
Killen Falls Plan of Management

Part B



Prepared for Ballina Shire Council

by MikeSvikisPlanning

Adopted by Ballina Shire Council on 26 October 2017


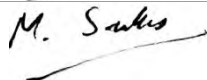
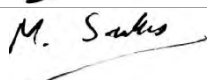
This Report has been prepared by MikeSvikisPlanning for Ballina Shire Council and may only be used and relied upon by Ballina Shire Council for the purpose agreed between MikeSvikisPlanning and Ballina Shire Council.

MikeSvikisPlanning otherwise disclaims responsibility to any person other than Ballina Shire Council for any matter arising in connection with this Report. MikeSvikisPlanning also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by MikeSvikisPlanning in connection with preparing this Report were limited to those specifically detailed in the Report and are subject to the scope limitations set out in the Report.

The opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the date of preparation of the Report. MikeSvikisPlanning has no responsibility or obligation to update this Report to account for events or changes occurring subsequent to the date that the Report was prepared.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by MikeSvikisPlanning described in this Report. MikeSvikisPlanning disclaims liability arising from any of the assumptions being incorrect.

| Rev No | Author | Approved for issue | |
|--------|-------------|--|------------------|
| | | Signature | Date |
| A | Mike Svikis |  | 30 March 2017 |
| B | Mike Svikis |  | 8 June 2017 |
| C | Mike Svikis |  | 11 December 2017 |



MikeSvikisPlanning

ABN 84638645183

3 Gibingbell Close Ocean Shores 2483

Mob: 0447 805 871

Ph: (02) 6680 1003

E: mikesvikisplanning@bigpond.com

Cover photograph supplied by N Cornale

CONTENTS

| | | |
|----------|--|----------|
| 1 | Background | 1 |
| 2 | Early Consultation | 1 |
| 2.1 | Who We Spoke To | 1 |
| 2.2 | Online and On-site Survey | 2 |
| 2.3 | Community Values | 2 |
| 2.4 | Recreation Needs and Opportunities | 2 |
| 2.5 | Commercial Activities | 2 |
| 3 | Costs and Funding | 3 |
| 3.1 | Costs | 3 |
| 3.2 | Funding | 6 |
| | Appendices | 8 |

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.

The plan of management was adopted by Ballina Shire Council at its meeting on 26 October 2017.

2 Early Consultation

2.1 Who We Spoke To

Three land owners directly abut 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 | <p>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.</p> <p>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.</p> <p>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.</p> |
| Seating | The existing seat at the northern end of the car park has a timber top that has rotted out. <i>Ekodeck</i> 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. |

| | |
|---|--|
| <p>Tracks</p> | <p>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 <i>Geohex</i>, 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. <i>Geohex</i> 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.</p> |
| <p>Handrail to Emigrant Creek</p> | <p>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.</p> |
| <p>Toilet</p> | <p>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.</p> <p>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.</p> <p>Therefore, recurrent costs for cleaning and waste disposal would be \$15,520 per annum.</p> |
| <p>Killen Falls Drive Improvements</p> | <p>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.</p> <p>Assuming four additional speed signs indicating a shared traffic and pedestrian zone at \$250 per sign for a cost of \$1,000.</p> <p>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.</p> <p>Total expenditure on Killen Falls Drive traffic calming would be \$6,700.</p> |

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

| <p>North Coast Local Land Services Grants</p> | <p>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.</p> <p>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.</p> <p>This funding could be used for upgrading the walk to the viewing platform, fencing, toilet installation, and for rainforest rehabilitation on the subject land.</p> | | | | | | | | |
|--|--|---|--|-----------------------|--------------------|--|--|---|---|
| <p>Australian Government's National Landcare Program</p> | <p>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.</p> <p>Applications for funding in regional locations are likely to occur again in 2017–18.</p> <p>There are four Strategic objectives including the following:</p> <table border="1"> <thead> <tr> <th>Strategic Objective 1</th> <th>Strategic Outcomes</th> <th>Contribution to National and International Obligations</th> </tr> </thead> <tbody> <tr> <td>Communities are managing landscapes to sustain long term economic and social benefits from their environment</td> <td>Maintain and improve ecosystem services through sustainable management of local and regional landscapes</td> <td>Protection and restoration of ecosystem function, resilience and biodiversity; appropriate management of invasive species which threaten ecosystems, habitats or native species</td> </tr> </tbody> </table> <p>This funding could be used for upgrading the walk to the viewing platform, fencing, toilet installation, and for rainforest rehabilitation on the subject land.</p> | | | 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 |
| 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 | | | | | | | |

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 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.

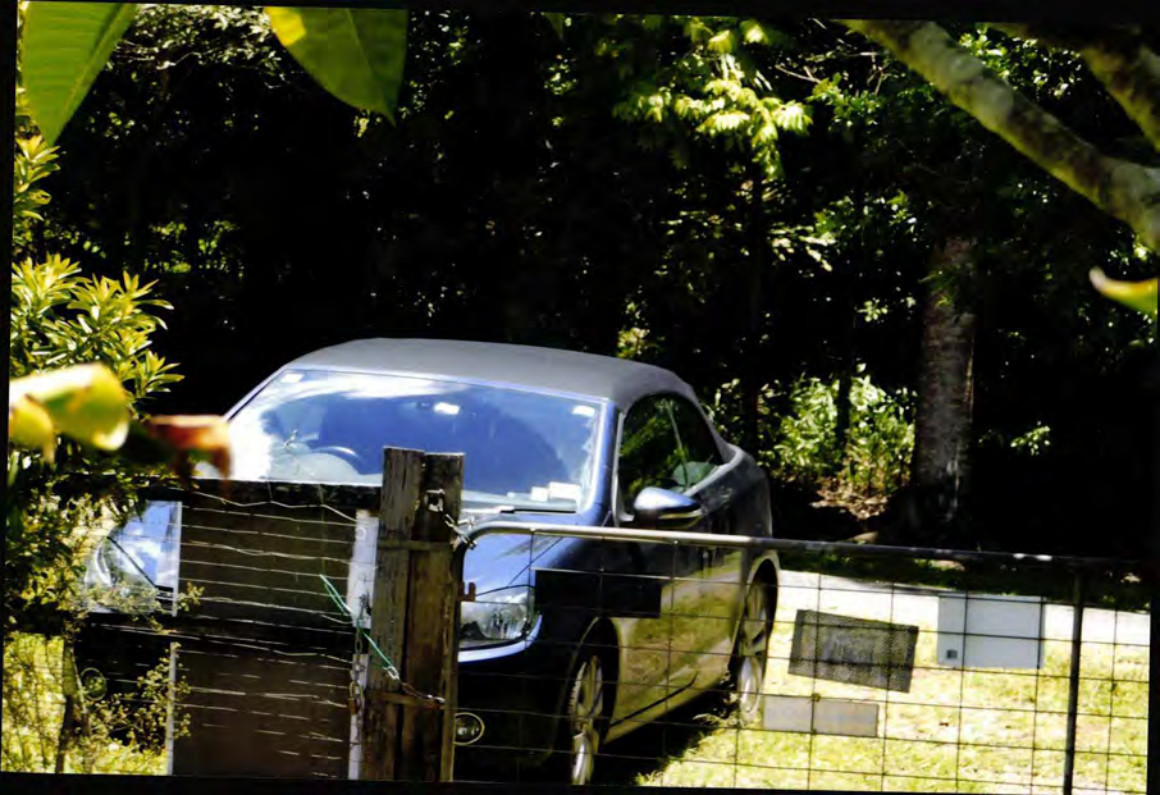
Your sincerely
David Bester
David Bester







apollo



















bellina
shire council

WASTE
SERVICES
6686 1287









Hertz

EMERGENCY EXIT

← → **Rous Water Operational Area**
Authorized Personnel Only

Emigrant Creek Dam P →

Killen Falls P →

10
SHARED ZONE







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.

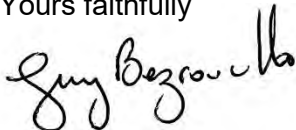
It should also be recognized that the high level of recreational use of the pool below the falls is also likely to increase the risk of primary contact with these waters through the introduction of additional contaminants associated with frequent recreational use of this location. Accordingly, it is 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.

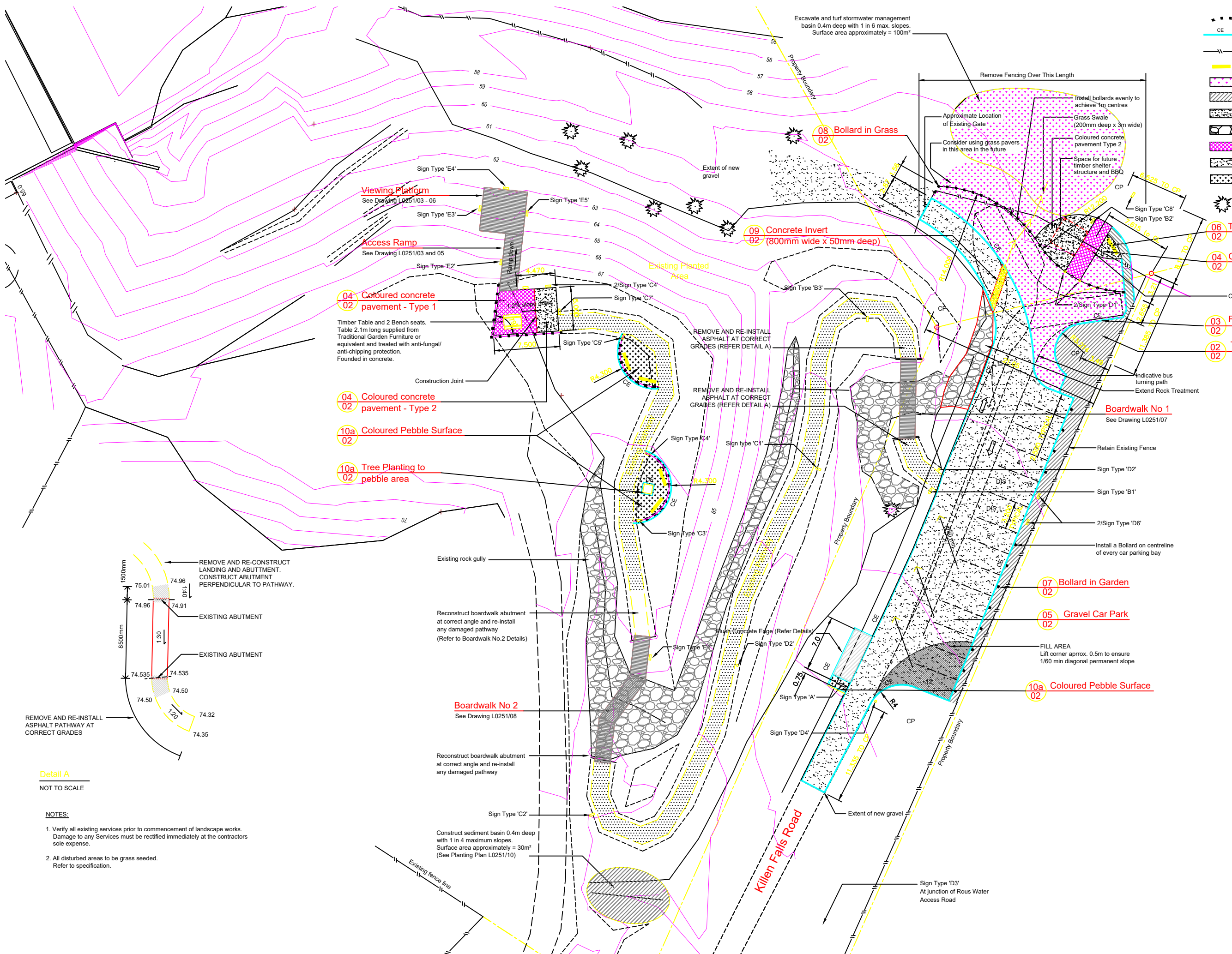
Yours faithfully



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.



- Bollards (Refer to Details)
- Flush Concrete Edge (Refer to Details)
- Existing Fence Line
- Timber Bench Seat (Refer to Details)
- Grassed Area
- Planting Area (Refer to Planting Plan)
- Gravel Carpark (Refer to Details)
- Existing Gully Rocks
- Coloured concrete type 1
- Coloured concrete type 2
- Coloured Pebble Surface (Pioneer 'Rosebrook Red' or similar - 10-15MM nom.)
- Existing Trees

| | | | |
|-----|------------------|----------|---------|
| 0 | For Construction | 07/05/03 | RLJ |
| No. | Description | Date | Initial |

GeoLINK 2003

This drawing must not be relied upon for any purpose other than that for which it was prepared or by any person or corporation other than the referred client.

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

GeoLINK
environmental management and design

Level 1, 64 Ballina Street
PO Box 9
Lennox Head NSW 2478
T 02 6687 7666
F 02 6687 7782
lennoxhd@geolink.net.au
www.geolink.net.au

quality solutions sustainable future

Project Title
Emigrant Creek Dam

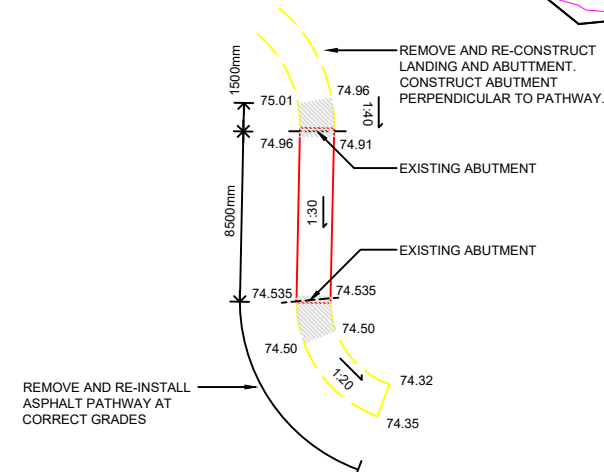
Client
Rous Water

| | | | | |
|----------|-----|-------|-----|---------|
| Designed | SDR | Drawn | PSC | Checked |
| Approved | | Date | | |

Scale
metres 0 2 4 6 8 10

Drawing Title
Layout Plan

Drawing Number
0251/01



- NOTES:**
1. Verify all existing services prior to commencement of landscape works. Damage to any Services must be rectified immediately at the contractors sole expense.
 2. All disturbed areas to be grass seeded. Refer to specification.

UFR 0251489
Drawing Number
0251/01



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.

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

PO Box 230

LISMORE NSW 2480

AUSTRALIA

Tel: (02) 6621 8055

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.

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



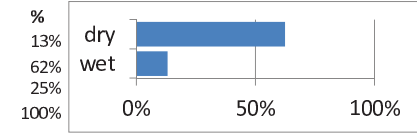
Robert Mustow
Chair

Summary Statistics:

| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------|------|------|-------|-------|------|------|------|------|------|------|---------|-------|-----------|
| | oC | mg/L | NTU | ug/L | | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | ug/L | 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 |

Rain

wet
dry
Mod
Total

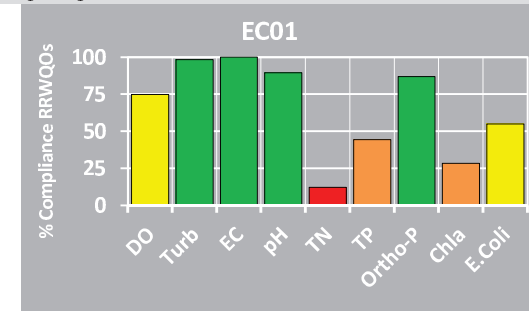


Compliance Assessment:

1. Richmond River WQOs (OEH, 2015):

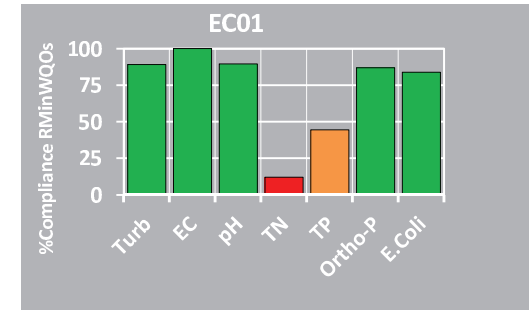
| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------------|------|------|------|------|------|-----------|-----|-----|-----|-------|---------|------|--------|
| No. of exceedences | | 312 | 20 | 0 | 131 | 204 | | | | 129 | 30 | 58 | 36 |
| %non-compliance | | 25 | 2 | 0 | 11 | 88 | | | | 56 | 13 | 72 | 45 |
| %compliance | | 75 | 98 | 100 | 89 | 12 | | | | 44 | 87 | 28 | 55 |
| WQO upper | | | 50 | 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 |

CHARTS:



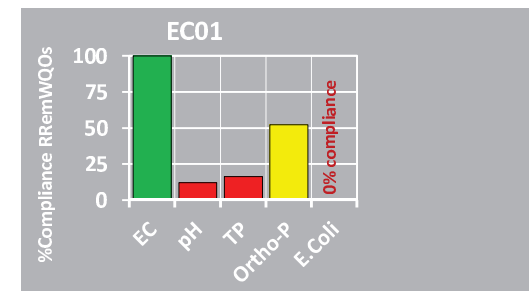
2. Rous Water Risk Minimisation Objectives:

| | 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:

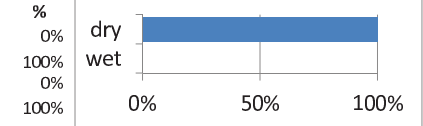
| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------------|------|----|------|------|-----------|----|-----|-----|-----|-----------|---------|------|-----------|
| No. of exceedences | | | | 0 | 1094 | | | | | 194 | 110 | | 80 |
| %non-compliance | | | | 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:

| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------|------|------|------|-------|-----|------|------|------|------|------|---------|-------|-----------|
| | oC | mg/L | NTU | ug/L | | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | ug/L | cfu/100mL |
| EC01 | | | | | | | | | | | | | |
| 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 | 5.8 | 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 |

Rain
wet
dry
Mod
Total

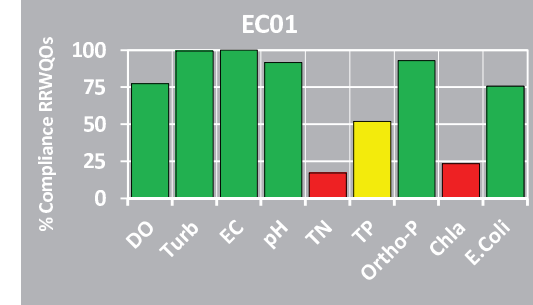


Compliance Assessment:

1. Richmond River WQOs (OEH, 2015):

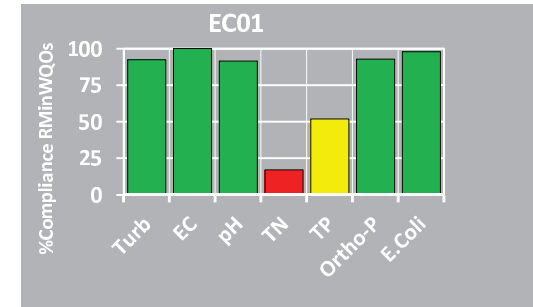
| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------------|------|------|------|------|------|-----------|-----|-----|-----|-------|---------|-----------|--------|
| No. of exceedences | | 174 | 4 | 0 | 65 | 107 | | | | 62 | 9 | 36 | 11 |
| %non-compliance | | 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 | 6 | 125 | 6.5 | | | | | | | | |
| Compliance Score | | Good | Good | Good | Good | Very Poor | | | | Fair | Good | Very Poor | Good |

CHARTS:



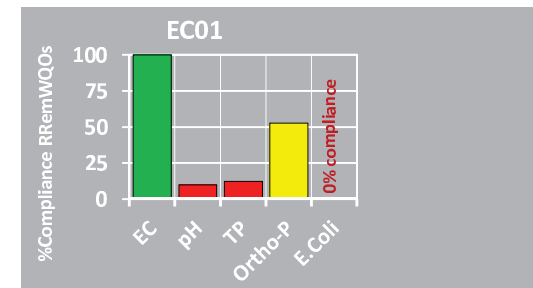
2. Rous Water Risk Minimisation Objectives:

| | 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:

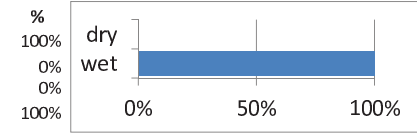
| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------------|------|----|------|------|-----------|----|-----|-----|-----|-----------|---------|------|-----------|
| No. of exceedences | | | | 0 | 697 | | | | | 113 | 60 | | 45 |
| %non-compliance | | | | 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 |



Summary Statistics:

| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------|------|------|-------|-------|-----|------|------|------|------|------|---------|-------|-----------|
| | oC | mg/L | NTU | ug/L | | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | ug/L | cfu/100mL |
| EC01 | | | | | | | | | | | | | |
| 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 |

Rain
wet
dry
Mod
Total

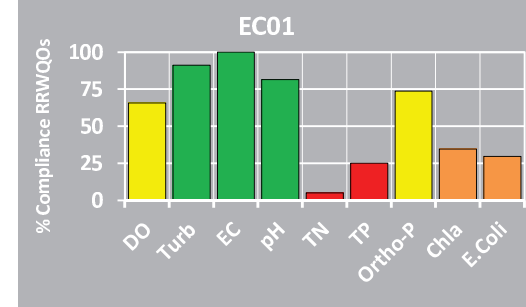


Compliance Assessment:

1. Richmond River WQOs (OEH, 2015):

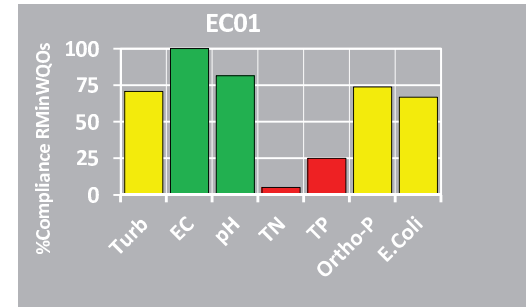
| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|-------------------------|------|------|------|------|------|-----------|-----|-----|-----|-------|---------|------|--------|
| No. of exceedences | | 55 | 14 | 0 | 30 | 76 | | | | 60 | 21 | 17 | 19 |
| %non-compliance | | 34 | 9 | 0 | 19 | 95 | | | | 75 | 26 | 65 | 70 |
| %compliance | | 66 | 91 | 100 | 81 | 5 | | | | 25 | 74 | 35 | 30 |
| WQO upper | | | 50 | 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 |

CHARTS:



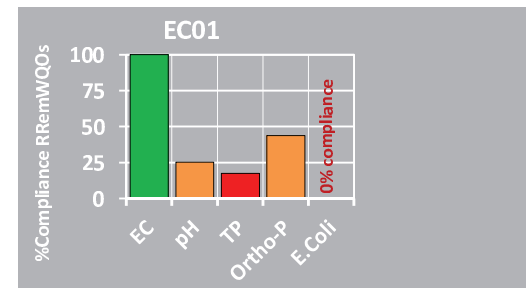
2. Rous Water Risk Minimisation Objectives:

| | 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.

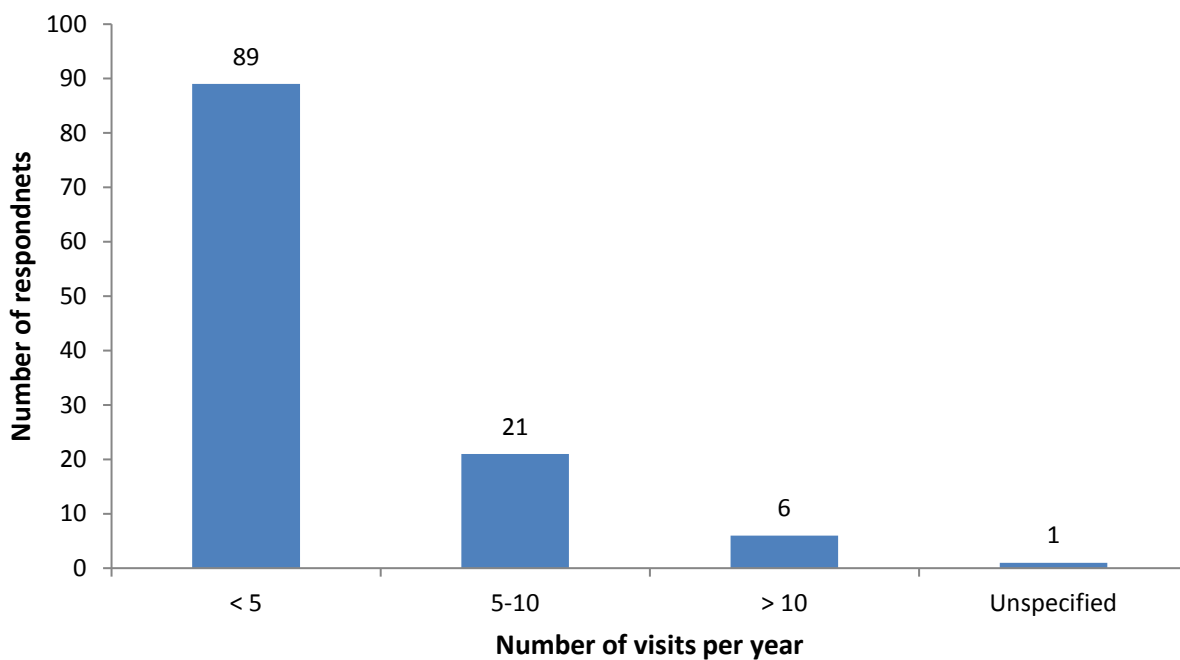
Summary of Results

| 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 |

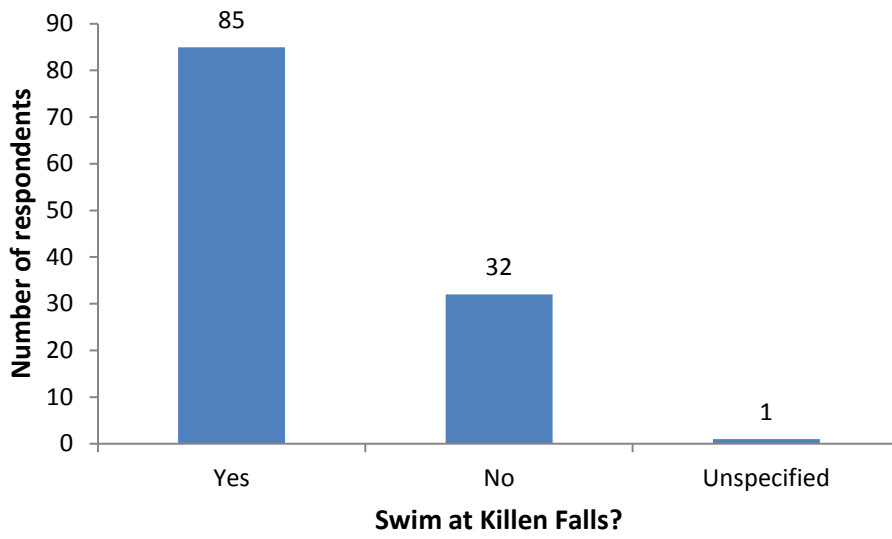
Number of visits per year by respondents



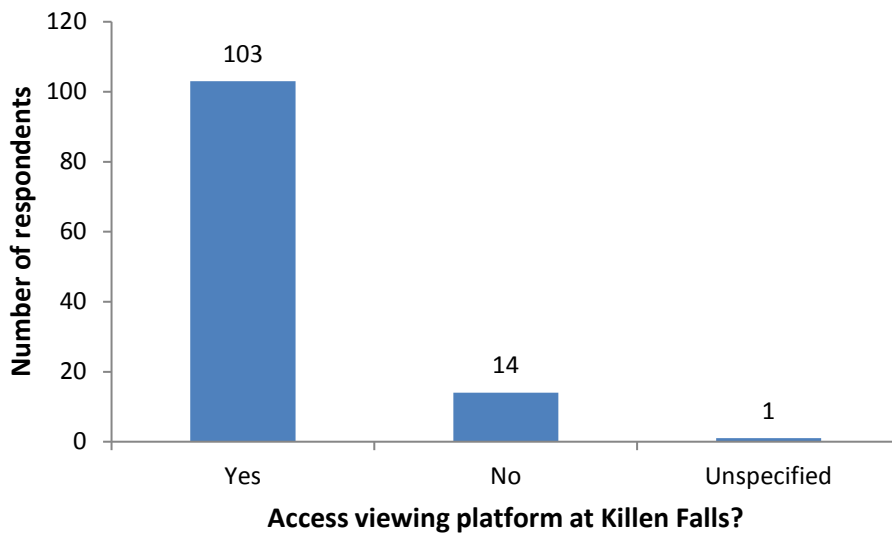
Who do respondents visit Killen Falls with?

- 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 |
| 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: Cls(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 | 0.3 | 0.2 |
| 0100-0200 | * | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 |
| 0200-0300 | * | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 |
| 0300-0400 | * | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 |
| 0400-0500 | * | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 |
| 0500-0600 | * | 0 | 1 | 0 | 0 | 0 | 0 | 0.3 | 0.2 |
| 0600-0700 | * | 0 | 1 | 2 | 0 | 0 | 1 | 0.8 | 0.7 |
| 0700-0800 | * | 1 | 0 | 2 | 2 | 0 | 3 | 1.3 | 1.3 |
| 0800-0900 | * | 1 | 4 | 3 | 4 | 0 | 4 | 3.0 | 2.7 |
| 0900-1000 | 4 | 5 | 6 | 5 | 8 | 3 | 8 | 5.6 | 5.6 |
| 1000-1100 | 8 | 18 | 13 | 15 | 13 | 17 | 13 | 13.4 | 13.9 |
| 1100-1200 | 10 | 31 | 19 | 16 | 14 | 26 | 16 | 18.0 | 18.9 |
| 1200-1300 | 11 | 17 | 24 | 26 | 25 | 26 | 11 | 20.6 | 20.0 |
| 1300-1400 | 21 | 16 | 16 | 18 | 13 | 13 | 19 | 16.8 | 16.6 |
| 1400-1500 | 28 | 10 | 16 | 17 | 24 | 9 | 18 | 19.0 | 17.4 |
| 1500-1600 | 15 | 19 | 12 | 14 | 10 | 14 | 14 | 14.0 | 14.0 |
| 1600-1700 | 11 | 10 | 9 | 7 | 14 | 4 | 9 | 10.2 | 9.1 |
| 1700-1800 | 7 | 8 | 9 | 3 | 5 | 7 | 3 | 6.4 | 6.0 |
| 1800-1900 | 8 | 7 | 2 | 6 | 2 | 8 | 1 | 5.0 | 4.9 |
| 1900-2000 | 2 | 2 | 2 | 2 | 0 | 2 | 1 | 1.6 | 1.6 |
| 2000-2100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0 |
| 2100-2200 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.0 | 0.4 |
| 2200-2300 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.0 | 0.4 |
| 2300-2400 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0.1 |
| Totals | <hr/> | | | | | | | <hr/> | |
| 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.

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: Cls(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 | |
|---------------|-----------|-----------|-----------|-----------|--------|--------|--------|-------------|-------------|
| | 19 Dec | 20 Dec | 21 Dec | 22 Dec | 23 Dec | 24 Dec | 25 Dec | 1 - 5 | 1 - 7 |
| 0000-0100 | 0 | 0 | 0 | 0 | 0 | * | * | 0.0 | 0.0 |
| 0100-0200 | 0 | 0 | 0 | 0 | 0 | * | * | 0.0 | 0.0 |
| 0200-0300 | 0 | 0 | 0 | 0 | 0 | * | * | 0.0 | 0.0 |
| 0300-0400 | 0 | 0 | 0 | 0 | 0 | * | * | 0.0 | 0.0 |
| 0400-0500 | 0 | 0 | 0 | 0 | 0 | * | * | 0.0 | 0.0 |
| 0500-0600 | 0 | 0 | 1 | 1 | 0 | * | * | 0.4 | 0.4 |
| 0600-0700 | 0 | 0 | 1 | 0 | 0 | * | * | 0.2 | 0.2 |
| 0700-0800 | 2 | 0 | 2 | 0 | 2 | * | * | 1.2 | 1.2 |
| 0800-0900 | 2 | 1 | 1 | 0 | 0 | * | * | 0.8 | 0.8 |
| 0900-1000 | 2 | 6 | 5 | 1 | * | * | * | 3.5 | 3.5 |
| 1000-1100 | 10 | 16 | 16 | 8 | * | * | * | 12.5 | 12.5 |
| 1100-1200 | 22 | 18 | 27 | 18 | * | * | * | 21.3 | 21.3 |
| 1200-1300 | 23 | 16 | 11 | 12 | * | * | * | 15.5 | 15.5 |
| 1300-1400 | 16 | 12 | 17 | 15 | * | * | * | 15.0 | 15.0 |
| 1400-1500 | 17 | 17 | 22 | 9 | * | * | * | 16.3 | 16.3 |
| 1500-1600 | 14 | 16 | 20 | 9 | * | * | * | 14.8 | 14.8 |
| 1600-1700 | 15 | 13 | 11 | 7 | * | * | * | 11.5 | 11.5 |
| 1700-1800 | 8 | 6 | 8 | 6 | * | * | * | 7.0 | 7.0 |
| 1800-1900 | 7 | 0 | 6 | 3 | * | * | * | 4.0 | 4.0 |
| 1900-2000 | 2 | 0 | 2 | 1 | * | * | * | 1.3 | 1.3 |
| 2000-2100 | 0 | 0 | 4 | 1 | * | * | * | 1.3 | 1.3 |
| 2100-2200 | 0 | 0 | 1 | 2 | * | * | * | 0.8 | 0.8 |
| 2200-2300 | 0 | 0 | 1 | 0 | * | * | * | 0.3 | 0.3 |
| 2300-2400 | 0 | 0 | 0 | 0 | * | * | * | 0.0 | 0.0 |
| Totals | | | | | | | | | |
| 0700-1900 | 138 | 121 | 146 | 88 | * | * | * | 123.3 | 123.3 |
| 0600-2200 | 140 | 121 | 154 | 92 | * | * | * | 126.7 | 126.7 |
| 0600-0000 | 140 | 121 | 155 | 92 | * | * | * | 127.0 | 127.0 |

| | | | | | | | | | |
|----------------|------|------|------|------|---|---|---|-------|-------|
| 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.

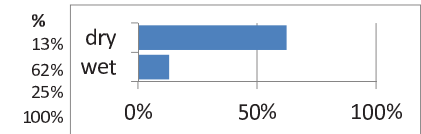
APPENDIX G

Rous water quality information – Emigrant Creek storage

Summ Statistics:

| | Temp | DO | Turb | EC | pH | TN | NOx | TKN | NH4 | TP | Ortho-P | Chla | E.Coli |
|--------------|------|------|-------|-------|------|------|------|------|------|------|---------|-------|-----------|
| | oC | mg/L | NTU | ug/L | | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | ug/L | 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 |

Rain
wet
dry
Mod
Total



APPENDIX H

Site photographs and infrastructure examples

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

Appendix H:
Site Photographs and Infrastructure Examples



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: Portaloo 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



Figure 21: Handrail pool at Weano Gorge Western Australia