

Killen Falls Plan of Management

Part A



Prepared for Ballina Shire Council

by MikeSvikisPlanning

8 June 2017

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1 Introduction

Killen Falls has been a popular spot for Tintenbar and Newrybar locals and visitors for many decades. It was surrounded by private land up until the mid-1970s when a subdivision created the rural residential lots to the south and Council accepted the public reserve land that now provides access to the falls.

In June 2016, Council resolved that a plan of management be prepared for Killen Falls to assist with the long term planning of the site.

This plan of management seeks to:

- provide options for management of the site
- identify potential opportunities for future development of facilities, access, and use of the site
- document a risk management strategy for the site.

Further information on a range of issues including the early neighbour and community consultation is included in Part B to this plan of management.

1.1 Objectives

The objectives of the plan of management are to:

- Manage the land consistent with the provisions of the *Local Government Act 1993*.
- Provide for the safety of visitors to the subject land.
- Ensure the ecological viability of the land by protecting its biodiversity and promoting rehabilitation of rainforest.
- Protect and respect the aesthetic, heritage, recreation, education and scientific values of the land and Emigrant Creek.

- Investigate facilities proportionate to site use that allow public enjoyment of the land.

1.2 Core Objectives

Pursuant to section 36 of the *Local Government Act 1993*, it is intended that the subject area remains categorised as “Natural Area – Bushland”.

Section 36J of the *Local Government Act 1993* identifies core objectives for management of Community land categorised as bushland as follows:

- (a) to ensure the ongoing ecological viability of the land by protecting the ecological biodiversity and habitat values of the land, the flora and fauna (including invertebrates, fungi and micro-organisms) of the land and other ecological values of the land, and
- (b) to protect the aesthetic, heritage, recreational, educational and scientific values of the land, and
- (c) to promote the management of the land in a manner that protects and enhances the values and quality of the land and facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion, and
- (d) to restore degraded bushland, and
- (e) to protect existing landforms such as natural drainage lines, watercourses and foreshores, and
- (f) to retain bushland in parcels of a size and configuration that will enable the existing plant an animal communities to survive in the long term, and
- (g) to protect bushland as a natural stabiliser of the soil surface.

2 Killen Falls Management Area

2.1 Land to which this Plan Applies

The land subject to this plan of management is Lot 1 DP 251994 (the subject land). Lot 1 is approximately 1.3 hectares and is primarily a riparian strip with its northern boundary being Emigrant Creek (Figure 1).

The subject land is located at the termination of Killen Falls Drive. A commercial macadamia plantation is located on Lot 12 DP 245987, on the northern (and eastern) side of Emigrant Creek. A 3 hectare rural residential property on Lot 2 DP 251994 forms the southern boundary of the Council land. Immediately to the west of the Council land is the Rous Water property, which contains the Emigrant Creek Dam. The nature of the property boundaries in this location indicates that the bed of Emigrant Creek, including the rocks that form the waterfall and the swimming hole, are not on Council or private land and remain Crown land.

Lot 1 DP 251994 was dedicated to Council as a Public Reserve at the subdivision of the parent lot in 1975. Killen Falls Drive was also dedicated to Council as a public road.

A number of the recommended actions in this plan affect the Killen Falls Drive road reserve.

2.2 Site and Facility Description

The subject land is a riparian strip that has been the subject of rehabilitation in accordance with a vegetation restoration plan for more than ten years. A canopy of camphor laurels has been removed and replaced with a healthy mix of endemic rainforest species. It is generally in stable condition other than where some visitors have been straying from the main track to access the creek.

Improvements to the subject land include the walking track, the viewing platform at the falls, a wooden seat, some fencing and some signage. All other features such as the car park and rubbish bins are located in the adjacent road reserve.

The condition of the walking track is poor other than for an elevated boardwalk across a shallow gully, which is in good condition. The track surface is compacted dirt and heavily affected by exposed tree roots. It is slippery when wet and has minimal directional signage. The warning signage at the end of the track is in good condition. The viewing platform was built in 2015, is galvanised metal and wood, and is in good condition. The wooden seat is in poor condition and unusable. The fencing is in fair condition in some locations, but is in poor condition with sections missing in other locations.

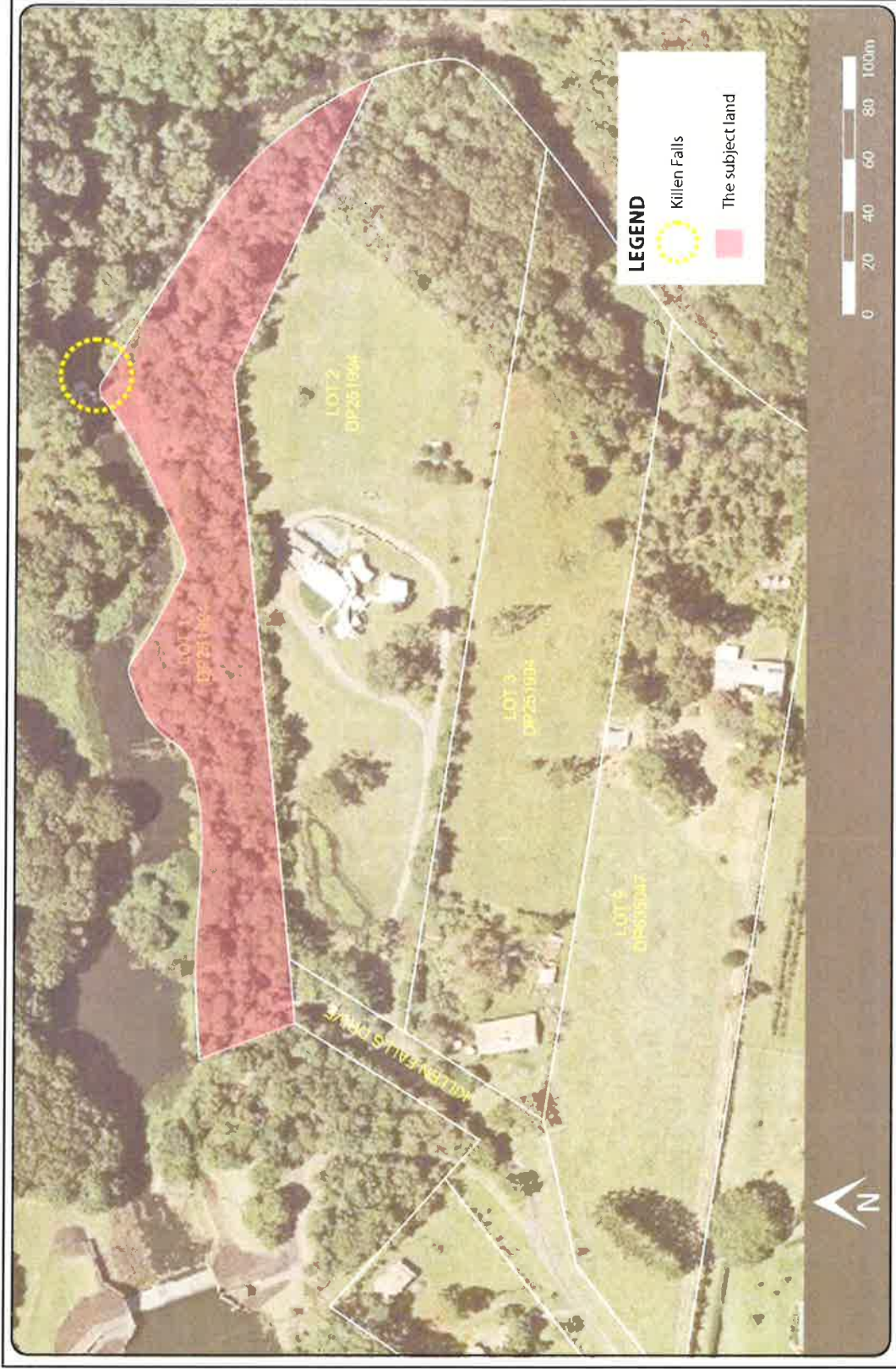


Figure 1: Lot 1 DP 251994, Killen Falls Drive, Tintenbar (the subject land)

3 Management Context

3.1 Legislative and Policy Framework

The subject land is owned by Ballina Shire Council and is classified under the *Local Government Act 1993* as Community land. It was dedicated to Council in 1975 as part of the subdivision of the parent lots.

It does not have an individual plan of management and is therefore subject to the *Ballina Shire Plan of Management for Community Land* (2015). Under that plan, it is categorised as “Natural Area – Bushland”. If Council adopts this site specific plan of management then pursuant to section 1.3 of the *Ballina Shire Plan of Management for Community Land*, the provisions of that plan will no longer apply. The next time that plan is reviewed, the reference to the subject land can be deleted.

Section 35 of the *Local Government Act 1993* requires that Community land is to be used and managed in accordance with the plan of management applying to the land. This plan of management seeks to satisfy the requirements of section 35 of the Act. Pursuant to section 36 of the *Local Government Act 1993*, it is intended that the subject area remains categorised as “Natural Area – Bushland”.

It is not intended that the primary use of the subject land be altered. It is a bushland reserve that is being restored as a rainforest. It has a pedestrian track to a viewing platform above a waterfall. The purpose of the existing and proposed facilities on the subject land is to enable public enjoyment of it while implementing measures directed to minimising or mitigating any disturbance caused by human intrusion. There is no intention to issue leases or licences over the subject land.

The subject land is zoned Deferred Matter under Ballina LEP 2012, which means that it is still subject to Ballina LEP 1987. The subject land is zoned entirely Rural 1(b) (Secondary Agricultural Zone) under Ballina LEP 1987 (Figure 2). It has been mooted in the past for inclusion in an environment

protection zone but the timeframe and likelihood of this outcome are unknown.

The objectives of the Rural 1(b) zone are split into primary and secondary as follows:

The primary objective is to regulate the subdivision and use of land within this zone:

- (a) to encourage the productive use of the land and enable development ancillary to agricultural land uses, particularly dwelling-houses, rural workers’ dwellings and rural industries, and*
- (b) to permit a range of uses which are compatible with the rural character of the land, particularly tourist oriented developments and recreation establishments and recreation facilities, and*

The secondary objective is to ensure that development within the zone:

- (a) maintains the rural character of the locality, and*
- (b) does not create unreasonable or uneconomic demands, or both, for the provision or extension of public amenities or services.*

Within this zone brothels; caravan parks for permanent occupation; residential buildings (other than dwelling-houses); shops (other than general stores) are prohibited. All other development is permitted with or without Council consent.

The strategies and actions arising from this plan of management are expected to be development “permitted with Council consent”. If not then they are likely to be “permitted without Council consent” as a result of *State Environmental Planning Policy (Infrastructure) 2007* or *State Environmental Planning Policy (Exempt and Complying Development)*, which both permit a range of minor development as either exempt or complying development depending on the scale and circumstances.

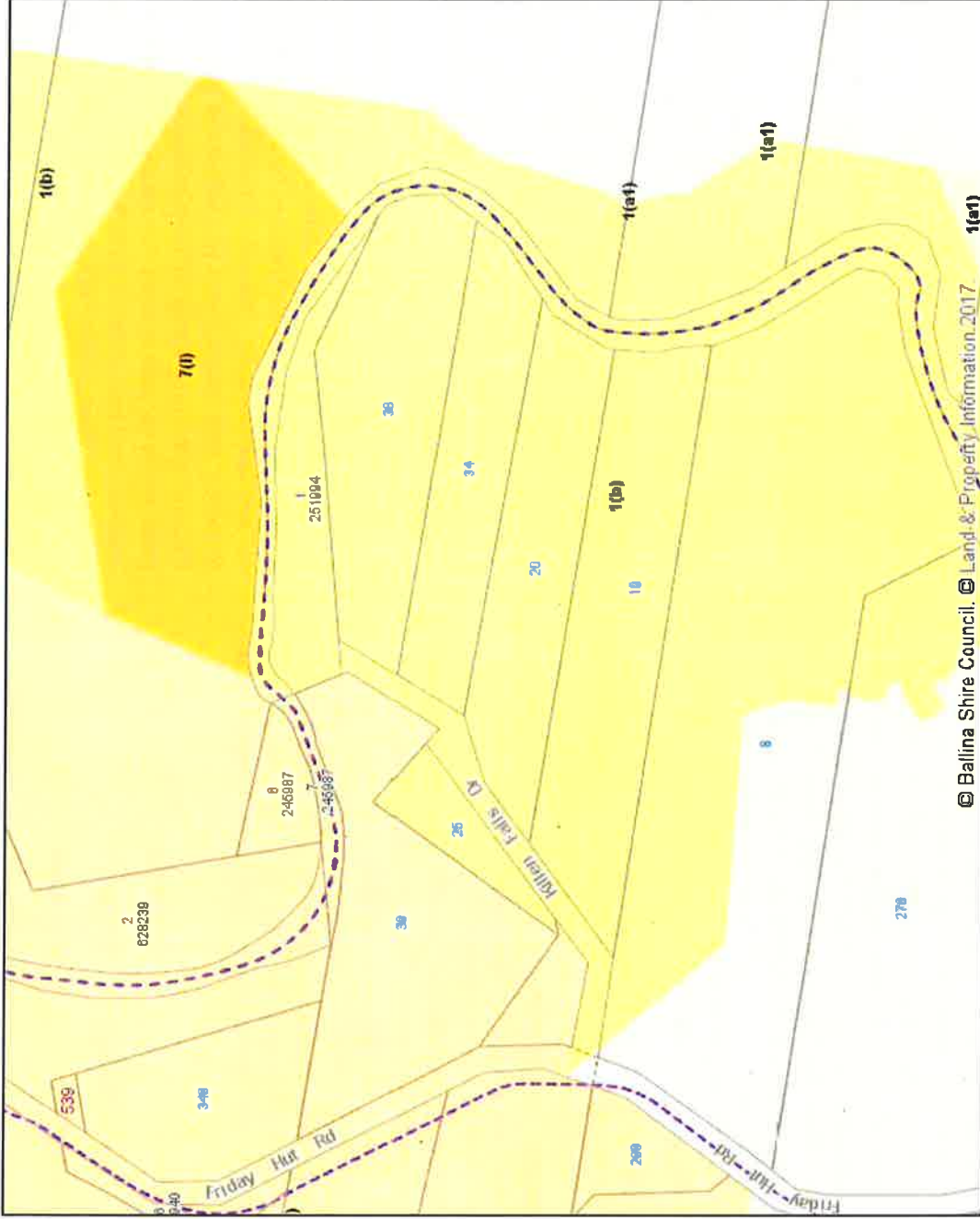


Figure 2: The subject land is zoned Rural 1(b) (Secondary Agricultural Zone) under Ballina LEP 2012

3.2 Visitation Numbers and Characteristics

It is difficult to be precise about how many people visit Killen Falls each day or each week. It is likely that visitation is higher in summer months when swimming is more popular and during school holidays when young people have more time for leisure. It is also likely that weather affects site usage. Residents advise that Killen Falls is a lot more popular now than five to ten years ago. Conversations with site visitors indicate that social media plays a role in this popularity. There are four ways to gauge visitation levels – count the numbers on site, ask people in a survey about visitation, speak to the neighbours, and traffic counts. At Killen Falls it was appropriate to access traffic counts for vehicle movements because most visitors drive to the site and it is not within walking distance to any urban areas.

A site count was undertaken on Sunday 22 January (school holidays) between 10 am and 2 pm, and 233 adults and 46 teenagers visited Killen Falls. This is a total visitor count of 279. Nine dogs (on leads) were also counted as entering the site. The day of the site count was warm and sunny. All visitors came by vehicle and parked at Killen Falls Drive, either in the car park or along the road. Three tour groups visited. One group of 18 persons was on a commercial tour and stayed approximately 20 minutes. One group of 16 persons visited for about 30 minutes. The other group of 36 persons was from a private school (a language school) and they stayed approximately one hour. Prior to 10 am on the day of the count, there was only one vehicle in the car park, suggesting visitors generally arrived in mid to late morning. After 2 pm, there were still about six cars in the car park but arrival numbers had slowed considerably. The hourly breakdown of visitor numbers was:

10 am – 11 am	=	49 persons
11 am – 12 pm (midday)	=	101 persons
12 pm – 1 pm	=	89 persons
1 pm – 2 pm	=	40 persons

The online survey (which was also completed by some visitors on-site on 22 January) undertaken in January/February 2017, indicates that about 75% of respondents visited less than five times per year, and only 1 in 20 visited more than ten times per year. Approximately 44% of respondents lived in postcodes in the LGAs of Ballina, Lismore and Byron. About 33% of respondents lived interstate or overseas.

The most popular things to do at Killen Falls are viewing the falls from the platform (87% of respondents) and swimming (72% of respondents). Most people came with family and friends.

In relation to changes at Killen Falls, the five most popular answers were – install toilets; better walking trail to creek; more parking; better walking track to viewing platform; and vehicle speed controls.

Neighbours along Killen Falls Drive have observed a sharp increase in visitor numbers to Killen Falls over the last five years. One neighbour collected over 1,300 signatures from visitors (on a petition asking for improved facilities) over a few days in late January and early February 2016. Another neighbour observed in December 2016, that there were 72 cars parked in Killen Falls Drive and more than 50 people swimming in the pool below the falls.

Council undertook a traffic count survey at the entrance to the nine-space car park at Killen Falls Drive from 12 December 2016 until 22 December 2016 (Part B – Appendix E). This was a school holiday period in warm weather, when the falls are known to be popular, and it included a weekend (17 and 18 December). However, the location of the counter at the entrance to the car park meant that if you visited the falls and parked along Killen Falls Drive then you would not have been counted. This is common in peak times as the car park is small. On balance, the traffic count is likely to have undercounted the volume of traffic that was linked to the site. However, it is still an important indicator of overall visitor numbers to the site.

Over the count period, the number of vehicles ranged between 127 and 146 vehicles per day, with an average of 134 vehicles per day. Peak hourly rates varied from zero at night time through to 31 vehicles per hour in the

middle of the day. The most active period at the site was between 10 am and 4 pm, and during this time the average was between 14 and 20 vehicles per hour. This peak vehicle activity period correlates quite well with the site count undertaken on Sunday 22 January 2017.

If it is assumed that a vehicle carries, on average, three occupants then the traffic count indicates that in a summer school holiday period the site could be attracting about 402 visitors per day, with average peak use of between 42 and 60 visitors per hour in the middle of the day. The highest peak hour would generate 93 visitors per hour. These hourly visitor volumes also correlate well with the site count undertaken on Sunday 22 January 2017.

At 402 visitors per day (every day), the site would generate visitor usage of 146,730 visits per annum. However, it is much more likely that these rates occur, at most, for the six warmest months of the year and that for the six cooler months the rates should be about half the peak. This assumption would yield a visitor rate of 109,947 per annum. A third option, which might represent a conservative approach, is to assume that 402 visitors per day occurs throughout the eleven weeks of school holidays, and for the remainder of the year rates are split evenly between half the peak rate (a “shoulder” period) and a quarter of the peak rate (a “low” season, when the days are short and the water is cold). This option yields a visitor rate of 74,298 per annum. On balance, the evidence suggests that Killen Falls has a high visitation rate.

These annual visitation numbers cannot be regarded as accurate because of the limitations on when data was collected and the assumptions that have been made upon its extrapolation. The online/site survey and traffic count data undertaken for this plan of management are a simple snapshot at one time. They do, however, give a general guide to the level of use of the site and those that use it.

As a comparison, it is worth considering the patronage at Ballina and Alstonville pools which in one sense are the modern alternative to swimming at a local creek. In 2015/16, Alstonville pool was open from 1 September to 15 May, and Ballina pool (and slide) from 19 September to 24 April. Alstonville had 70,096 patrons and Ballina pool had 89,860 patrons. The current year is heading towards similar numbers. During the week ending Sunday 22 January 2017, Alstonville pool received 2,078 patrons for an average of 296 per day; and Ballina pool received 3,967 patrons for an average of 566 per day.

At its peak, the visitation to Killen Falls (at about 402 visitors per day) falls between the daily visitation volumes of Council’s two swimming pools.

4 Values of the Management Area

4.1 Existing Facilities and Infrastructure

Existing facilities and infrastructure on the subject land (and in the road reserve adjacent to it) are basic and include a nine-space landscaped car park, a car and bus turn-around area at the northern end of the car park, twin wheelie bins for rubbish, some seating, some basic signage, a viewing platform above the waterfall and the 330 metre track to the waterfall. A temporary toilet was trialled at the site for three months over Christmas 2016 and early 2017. These items are illustrated at Figure 3.

4.2 Site and Facility Condition

The subject land is a riparian strip that has been the subject of rehabilitation in accordance with a vegetation restoration plan for more than ten years. A canopy of camphor laurels has been removed and replaced with a healthy mix of endemic rainforest species. It is generally in a stable condition other than where some visitors have been straying from the main track to access the creek.

Improvements to the subject land include the walking track, the viewing platform at the falls, a wooden seat, some fencing and some signage. All other features such as the car park and rubbish bins are located in the adjacent road reserve.

The condition of the walking track is poor other than for an elevated boardwalk across a shallow gully, which is in good condition. The track surface is compacted dirt and heavily affected by exposed tree roots. It is slippery when wet and has minimal directional signage. The warning signage at the eastern end of the track is in good condition. The viewing platform was built in 2015, is galvanised metal and wood, and is in good condition. The single wooden seat located on the subject land is in poor condition as it is affected by wood rot. The fencing is generally in fair condition. Some boundary fencing has been affected by rot. Some track fencing has been removed by visitors to gain access to the creek. Some fencing may be able to be restored and reused.

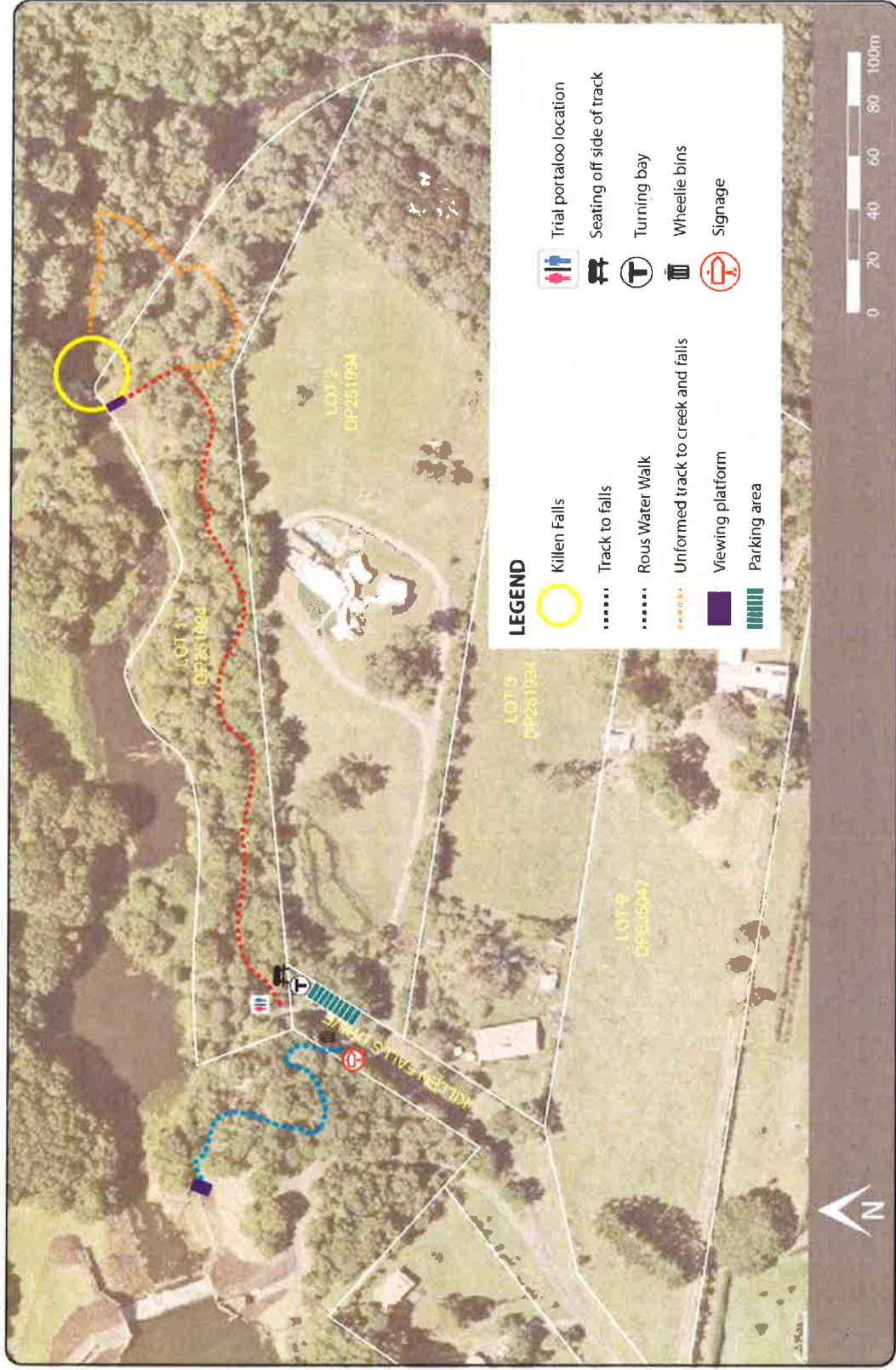


Figure 3: Infrastructure on the subject land

4.3 Landform, Geology and Soils

Emigrant Creek is a tributary of the lower Richmond River and commences in heavily modified farm land north of Newrybar. The catchment runs north/south and is traversed by the Pacific Highway (old and new). The northern 1,910 hectares drain into the Emigrant Creek Dam (an on-river storage) built in 1968 (and upgraded in 2002). Environmental flow water leaving the 18 hectare lake above the dam wall, runs south past the subject land, eventually connecting to Maguires Creek along the Teven Road and then the Richmond River at West Ballina.

The banks of Emigrant Creek near the subject land vary from steep sided to low, rocky and undulating. The northern boundary fronting Emigrant Creek has extensive surface rock. Most of the subject land is not flood affected but land near to the creek bed will at times be affected by high velocity flows and potentially flash flooding. Debris loads in high flows could be significant, particularly after long periods of dry weather or storm conditions that knock trees and limbs into the waterway.

Morand describes the red soils of the subject land as originating from the Mount Warning volcano. They are a deep, well structured red clay loam (Krasnozem). It is deep and free draining, and subject to basalt floaters and rock layers including sedimentary rocks such as slate. They often occur in high rainfall areas that, in combination with warm temperatures, grow lush rainforest (Bower Bush Works, 2004).

4.4 Vegetation and Habitat

A vegetation management plan was prepared for Killen Falls in 2004 (Bower Bush Works, 2004) and it documented the vegetation of the subject land at that time. It was described as Management Area 3. The plan noted that the alignment of the walking track was formerly a vehicle access to the top of the falls. Restoration work was already being undertaken in 2004, and the site had been regenerating slowly for about 20 years. Bower Bush Works

described it as highly modified, weed dominated and exposed. It was a simple to complex notophyll closed and open forest dominated by camphor laurel in combination with a shrubland dominated by lantana and woody weeds. It contained 45 species of trees and shrubs, 18 vines and 12 ferns, as well as herbs and grasses. A threatened vine (Arrow head) and shrub (Quassia) were identified. It also contained 33 exotic plant species.

The subject land would have been part of the Big Scrub rainforest prior to white settlement. The Big Scrub was approximately 75,000 hectares of subtropical rainforest associated with the Mount Warning Volcanics, located approximately between east Lismore, Alstonville, St Helena and Dunoon. By the turn of the 1900s, much of the Big Scrub had been reduced to a series of isolated remnants that comprise less than 1% (or 300 hectares) of the original vegetation. The private land immediately opposite the subject land is a genuine Big Scrub remnant that is an excellent seed source for all areas in the locality. It is part of the Killen Falls Vegetation Restoration Management Plan area. The land opposite the subject land is considered by Bower Bush Works to be of regional and even national significance due to its environmental attributes.

The Council land has, since 2004, been subject to extensive work by neighbours and the Big Scrub Landcare group in conjunction with Council. A lot of work recommended by Bower Bush Works has been undertaken. The weed removal and extensive rainforest regeneration now ensure the subject land provides an important link between the rainforest remnants on both banks of Emigrant Creek. Council's land will add further to the biodiversity of this area as it matures and expands.

Bower Bush Works predicted in 2004 that up to 13 threatened mammals, eight threatened birds, one threatened reptile and a threatened beetle would likely occur in and around the subject land given the proximity of a Big Scrub remnant across the creek. The caves behind and around the falls were known to be used by endangered micro bats as a daytime roosting spot. It is believed that the high level of daylight use in recent years has disrupted the bats, and they may no longer roost at the site.



Figure 4: Much of the land surrounding Killen Falls was still cleared in the late 1970s and early 1980s
(Photo provided by the Lane family)

4.5 Heritage

White settlers came to the area in the 1850s, primarily to log valuable rainforest timber from the Big Scrub rainforest. Good quality soils and high rainfall made the area an obvious place for agriculture once the timber had been removed. The neighbouring property, to the north of Killen Falls, was owned by the Killen family circa 1885, and the falls are believed to be named after them (Bower Bush Works, 2004).

The Ballina Community Based Heritage Study (BSC 2008) states:

The shire's waterfalls that were utilised by the public for recreation include Cawleys, Dalwood, Tosha and Marshalls Falls on the Alstonville Plateau and Killen Falls at Newrybar. Evidence of the use of these falls is scant, mostly derived from oral accounts and photographic evidence (these photos taken to promote these places). The scant nature of this evidence does not diminish the significance these areas had as places of recreation. The broader context of the history of the use of the natural environment for leisure demonstrates the popularity and widespread patronage of natural recreational spots.

Killen Falls is not listed in the current Local Environmental Plan as a heritage item.

Emigrant Creek Dam was constructed between 1967 and 1968, and at that time it provided the major water supply to Lennox Head and Ballina. Prior to the completion of dam safety strengthening works at Emigrant Creek Dam in 2002, there was no effective means of restricting and/or controlling access to the dam for security/risk management purposes. Once the dam strengthening works were completed, the informal car park area and adjacent areas at Killen Falls Drive required substantial remediation due to the extent of site disturbance/spoil and the impact of construction vehicles.

Following discussions between Rous County Council and Ballina Shire Council at that time, it was generally agreed that site rehabilitation would occur as follows:

- Rous would prepare landscaping plans for all of the disturbed areas;
- Site rehabilitation would include the construction of an access path to an observation area overlooking Emigrant Creek Dam as well as a formalised car parking area to accommodate visitors to both Emigrant Creek Dam and those visiting Killen Falls (noting that the car park and some of the access track to the dam are located on Ballina Shire Council property);
- Rous would construct the improvements in the plan;
- The car park areas would subsequently be handed over to Ballina Shire Council for maintenance as part of the Ballina Shire road network.

Rous completed the works in June 2003. It was always intended that the nature of the site be kept "low key".

The path from the car park to the top of the waterfall was constructed in its current alignment at about this time. A Rous Water information sheet identified the walk as the "Boodgeraga Walk" (approximately 330 metres long) and it is named after the Wiyabul word for fig tree (Rous Water, 2007). The walk to view the dam was identified as the "Water Walk".

The viewing platform above the falls was constructed by Ballina Shire Council in 2015, as a response to the incidence of visitors walking down on to the river bed above the falls and approaching the edge. This was assessed to be a hazardous situation and a fixed viewing platform would reduce that behaviour.



Figure 5: Camping at Killen Falls in the 1970s. Note the dam wall in the background
(Photo provided by the Lane family)

4.6 Aboriginal Heritage

It can be assumed that all streams and waterholes were used by Aboriginal people throughout the Tintenbar area prior to white settlement.

Killen Falls, however, is not registered as a site on the AHIMS register. At the time of preparing this draft plan of management, the Jali Local Aboriginal Land Council had not responded.

5 Issues in the Management Area

5.1 Safety and Risk

Slip and trip type injuries are possible, both when walking through the site and getting in and out of the water at the pool below the falls. If the track to the viewing platform is improved, this risk will diminish for the initial 330 metres of the access. It will be difficult to diminish this risk for the balance of the track without major changes to the environment. It is also not possible to diminish the slip hazard along Emigrant Creek and the pool below the falls without major changes to the environment. Proper hazard signage and track ratings should make it clear that Council does not recommend walking further than the viewing platform or swimming in the pool below the falls.

There is no traditional jumping rock at Killen Falls and the pool is obviously shallow. Even so, the hazard signage at the viewing platform should make it clear that jumping is extremely dangerous and being near the edge is dangerous too. The unformed creek access, next to the viewing platform, which is currently used to access the rocks at the top of the falls, needs to be blocked by fencing and an additional warning sign.

Snakes are an issue in hot weather in the vicinity of Emigrant Creek. They occur throughout the area, and warning visitors of the danger in the site hazard signage is an appropriate response.

It was observed at site inspections that some visitors brought alcohol onto the reserve and took it down to the pool below the falls. It would be very difficult to clean up broken glass if bottles were smashed, either intentionally or accidentally. Alcohol can also create behavioural issues with some visitors and make the subject land less attractive to families and more attractive for parties. The subject land can only be declared an "alcohol prohibited area" under the *Local Government Act 1993* with the approval of the Local Area Commander of Police, and this normally occurs where there is an increased

risk of alcohol-related crime or anti-social behaviour. In the absence of reports from the Police, the area could be signposted as "glass free" to reduce the risk from broken glass.

Hazard warning signs consistent with Australian Standards should be located at appropriate points on entry to the site, along the walk and at the falls, and replaced if stolen or vandalised.

Tour operators that visit Killen Falls should be contacted to ensure they have a Council permit (and insurance) to operate on Council land. This is currently required by Council policy but needs to be enforced to ensure that those bringing visitors to the subject land are adequately insured.

5.2 Water Quality and Swimming

For a long time Killen Falls has been a place to view a waterfall and swim in the pool below the falls. For most of its history, Killen Falls has been surrounded by private land, and access has been at the discretion of neighbours (other than by trespass). Council does not identify Killen Falls as a location for swimming.

Rous Water (as the Water Authority) manages the Emigrant Creek Dam. As part of its water quality monitoring, Rous Water regularly collects water samples upstream of the falls, in the dam. The creek receives environmental flows from Emigrant Creek Dam, approximately 500 metres upstream of the falls.

Water quality data for the dam is provided in Part B – Appendix G. The water quality samples have not been collected for the purposes of assessing whether they comply with standards for recreational purposes such as swimming. However, they do give an indication of overall water quality. The

Rous Water data is based on 80 samples taken between 2003 and 2015, with 13% of samples during wet weather, 62% during dry weather and 25% somewhere in between. The E. coli counts ranged from 3 per 100 ml of water through to 8,320 per 100 ml of water. The average count over the

80 samples was 624 per 100 ml of water, and the median count was 125 per 100 ml of water. The standard normally required for swimming water is less than 40 E. coli per 100 ml of water, to avoid illness (Table 1). When levels exceed 500, there may be a significant risk of illness.

Category	95 th Percentile of enterococci (cfu/100 mL)	Basis of derivation	Estimation of probability
A	≤40	No illness seen in most epidemiological studies	GI* illness risk <1% AFRI** risk <0.3%
B	41–200	Upper level is above the threshold of illness transmission reported in most studies	GI illness risk >1–5% AFRI risk >0.3–1.9%
C	201–500	Represents a substantial elevation in the probability of adverse health outcomes	GI illness risk >5–10% AFRI risk >1.9–3.9%
D	>500	Above this level there may be a significant risk of high levels of illness transmission	GI illness risk >10% AFRI risk >3.9%

* GI = gastrointestinal

** AFRI = acute febrile respiratory illness

Table 1: Microbial assessment categories for fresh water (source NHMRC 2008)

Note: *Enterococci is a group of faecal bacteria common to the faecal matter of warm-blooded animals, including humans; a subset of the faecal streptococci, but generally the vast majority; now referred to in Europe as the intestinal enterococci. Escherichia coli (E. coli) is a bacterium found in the gut, used as an indicator of faecal contamination of water (from warm-blooded animals and humans).*

Like the majority of natural swimming locations in the Shire, the water quality is variable depending on weather, especially rainfall, and land uses in the catchment. Water quality data for the site collected from the dam above the falls shows that variability. The safety to users can change at any time without warning (due to an outbreak of blue-green algae or a branch dropping into the waterhole from upstream). Council does not have a life

guard on duty or any lifesaving equipment at or near the site. Notwithstanding this, the site still attracts some users where the 'wild state' of the locality is the attraction to swim there.

If Council permits access to Killen Falls then it is permitting the public to access land under its care and control. However, if Council is aware that

the public enter this land now (which they do), it therefore already has a duty of care to the public.

It is important that Council indicates to the public that it is not recommending Killen Falls and the waterhole as place to swim. Council will have to manage the site to ensure that it takes reasonable steps to guard site users against reasonably foreseeable risk of injury arising from being on the subject land. This would likely include:

- Site safety inspections to be conducted on a regular basis.
- Any ropes or devices (such as swings) for entering the pool should be removed as soon as practicable.
- Expand the information on Council's Beachwatch website regarding water quality at Killen Falls such as blue-green algae outbreaks, as well as pollution signs.
- Hazard warning signs should be replaced if stolen or vandalised.
- Install warning signage at the site indicating that the site is not routinely monitored by Council for water quality parameters and therefore swimming is not recommended.
- If Council decided to promote the site as a swimming location, regular water quality monitoring should be undertaken and suitable associated signage erected. This would require significant resourcing.

5.3 Toilets

During the last few years, there has been a consistent campaign from some local residents and visitors to get Council to install an eco-friendly toilet near the car park at the end of Killen Falls Drive. The campaign has included a 1,300 signature petition collected in January/February 2016, and multiple letters and presentations. Up until recently, signs were erected at the car park, asking visitors to lobby Council to install a toilet. The nearest public

toilet to the site is located at the Tintenbar Sports Ground, approximately 5 kilometres to the south (via Tintenbar village). The incidence of human waste along the track and around the car park has been well documented by neighbours. Some neighbours have also received requests from site visitors to use their private toilet.

Council considered a report in June 2016, which canvassed the option of installing a toilet at the site. In November 2016, Council decided to support a temporary toilet at Killen Falls car park on a three-month trial basis. This toilet was installed at the northern end of the car park and operated between 12 December 2016 and 12 March 2017. On the day of the visitor site count, it was observed to be used approximately 20 times in four hours by visitors. Details of the three-month trial are as follows:

- One low-flush toilet was installed.
- The quantity of effluent pumped out over the three-month trial was 6,408 litres (an average of 71 litres per day). It was serviced twice a week, with four emergency pump-outs required when the holding tank was full between pump-outs.
- The trial cost \$5,560 (approximately \$62 per day).

The two questions that arise are:

- Is a toilet required? and
- What sort of toilet can be installed on this site if it is required?

A toilet would normally be installed in response to managing public health, safety and regulatory risks (such as pollution). In this case, the site has a high visitation rate by visitors of all ages and physical abilities. There is anecdotal evidence that visitors are staying long enough to use the surrounding riparian rainforest as a toilet when there is no other option. The usage rate of the temporary toilet trial has further demonstrated the need for a toilet on the site. The survey response indicates that most users want a toilet. The absence of a public toilet anywhere close to Killen Falls,

combined with a high rate of interstate and overseas visitors indicates that a toilet is required on this site.

The second question, concerning what sort of toilet, would depend on a range of factors. There is no sewerage at the site. In this case, the site users are short-stay; there is a peak load during the middle hours of the day; and there is a seasonal peak during warmer months and school holidays. We could also assume that about 7% of visitors would use the toilet, if the ratio of toilet users to site visitors observed during the January site count is typical. We know that the site generates about 70 litres of effluent per day during the summer months. The absence of reticulated power and water are issues, as is the proximity of Emigrant Creek (about 40 metres away). The logical location for a toilet is at the end of the car park and near the start of the walking track. In a similar situation at Brunswick Heads Nature Reserve (North Head Road), NPWS has installed a wheelchair accessible, low-flush, hybrid, two-stall septic treatment system, with a primary tank that retains solids and a secondary tank to treat the displaced liquid. Treated effluent from the secondary tank is pumped out periodically for off-site disposal. This type of toilet requires approximately 50 square metres of land, and an open area of at least this size is available near the car park. On-site disposal is not possible at Killen Falls due to the proximity of Emigrant Creek. Installation could be undertaken for about \$130,000 (excluding GST), with pump-out costs on top of that. The regularity of pump-outs depends on the level of usage and storage tank size. Water for hand washing could be from a rainwater tank linked to the toilet roof. A no-flush compost system might work on this site but Council would still need to dispose of excess liquid, which could be problematic.

A qualified wastewater consultant should be engaged to design or recommend a system that would suit the characteristics of this site and deal with the waste for the least cost and without significant environmental impacts.

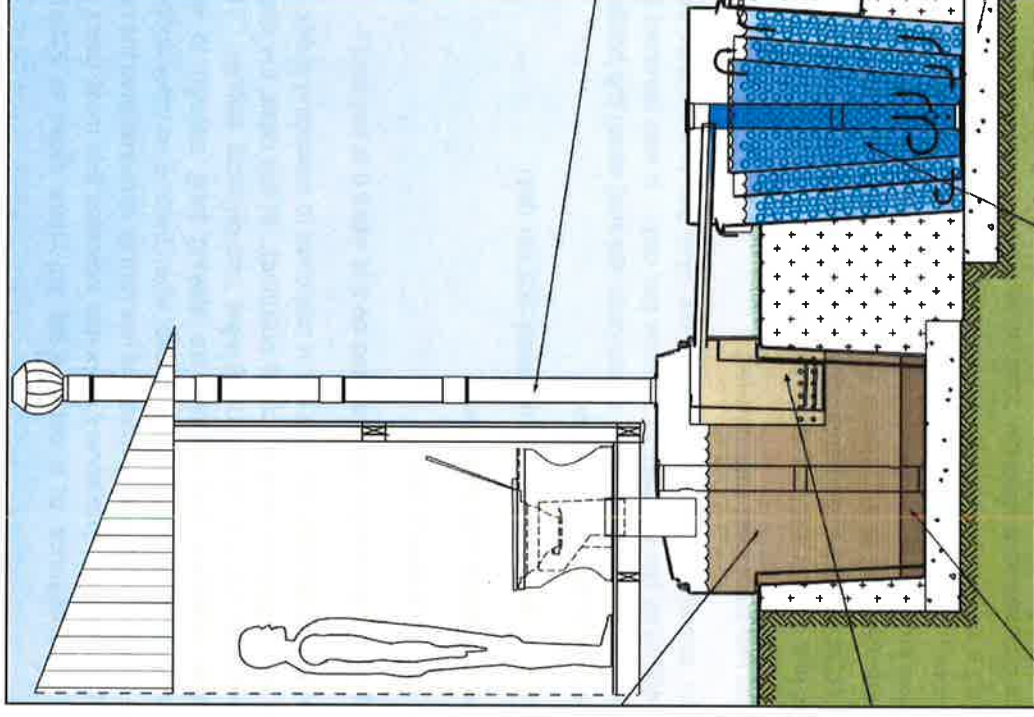


Figure 6: Low-flush, pump-out, hybrid system
(Source: NPWS sewerage manual)

5.4 Rubbish and Seating

There are already two wheelie bins at the Killen Falls car park, which are emptied regularly. The bins are well positioned in the car park. Although the locals still pick up loose rubbish, the bins are used by visitors and are adequate. When the car park is full, they are difficult to collect but moving them is not recommended as it is likely to reduce their use.

A single, low bench seat is provided on the Council land at the northern end of the car park. It has rotted out over time and is no longer usable. It is a place where visitors could stay in the shade and enjoy the locality while waiting for others. It is suggested that the timber top could be replaced using the existing brackets and footings.

5.5 Privacy and Trespass

The privacy issue stems from the volume of visitors accessing the site in peak times. One private dwelling is close to the car park and is directly affected by noise, headlights, damage to the road verge, and the general 'activity' of cars and people coming and going from the car park. Some residents have erected larger gates and better fencing to discourage trespass and privacy intrusions.

Landscaping may assist with some of these impacts. In particular, additional landscaping on the road reserve in front of Lot 3 DP 251994, in combination with locating overflow parking further up Killen Falls Drive, would assist with privacy issues on this lot. Landscaping may be more effective if undertaken on private land as well. Treatment of the road verge for better overflow parking is discussed later in this plan of management.

Trespassing to the northern side of Emigrant Creek has been an issue. Better fencing of the track to the viewing platform, with clear signage asking people to stay on the track should assist with this. The gap beside the viewing platform, which still allows access on to the top of the falls (and the other side), also needs to be blocked off and signposted.

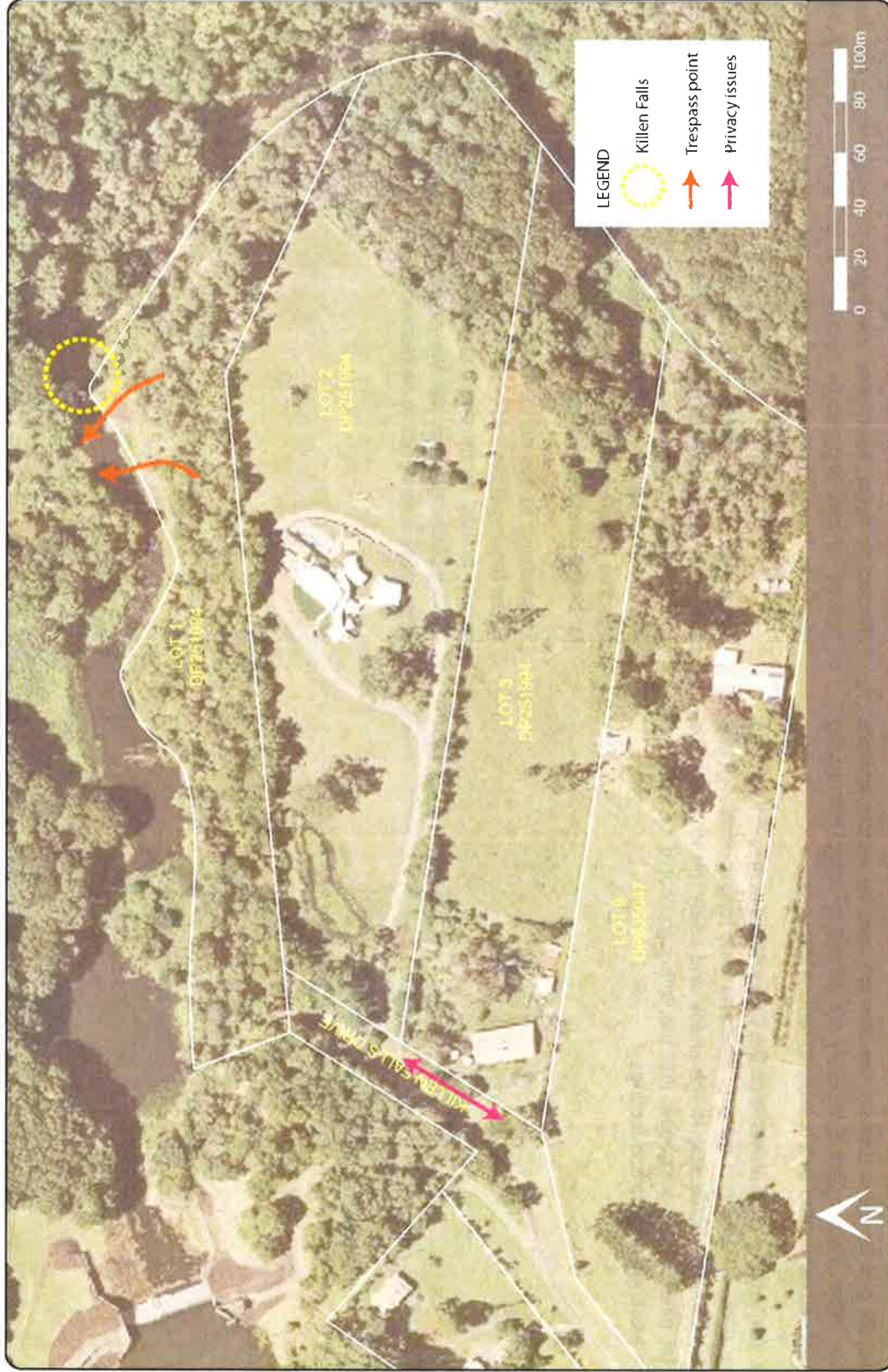


Figure 7: Trespass and privacy issues related to accessing Killen Falls

5.6 Killen Falls Drive

Killen Falls Drive is a bitumen sealed road suitable for low speed traffic either accessing private driveways or the car park. There is no speed signposted until just short of the car park, where it is signposted as 10 kph. Observations by multiple persons suggest that some cars drive down Killen Falls Drive at more than 40 kph, and then arrive at a busy car park full of pedestrians, creating a dangerous mix of cars and people on foot. Given that vehicles often park well up Killen Falls Drive in the road reserve, it makes sense that the entire road be signposted as a 40 kph shared vehicle and pedestrian zone. This should be combined with speed reduction cushions on the road, which are well marked and signposted, and ensure traffic reduces speed soon after turning in from Friday Hut Road. The speed at the entrance to the car park should be a 10 kph shared zone, with a speed cushion located full-width at its entrance to ensure that drivers slow down.

5.7 Friday Hut Road

Friday Hut Road is the only way vehicles can access Killen Falls Drive. It is a narrow, sealed rural road that is in variable condition. It has an 80 kph speed limit at the intersection with Killen Falls Drive, and this intersection is on a bend with poor sight lines. Anecdotally, it is common for vehicles to overshoot the turn-off to Killen Falls Drive, and this leads to dangerous manoeuvres to get back to it.

Council should undertake a traffic assessment of this intersection and consider if the speed limit on Friday Hut Road should be reduced, whether the turn-off needs to be properly signposted (it currently identifies the street but not the falls or the dam), and whether anything can be done to improve sight lines or the functioning of the intersection.

5.8 Parking

The key goal with the parking on this site is to make it safer for site users and pedestrians, and to improve congestion and impact on local residents.

Parking at the site currently caters for nine vehicles and includes a car or bus turn-around area at the northern end. The sign to the turn-around area is faded and this area is often used as a car space. This turn-around area needs to be marked as a “no parking” area on the road surface, and a new sign should be erected to identify its purpose.

The roadway immediately behind the parking spaces needs to be identified, via road surface marking, as a “no parking” area to prevent cars parking there during peak periods, which restricts the reversing options for cars in the marked bays.

The speed at the entrance to the car park should be maintained as a 10 kph shared zone, with a speed cushion located full-width at its entrance to ensure that drivers slow down.

A designated disabled car space should be identified by on-road markings and signage.

Overflow parking occurs in unmarked parts of the road reserve south of the car park, along Killen Falls Drive. Parts of the verge have been damaged by this action and this needs to be addressed. Permeable products such as “Geohex” can be easily laid in the road verge at signposted locations to provide overflow parking that can still be mowed, is permeable to rainfall, and retains the look of a rural road verge rather than a large car park. These areas should be located along Killen Falls Drive in locations where the road reserve is wide enough. These overflow areas could also be used by any buses that access the site, to prevent them driving into a full car park. Figure 8 shows the location of the suggested car park improvements. No land acquisition is required to achieve the overflow parking.

Overnight parking is not a major problem at this stage but that could change with social media or any increase in facilities (such as a toilet). Parking

signage needs to clearly state that overnight stays are prohibited. In neighbouring shires, this usually means no parking between 1 am and 5 am.

Other suggestions for parking include time-limited parking and paid parking. Both these suggestions can be effective in creating turnover in car parking spaces, and in the case of paid parking, generate fees for maintenance. However, it is unlikely that a nine-space car park would generate sufficient

fees to pay for infrastructure (signage and a parking ticket dispenser) or cover the cost of enforcement required to ensure that fees are paid. Most site users are already short-stay and fee avoidance would be common. Equipment at the site could easily be vandalised. Power would need to be connected to the car park to allow credit card payment of fees. Unless parking fees were set at a high level, it would be unlikely to be cost effective. These suggestions are not recommended for this site.

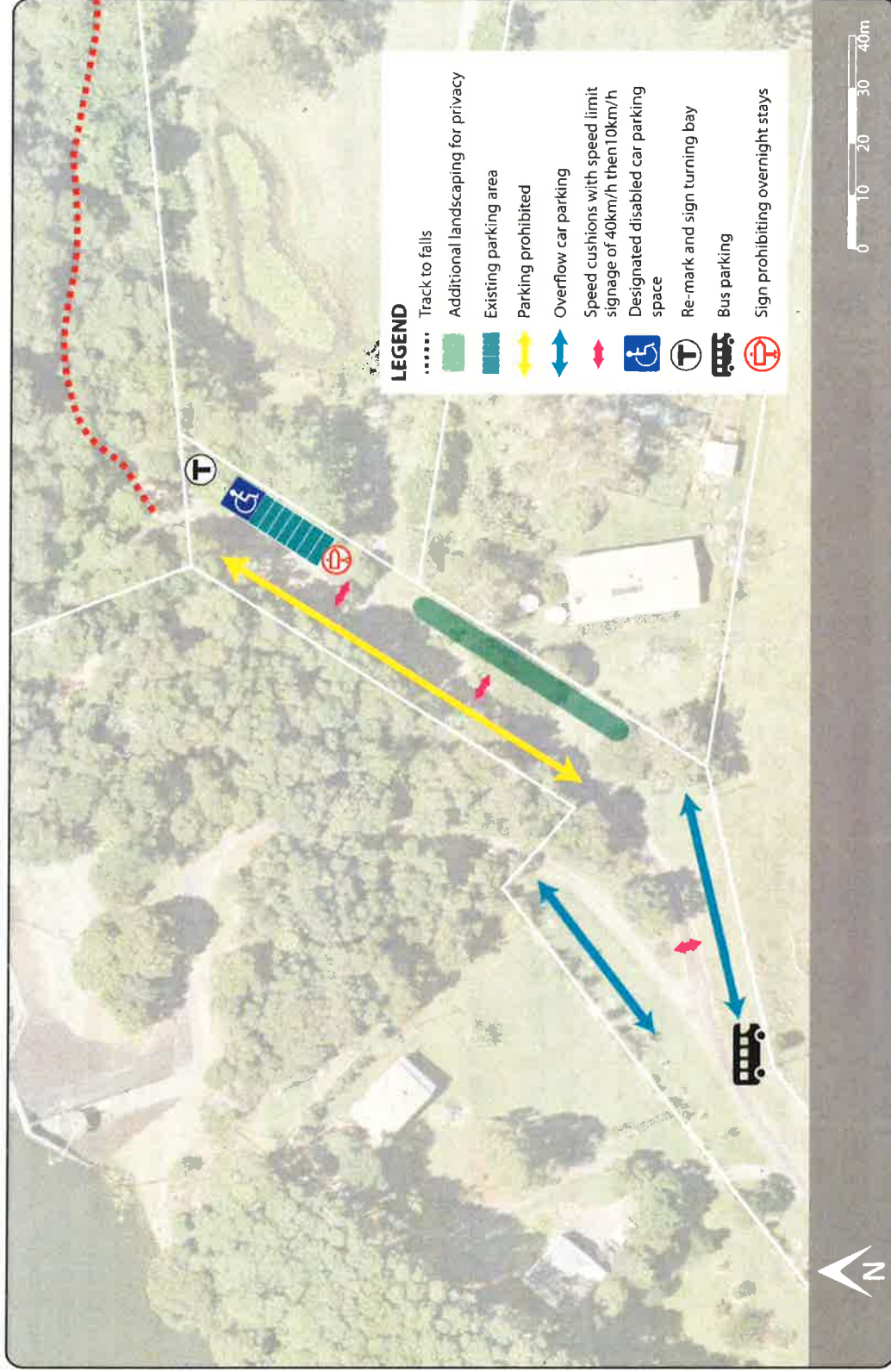


Figure 8: Car parking improvements

5.9 Other Access Options and Prohibition of Access

One suggestion is that a public road be constructed to access Killen Falls from the northern side of Emigrant Creek. This option is not recommended for the following reasons:

- significant impacts on a commercial macadamia plantation located on prime agricultural land;
- environmentally disruptive to a genuine Big Scrub remnant rainforest area;
- it would be constructed within the Emigrant Creek Dam catchment;
- expensive to purchase the land (more than 1 kilometre long plus a car park area);
- expensive to build due to the length of road and a gully crossing;
- impact heavily on privacy on the northern side due to existing house location;
- transfers the same issues from the southern side of Emigrant Creek to the northern side; and
- requires maintenance of two access roads and car parks and any other facilities because Killen Falls Drive will remain open to access private property and the Emigrant Creek Dam viewing area and Water Walk.

It has also been suggested that access to Killen Falls beyond the viewing platform should be prohibited. Although the viewing platform is popular with visitors (103 out of 118 respondents used the platform), 85 out of 118 respondents also went beyond the platform, down to the creek and went swimming. Fencing that restricted access to the creek has been removed in the past, and it would be very difficult to maintain any sort of barrier in this location. Even if an effective barrier could be erected and maintained, it may result in trespass on adjacent properties on both sides of Emigrant Creek as visitors seek new access points to the falls and the pool below. If swimming were declared prohibited, how would it be enforced? Would Council take legal action against locals and visitors for swimming at the falls or issue fines? How much would such action cost in staff time? Other sites

where access has been prohibited due to injuries and deaths are still popular with swimmers, despite barriers and signage. On balance, it is unlikely that access to Emigrant Creek below the falls can be prohibited. Visitors can be warned of dangers and hazards, and discouraged from going beyond the viewing platform or swimming in the pool below the falls, but prohibition is unlikely to be successful.

5.10 Environmental Restoration

Site users and neighbours are in favour of the continued rehabilitation of the Council land. There is a vegetation management plan for the site (prepared in 2004), which has been implemented effectively over the past thirteen years with Council assistance and grant funding. Continuing the rehabilitation of the subject land is important given its current level of visitation. In particular, keeping visitors on the track and limiting 'rat runs', particularly down to the creek between the car park and the top of the falls, is important. An obvious gap next to the western edge of the viewing platform needs to be blocked to discourage access to the top of the falls, where visitors may be tempted to approach the edge. It is recommended Council supports the further rehabilitation of the rainforest areas on the subject land in conjunction with landcare groups and neighbours.

5.11 Tracks and Signage

The walking track to the falls is not clearly identified at its entrance, and there is no information on its suitability for different ages or abilities. These are recommended. It is also recommended that signage along the walk (waist height) should be used to encourage visitors to stay on the track, warn about risks and help protect the rehabilitation of the rainforest.

Signage at the viewing platform needs to discourage visitors from accessing both the top and bottom of the falls, and to warn of hazards and the degree of difficulty involved.

The track needs to be considered in three parts – the walking track to the viewing platform (approximately 330 metres long); the track from the viewing platform down to Emigrant Creek; and the track from Emigrant Creek along the creek bed to the base of the falls.

The track to the viewing platform is in fairly poor shape. It is compacted earth and therefore slippery when wet. The track is heavily affected by surface tree roots, which present a trip hazard in many spots. It is not properly fenced along parts of its length, which allows users to easily leave the track. A small gully overflow has been fixed with a short boardwalk and rocks for erosion control. It is recommended that this track be fenced from the car park to the viewing platform to stop 'rat runs' to the creek or private property and to protect rehabilitation areas. It should also be signposted, asking people to stay on the track for environmental reasons. The track should be up to 1.2 metres wide, fully constructed along its current alignment, with no substantial vegetation clearing. It should be a crushed rock surface with timber edge to contain the material or *Geohex* if it is cost effective. The goal should be to upgrade the track to Australian Walking Track Grading System (Part B – Appendix F) Grade 2 – “No bushwalking experience required. The track is hardened or compacted surface and may have a gentle hill section or sections and occasional steps. Walks no greater than 10km.”

The track, from the viewing platform down to Emigrant Creek, is steep and rocky and is slippery when wet. It is also, at least partly, in a high velocity flood area. It would be difficult to construct a trail, and steps are required. The steps could be simple but to withstand flood impact they would need to be well constructed and secured, and that would be expensive. One improvement that would make this track section safer and would be easier to implement is a low handrail to give walkers something to hang on to other than the surrounding vegetation. The handrail posts would need to be fixed but the rail could be pipe or heavy chain. A handrail in this section is recommended to increase user safety. With a handrail, this track section could satisfy Australian Walking Track Grading System (Part B – Appendix F) Grade 3 – “Suitable for most ages and fitness levels. Some

bushwalking experience recommended. Tracks may have short steep hill sections a rough surface and many steps.”

The final section is the 'track' from Emigrant Creek, along the creek bed to the base of the falls. This is a mix of bedrock and pools, and is entirely within a high velocity floodway. One option would be to use concrete stepping stones in conjunction with natural rock areas. Although it may make the walk to the base of the falls safer, it would have a high visual impact in a scenic area and be expensive to construct. It would be difficult to achieve without polluting Emigrant Creek and potentially impacting on native fish, amphibians or platypus. This work is not recommended.

5.12 Dogs

Dogs are currently permitted on a lead on the subject land and are brought to the falls. Owners permit dogs to swim in the pool below the falls. This could be a risk to other users and wildlife. Dogs swimming in the waterhole would not assist with water quality. Dogs off lead will also enter the upper ends of the caves behind the waterfall, which could disturb any bats or other wildlife that might be using it as a roosting area.

Unless dogs are on leads, it would not be possible to stop them from straying onto adjacent private land near the falls. Permitting dogs also brings with it the need for dog faeces bags. The site is noted for its environmental restoration and proximity to a Big Scrub remnant, and dogs are not consistent with wildlife protection in an ecologically important area.

Under the *Companion Animals Act 1988*, dogs are prohibited in the following places:

- In or within 10 metres of any children's play areas
- Recreation areas where dogs are declared prohibited
- Wildlife protection areas.

Dogs should not be permitted on the subject land.

6 Management Strategies and Actions

An outline of the recommended strategies and actions is provided below:

- Site risk and safety inspections and water quality monitoring are recommended. Water quality monitoring should be carried out periodically at the falls using the criteria normally assessed for human contact.
- Given visitation rates at the site during peak times, a traffic assessment is required for Friday Hut Road at the Killen Falls Drive intersection to assess speed limits, signage and sight lines.
- Access to the falls should continue to be via Killen Falls Drive with measures implemented to slow down traffic and make it safer for pedestrians, including speed reduction for the entire road and speed cushions to make it happen.
- The continuation of rainforest rehabilitation will be a major ecological improvement that will benefit users and the environment over time. The existing viewing platform above the falls should remain.
- A permanent toilet is recommended for the site, to be located at the northern end of the car park near the beginning of the track to the falls. A hybrid system is likely to be the best option for this site given its proximity to water. The design and wastewater capacity of the toilet should be assessed by a wastewater management professional.
- Parking overflow areas should be designated along Killen Falls Drive, as well as bus parking. Additional signage is recommended to control parking and a designated turning area. Landscaping is suggested close to the nearest dwelling to increase privacy. Parking signage improvements are recommended, including no overnight stays. A designated disabled car space in the existing car park should be identified with on-road markings and signage.

- The rotted timber bench seat near the car park should be replaced utilising existing brackets and footings.
 - Signage at the northern end of the car park should identify the entrance to the viewing platform track and provide information regarding its suitability for different ages or abilities, as well as distances and hazards. The hazard signage at the viewing platform should clearly identify that jumping is extremely dangerous and access to the top of the falls is not recommended.
 - Council signage should indicate to the public that Council does not recommend Killen Falls as place to swim, and that water quality is unreliable and often does not meet safe swimming standards.
 - Fencing is required along the full length of the viewing platform track, along with signage to stop 'rat runs' down to Emigrant Creek and to prevent access onto private land on the northern and southern sides. The unformed access next to the viewing platform, which is currently used to access the creek and rocks at the top of the falls, needs to be blocked by fencing and an additional warning sign.
 - Track improvements are needed along the 330 metres of the viewing platform track to make it accessible to a wider range of walking abilities and to reduce slip and trip hazards. Beyond the viewing platform, the only improvement would be a low, fixed handrail to the steep section to improve safety for site users.
 - Dogs should not be permitted on the subject land, and it should be declared glass free.
 - Tour operators who visit Killen Falls should be contacted to ensure they have a Council permit (and insurance) to operate on Council land.
- No facilities are recommended at the falls itself. It is not recommended that Council promotes or advertises Killen Falls.

6.1 Summary of Strategies and Actions

The approach taken with this plan of management is to document strategies and actions, and then cluster them into three priority options to manage and develop the site. Council can then consider these options that represent a minimal, moderate and major approach in terms of risk and safety, timing, feasibility and cost. Risk and safety is the dominant factor in prioritising the

actions. They are a cumulative set of options with Priority 1 being the baseline of actions that should be undertaken. Priority 2 (if adopted) will be in addition to Priority 1, and Priority 3 (if adopted) will be in addition to Priorities 1 and 2.

Priority 1 = Are required for public safety or risk reasons; can be implemented within 12 months of adopting the plan of management; are relatively low cost.

Priority 2 = Can be implemented within 1 to 3 years of adopting the plan of management; are more expensive to implement.

Priority 3 = May take more than 3 years to implement after adopting the plan of management; are more expensive to implement; may not be feasible once investigations are completed.

Objective	PRIORITY 1: Strategies and Actions	Cost (ex GST)
Ensure the ecological viability of the land by protecting its biodiversity and promoting rehabilitation of rainforest;	Declare the subject land to be a dog prohibited area.	Minimal cost
And Protect and respect the aesthetic, heritage, recreation, education and scientific values of the land and Emigrant Creek.	Provide signage requesting that visitors stay on the designated track and keep out of rainforest rehabilitation areas.	\$480
Minimise impacts arising from the use of the subject land on adjacent private land (in particular trespass and privacy).	Provide fencing and an additional warning sign to prevent access from next to the viewing platform, which is currently used to access the creek and rocks at the top of the falls. Follow up with tour operators that visit Killen Falls to ensure they have a licence with Ballina Shire Council to operate on public land and that they have appropriate insurance in place (consistent with Council policy).	\$250 Minimal cost

Objective	PRIORITY 1: Strategies and Actions	Cost (ex GST)
Provide facilities proportionate to site use that allow public enjoyment of the land;	Alert the public of potential risks on the subject land by providing signage based on Australian Standards for hazard signage.	\$1,000 (at \$250 per sign)
And	Provide signage advising that Council does not make any claim that the water in Emigrant Creek meets the standard required for swimming, and that swimming is not advised.	\$250
Provide for the safety of the users of the subject land.	At the northern end of the car park, provide signage that identifies the viewing platform track and supplies information regarding its suitability for different ages or abilities, as well as distances and hazards.	\$500
	Provide additional signage to properly identify an existing designated turning area at the northern end of the car park. Parking signage improvements are recommended, including no overnight stays and no parking opposite the current nine bays.	\$750
	Provide an edge-to-edge speed hump at the entrance to the car park and designate a 10 kph speed limit in the car park as a shared zone.	\$1,400
	Provide road markings and signage to identify a designated disabled car space in the existing car park.	\$500
	Declare the entire area to be glass free to make it safer for users and discourage anti-social behaviour.	Minimal cost
	Replace the rotted timber bench seat near the car park utilising existing brackets and footings.	\$125
	Undertake periodic water quality monitoring at the falls using the criteria normally assessed for human contact.	\$2,500 (per annum)

Objective	PRIORITY 1: Strategies and Actions	Cost (ex GST)
<p>Provide facilities proportionate to site use that allow public enjoyment of the land;</p> <p>And</p> <p>Minimise impacts arising from the use of the subject land on adjacent private land (in particular trespass and privacy).</p>	<p>Provide a permanent toilet at the northern end of the car park, near the beginning of the track to the falls. The design and wastewater capacity of the toilet should be assessed by a wastewater management professional.</p> <p>Undertake track improvements along the 330 metre length of the viewing platform track to make it safer and to reduce slip and trip hazards along its length.</p> <p>Undertake site safety inspections at the falls not less than monthly.</p>	<p>\$130,000* installation</p> <p>\$15,520 per annum recurrent costs</p> <p>\$25,550</p> <p>Undertake at same time as water quality assessment</p>

* Plus the cost of wastewater professional to advise on design, etc

Table 2: Priority 1 Strategies and Actions – Summary and Costs

Objective	PRIORITY 2: Strategies and Actions	Cost (ex GST)
Minimise impacts arising from the use of the subject land on adjacent private land (in particular trespass and privacy).	Establish additional landscaping near the front boundary of Lot 3 DP 251994 to increase privacy for the dwelling on this lot.	\$3,000
Provide facilities proportionate to site use that allow public enjoyment of the land;	Fence both sides of the viewing platform track along its entire length to decrease access to the northern side of Emigrant Creek and to Lot 2 DP 251994.	\$10,500
And	Beyond the viewing platform, install a low, fixed handrail along the steep section to improve safety for site users who access the creek.	\$2,400
Minimise impacts arising from the use of the subject land on adjacent private land (in particular trespass and privacy).	Implement measures to slow traffic along Killen Falls Drive to make it safer for pedestrians, including speed reduction (40 kph) for the entire road from the turn-off to the car park and speed cushions (with signage) to make it happen.	\$6,700

Table 3: Priority 2 Strategies and Actions – Summary and Costs

Objective	PRIORITY 3: Strategies and Actions	Cost (ex GST)
<p>Ensure the ecological viability of the land by protecting its biodiversity and promoting rehabilitation of rainforest;</p> <p>And</p> <p>Protect and respect the aesthetic, heritage, recreation, education and scientific values of the land and Emigrant Creek.</p>	<p>Protect, maintain and continue to rehabilitate environmentally sensitive areas, and continue with rainforest rehabilitation on land in Council control.</p>	<p>\$10,000 per annum recurrent costs</p>
<p>Provide facilities proportionate to site use that allow public enjoyment of the land;</p> <p>And</p> <p>Provide for the safety of the users of the subject land.</p>	<p>Identify parking overflow areas along Killen Falls Drive as well as bus parking. Use Geohex or similar material to control erosion and damage to the road verge in these locations. Use signage to identify the preferred locations and parking patterns.</p>	<p>\$43,415</p>
<p>Provide facilities proportionate to site use that allow public enjoyment of the land;</p> <p>And</p> <p>Minimise impacts arising from the use of the subject land on adjacent private land (in particular trespass and privacy).</p>	<p>A traffic assessment should be conducted for Friday Hut Road at the Killen Falls Drive intersection to assess speed limits, signage and sight lines.</p>	<p>\$10,000</p>

Table 4: Priority 3 Strategies and Actions – Summary and Costs

The full suite of possible strategies and actions is presented in Figure 9.

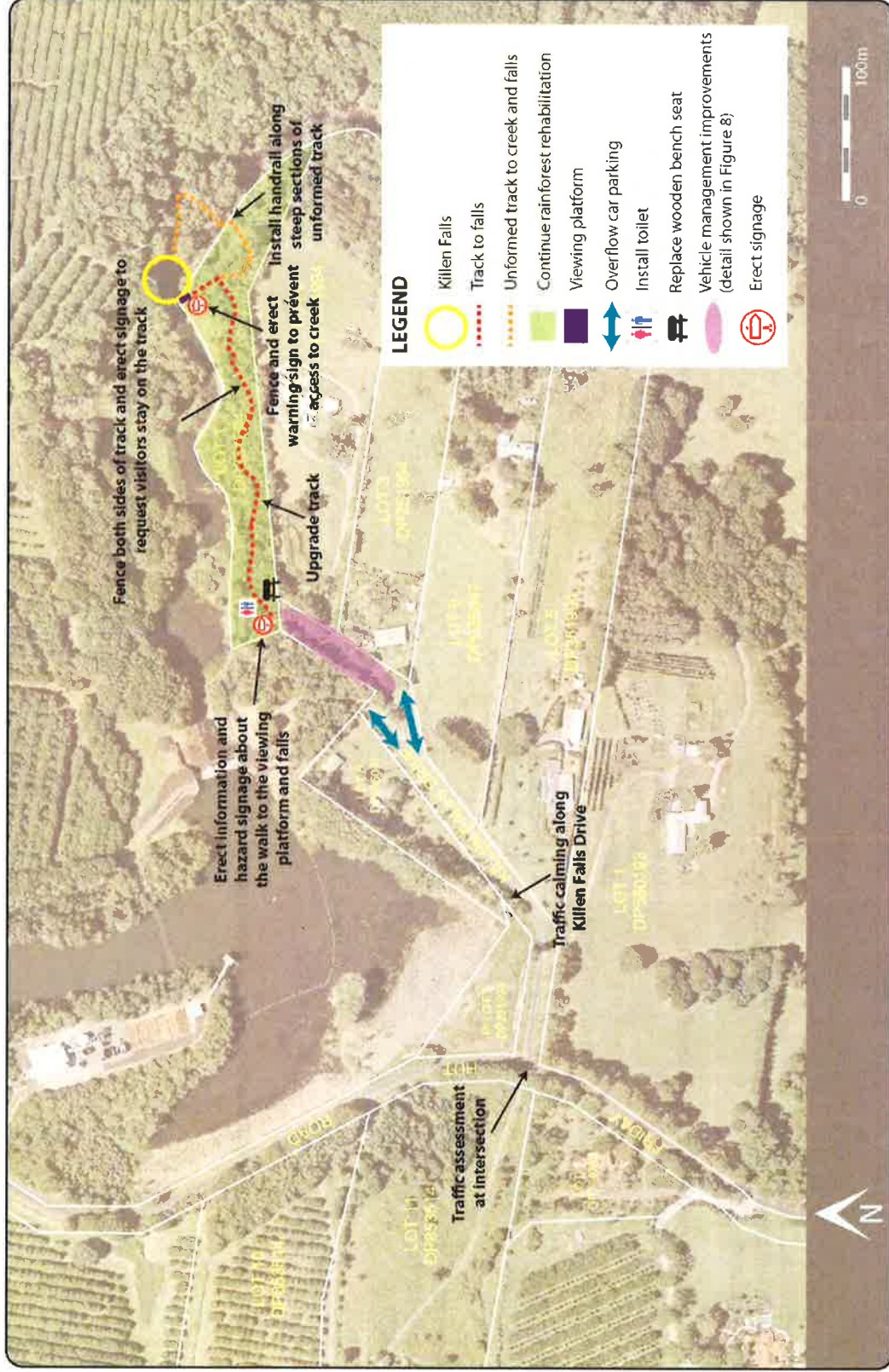


Figure 9: Possible Strategies and Actions illustrated on a site map

Discussion of the costs of strategies and actions, and how they might be funded is included in Part B to this plan of management.

Site photographs and infrastructure examples are shown in Part B – Appendix H.

6.2 Monitoring

As this site has never been subject to a specific plan of management, it is important that the actions are monitored to establish if the anticipated outcomes have been achieved.

The plan of management should be monitored on an annual basis, and comprehensively reviewed after five years.

References

- Ballina Shire Council, 2008. Ballina Community Based Heritage Study
- Ballina Shire Council, 2015. Ballina Shire Plan of Management for Community Land
- Bower Bush Works, 2004. Killen Falls Vegetation Restoration Management Plan
- Rous Water, 2007. Welcome to the Water Walk – Information Sheet # 2

Killen Falls Plan of Management

Part B



Prepared for Ballina Shire Council
by MikeSvikisPlanning
8 June 2017

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1 Background

In June 2016, Council resolved that a plan of management be prepared for Killen Falls to assist with the long term planning of the site.

The plan of management plan seeks to:

- provide options for management of the site
- identify potential opportunities for future development of facilities, access, and use of the site
- document a risk management strategy for the site.

The Killen Falls Plan of Management has been split into two parts to make it easier to read and simpler to access online. Part A has sufficient information to document the strategies and actions that are the basis of the plan of management, while Part B documents a range of issues including the early neighbour, community and agency consultation. Part B also outlines the costs of actions and infrastructure, and how it might be funded. Part B includes the appendices with additional supporting information such as site photographs and infrastructure examples.

2 Early Consultation

2.1 Who We Spoke To

Three land owners directly about the Killen Falls land owned by Council. On the northern (and eastern) side of Emigrant Creek, the James family operate a commercial macadamia plantation on Lot 12 DP 245987. On the southern boundary of the Council land, the Lane family has a 3 hectare rural residential property. Immediately to the west of the Council land is the Rous Water property, which contains the Emigrant Creek Dam.

Further along Killen Falls Drive, there is a cluster of rural residential properties, which are the most heavily affected by the activity at Killen Falls. All land owners along Killen Falls Drive were contacted by letter and either telephone or a site visit. The land owner on the northern side of Emigrant Creek was also contacted by letter and telephone.

Written submissions from a number of these land owners are provided at Appendix A.

Contact was also made with:

- Rous County Council, and a written submission is at Appendix B.
- the Office of Environment and Heritage, and a written submission is at Appendix C.
- Jali Aboriginal Land Council (had not submitted a written response at the time of preparing this draft plan of management).

A summary of the early consultation with neighbours is provided at Appendix D. Key issues raised include trespass and privacy, traffic and parking on Killen Falls Drive, tracks and other infrastructure, environmental restoration, water quality, toilets, rubbish, safety and risk.

2.2 Online and On-site Survey

A survey of some of the public that use Killen Falls was also undertaken through January and February 2017. The purpose was to gain an idea of the range and number of people that use Killen Falls, where they live, how they use it and what the community values about the falls. It is important to note that the results collected in this survey represent a snapshot in time of some of the site users, and are not statistically accurate due to sample size and methodology. Filling out the survey did not require names or other identification.

One hundred and eighteen (118) people filled out the eight question survey (either online or on-site), and a summary of the survey results is provided at Appendix D.

2.3 Community Values

Killen Falls users and neighbours (contacted in early consultation) describe the values of the subject land as:

- Ecologically significant with great bird life
- Amazing waterfall that is easily accessible
- Can swim under the waterfall
- Beautiful short walk to the falls
- Local swimming spot that is cool and refreshing
- Fun for kids
- Quiet, peaceful and secluded
- Great photo opportunities
- A successful rainforest rehabilitation project
- Important to locals/neighbours

2.4 Recreation Needs and Opportunities

Early consultation and site visits indicate that the subject land fulfils a range of recreation needs and opportunities. People of all ages come to the falls to:

- Swim in the pool below the falls
- Look at the waterfall and take photos
- Picnic on the rocks around the pool
- Picnic near the car park on the mown grass area or tables with family and friends
- Enjoy a short walk to a beautiful destination

2.5 Commercial Activities

Three tour groups were encountered at this site when conducting early consultation on this plan of management. There may be other operators. The Byron Happy Coach runs tours between Byron Bay and Nimbin most days and often stops at Killen Falls along the way. Another operator runs a mini-bus tour that takes tourists (mostly backpackers) to local swimming holes and waterfalls for a 'freshwater' experience that is an alternative to the obvious coastal attractions of the Ballina area. The other group was from a private school (a language school), and they indicated that it was a 'day out' for their students.

One of the properties along Killen Falls Drive contains a Council approved three-bedroom tourist facility, which offers high quality accommodation for up to eight travellers on a short term basis. There do not appear to be any other commercial activities carried out at Killen Falls.

3 Costs and Funding

3.1 Costs

Rainforest Rehabilitation

The costs for rehabilitation vary considerably. However, over the long term, Council should budget approximately \$10,000 to continue the long term rehabilitation of this area as a riparian rainforest. This would mostly go towards labour, weed control and plants.

Signage

Council signs that warn or advise the public (in accordance with Australian Standards) cost \$250 per sign installed. These will be used for a variety of purposes and warnings including dogs and alcohol prohibited, swimming is not advised due to water quality, snakes, slips, trips and falls. Up to four signs are required for a total cost of \$1,000.

Smaller signs advising visitors to stay on the track and protect the rainforest can be affixed with clips to the track fencing about every 50 metres on both sides. They cost approximately \$40 installed, and up to twelve are required from the car park to the viewing platform above the falls, for a total cost of \$480.

Provision of signage at the northern end of the car park to identify the walk to the viewing platform and supply information regarding its suitability for different ages or abilities, as well as distances and hazards. Estimate is \$500 for one large information sign.

Seating

The existing seat at the northern end of the car park has a timber top that has rotted out. *Ekodeck* composite material (UV and rot resistant) is \$65 for the equivalent of three (3) pieces each 1.8 metres long. Cost of installation would be \$150, for a total cost of \$215.

Landscaping

Establish additional landscaping near the front boundary of Lot 3 DP 251994 to increase privacy for the dwelling on this lot. Layout and design should be the same as other parts of the car park edge. Use only low maintenance native plants. Approximately \$3,000 for plants and labour.

Fencing

Fence both sides of the walk to the viewing platform along its 330 metre length. Could use standard hinge lock fencing with a single strand of wire above, supported by steel pickets plus stringers. At \$15 per metre (assume 700 metres) installed, fencing would cost \$10,500.

Tracks

Upgrade the walk to the viewing platform along its 330 metre length to make it safer for visitors of varying abilities. A standard 1.2 metre wide track with a crushed rock surface and timber edge would cost \$115 per metre installed, for a total cost of approximately \$40,250. However, due to its topography, it would be a difficult track to construct without some steps. Retaining the crushed rock on the track may be difficult in high rainfall events if it is not flat, so track maintenance may be an issue. Another option would be to use 1 metre wide *Geohex*, which is a permeable ground stabilisation material that is manufactured in Australia from 100% recycled material, and is quick to install and low maintenance. It has a load rating of over 1,200 tonnes per square metre and is suitable for heavy traffic areas. *Geohex* costs \$33 per metre and can be laid directly on the ground. Some earthworks would be required. Allowing a further \$40 per metre for preparation earthworks, labour and some fill material, the total cost would be approximately \$25,550.

Handrail to Emigrant Creek

A “Tubeclamp” handrail system can be designed by suppliers to meet the site requirements of accessing Emigrant Creek. All components are manufactured from hot dip galvanized steel tube. The length of the handrail would be approximately 20 metres. Material supply cost is \$60 per lineal metre. Securing the handrail will be difficult without access to power tools and because of the rocky nature of the slope. Allow a further \$60 per metre for installation costs, for total cost of \$2,400.

Toilet

A wheelchair accessible low-flush, hybrid, two-stall septic treatment system, with a primary tank that retains solids and a secondary tank to treat the displaced liquid is a likely option for installation at this site. Effluent from the secondary tank is pumped out periodically for off-site disposal. Installation could be undertaken for about \$130,000, including a small water tank for hand washing and flushing. Pump-out costs and cleaning costs would be on top of that.

The standard pump-out charge for a local waste contractor is \$250 for the first 2,000 litres, and \$0.05 per litre thereafter. Assuming a system is installed with a 10,000 litre holding tank that is pumping 5,000 litres at a time, each pump-out would cost \$400. Three pump-outs would be required in the warmer months and two pump-outs in the cooler months, which would cost \$2000 per annum. Twice-weekly cleaning at commercial rates is \$260 per week, which would cost \$13,520 per annum. Council contract cleaning rates may be less.

Therefore, recurrent costs for cleaning and waste disposal would be \$15,520 per annum.

Killen Falls Drive Improvements

Measures to slow traffic along Killen Falls Drive should be implemented to make it safer for pedestrians, including speed reduction along the entire road (40 kph) from the turn-off to the car park, and speed cushions (with signage) to make it happen.

Assuming four additional speed signs indicating a shared traffic and pedestrian zone at \$250 per sign for a cost of \$1,000.

Rubber speed cushions (2 metres by 1.8 metres) could be fitted to the existing road surface in two locations on the way into the car park along Killen Falls Drive. Two sets would be required at \$2,700 per set. Warning signs for each set would be an additional four signs at a cost of \$1,000. Assume a cost of \$2,000 to install, with traffic control required.

Total expenditure on Killen Falls Drive traffic calming would be \$6,700.

Car Park Improvements

Identify parking overflow areas along Killen Falls Drive as well as bus parking. Use *Geohex* or similar material to control erosion and damage to the road verge in these locations. Use signage to identify the preferred locations and parking patterns.

Two areas for overflow parking in the road verge along Killen Falls Drive. Each area is 7 metres by 50 metres (approximately 10 cars each). Each site would be levelled and *Geohex* would be laid to accommodate vehicles, even when the ground is soft. Three hundred and fifty (350) square metres at \$53 per square metre (installed) is \$18,550 for each overflow area.

One bus parking area is 7 metres by 15 metres. The area would be levelled and *Geohex* would be laid to accommodate a bus, even when the ground is soft. One hundred and five (105) square metres at \$53 per square metre (installed) is \$5,565 for a bus parking area.

Signage for two overflow areas and a bus parking area would be \$750 installed.

Additional signage is proposed to properly identify an existing designated turning area at the northern end of the car park. Parking signage improvements are recommended, including no overnight stays and no parking opposite the current nine bays. Estimated cost for three signs would be \$750 installed.

A designated disabled car space in the existing car park should be identified by on-road markings and signage. Sign would cost \$250 (installed); road marking would cost \$250.

Rubber 75 mm by 0.5 metre long 'aggressive' speed humps could be used at the car park entrance when vehicles need to be travelling at 10 kph. They cost \$100 each and four are required at a cost of \$400 for a set. Assume a cost of \$1,000 to install, with traffic control required.

Total expenditure on Killen Falls car park and overflow areas would be \$46,065.

Friday Hut Road Assessment

A traffic assessment should be undertaken for Friday Hut Road at the Killen Falls Drive intersection to assess speed limits, signage and sight lines, and to assess vehicle numbers at the site during peak times. A cost estimate for the assessment is \$10,000. The cost of any works arising from the assessment cannot be estimated at this stage.

3.2 Funding

North Coast Local Land Services Grants

Each year North Coast Local Land Services deliver a number of grant and funding programs to support the community to undertake natural resource management and sustainable agriculture activities.

When available, funding opportunities are advertised on this website and promoted through the North Coast Local e-newsletter. Each funding program has clearly defined objectives and selection criteria, and applications must be lodged using specific application forms. Available funding is highly sought after, and opportunities are very competitive.

This funding could be used for upgrading the walk to the viewing platform, fencing, toilet installation, and for rainforest rehabilitation on the subject land.

Australian Government's National Landcare Program

The Australian Government will invest \$1 billion through the National Landcare Program over four years from 2014–15, including support for the Landcare Networks, 20 Million Trees and Australia's 56 regional natural resource management (NRM) organisations. This funding helps support local environmental and sustainable agriculture projects, including the Reef 2050 implementation, and complements funding for the Land Sector Package.

Applications for funding in regional locations are likely to occur again in 2017–18.

There are four Strategic objectives including the following:

Strategic Objective 1	Strategic Outcomes	Contribution to National and International Obligations
Communities are managing landscapes to sustain long term economic and social benefits from their environment	Maintain and improve ecosystem services through sustainable management of local and regional landscapes	Protection and restoration of ecosystem function, resilience and biodiversity; appropriate management of invasive species which threaten ecosystems, habitats or native species

This funding could be used for upgrading the walk to the viewing platform, fencing, toilet installation, and for rainforest rehabilitation on the subject land.

Crowdfunding

Crowdfunding is the practice of funding a project or venture by raising money from a large number of people who each contribute a relatively small amount, typically via the internet. Although it has been used widely to fund music, cultural or business projects, it has also been used to fund natural resource and land management outcomes.

The technique is currently being used by three Victorian Catchment Management Authorities to pay for the conservation project called "Funds for Fish". The Victorian Government will agree to match dollar for dollar the money raised by crowdfunding with the aim of raising \$40k. It gives a sense of community ownership to projects and a very direct and local outcome with money being spent only on local projects.

More locally, Brunswick Valley Landcare has run a "Pozible" crowdfunding project to raise money for nest-boxes for owls. The target was \$7,500 and this was reached in the time allowed from 81 supporters. That is an average of \$92 per donation.

This funding could be used for upgrading the walk to the viewing platform, fencing, signage, seating, toilet installation, and for rainforest rehabilitation on the subject land. Council could consider matching money raised dollar for dollar to achieve better outcomes. It could be used in conjunction with other grant funding.

Appendices

- Appendix A: Written submissions from neighbours
- Appendix B: Rous County Council submission
- Appendix C: OEH submission
- Appendix D: Summary of early neighbour consultation and survey consultation
- Appendix E: Killen Falls Drive traffic counts
- Appendix F: Australian Walking Track Grading System
- Appendix G: Rous water quality information – Emigrant Creek storage
- Appendix H: Site photographs and infrastructure examples

APPENDIX A

Written submissions from neighbours

To Jessica Saad

Killen Falls plan of Management (316-04)

10-1-2017

In reply to the plan of Management For Killen Falls,

I would like to thank the council for the plan of management and the opportunity to receive feedback on this matter, as it is not before time. This site at Killen Falls lacks many things to cater for the growing interest to visit by the general public. Of course many people both local and interstate and abroad come and go throughout the year and there is huge numbers of people who are attracted to an environmental experience. Indeed it's good to see people moving around and getting equated with the natural beauty of this site. However this area could be coping better for visitor and residence alike if there could be more appropriate infrastructure put in place to keep both the environmental footprint clean as possible and providing a great experience for the general public visiting this area.

So we need good management by the government of the day and council to see this happen.

Indeed, we need permanent eco friendly toilets and amenities to be built and maintained by the council. There also needs further parking to be available for visitors and speed bumps and traffic signs in place to help control traffic pedestrian interaction. Money needs to be spent to help stop a serious accident or fatality from occurring. There also needs something in place to prevent overnight camping, eg No Standing or camping at night with penalty's applying. On top of that the pathway to the water needs to be upgraded due to heavy use by the

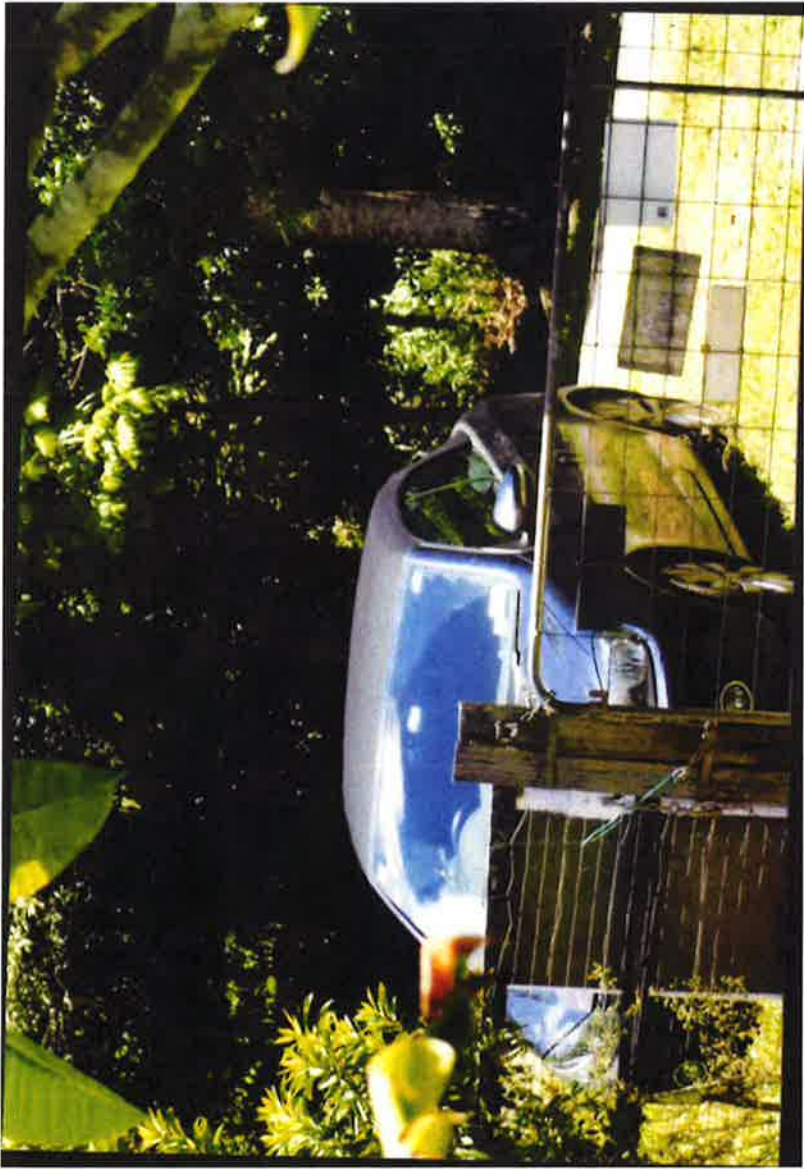
general public. There is and uneven slippery
when wet with exposed tree's roots right along
the walking track. This poses a problem with
trip, hazard for the public and walking going down
to the waterfall and viewing the top part of the
waterfall. This needs to be upgraded to make it safer
for people to walk along with some comfort.
In addition, our front verge is being totally destroyed
through people parking their vehicles all over the
place, and is of great concern. I think parking area
could be moved further up the road where it could
be safer for everyone, and we could have a little
bit of peace. Besides that, council could also introduce
paid parking to help maintain better traffic flow and
also the money's made could be used to help
maintain the site at Killen Falls. I have provided
some photos to help you get an idea what's
happen a little better.

Your sincerely
David Bester
David Bester









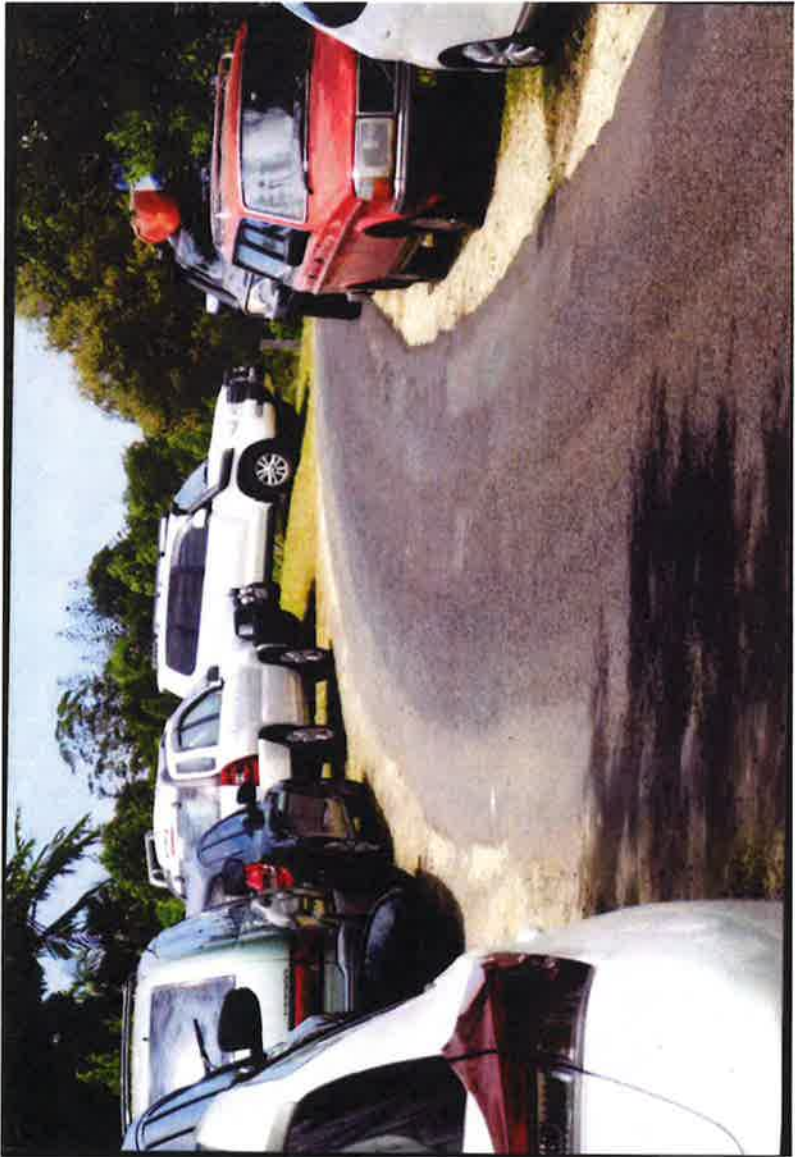






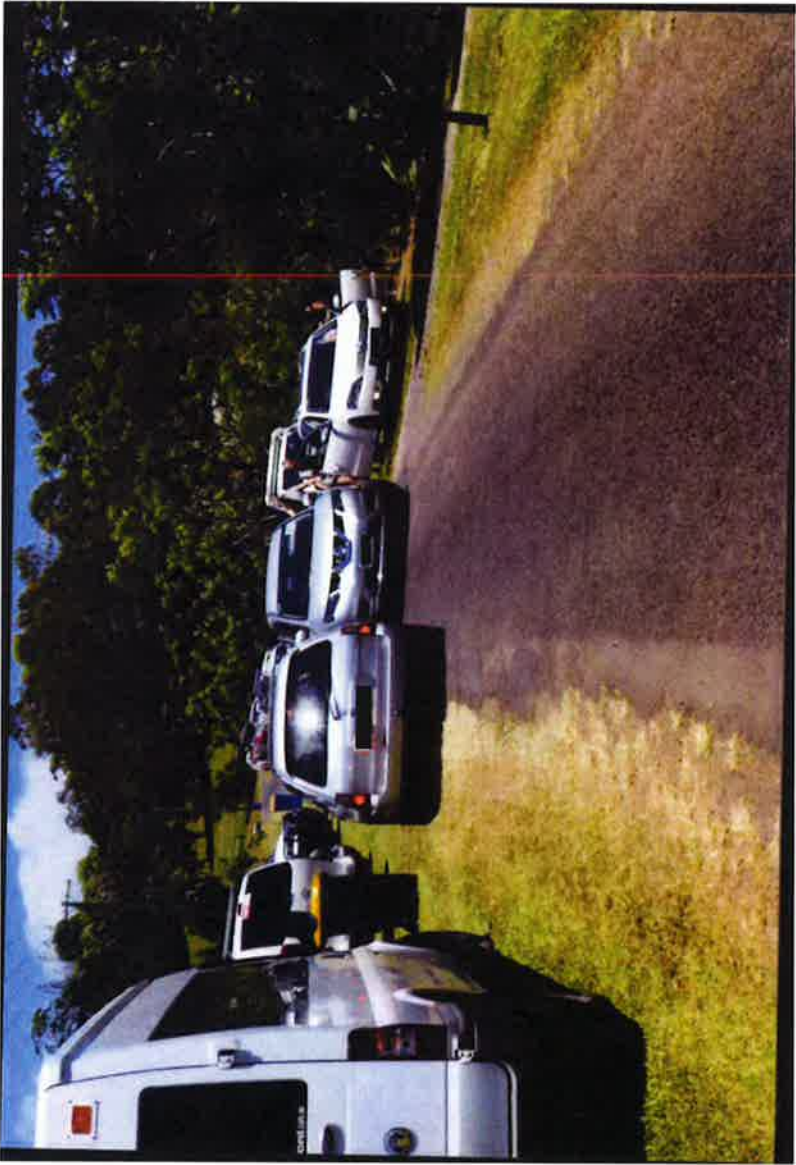
























1 Introduction

We are the owners of a property at 38, Killen Falls Drive (Lot 2 on DP 251994) located immediately adjacent to the south boundary of Killen Falls waterfall and reserve. We have owned this property fourteen years and in that time have carried out extensive rainforest regeneration and environmental improvements.

We and the environment are being seriously impacted by the effect of large numbers of visitors to the Falls following the installation of a viewing platform. These are the unintended consequences of well-meaning development initiatives that have not been fully thought through.

2 Current situation

2.1 Ownership

Killen Falls is located on Emigrant Creek immediately below the Emigrant creek dam operated by Rouse Water. The site is accessed over a section of public land identified as Lot 1 on DP 251994. The parcel of land which includes the waterfall and part of the creek is owned in freehold by Ballina Shire and is classified as "Community land". Ballina Shire Council has the care, control and management responsibility for the land.

2.2 History

The site of the waterfall was previously in private ownership until the original rural lot was subdivided in about 1976. At that time, Lot 1 became vested in Ballina Shire. To the best of our knowledge little or no capital or maintenance works were carried out by council on the subject land in the period from 1976 to about 2004. At that time the current carpark and associated landscaping and visitor information signage was completed largely by Rouse Water in connection with the existing Emigrant Creek dam infrastructure. Access to the waterfall was via an informal track that was rarely used by the public.

In 2004 the council commissioned Bower Bush works to prepare a "Killen Falls Vegetation Restoration Management Plan". This study identified and evaluated the existing environmental assets in the adjacent Big Scrub rainforest remnant and outlined a management plan for future care and maintenance.

With some limited assistance from Council, the local 'Landcare' group took it upon themselves to regenerate the rainforest remnant with a view to improving the environmental quality of the site. This work has established extensive plantings of rain forest species over part of the subject site.

2.3 Recent development

In late 2015 the council installed a viewing platform at the top of the falls and carried out improvements to the access track from the existing carpark to the viewing platform location. We provided access across our land at that time to facilitate the contractor's completion of the construction work. At about this time the facility began to be promoted as a tourist attraction on various internet sites as well as the council's official website.

2.4 Utilisation

Following installation of the viewing platform and subsequent promotion of the facility the number of visitors to the waterfall has dramatically increased. While actual data on visitor numbers is not available we have noticed a massive increase with dozens of cars overspilling the formal carpark and lining the access road for about 100m beyond on both sides. On one particularly busy day in the recent Christmas holiday period we counted 72 parked cars in Killen Falls Drive and noticed over 50 people swimming in the water hole below the falls. (Refer to the following photograph.)

It would appear that the primary attraction for most visitors is the opportunity to swim in the water hole below the falls.



3 Risks & hazards

3.1 Personal injury

3.1.1 Falls from heights

The modified path to the viewing platform while sometimes slippery is adequate for the purpose. The informal path beyond the viewing platform involves a steep and treacherous descent over sharp rocks and boulders to the creek level below. This represents a real and present risk of falls and serious injury to members of the public who may be ill equipped and inexperienced for such a dangerous activity. In fact there have been recent reports of serious injuries including broken limbs that required the attendance of the ambulance. It is only a matter of time before someone is fatally injured.

3.1.2 Drowning

The water hole below the falls is generally quite cloudy and the bottom is of irregular and unknown depth. Swimmers enjoy jumping into the water from adjacent rock ledges at various heights above the water. This activity is particularly hazardous and could easily result in a person hitting submerged rocks and being rendered unconscious.

3.1.3 Snake bites

The adjacent Big Scrub remnant rain forest is a known habitat for many species of venomous snakes. Large brown snakes have been sighted regularly in the area by local residents and visitors

3.1.4 Vehicle accidents

The existing carpark area and approach road is at peak times a dangerous place, particularly for small children. Cars are seen reversing across pedestrian access ways from parking bays and other informal parking locations. Some cars approach the parking area at dangerous speed and pedestrians often emerge from behind bushes into the path of moving traffic. The intersection at Friday Hut Rd is particularly dangerous as it is located on a sweeping downhill bend and several near misses and accidents have been reported.

Council rubbish collection vehicles also use the carpark area for collection stops and turning at the designated turning bay. Unfortunately, this turning bay is often obstructed by visitor's cars causing the truck to make a hazardous reverse manoeuvre all the way down the approach road to collect resident's and council bins. This situation has the potential to result in serious harm to unwary pedestrians and places an unreasonable burden of care on the truck driver.

3.1.5 Contaminated water

Blue-green algae and other toxic agents are known to be present from time to time in the creek water. Notices are often issued to local residents by Rouse Water alerting us to the hazard in the creek and advising against swimming in or drinking the water. Serious illness can be caused by exposure to such contaminants. Ref. NSW Dept. of Primary Industry website: *"Blue-green algae, or cyanobacteria, are the most ancient of all photosynthetic organisms. Some produce poisons harmful to humans and possibly fatal to domestic animals and fish - neurotoxins and liver toxins, and skin allergens."*

3.2 Environmental damage

3.2.1 Zoning

The site is zoned 1(b) and is immediately adjacent to a section of remnant rain forest zoned 7(l) *Environmental Protection - Habitat*. Council must have regard to the impact any development of the site will have on the adjacent land.

3.2.2 Vegetation

The quality and value of the Big Scrub rainforest remnant that currently dominates the site has been fully documented in 2004 by Bower Bush Works in their report titled *"Killen Falls Vegetation Restoration Management Plan"* funded by the National Heritage Trust. The report concluded that, *"The Killen Falls remnant is considered to be of regional and national significance due to its environmental attributes"*

The report further stated in relation to Tracks & human visitation:

"A network of tracks within small remnant ecosystems may pose a threat to the condition of a remnant through increased light conditions and impacts associated with human activities. Visitation to small isolated remnants is best kept to a minimum level and to low-key low-impact activities to minimise disturbance to fauna and to maintain scenic amenity and ecological integrity."

From recent observations, we are very concerned that the negative impacts predicted in the report are now taking effect.

3.2.3 Fauna (Extract from Bower Bush Works report)

"Killen Falls remnant and the adjacent surrounds provide important habitat for a range of sedentary and nomadic fauna."

"Killen Falls itself comprises a large overhang or open cave with a number of smaller caverns and holes scattered along the rock face. The site is likely to have supported a significant communal roost site. It is important that roost sites are not regularly disturbed. Activities that disturb roost sites should be prohibited or actively managed."

Documented species that are dependent on the Emigrant Creek water at this location include, Bush hen, Eastern water dragon, Black Bittern, White bellied sea eagle, Platypus, Water rat, Large footed myotis bat, various aquatic invertebrates and fish. The site also provides habitat for several frog species.

We have personally noted the loss of a breeding pair of white bellied sea eagles who for the last 12 years nested in a large tree adjacent to the falls and used the basin below as their fishing ground. They have not been sited since the installation of the viewing platform.

3.2.4 Noise

Swimming activities by large numbers of people in the basin below the falls produces excessive and disturbing noise both to us as neighbours and to the local native fauna. The acoustics within the chamber are particularly reverberant and encourage people to shout excessively.

3.2.5 Pollution

Large numbers of people swimming in confined spaces will inevitably result in pollution of the water. The longer people stay at the site the greater is their need for toilet facilities. At present, there is evidence that people are staying for long periods of time and through necessity are relieving themselves in the adjacent bushes. This is both unsightly and harmful to the environment.

3.3 Social issues

3.3.1 Crime

There have recently been increased reports of thefts from vehicles parked adjacent to the site. On one occasion a person was apprehended in the act of stealing items from a parked bus and Police were called.

3.3.2 Noise

Refer to 2.2.3 above

3.3.3 Quiet enjoyment

Due to the number of vehicles parking in Killen Falls Drive there are many instances of disturbance caused by people blocking driveways, picnicking in front of properties and causing nuisance to neighbours. The noise of people shouting while swimming is also intrusive and disturbing.

3.3.4 Amenities

Council has recently installed a temporary portable toilet to address the pollution problem however it is feared that this facility will also encourage some to stay overnight.

3.4 Property values

Promotion of Killen Falls as a tourist attraction comes at a cost, most particularly to neighbouring property owners affected by the change. It is difficult to quantify this cost but apart from the day to day loss of quiet enjoyment there is the hard issue of reduction in property value.

4 Risk management

4.1.1 General

The current high level of risks to health and safety are largely due to the number and duration of visitations to the site. This has clearly become beyond the capacity of the existing infrastructure.

It has been suggested by some that development of the site infrastructure with additional toilets, car parking and road improvements will address the current situation. We and others in the vicinity take the view that any improvements will simply attract more people and compound the problem even further. This is clearly demonstrated by the massive increase in problems following the installation of the viewing platform.

We believe that mitigation of risks will be most effectively achieved when total visitor hours are reduced and dangerous activities are eliminated.

4.1.2 Shorter visitations

Since most of the problems appear to be due to people swimming, we suggest that this activity be prohibited as originally stated on the Council website. This will result in substantially shorter visitation times where activities are limited to short walks to the viewing platform. This can be most effectively achieved by limiting car parking in Killen Falls drive to 1 hour, so giving adequate time for passive, non-invasive activities. Enforcement of such restrictions with fines is essential but need only be policed randomly or at peak times to be effective.

Access beyond the viewing platform down to the creek must be restricted by the installation of a substantial man-proof fence from the adjoining boundary with Lot 2 to the cliff edge. Permanent signage should be provided at the carpark and at other locations beyond, to prohibit swimming and advise penalties.

4.1.3 Reduced visitor numbers

A ban on swimming will immediately reduce the number of visitors, as it seems most people come here solely for that purpose. We believe there are adequate alternative swimming opportunities in the Shire to satisfy that requirement.

5 The way forward

In conclusion, we strongly urge the council to incorporate the following actions as part of the future management of the site:

- Ban swimming
- Stop promotion
- Freeze all capital works
- Control access below falls
- Limit parking to 1 hour

We need to protect our environment and the native wildlife for future generations.

Dear Mike,

Following on from our telephone conversation yesterday in relation to information and feedback regarding the proposed Killen Falls Management plan.

As discussed with you my first suggestion is to change access to the falls from the other side of emigrant creek. This would eliminate the very bad driving of tourists on Friday Hut Road. Eliminate the congestion and rubbish from Killen Falls Drive and return our little rural street back to the way it was a few years ago. Each day through the year we have seen more and more cars enter the street. Since the start of Christmas holidays there would be more than a few hundred cars each day. It is disturbing to think what is happening to the once quiet and well kept area and how dangerous the 'track' to the bottom of the creek and the 'track' that weaves back up to the bottom of the falls has become.

However if this is not an option then my first suggestion then to start with a few suggestions to improve the safety for future visitors to the street I suggest the following:

Place signs at the Tintenbar end and Brooklet end of Friday Hut Road indicating 'this is a rural road, please KEEP TO THE LEFT'.

Place speed humps on Killen Falls Drive; one at the beginning of the straight stretch just past No 10 (main driveway) with a 20 klm 'shared zone' sign and again where the existing 10 klm 'shared zone' sign is.

I would like to see 'no parking' signs at the fork in the road where the sign indicates Killen Falls to the right (daily vehicles cram and park in front of this sign - blocking it- I've taken the occasional photo if you would like them) also 'no parking' on the left hand side of the road from the 'shared sign'. This will create more space for people to walk and cars to pass each other without the grid lock of congestion which at the moment is an accident waiting to happen.

We spoke about 'not encouraging tourists' by providing services and extra parking. I'm only guessing this: When people plan a visit to Killen Falls I'm thinking no one is giving any thought to organised parking or amenities. They would just think there will be somewhere to leave their car and (like Rocky Creek Dam) surely there will be a toilet of some sort. As the tourists have proven they will and do use anywhere they can find a quiet spot as a toilet. I'm hoping the porta loo that has been here since December 2016 is preventing the outside area from being used. However the few times I have been down the end of the street to toilet was in a disgusting state. I have only seen a truck come to empty it 3 times in the last month. Not the three times a week Matt Wood from Ballina Council told me was going to happen.

I'm hope when you visit Killen Falls this weekend you will get a better idea from tourists and locals visisting that day if they will provide you with information you require for the Management Plan.

May I suggest you ask people. Why they came here, Have they been here before, did they know about having to drive down a busy rural road to get here and do they have any experience driving on a rural roads. Where they expecting better parking arrangements and were they expecting a toilet to be here and are they happy it's here.

I know that the owners of properties in Killen Falls have different concerns regarding the tourists and the facilities and changes Ballina Shire could address. Some of us in our semi rural street reside here as permanent residences while some don't reside here or partially reside here and have expectations of financial gain from their properties. I believe we are not going decrease the influx of tourists in fact it will increase. We need to make their visit safer.

Yours truly

Gail Brennan

25 Killen Falls Drive

Tintenbar NSW 2478

20 Jan 2017

APPENDIX B

Rous County Council submission

Our Ref: AAVG: 439/09 (107717) (48181)
Your Ref: Killen and Tosha Falls Plans of Management (316-04)

14 February 2017

General Manager
Ballina Shire Council
PO Box 450
BALLINA NSW 2478

Att: Ms Jessica Saad

Dear Madam

Killen Falls Plans of Management

Introduction

Thank you for your letter dated 22 December 2016 (received 3 January 2017) outlining Ballina Shire Council's intention to prepare a Plan of Management for Killen Falls Reserve (and Tosha Falls Reserve). In this letter, Rous County Council (RCC) has been requested to provide Ballina Shire Council (BSC) with comments to assist Council to provide a framework for the long term management of this land. Council intends that the Plan of Management (POM) will identify potential opportunities for the future development of facilities, access and infrastructure and address public safety.

It should be noted that the comments of RCC relate only to Killen Falls Reserve, as RCC has no involvement in relation to Tosha Falls.

To assist Council's understanding of the concerns of RCC for this location, our submission is structured as follows:

- *Background to RCC involvement at this site (refer Section 1 below);*
- *RCC comments on the future development of facilities, access and infrastructure (refer Section 2 below);*
- *RCC comments on public safety (refer Section 3 below).*

1. BACKGROUND

1.1 Background to RCC involvement at Killen Falls Reserve

Prior to the completion of dam safety strengthening works at Emigrant Creek Dam (pre-2002), visitors to the site (the dam site) would enter the dam and spillway area to make use of the site for recreational purposes. However at this time there was no effective means of restricting and/or controlling access for security/risk management purposes.

Following completion of major construction works associated with the dam and spillway strengthening at Emigrant Creek Dam in 2001, it was apparent that:

- (i) the local community valued the ability to view the dam and spillway, particularly during large storm events; and that
- (ii) formalised car-parking arrangements were required for visitors accessing the Emigrant Creek Dam/Killen Falls precinct.

Previous arrangements for visitation to the dam (whereby visitors could walk to and picnic at the actual dam structure and waterbody) were inappropriate for a range of public health, environmental, safety and security reasons.

Once the dam strengthening works were completed, informal car park area and adjacent areas at Killen Falls Drive required substantial remediation due to the extent of site disturbance/spoil and the impact of construction vehicles – it was a major construction project. In order to meet the ongoing needs identified in (i) and (ii) above, Rous completed a series of site improvements as part of the site rehabilitation work following the dam strengthening works.

Following discussions between Rous County Council and Ballina Shire Council at that time, it was generally agreed that site rehabilitation would be as follows:

- Rous would prepare landscaping plans for all of the disturbed areas;
- Site rehabilitation would include the construction of an access path to an observation area overlooking Emigrant Creek Dam as well as a formalised car parking area to accommodate both visitors to Emigrant Creek Dam as well as those visiting Killen Falls (noting that the car park and some of the access track to the dam are located on Ballina Shire Council property);
- Rous would construct the improvements in the plan;
- The carpark areas would subsequently be handed over to Ballina Shire Council for maintenance as part of the Ballina Shire road network.

In December 2001, Ballina Shire Council (BSC) issued consent to Rous Water for the undertaking of landscaping/vegetation clearing, access track construction and car park improvement works at Emigrant Creek Dam, Killen Falls Road at Tintenbar (Development Application No. 2002/533). These works also included a sealed car parking area (including provision for a safe bus turning area), and the installation of interpretive signage. A plan of these works is illustrated in the attached layout plan. This plan also shows the RCC/BSC property boundary, demonstrating that the carpark forms part of the BSC owned/controlled land (within the road reserve for Killen Falls Drive).

The layout plan did identify a space within the BSC land for a future shelter structure and barbecue however such facilities have never been constructed. Following the Rous improvements in June 2003 Rous received representations from the local community regarding the potential provision of improved facilities at this location. At this time Rous wrote to BSC regarding these options (Our reference AA/ 1322G/02 (28626) – letter dated 11 September 2003).

Discussions with BSC staff at the time identified that it remained the intention of both BSC and Rous to maintain the 'low-key' nature of the existing development at the site – given that the site did not have facilities such as car parking or toilets to cater for large numbers of visitors. It was agreed that this 'low-key' nature be maintained.

Please see the attached layout plan showing the approved design (Refer Attachment 1). Note that the plan shows the location of the property boundary between the Rous and BSC land.

Rous completed construction of the majority of the landscape plan in 2003. As noted on the plan, space was allowed for future improvements (including a barbecue shelter and picnic tables), although no such improvements have subsequently been made.

The extent to which any official handover of assets was undertaken is uncertain, however it does not appear that there was any formal handover of constructed assets.

1.2 Previous RCC correspondence

Throughout the period following the dam safety/strengthening works, there has long been a general agreement between Rous and BSC to try to keep the site as a low-key destination, by not promoting the site, and by keeping the level of facilities at the site very basic.

I have attached for your information copies of correspondence throughout this period confirming these general arrangements. Whilst this list is not exhaustive, this correspondence is instructive in presenting Rous' position on these matters which today remains largely as outlined above and communicated in this correspondence. This includes:

- Letter dated 9 January 2012 confirming Rous' intention to maintain the site as a low-key location, and confirming that Rous has no plans or budget for the provision of any increase in service levels for this location (Attachment 2).
- Email dated 6 May 2015 following joint site inspection, confirming agreed responsibilities for identified issues (Attachment 3).
- Copy of a letter dated 8 July 2016 to the Hon Tamara Smith MP regarding management of dam levels with Emigrant Creek Dam and the inability to manipulate flows for flood mitigation purposes (Attachment 4).

2. FUTURE DEVELOPMENT OF FACILITIES, ACCESS AND INFRASTRUCTURE

Rous comments in relation to these issues are described below.

2.1 Formal handover of existing assets

As described in Section 1.1 above, it would appear that there has never been any formal handover of assets constructed by Rous in 2003 - 2005. To address this issue and to ensure that future maintenance needs of any such assets are provided for, Rous would like to work with BSC to ensure that all of the assets located on BSC land are properly identified and appropriately included in BSC's asset management system.

2.2 Facilities

Notwithstanding the context described in Section 1, it is acknowledged that over the intervening period since Rous constructed the formal car park and associated facilities, the level of visitation has increased markedly, placing pressure on the site, and associated impacts on local residents.

It is recognized that the level of visitation to Killen Falls has reached a level that the lack of any toilet facilities at the site now represents a health concern for local residents and visitors.

There are significant constraints associated with the construction of any toilet facilities in such a location, being so close to Emigrant Creek. It is likely that options would be limited to a composting toilet or a pump-out system – both of which would have significant maintenance costs for BSC.

It should also be noted that once these facilities are installed, that this may attract additional visitation and trigger the need for additional parking and other facilities.

2.3 Access

In the past BSC has indicated that whilst it was agreeable to permit public visitation to the viewing platform overlooking the falls, it was intending to prohibit access to the base of the falls. Information was circulated bringing awareness within the local community of the issue of the microbats in the caves below the falls, and a fence was erected alongside the platform access in an attempt to restrict this access. It would appear that enforcement of this position is no longer the intention of BSC (i.e. the attempt to restrict access), and this barrier to the track to the base of the falls is now removed.

It is clear that the level of visitation has reached a point that exceeds the capacity of the car parking facilities at the site. This increases the risk of traffic incidents and causes amenity and safety issues for local residents. Bearing in mind that additional facilities may attract even greater levels of visitation (including increased levels of illegal camping), RCC is of the view that there is likely to be a need to control this level of access in the future. Options may include:

- Prohibit/discourage swimming;
- Paid parking/entry fees;
- Improved traffic signage and enforcement of parking/no parking areas;
- Restricted hours (in order to restrict access to this location you may need to have automated gates or similar further up Killen Falls Drive in order to prevent visitors parking/camping illegally and walking into the site.

Finally in relation to access, RCC has a similar range of issues on land that it owns at Whian Whian Falls. At this site commercial tourism operators were exacerbating visitation issues resulting in conflicts with local residents/community. Whilst the commercial operators themselves were diligent in trying to ensure that their customers were well behaved and whilst it is acknowledged that licensing provides a degree of control over what operators can and can't do, on balance the commercial tourism use of the site was adding to a range of management issues. Accordingly, as part of a recent change in policy for this site, RCC prohibited the use of the site for commercial tourism purposes, which has alleviated some of the pressures at the site as the tourist busses no longer visit the site. This may be another option available to BSC to manage the level of visitation at the site.

2.4 Infrastructure

As described in Section 2.1, there is a range of assets to be formally handed over to BSC.

As part of long-term financial planning, Rous has in the capital works plan for 2017/18 funds earmarked for renewal of Rous facilities at the site. This allocation has been deferred over recent years due to concerns regarding attracting additional visitation and impacts, and as the prevailing asset condition for several asset groups was such that the forecast renewals were not needed at that time. This capital works plan is currently under review.

3. PUBLIC SAFETY

Design of the car park and vehicle turnaround facilities at the time was conducted in accordance with relevant standards and appropriate for the then level of site visitation. Given the increased levels of visitation, it is apparent that the level of visitation frequently exceeds the capacity of the parking available at the site. In addition, people are parking in no parking areas making access and entry/exit difficult and potentially hazardous. Vehicle access into and out of the site, ad hoc parking arrangements and parking conflicts all represent potential public safety issue at the site. In addition,

it should be noted that all of these issues increase the likelihood of conflict with local residents and associated amenity impacts.

Finally, it is understood that BSC is interested in the prevailing water quality at Killen Falls. As Killen Falls is downstream of Emigrant Creek Dam, Rous has no water quality data for the section of Emigrant Creek at the falls themselves. However Rous has long term monitoring at a water quality monitoring site adjacent to the dam wall and spillway. Prevailing water quality in this location could be considered indicative of that prevailing further downstream.

Please find attached as Attachment 5 a summary of recent analysis conducted of the water quality at this monitoring location. This analysis conducts compliance reporting *inter alia* against the primary recreational threshold for *E. Coli* of < 150 CFU per 100 mL. As can be seen overall compliance of the water quality at this site was 55% of samples, although this compliance ranged from 76% during dry weather to 30% compliance during wet conditions.

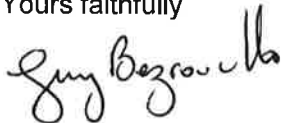
It should also be recognized that the high level of recreational use of the pool below the falls is also likely to increase the risk of primary contact with these waters through the introduction of additional contaminants associated with frequent recreational use of this location. Accordingly, it is apparent that water quality at the falls is likely to be quite variable, and at times would not be safe for swimming/primary contact and so would represent an additional consideration associated with public safety at the site.

4. CONCLUSION

I trust that this assists in providing a very brief history of the situation from a Rous perspective at Emigrant Creek Dam, Killen Falls Drive, and helps inform your considerations regarding planning for this location.

Rous County Council would be happy to meet with you to discuss these matters further. Should you require any further information regarding this matter please contact me or Mr Anthony Acret on (02) 6623 3828.

Yours faithfully



Guy Bezrouchko
Acting General Manager

Attachments:

1. Layout plan showing the approved design.
2. Letter to BSC dated 9 January 2012.
3. Email to BSC dated 6 May 2015.
4. Copy of letter dated 8 July 2016 to the Hon Tamara Smith MP.
5. Summary of recent analysis conducted of the water quality at this monitoring location.

- • • Bolalags (Refer to Details)
- Plan Concrete Edge (Refer to Details)
- Existing Fence Line
- Timber Bench Seat (Refer to Details)
- Grassed Area
- Parking Area (Refer to Parking Plan)
- Level Carparks (Refer to Details)
- Existing Cully Beds
- Coloured concrete Type 1
- Coloured concrete Type 2
- Coloured Pebble Surface or smaller (10-15MM max)
- Existing Trees

- 01 Coloured Concrete Pavement
- 02 Coloured Concrete Edge
- 03 Typical Garden Bed Preparation
- 04 Coloured Concrete
- 05 Coloured Pebble Surface
- 06 Timber Bench Seat
- 07 Bolalag in Grass
- 08 Concrete Inset
- 09 Coloured Concrete
- 10a Trans Planting to pebble area
- 10b Coloured Pebble Surface
- 11a Coloured Pebble Surface
- 11b Bolalag in Garden
- 11c Gravel Car Park
- 11d Coloured Pebble Surface

No.	Description	Date	Initial	Approved
0	For Construction	27/05/23		

This drawing must not be relied upon for any purpose other than that for which it was prepared and no liability is accepted other than the referred client.

This drawing was prepared using a quality system certified as complying with ISO 9001 by an accredited certification body.

GeoLINK
environmental management and design

Level 1, 64 Walker Street
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Murrumbidgee NSW 2576
T 02 6887 7336
F 02 6887 7372
www.geolink.com.au
info@geolink.com.au

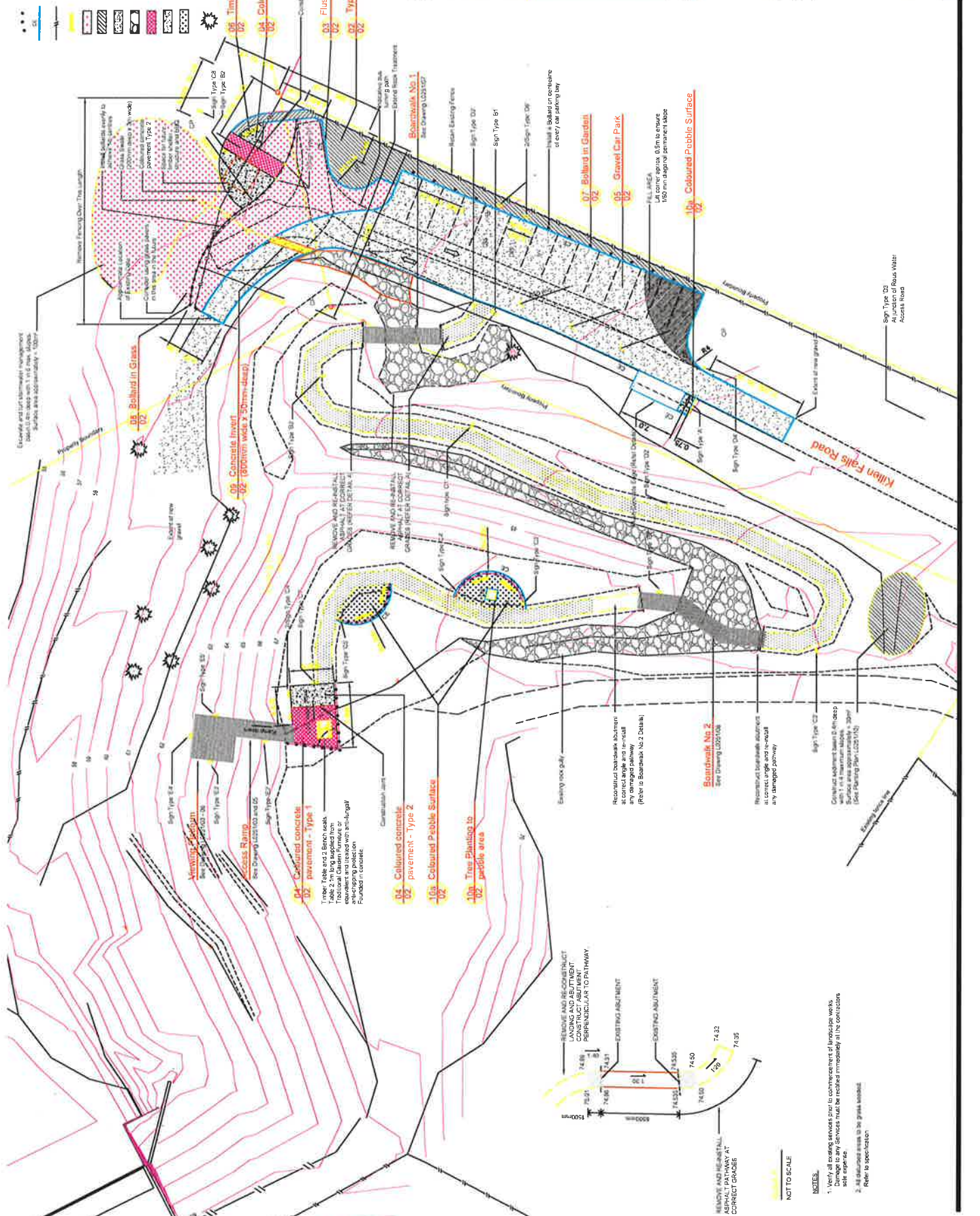
QUALITY SOLUTIONS. SUSTAINABLE. FUTURE.

Emigrant Creek Dam

Project file

Drawn: SDR
Checked: PSC

Scale: 1:10



NOT TO SCALE

- NOTES**
1. Verify all boundary markers prior to commencement of landscape works. Damage to any markers must be rectified immediately by the contractor.
 2. All dimensions shall be to grade unless stated.
- Refer to specification



Rous Water

REGIONAL WATER SUPPLY

BALLINA
BYRON
LISMORE
RICHMOND VALLEY

Our Ref: AA/NS1712E (40029)
Your Ref: Paul Hickey (Killen Falls Reserve)

9 January 2012

General Manager
Ballina Shire Council
PO Box 450
BALLINA NSW 2478

Dear Sir

Attention: Mr Paul Hickey

RE: EMIGRANT CREEK DAM/KILLEN FALLS RESERVE

Introduction

Thank you for your letter dated 7 December 2011 regarding the provision of improved facilities and infrastructure at Killen Falls Reserve. Rous Water recognises the community interest in this location as demonstrated by the Landcare work undertaken in Killen Falls Reserve. The local community has been supportive of the improvements made by Rous Water in this vicinity over the past 10 years.

However it is important to note that this area is not "controlled by Rous Water" as indicated in your letter. Both the car parking area (situated within the Killen Falls Drive road reserve) and the Killen Falls public reserve are under the ownership and control of Ballina Shire Council (BSC). Accordingly, any future improvements in this vicinity are primarily a matter for consideration by BSC.

Background

Following completion of major construction works associated with the dam and spillway strengthening at Emigrant Creek Dam in 2001, it was apparent that:

- (i) the local community valued the ability to view the dam and spillway, particularly during large storm events; and that
- (ii) formalised car-parking arrangements were required for visitors accessing the Emigrant Creek Dam/Killen Falls precinct.

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ROUS COUNTY COUNCIL

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Email water@rouswater.nsw.gov.au
ABN 81 383 023 771

Previous arrangements for visitation to the dam (whereby visitors could walk to and picnic at the actual dam structure and waterbody) were inappropriate for a range of public health, environmental, safety and security reasons. However in response to these needs, Rous Water completed a series of site improvements as part of the site rehabilitation work following the dam strengthening works.

In December 2001, Ballina Shire Council (BSC) issued consent to Rous Water for the undertaking of landscaping/vegetation clearing, access track construction and car park improvement works at Emigrant Creek Dam, Killen Falls Road at Tintenbar (Development Application No. 2002/533). These works also included a sealed car parking area (including provision for a safe bus turning area), and the installation of interpretive signage. A plan of these works is illustrated in the attached layout plan. This plan also shows the Rous Water/BSC property boundary, demonstrating that the carpark forms part of the BSC owned/controlled land.

One of the optional features identified in the layout plan (that was not constructed) was the establishment of a shelter structure and barbecue facility. Following the Rous Water improvements in June 2003 Rous Water received representations from the local community regarding the potential provision of improved facilities at this location. At this time Rous Water wrote to BSC regarding these options (Our reference AA/ 1322G/02 (28626) – letter dated 11 September 2003).

Discussions with BSC staff at the time identified that it remained the intention of both BSC and Rous Water to maintain the 'low-key' nature of the existing development at the site – given that the site does not have facilities such as car parking or toilets to cater for large numbers of visitors. It was agreed that this 'low-key' nature be maintained.

Current Situation

Rous Water recognizes that there has been a gradual increase in the level of visitation to the site. Our observation is that there has been an increase in the level of visitation from both general tourists and commercial tour operators. Whilst Rous Water is of the understanding that the site is not actively promoted by Ballina Tourism as a destination (both due to the limited facilities present and the need to protect the habitat of an endangered species of bat), it is apparent that the site does receive some promotion in the broader tourism industry. Rous Water is also unsure as to whether the commercial tourist operators that visit Killen Falls are authorized by BSC to do so.

Whilst the establishment of toilet facilities at the site would be of benefit to visitors, the establishment of toilet facilities may also have the effect of further increasing visitation and placing additional pressure on parking facilities and on local residents. It is also noted that the establishment of toilet facilities at this site could be problematic, given the need to site such facilities at appropriate distances from both Emigrant Creek and local residents.

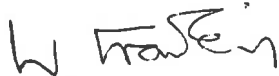
Summary

In summary, on balancing the above-described considerations, the position of Rous Water is as follows:

- Rous Water recognises that the lack of toilet facilities at the site represents a constraint on the nature and extent of visitation at the site.
- However given the environmental constraints and parking limitations at the site, Rous Water considers that the current 'low-key' nature of the existing level of development at the site is appropriate.
- Rous Water is concerned that the installation of toilet or other facilities would further increase the level of visitation and potentially lead to adverse impacts on neighbouring properties (including both Rous Water and local residents).
- Rous Water has no forward plans or budget allocated to the establishment of new facilities at this site now or in the future.
- Given that the area is under the ownership and control of Ballina Shire Council (BSC), any future improvements in this vicinity are primarily a matter for consideration by BSC.

Rous Water would be happy to meet with you to discuss these matters further. Should you require any further information regarding this matter please contact me or Mr Anthony Acret on 6621 8055.

Yours faithfully




Wayne Franklin
Technical Services Director

From: Anthony Acret
Sent: Tuesday, 14 February 2017 11:24 AM
To: Vanessa George
Subject: FW: Emigrant Creek Dam and Killen Falls
Attachments: P5060082.JPG; P5060083.JPG

Anthony Acret
NRM Planning Coordinator
Rous County Council

PO Box 230 LISMORE NSW 2480 | 0266233800 | 0428 239 540 | anthony.acret@rous.nsw.gov.au | www.rous.nsw.gov.au

 Please consider the environment - do you really need to print this email?

From: Anthony Acret [<mailto:Anthony.Acret@rous.nsw.gov.au>]
Sent: Tuesday, 14 February 2017 11:23 AM
To: Anthony Acret <Anthony.Acret@rous.nsw.gov.au>
Cc: Anthony Acret <Anthony.Acret@rous.nsw.gov.au>
Subject: FW: RE: Emigrant Creek Dam and Killen Falls

-----Original Message-----

From: Anthony Acret [<mailto:anthony.acret@rouswater.nsw.gov.au>];
Sent: 6/05/2015 4:44:44 PM
To: amyc@ballina.nsw.gov.au [<mailto:amyc@ballina.nsw.gov.au>];
CC: Records [<mailto:Records@rouswater.nsw.gov.au>];
Subject: RE: Emigrant Creek Dam and Killen Falls

Hi Amy

Further to our meeting on-site at Emigrant Creek Dam (Killen Falls carpark) this morning (together with Kelly Brown/BSC), please find attached several images taken of the walking track in to Killen Falls, and in particular, the location where surface flows from adjoining properties flow across the walking track towards Emigrant Creek. As can be seen the pipes that have been installed have become completely blocked with debris, with flows spreading out across the track.

At our meeting it was agreed that:

- Both Ballina Shire Council (BSC) and Rous Water (RW) intend to keep this location as a low-key destination, with minimal advertising aimed at encouraging visitation. In terms of facilities, both BSC and RW shall aim to provide facilities that manage visitor risks by allowing and controlling (current levels of) visitor access, yet not undertake improvements that are likely to be a drawcard for additional visitation (such as toilets or barbecues).

- In this regard, BSC shall proceed with installation of a viewing platform and upgraded walkway and educational signage.
- RW shall update information and signage to reflect the fact that visitor access is permitted only to the viewing platform itself, not to the base of Killen Falls.
- BSC and RW shall work together on the above initiatives.

Best regards, Anthony Acret

[Records = 1712E]

From: Anthony Acret
Sent: Friday, 10 April 2015 10:16 AM
To: 'amyc@ballina.nsw.gov.au'
Subject: Emigrant Creek Dam and Killen Falls

Hi Amy

Thank you for your letter dated 23 February 2015 concerning the Emigrant Creek Dam and Killen Falls area. In your letter you suggested that you and Kelly Brown would like to catch up to discuss our respective management issues and objectives for this area – perhaps it would be good to meet on-site so that we can have our discussion following a site inspection of the area.

Suitable times for me over the next few weeks would be as follows:

Wednesday 15 April – AM or PM

Thursday 16 April – PM only

Tuesday 21 April – PM only

Friday 24 April – AM or PM

Could you please check your availability for both yourself and Kelly Brown for any of these times and let me know what may suit.

Kind regards,

Anthony Acret

Anthony Acret

Catchment Assets Manager

Rous Water

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AUSTRALIA

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Fax: (02) 6622 1181

Mob: 0428 239 540



Rous Water

REGIONAL WATER SUPPLY

BALLINA
BYRON
LISMORE
RICHMOND VALLEY

Our Ref: WF/VG: 1712.5/06 (104743) (47080)

8 July 2016

Tamara Smith MP
Member for Ballina
1/7 Moon Street
BALLINA NSW 2478

Dear Ms Smith

I am writing in reply to your letter of 23 May 2016 concerning the water level in Emigrant Creek Dam and possible impact of the dam on the downstream environment.

I have referred your letter to the General Manager of Rous Water and can advise the following response.

It is not standard practice to hold dams at 80-85 percent full to cope with flood events. Some dams are utilised as flood mitigation dams, others as water supply dams, whilst a third use is as a combined flood mitigation and water supply dam.

Those dams that are either flood mitigation dams or combined flood mitigation and water supply dams are held below top water level to provide air space that captures the first part of a flood before filling and then spilling the remainder of the flood event. These types of dams are specifically designed for that purpose.

Emigrant Creek Dam has been designed and operated as a water supply dam and therefore is kept at full supply level to ensure that it plays its part in providing the 100,000 people to whom Rous Water supplies water with a robust and secure water supply. The dam is typically held full during the wet season so that the water is available during the dryer periods of the year. Emigrant Creek Dam is quite small in capacity at 820ML. An attempt to hold it at a lower than full capacity would not provide significant flood mitigation storage and would compromise the security of the regional water supply.

It is not correct to believe that the dam adds to the effect of flooding downstream.

If the dam was not there many of the flood events in the creek would be more severe than if it was there. The dam does not add to the intensity of any flood event that passes through the dam.

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During the most recent flood on 4th and 5th June 2016, the water level in the dam rose to approximately 1.3m above the spillway crest before steadily falling back to a lower level after the intense rainfall past. This indicates that the dam actually attenuated the peak flood level and therefore the water velocities that would be experienced downstream. The spillway of the dam has been constructed to absorb the energy of the water flowing over the dam. Rous Water staff inspected the dam on Sunday morning, 5 June 2016, which is normal practice following a flood event. It was clear during that inspection that the energy of the water flowing over the spillway was being dispersed and the flow of water in the creek below the dam, whilst high, was steady and not turbulent.

Rous Water's Catchment Assets Manager, Anthony Acret, has recently inspected the creek banks between the dam and Killen Falls together with representatives of the local Landcare group and Ballina Shire Council. At this inspection, substantial stream bank erosion was observed on the outside of a bend in Emigrant Creek approximately 250m downstream of the dam, resulting in the loss of a considerable extent of trees and vegetation that has been replanted and restored by the Landcare group over the past 10 years. Review of aerial photographs over this 10-year period does highlight the substantial revegetation of the riparian areas of Emigrant Creek that has occurred over this period, but does not identify any significant change in the channel planform. Therefore, whilst clearly an undesirable situation, it is noted that this type of erosion is a natural process and (without intervention) may continue, potentially leading to the additional loss of trees before the channel and banks stabilise. It is also characteristic of the challenges faced when working in riparian areas where improvements are often 'two steps forward, one step back.'

Rous Water has previously worked in conjunction with both the local Landcare group and Ballina Shire Council in the area of Killen Falls and has developed a great working relationship. Whilst I cannot offer financial assistance to address the stream bank erosion, I am able to offer in-kind assistance to the Landcare group and Council in any effort they may make to gain a grant to address the situation including assessment and stabilisation through a combination of bank protection and revegetation along the creek.

I trust that the above both explains the role and effect of Emigrant Creek and offers assistance to the local community.

Please feel free to direct any local community members to contact Rous Water's General Manager if they wish to pursue our offer of assistance.

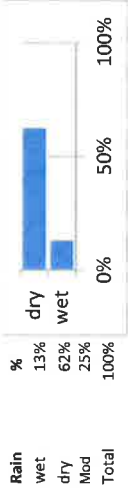
Yours faithfully



Robert Mustow
Chair

Summary Statistics:

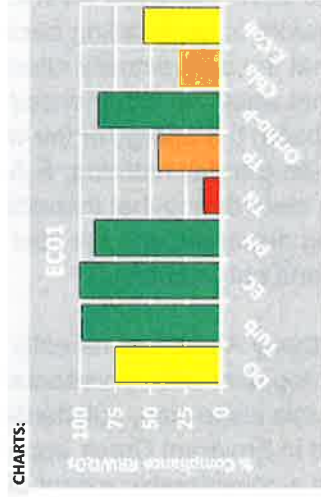
	Temp oC	DO mg/L	Turb NTU	EC ug/L	pH	TN mg/L	NOx mg/L	TKN mg/L	NH4 mg/L	TP mg/L	Ortho-P mg/L	Chla ug/L	E.Coli cfu/100ml
EC01													
Mean	20.8	6.9	8.8	99.7	6.8	0.5	0.2	0.3	0.0	0.1	0.0	18.3	624.4
Median	21.5	6.9	5.9	99.0	6.8	0.5	0.2	0.3	0.0	0.0	0.0	12.0	125.7
Minimum	11.7	1.1	1.0	37.0	5.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	3.0
Maximum	28.6	11.3	144.0	197.0	7.8	1.2	0.7	0.6	0.2	0.4	0.1	135.0	8320.0
Standard Dev	4.2	1.5	10.9	13.5	0.3	0.2	0.2	0.1	0.0	0.1	0.0	22.5	1541.6
No. samples	1245	1234	1227	1240	1244	232	77	72	226	232	230	81	80



Compliance Assessment:

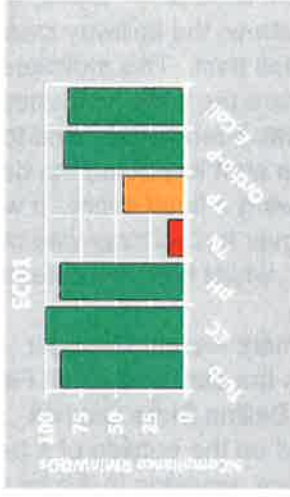
1. Richmond River WQOs (OEH, 2015):

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences	312	20	0	131	204				129	30	58	36
%non-compliance	25	2	0	11	88				56	13	72	45
%compliance	75	98	100	89	12				44	87	28	55
WQO upper	50	50	2200	8.5	0.35				0.025	0.02	5	150
WQO lower	6	6	125	6.5								
Compliance Score	Fair	Good	Good	Good	Very Poor				Poor	Good	Poor	Fair



2. Rous Water Risk Minimisation Objectives:

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences		134	0	131	204				129	30		13
%non-compliance		11	0	11	88				56	13		16
%compliance		89	100	89	12				44	87		84
WQO upper		15	800	8.5	0.35				0.025	1.025		500
WQO lower				6.5								
Compliance Score		Good	Good	Good	Very Poor				Poor	Good		Good

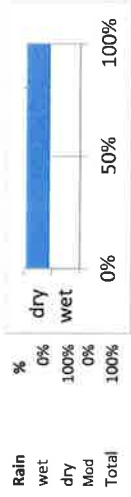


3. Rous Water Risk Removal Objectives:

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences			0	1094					194	110		80
%non-compliance			0	88					84	48		100
%compliance			100	12					16	52		0
WQO upper			500	6.5					0.02	0.01		1
WQO lower				5.7								
Compliance Score			Good	Very Poor					Very Poor	Fair		Very Poor



Summary Statistics:



EC01	Temp oC	DO mg/L	Turb NTU	EC ug/L	pH	TN mg/L	NOx mg/L	TKN mg/L	NH4 mg/L	TP mg/L	Ortho-P mg/L	Chla ug/L	E.Coli cfu/100mL
Mean	20.2	7.1	7.2	100.7	6.8	0.5	0.2	0.3	0.0	0.0	0.0	19.9	151.4
Median	20.4	7.2	5.6	100.0	6.9	0.5	0.2	0.3	0.0	0.0	0.0	15.0	66.0
Minimum	11.7	2.8	1.0	62.0	5.6	0.1	0.0	0.1	0.0	0.0	0.0	3.0	3.0
Maximum	28.6	11.3	79.3	168.0	7.8	1.0	0.4	0.6	0.2	0.3	0.0	135.0	2600.0
Standard Dev	4.3	1.5	6.8	12.2	0.3	0.2	0.1	0.1	0.0	0.0	0.0	24.2	384.8
No. samples	774	771	766	773	773	129	54	50	124	129	127	47	45

Compliance Assessment:

1. Richmond River WQOs (OEH, 2015):

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences	174	4	0	65	107				62	9	36	11
%non-compliance	23	1	0	8	83				48	7	77	24
%compliance	77	99	100	92	17				52	93	23	76
WQO upper		50	2200	8.5	0.35				0.025	0.02	5	150
WQO lower		6	125	6.5								
Compliance Score	Good	Good	Good	Good	Very Poor				Fair	Good	Very Poor	Good

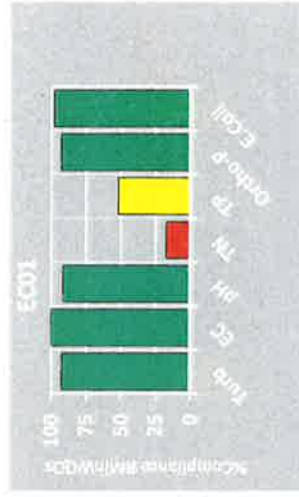
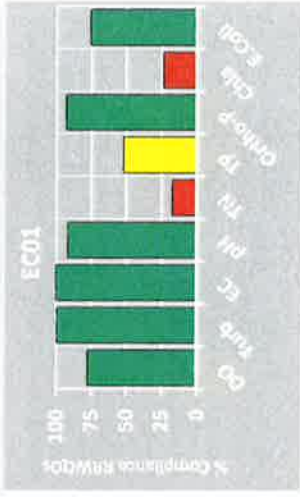
2. Rous Water Risk Minimisation Objectives:

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences		58	0	65	107				62	9		1
%non-compliance		8	0	8	83				48	7		2
%compliance		92	100	92	17				52	93		98
WQO upper		15	800	8.5	0.35				0.025	1.025		500
WQO lower				6.5								
Compliance Score		Good	Good	Good	Very Poor				Fair	Good		Good

3. Rous Water Risk Removal Objectives:

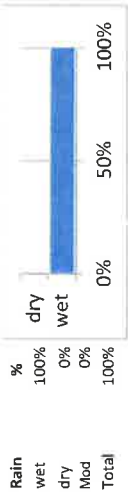
Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences			0	697					113	60		45
%non-compliance			0	90					88	47		100
%compliance			100	10					12	53		0
WQO upper			500	6.5					0.02	0.01		1
WQO lower				5.7								
Compliance Score			Good	Very Poor					Very Poor	Fair		Very Poor

CHARTS:



Summary Statistics:

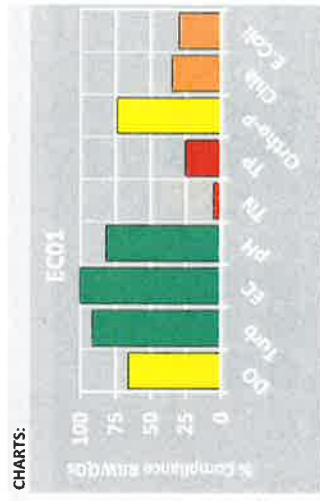
EC01	Temp oC	DO mg/L	Turb NTU	EC ug/L	pH	TN mg/L	NOx mg/L	TKN mg/L	NH4 mg/L	TP mg/L	Ortho-P mg/L	Chla ug/L	E.Coli cfu/100ml
Mean	22.1	6.3	17.6	92.9	6.7	0.6	0.4	0.4	0.1	0.1	0.0	16.6	1424.0
Median	23.1	6.3	9.7	96.0	6.7	0.6	0.4	0.4	0.1	0.1	0.0	8.5	400.0
Minimum	14.7	1.1	1.9	37.0	5.9	0.2	0.2	0.2	0.0	0.0	0.0	0.0	12.0
Maximum	28.0	9.3	144.0	133.0	7.3	1.2	0.7	0.6	0.2	0.4	0.1	108.0	8320.0
Standard Dev	3.3	1.4	22.1	17.2	0.2	0.3	0.2	0.1	0.0	0.1	0.0	21.8	2388.0
No. samples	162	160	160	162	162	80	14	14	80	80	80	26	27



Compliance Assessment:

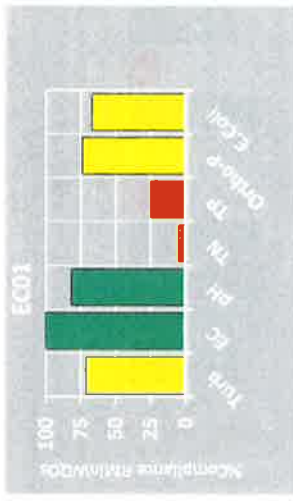
1. Richmond River WQOs (OEH, 2015):

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences	55	14	0	30	76				60	21	17	19
%non-compliance	34	9	0	19	95				75	26	65	70
%compliance	66	91	100	81	5				25	74	35	30
WQO upper	50	50	2200	8.5	0.35				0.025	0.02	5	150
WQO lower	6	6	125	6.5								
Compliance Score	Fair	Good	Good	Good	Very Poor				Poor	Fair	Poor	Poor



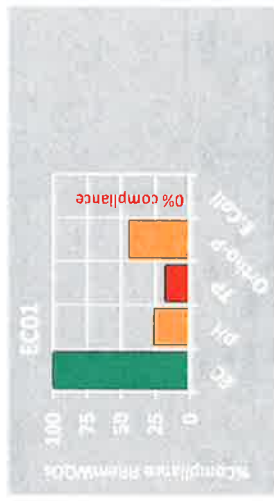
2. Rous Water Risk Minimisation Objectives:

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences		47	0	30	76				60	21		9
%non-compliance		29	0	19	95				75	26		33
%compliance		71	100	81	5				25	74		67
WQO upper		15	800	8.5	0.35				0.025	1.025		500
WQO lower				6.5								
Compliance Score		Fair	Good	Good	Very Poor				Poor	Fair		Fair



3. Rous Water Risk Removal Objectives:

Temp	DO	Turb	EC	pH	TN	NOx	TKN	NH4	TP	Ortho-P	Chla	E.Coli
No. of exceedences			0	121					66	45		27
%non-compliance			0	75					83	56		100
%compliance			100	25					18	44		0
WQO upper			500	6.5					0.02	0.01		1
WQO lower				5.7								
Compliance Score			Good	Poor					Very Poor	Poor		Very Poor



APPENDIX C

OEH submission



Our Ref: DOC17/20117
Your Ref: Killen & Tosha Falls Plans of Management (316-04)

Mr Paul Hickey
General Manager
Ballina Shire Council
PO Box 450
Ballina NSW 2478

Attention: Jessica Saad Property Officer

Dear Mr Hickey

Re: Plans of Management for Killen and Tosha Falls, Ballina.

Thank you for your letter dated 22 December 2016 requesting initial feedback on key issues or considerations to assist in the development of the Killen and Tosha Falls Plans of Management (plans). The Office of Environment and Heritage (OEH) appreciates the opportunity to provide input.

The OEH has responsibilities relating to biodiversity, Aboriginal and historic heritage, National Parks and Wildlife Service estate, acid sulfate soils, flooding, coasts and estuary management. In response to this request, the OEH advises that the following comments are provided in relation to Aboriginal cultural heritage and biodiversity (including threatened species, populations, ecological communities, or their habitats).

1. Aboriginal cultural heritage (ACH)

The OEH advises that natural features in the landscape such as Tosha and Killen Falls may potentially have significant cultural values requiring additional consideration.

The OEH recommends:

- a) That consultation is undertaken with the local Aboriginal community representatives and/or knowledge holders to assess any cultural values within the area to inform the plan, the *Aboriginal Consultation Requirements for Proponents 2010* can be used as a guideline to assist with this process.
- b) A review of known ACH values, including the significance of Aboriginal objects and declared Aboriginal places, which exist within the local area. The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (OEH, 2010) can be used as a guideline to this process.
- c) The design and location of infrastructure and any axillary services to avoid actual or likely harm to ACH values in consultation with the local Aboriginal community.

- d) The plans should consider appropriate management of ACH values if relevant and address any sensitives requested by the local Aboriginal Community.

2. Biodiversity

In regards to biodiversity values, the OEH acknowledges that both Tosha and Killen Falls are located within highly modified landscapes, therefore any biodiversity values which exist in the riparian corridor are highly significant.

The OEH recommends:

- a) Biodiversity values at the falls are clearly identified, in that threatened species, populations, ecological communities and their habitat listed under the *Threatened Species Conservation Act 1995* are acknowledged in the early stages of the planning.
- b) The design and placement of infrastructure is sensitive to the riparian corridor and identified biodiversity/ecological values.
- c) The biodiversity values and ecosystem functions are preserved/improved over time and form part of the plans objectives and performance targets.
- d) Threatening processes and applicable aspects of recovery plans for threatened species and ecological communities present or with the potential to utilise (or recover) are included in detailed onsite actions (e.g. reducing trampling, weed control and rehabilitation of riparian vegetation communities).

Note: Consultation with Department of Primary Industry - Water and Fisheries is advised as activities proposed may occur in waterfront lands and affect species listed under the *Fisheries Management Act 1994*.

If you have any further questions about this issue, Ms Rachel Binskin, Regional Operations Officer, Regional Operations, OEH, can be contacted on 6659 8247 or at rachel.binskin@environment.nsw.gov.au.

Yours sincerely



31/1/2017

ROSALIE NEVE
A/Senior Team Leader Planning, North East Region
Regional Operations

Contact officer: RACHEL BINSKIN
6659 8247

APPENDIX D

Summary of early neighbour consultation and survey consultation

Killen Falls Neighbours Consultation Summary

Level of Use/Popularity

All neighbours agree that the popularity of Killen Falls has jumped considerably over the last five years or so. Many remember the site as being a “locals place” that not many people knew about. Early photos show the site before rainforest regeneration as open grazing land that was used by locals as a swimming hole.

Up to 70 cars parked along Killen Falls Drive in summer school holidays has occurred in recent times, and up to fifty people swimming in the pool below the waterfall. Buses now bring tour groups to the falls as well. Some people stay and swim and picnic and hang around for hours. Social media has raised the awareness of the site massively.

This level of usage brings specific issues and problems for locals that are dealt with in the following sections.

Trespass and Privacy

Trespass has been observed along the fence with the Lane property and in the Rous Water operational area near and around the dam wall. The James property (north side of creek) has been the subject of many trespass issues with people walking across the creek bed to access their macadamia farm. Personal items have been stolen from the farm as well. People have picnicked on the northern side on private land and attempted to abseil off the cliffs from the northern side without permission.

Privacy is a concern to those closest to the car park and access trail. It most impacts the Bester and Lane families, and has resulted in installation of gates and better fencing to control random access. Noise from the car park, trail and creek can also impact on peaceful enjoyment of the locality, particularly at night or in the evening.

Killen Falls Drive and Other Access Options

Currently all vehicles access the site via Killen Falls Drive (KFD). It is not marked with a speed sign until about half way along and then it is 10 km/hr. Cars often speed down the road and then break hard when they meet pedestrians, a full car park or cars manoeuvring to park or leave. There are a lot of near misses.

Traffic calming devices are supported to slow vehicles right from the turn-off. Should be 20 km/hr from the start. There have been vehicle and bus accidents along KFD and its surprising there has not been more.

There is no place for buses or caravans to turnaround and no sign stating it's not suitable for them.

One land owner suggested that an alternative road access be investigated along the northern side of Killen Falls to reduce traffic impacts on KFD. The owner of the land on the northern side does not support this idea as it will:

- impact heavily on a commercial macadamia plantation located on prime agricultural land,
- be environmentally disruptive to a genuine Big Scrub remnant rainforest area,
- be constructed entirely within the Emigrant Creek dam catchment,
- be expensive to purchase the land (more than 1 km long plus a car park area)
- be expensive to build due to the length of road and a gully crossing,
- impact heavily on privacy due to existing house location,
- transfer the same issues from the southern side of Emigrant Creek to the northern side,
- require maintenance of two access roads as KFD will remain open.

Friday Hut Road

All vehicles reach Killen Falls Drive (KFD) via Friday Hut Road (FHR). The intersection between KFD and Friday Hut Road is on a bend with poor sight lines and is not marked as being the turn-off for Killen Falls. Many vehicles overshoot the intersection and then either do a U-turn on a bend or simply reverse back along a blind corner. Rear-end accidents have occurred and near misses are common. FHR is an 80 km/hr road at this point and this may be too fast.

Generally, FHR is a narrow rural road that has narrow verges and is not designed to take the vehicle traffic generated by Killen Falls. It should be widened and fixed up.

Parking

Parking is a consistent issue among residents of Killen Falls Drive. It is of particular concern to the houses closest to the car park as overflow parking occurs along the frontage to their properties on many days of the year. Grass and plants are destroyed, soil is disturbed and eroded, and landscaping is damaged. Cars park illegally in landscaped areas and turning areas.

Some residents think that parking should be time-limited to discourage the long day stayers and overnight stayers (others oppose time limitations). Some suggested that paid parking might work. Both would require enforcement by Council to be effective. It could generate much needed funds to maintain the locality.

Some suggested more parking in the form of designated overflow spaces and better signage indicating where not to park (like left-hand side of car park and in front of signage). Others oppose more parking as it will encourage more visitors.

Car park should be a 10 km/hr shared zone with speed controls to slow cars down and make it safer for pedestrians.

Toilets

The neighbours and land owners in the area are divided on whether a permanent toilet should be provided. Most have observed faeces and toilet paper in the bush around the car park and trail, and on private property in some instances. Those who favour it support some sort of composting or eco toilet located in the car park somewhere discreetly. Some support it reluctantly due to the obvious need. Would it be needed if there was no swimming at Killen Falls?

Those that oppose it believe it will make the site attractive to more visitors and tour groups, and to overnight campers. Social media will ensure it becomes a camp site. They oppose a toilet and suggest actions be taken to reduce and discourage the visitation instead.

Tracks and Track Related Signage

Some neighbours commented that the track to the viewing platform is in poor condition, is slippery after rain and has numerous trip hazards. Others consider it is adequate as is. The track from the viewing platform down to the creek is worse because it is rough and steep. An ambulance has been called for an injured person in the past (no details provided of injury or date).

Track upgrades and maintenance are required. Site users also need to be kept on the track and out of rainforest rehabilitation areas, both for their safety and the environment.

One neighbour feels very strongly that the track beyond the viewing platform should be closed and fenced so that there is no access to the bottom of the falls for swimming or whatever. Others consider this is either unfair or unrealistic in that it could never be maintained and prohibitions cannot be readily enforced. Fences erected to stop access to the bottom of the falls have been removed regularly in the past.

Dogs

Dogs are currently permitted on a lead at the site and some users don't keep their dogs on leads. There is a suggestion that permitting dogs into a natural area undergoing rehabilitation and adjacent to a Big Scrub remnant is inconsistent. There are no dog faeces bags at the garbage bin location.

Environmental Restoration and Wildlife

The continuing rehabilitation and protection of the Council riparian land is supported by neighbouring land owners. Many have worked hard for many years in local landcare groups

to change the area from open grassland and camphor laurel to a regrowth rainforest. The Killen Falls Vegetation Restoration Management Plan undertaken in 2004, documents the site and what has been done. Numerous birds, reptiles, amphibians and mammals have all been documented as using the site. High visitation and access to the bottom of the falls has impacted, in particular, on the roosting caves once used by micro bats.

Water Quality and Swimming

Many locals and visitors have swum in Emigrant Creek below Killen Falls regularly, with little evidence of sickness related to water quality (ear aches, etc).

Blue-green algae have been recorded in Emigrant Creek at this locality, and swimming should not be permitted while it is present. It is most common in warm weather when swimming is popular. The absence of a warning system to tell people is a reason that some neighbours consider that swimming should be prohibited.

Large numbers of people swimming in the pool below the falls will result in water pollution from sunscreen and urine.

Anecdotally, the creek still contains Australian Bass, Freshwater Mullet and Herring as well as eels, turtles and platypus.

Rous Water has collected water samples regularly near the bottom end of Emigrant Creek Dam, which is about 400 metres upstream of the falls. Water quality data is attached at Appendix G.

Rubbish

Many neighbours pick up rubbish left behind on tracks and in the parking area or thrown into private property. This action keeps it under control, so it could be worse. Some neighbours observe that the litter problem is becoming worse, despite there being two wheelie bins in the car park. People do take food and drink to the pool below the falls.

Jumping and Abseiling

The pool below the falls is shallow and very rocky, and the drop from the waterfall is considerable (perhaps 10 metres). There is no anecdotal history of users jumping from the waterfall into the pool.

One neighbour observed users preparing to abseil down the cliff face on the northern side and requested them to leave the private property.

Safety and Risk

A number of neighbours raised safety and risk issues. Slip and trip type injuries are possible, both when using the tracks and getting in and out of the water. Some people leave the track to access the upper creek bed and the top of the falls, which is dangerous. Venomous snakes are an issue in hot weather. Drowning is possible in any water body if people choose to swim.

Most neighbours cite the road and car park as a major risk area, with vehicles and pedestrians involved in close calls all the time.

Other Issues

The negative impact on property values created by increased visitation and congestion was raised as a concern by one neighbour.

Making the locality an alcohol free zone was suggested to reduce its attraction for some visitors.

Stealing from cars was cited as an issue that has been observed in the car park, which resulted in the police being called.

Promotion of the site by Ballina Shire Council and the media is opposed as it increases visitation and makes things worse.

Killen Falls – Survey Summary

Introduction

A survey was collected from the public through January and February 2017, to gain an idea of the range of people that use Killen Falls, the way in which they use it, and the community's values in regards to the falls. It is important to note that the results collected in this survey represent a snapshot in time and are not statistically accurate due to sample size and methodology.

The survey asked nine (9) questions as follows:

1. *What is your postcode at your regular place of residence? (or country of residence if from overseas)?*
2. *How often do you visit Killen Falls?*
 - a. *Less than five times per year*
 - b. *Between five and ten times per year*
 - c. *More than ten times per year*
3. *When you visit Killen Falls who do you travel with?*
 - a. *Family*
 - b. *Friends*
 - c. *Children*
 - d. *On my own*
 - e. *A tour group*
4. *Do you swim at Killen Falls?*
 - a. *Yes*
 - b. *No*
5. *Do you access the viewing platform at Killen Falls?*
 - a. *Yes*
 - b. *No*
6. *What makes Killen Falls special for you?*
7. *What changes, facilities or infrastructure (if any) would most improve Killen Falls?*
 - a. *A toilet*
 - b. *More parking*
 - c. *Better walking trail to viewing platform*
 - d. *Better walking trail to creek*
 - e. *Vehicle speed controls on Killen Falls Road*
 - f. *Other (please specify)*
8. *Do you want to make any other comments about Killen Falls?*

Collection Methods

Two methods were used to collect survey information:

- The survey could be accessed online on SurveyMonkey from 1 January 2017 to 10 February 2017 using the following link:
<https://www.surveymonkey.com/r/MDR5V9M>
- The public were made aware of the survey through Council's website. A press release was issued by Council on 9 January 2017, and it was subsequently run in *The Northern Star* and on Channel 7 and Channel 9 local TV news.
- On 22 January 2017 from 10 am to 2 pm, surveys were collected on-site. Users of the falls were approached to answer the survey questions.

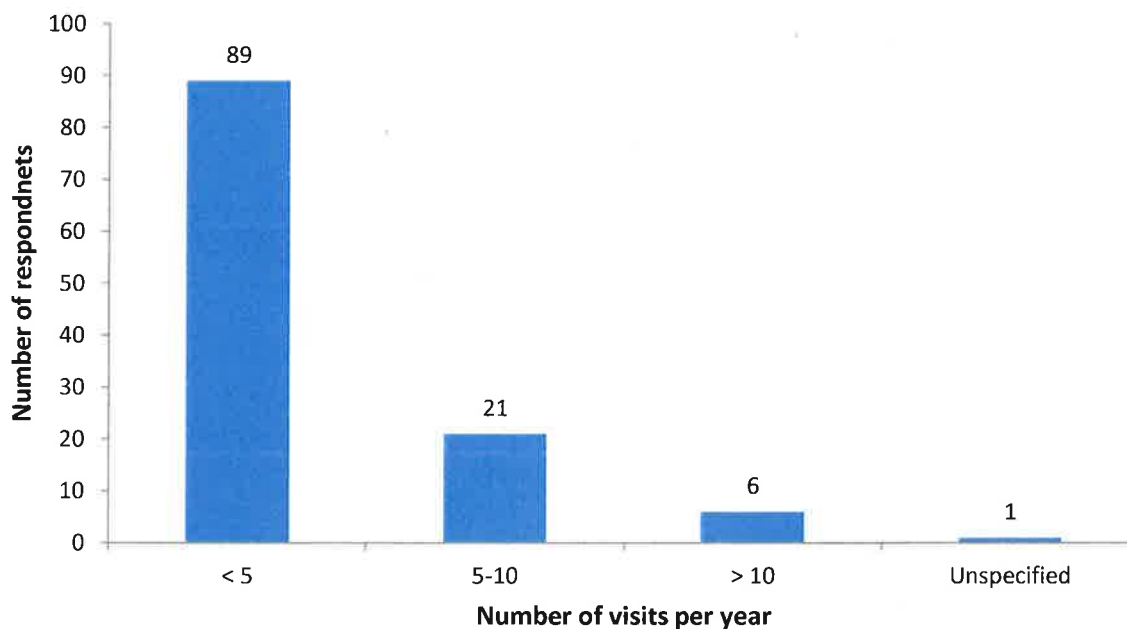
Summary of Results

Number of responses collected	
Online	40
On-site	78
Total responses collected	118

Respondents' place of residence	
Place of residence	Number of respondents
Ballina/Lennox Head/Tintenbar area – 2478	26
Alstonville area – 2477	9
Lismore area – 2480	3
Byron Bay area – 2481	4
Bangalow/Newrybar area – 2479	7
Brunswick Heads/Ocean Shores area – 2483	3
Kingscliff/Pottsville area – 2487, 2489	5
Tabulam area – 2469	1
Coraki area – 2471	1
Gold Coast area, QLD – 4213, 4218, 4225	3
Brisbane area – 4065, 4128, 4151, 4165, 4178, 4184	9
Sydney area – 2118, 2203, 2234, 2567, 2570,	6
Central Coast area, NSW – 2250, 2251	3
Wagga Wagga area – 2650	1
Parkes area – 2870	2
Melbourne area – 3070, 3122, 3155, 3187	5
Cairns area, QLD – 4877	2
Western Australia – 6112, 6282	2

Respondents' place of residence	
Place of residence	Number of respondents
Australia	1
Canada	1
England	7
Germany	2
Spain	2
Switzerland	5
Not specified	8
Total number of respondents	118

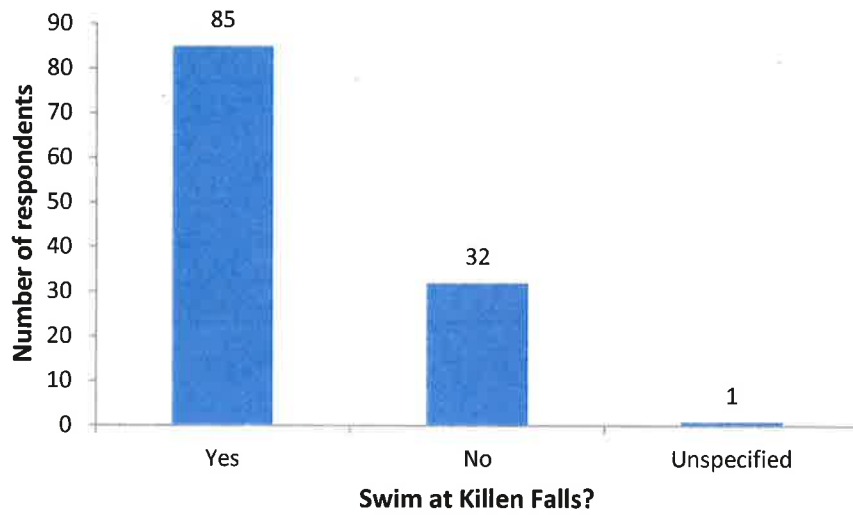
Number of visits per year by respondents



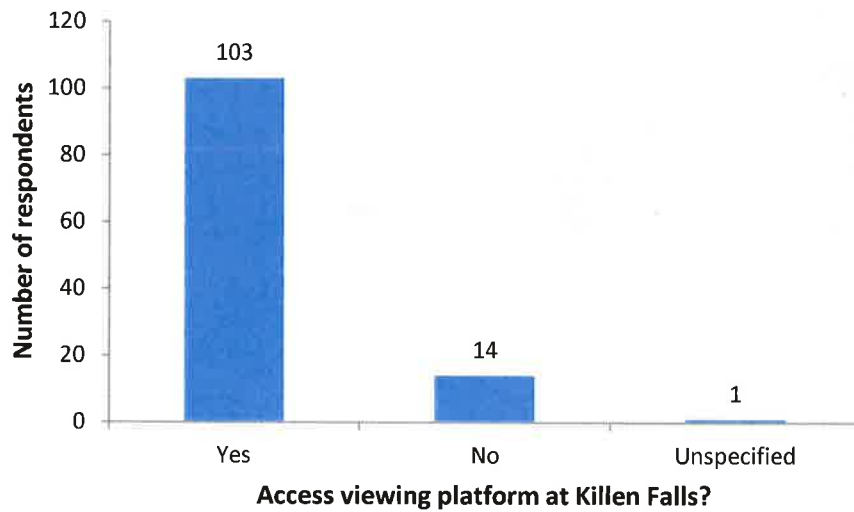
Who do respondents visit Killen Falls with?

- 71** of 118 respondents visit with their **family**
- 102** of 118 respondents visit with **friends**
- 14** of 118 respondents visit **with children**
- 13** of 118 respondents visit **on their own**
- 2** of 118 respondents visited with a **tour group**
- 1** of 118 respondents **did not specify** who they visit with

Do respondents swim at Killen Falls?



Do respondents access the viewing platform at Killen Falls?



Aspects of Killen Falls that respondents find most special

Amazing view/scenery
Natural beauty/natural setting of the falls and surrounds
Natural asset
Unique spot
The wilderness
Bird life
Natural resource and recreation area
The healthy/beautiful rainforest
Peacefulness/serenity/quietness
Good vibes/energy
Feeling of seclusion and lack of people
Easily accessible
Close proximity to respondents' homes
It's a local swimming spot
A large waterfall so close to home
Ability to access under the waterfall
The waterfall itself
Great spot to swim
Safe spot to swim
Fun for kids
Cool freshwater
Cool surrounds
Unpolluted environment
Walk/hike to the falls
Rough path to the falls is special
Walk to the falls feels like an adventure
Short walk with kids
Dogs are allowed
Different experience to the beach
Great photo opportunities
Not a major tourist feature
It's not special anymore, but it used to be when it was secluded, quiet and had less visitors
Personal ancestral links to the site
Using the fall for years
Helped to regenerate the area to allow visitation by people
Indigenous significance of the area

Improvements that could be made to Killen Falls	
Improvement	Number of respondents
Road	
Maintenance of Friday Hut Road – mow grass and repair shoulders	2
Better road signage	1
Vehicle speed controls	19
Access	
Better walking trail to creek	50
Better walking trail to viewing platform	23
Add gravel to paths to the falls	1
Handrails	2
More parking	34
Paid parking	1
Disabled parking	1
Longer trail walk and activities	2
Amenities	
Toilet	63
Bins	2
Cafe	5
Picnic area with tables	1
Seating along the viewing platform for the less able visitors	1
Boardwalk to the middle of the swimming hole so you don't have to scramble over rocks	1
Limit numbers of people	
Nothing – more infrastructure will increase the number of people visiting	8
Remove advertising from the Ballina Guide	
Close it to the public	2
Prohibit swimming	
Fencing	
Better fencing – to prevent access to the top and bottom of the falls	2
Repair existing wire fencing	1
	1
Signage	
Signage asking people to take rubbish with them and take care of the falls	2
Wildlife signs along Friday Hut Road	1
Interpretive signage on key environmental features of site	1
Sign saying how far the falls are from the car park	1
Environmental protection	
Environmental restoration	1
Ranger presence to supervise and ensure rubbish is not left behind	1
Other	
Make it a commercial swimming hole, like Radium Springs in Canada	1

Other comments
No changes
Leave it as it is. No changes are needed
Don't change the walking trail – it's part of the appeal
More amenities, upgrades, etc, will ruin its natural beauty and appeal
Simple improvements, don't overdo it
It's special because it's relatively untouched by man – keep it natural
Visitors and numbers
Don't promote it or improve infrastructure– too many people coming to it will wreck it. Keep it as a special spot for locals
It's really crowded and busy and being loved to death – unsustainable
No backpackers
Keep it a secret
Promote it
Maintenance and improvements
No toilets as campers will start using the site
NPWS style facilities – drop toilets, low scale unpaved parking, and walking tracks
One toilet will suffice
Facilities similar to Victoria Park would be appropriate
More water
Signage poor
Natural environment and habitat
Walking platform along creek and better track so soil is not eroded
Protect it by zoning an environmental zone
Preserve its natural ambience and as a natural spot
Vegetation has been damaged
Often smells like a urinal and tourists defecate here – hygiene needs addressing
Lots of rubbish at the falls
Need to protect it from misuse and maintain it
Swimmers are killing off wildlife and damaging the rainforest
Weed control and revegetation is needed
Water and surrounding environment aren't as clean as they once were
Ambience and feel
Amazing
Don't increase parking too much – it will detract from going to the falls
Too many cars parking on a quiet country road
The quiet surrounds and the small number of people that visit makes it special
Behaviour
Dangerous driving; will cause a fatality soon
Bad behaviour by some
Some people leave lots of rubbish
Access
Improve access so it's equitable to all abilities
Leave the track soft and as is
Keep track to creek harder and rougher than track to platform
Access to the bottom of the falls should be stopped

Other comments

Traffic and cars

Friday Hut Road and Killen Falls Road are degraded and unsafe due to the high number of cars and dangerous driving going to and from falls

Other

Loved it

Kids loved it

Hope this survey is to genuinely improve the amenities and not just to satisfy complaints by neighbours

Slippery rock

APPENDIX E

Killen Falls Drive traffic counts

MetroCount Traffic Executive Weekly Vehicle Counts

WeeklyVehicle-445 -- English (ENA)

Datasets:

Site: [14915] KILLEN FALLS DR ,AT ENT.TO CARPARK
Attribute: FERNLEIGH
Direction: 5 - South bound A>B, North bound B>A, Lane: 0
Survey Duration: 9:30 Monday, 12 December 2016 => 8:45 Friday, 23 December 2016,
Zone:
File: 14915 0 2016-12-23 0845.EC0 (Plus)
Identifier: A692TXND MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default axle (v4.06)
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: 9:31 Monday, 12 December 2016 => 8:45 Friday, 23 December 2016 (10.9684)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound), P = North
Separation: Headway > 0 sec, Span 0 - 100 metre
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile: Vehicles = 1444 / 1617 (89.30%)

Weekly Vehicle Counts

WeeklyVehicle-445

Site: 14915.0.1SN

Description: KILLEN FALLS DR ,AT ENT.TO CARPARK

Filter time: 9:31 Monday, 12 December 2016 => 8:45 Friday, 23 December 2016

Scheme: Vehicle classification (AustRoads94)

Filter: CIs(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages		
	12 Dec	13 Dec	14 Dec	15 Dec	16 Dec	17 Dec	18 Dec	1	5	1 - 7
0000-0100	*	0	1	0	0	0	0	0	0.3	0.2
0100-0200	*	0	0	0	0	0	0	0	0.0	0.0
0200-0300	*	0	0	0	0	0	0	0	0.0	0.0
0300-0400	*	0	0	0	0	0	0	0	0.0	0.0
0400-0500	*	0	0	0	0	0	0	0	0.0	0.0
0500-0600	*	0	1	0	0	0	0	0	0.3	0.2
0600-0700	*	0	1	2	0	0	1	1	0.8	0.7
0700-0800	*	1	0	2	2	2	3	3	1.3	1.3
0800-0900	*	1	4	3	4	4	4	4	3.0	2.7
0900-1000	4	5	6	5	5	8	8	8	5.6	5.6
1000-1100	8	18	13	15	13	17	13	13	13.4	13.9
1100-1200	10	31	19	16	14	26	16	16	18.0	18.9
1200-1300	11	17	24	26	25	26	11	11	20.6	20.0
1300-1400	21	16	16	18	13	13	19	19	16.8	16.6
1400-1500	28	10	16	17	24	9	18	18	19.0	17.4
1500-1600	15	19	12	14	10	14	14	14	14.0	14.0
1600-1700	11	10	9	7	14	4	9	9	10.2	9.1
1700-1800	7	8	9	3	5	7	3	3	6.4	6.0
1800-1900	8	7	2	6	2	8	1	1	5.0	4.9
1900-2000	2	2	2	2	0	2	1	1	1.6	1.6
2000-2100	0	0	0	0	0	0	0	0	0.0	0.0
2100-2200	0	0	0	0	0	0	3	3	0.0	0.4
2200-2300	0	0	0	0	0	0	3	3	0.0	0.4
2300-2400	0	1	0	0	0	0	0	0	0.2	0.1
Totals										
0700-1900	*	143	130	132	134	127	119		133.3	130.3
0600-2200	*	145	133	136	134	129	124		135.6	133.0
0600-0000	*	146	133	136	134	129	127		135.8	133.5

0000-0000	*	146	135	136	134	129	127	136.3	133.9
AM Peak	*	1100	1100	1100	1100	1100	1100		
	*	31	19	16	14	26	16		
PM Peak	1400	1500	1200	1200	1200	1200	1300		
	28	19	24	26	25	26	19		

* - No data.

0000-0000	140	121	156	93	*	*	127.3	127.3
AM Peak	1100	1100	1100	1100	*	*		
	22	18	27	18	*	*		
PM Peak	1200	1400	1400	1300	*	*		
	23	17	22	15	*	*		

* - No data.

APPENDIX F

Australian Walking Track Grading System

Australian Walking Track Grading System

NSW national parks offer hundreds of walking tracks across the state for all levels and experiences. To help you find walks best suited to your needs, tracks are graded using the Australian Walking Track Grading System (AWTGS).

AWTGS classifies tracks into 5 grades, based on the Australian Standard for walking track construction (AS 2156). It was funded and developed by a Victorian Government initiative, in partnership government agencies and non-government groups across Australia, including NSW National Parks.

How a track gets its grade

The grading system assesses a walk's difficulty based on several criteria, including: experience required, steps, gradient, path quality and signage. The walk's final grade is based on the most difficult of these 5 criteria, rather than an average. So some walks will have criteria that meet an easier grade.

Take a look at our guide below, and before your next adventure ask yourself 'is this walk suitable for me?'



Grade 1

No bushwalking experience required. Flat even surface with no steps or steep sections. Suitable for wheelchair users who have someone to assist them. Walks no greater than 5km.



Grade 2

No bushwalking experience required. The track is hardened or compacted surface and may have a gentle hill section or sections and occasional steps. Walks no greater than 10km.



Grade 3

Suitable for most ages and fitness levels. Some bushwalking experience recommended. Tracks may have short steep hill sections a rough surface and many steps. Walks up to 20km.



Grade 4

Bushwalking experience recommended. Tracks may be long, rough and very steep. Directional signage may be limited.



Grade 5

Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. Tracks are likely to be very rough, very steep and unmarked. Walks may be more than 20km.

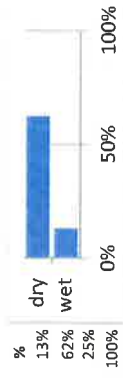
APPENDIX G

**Rous water quality information
– Emigrant Creek storage**

Summ Statistics:

	Temp oC	DO mg/L	Turb NTU	EC ug/L	pH	TN mg/L	NOx mg/L	TKN mg/L	NH4 mg/L	TP mg/L	Ortho-P mg/L	Chla ug/L	E.Coli cfu/100mL
Mean	20.8	6.9	8.8	99.7	6.8	0.5	0.2	0.3	0.0	0.1	0.0	18.3	624.4
Median	21.5	6.9	5.9	99.0	6.8	0.5	0.2	0.3	0.0	0.0	0.0	12.0	125.7
Minimum	11.7	1.1	1.0	37.0	5.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	3.0
Maximum	28.6	11.3	144.0	197.0	7.8	1.2	0.7	0.6	0.2	0.4	0.1	135.0	8320.0
Standard Dev	4.2	1.5	10.9	13.5	0.3	0.2	0.2	0.1	0.0	0.1	0.0	22.5	1541.6
No. samples	1245	1234	1227	1240	1244	232	77	72	226	232	230	81	80

Rain
wet
dry
Mod
Total



APPENDIX H

Site photographs and infrastructure examples

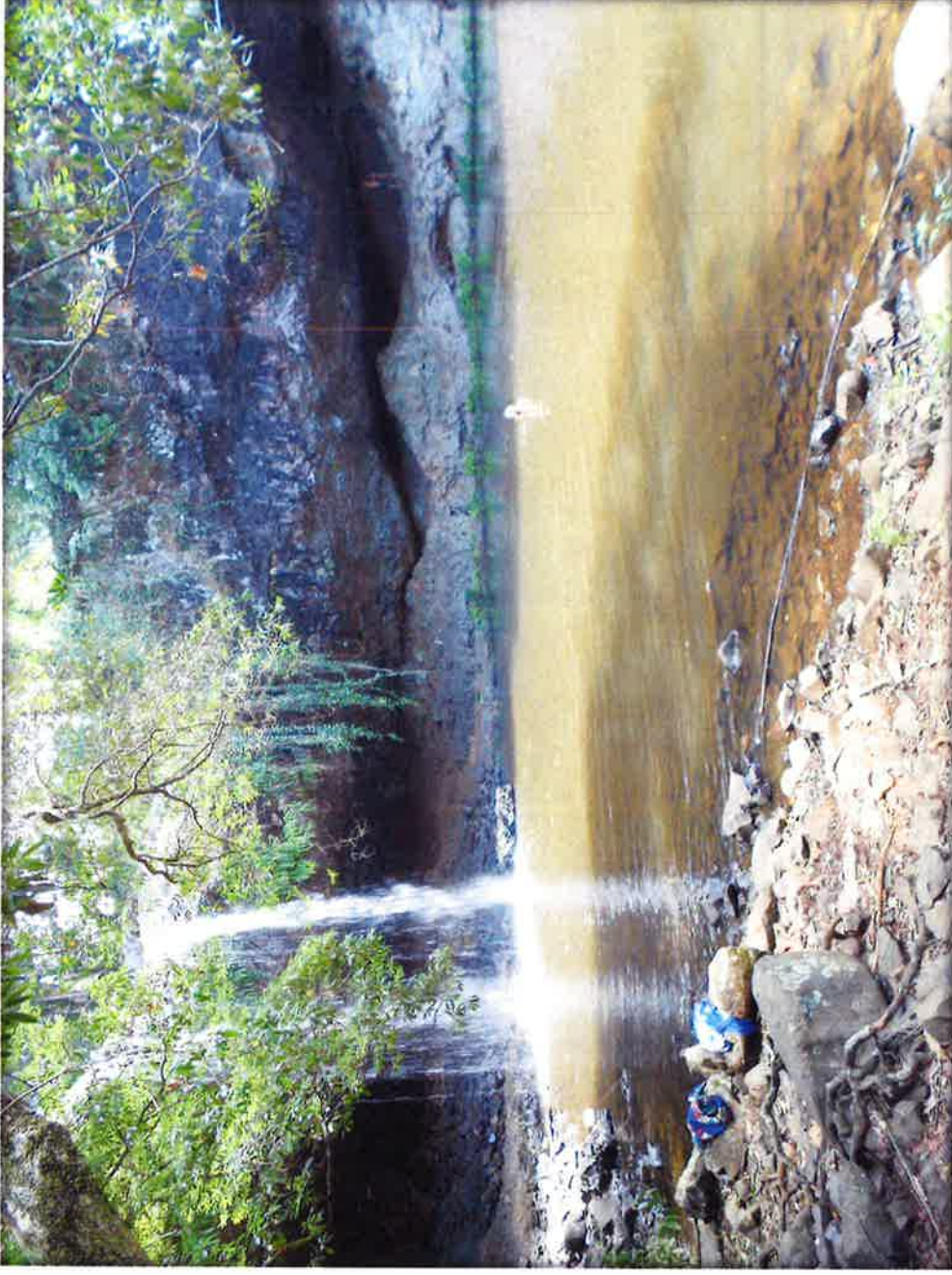


Figure 1: Swimming in the shallow pool is popular, despite the access and water quality



Figure 2: Viewing platform is well used

Appendix H:
Site Photographs and Infrastructure Examples

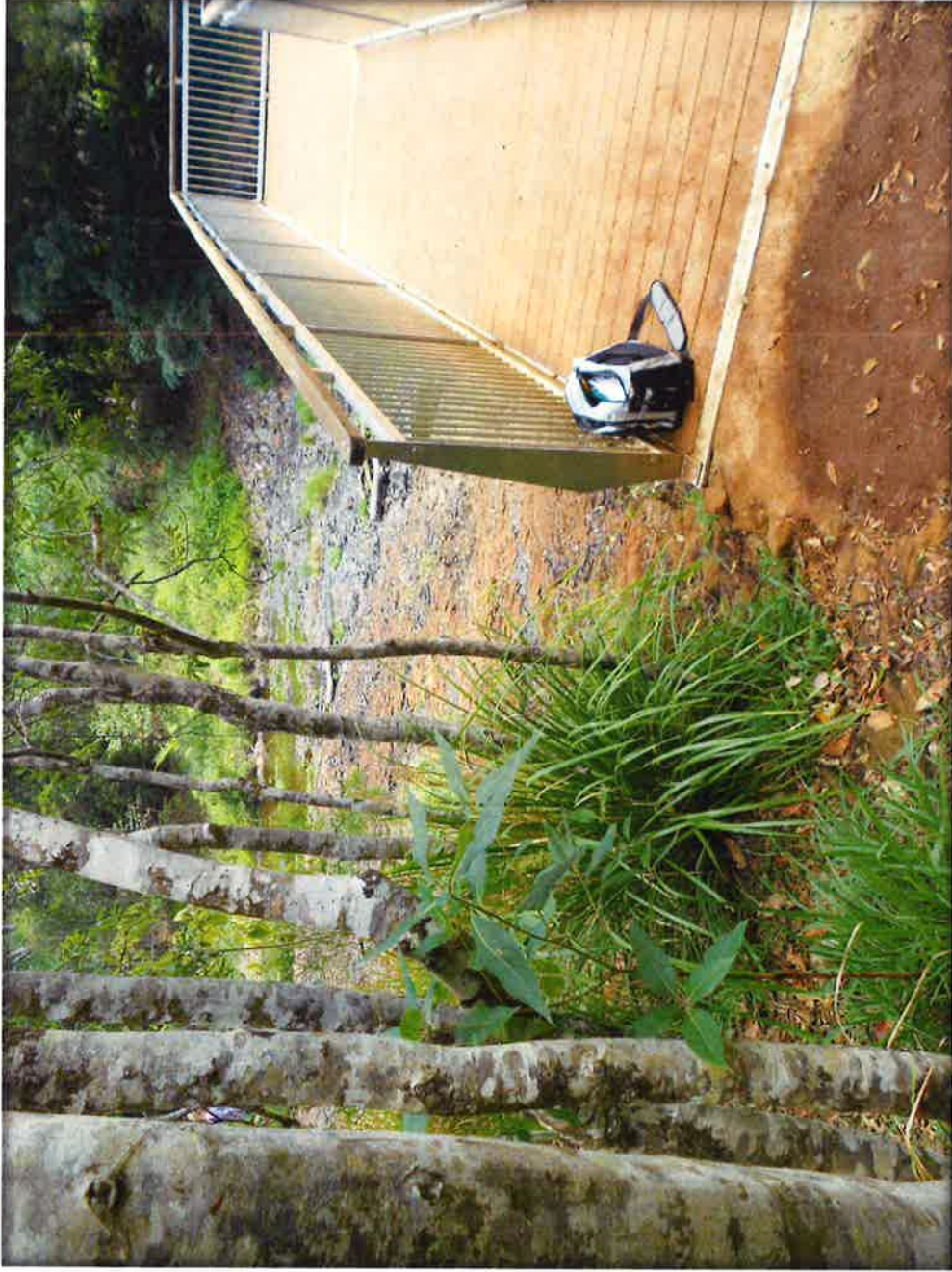


Figure 3: This gap next to the viewing platform needs to be fenced and signposted



Figure 4: Side track to creek that needs to be fenced and signposted



Figure 5: Safety sign that needs to also warn about water quality and swimming



Figure 6: Existing signage has limited information



Figure 7: Replace rotten top on existing seat



Figure 8: Location for a permanent toilet at northern end of car park

Appendix H:
Site Photographs and Infrastructure Examples



Figure 9: Portaloos trialled for 3 months in 2016/17



Figure 10: Existing 9-space car park

Appendix H:
Site Photographs and Infrastructure Examples



Figure 11: Heavily used track has significant trip hazards



Figure 12: Heavily used track has a poor surface when wet and no fencing

Appendix H:
Site Photographs and Infrastructure Examples



Figure 13: Area where landscaping will improve privacy for residents



Figure 14: Track to creek is steep, rocky and has no hand holds

Appendix H:
Site Photographs and Infrastructure Examples



Figure 15: Killen Falls Drive is narrow and needs traffic calming to slow vehicles



Figure 16: Parking overflow area on western side of Killen Falls Drive

Appendix H:
Site Photographs and Infrastructure Examples



Figure 17: Buses can park in the eastern overflow area



Figure 18: Killen Falls Drive and Friday Hut Road intersection should be assessed

Appendix H:
Site Photographs and Infrastructure Examples



Figure 19: Once at the creek, visitors walk along bedrock to the falls



Figure 20: Fence that once blocked track to creek has been removed

Appendix H:
Site Photographs and Infrastructure Examples



Figure 21: Handrail pool at Weano Gorge Western Australia