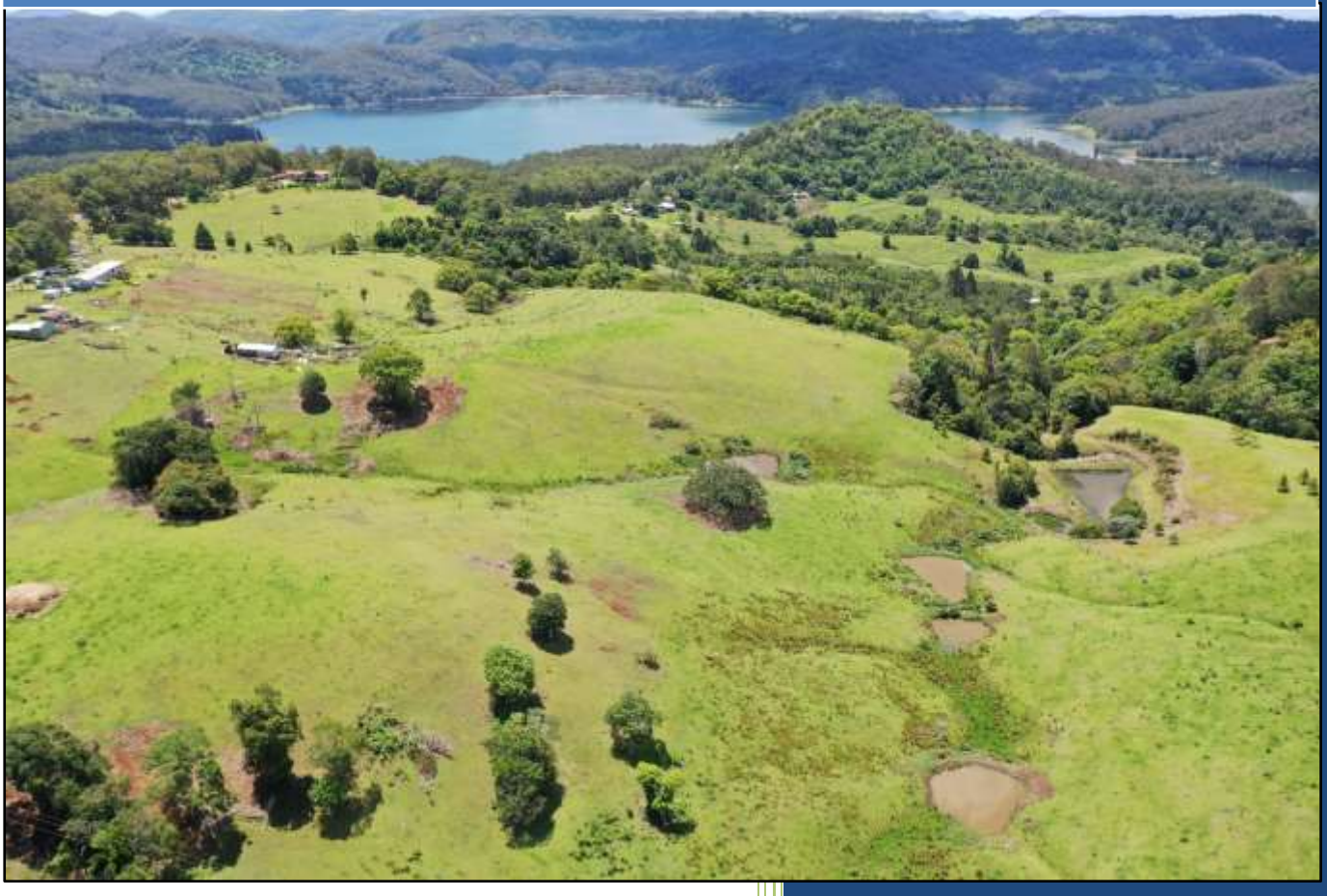
Lake Baroon Catchment Care Group

Working with our community...for our waterways

Projects 2021-22

Falls Creek Riparian Fencing & Off Stream Watering, Stage 2



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Sunshine Coast COUNCIL

PROJECT PLAN

Project No. 2122-012

This Project Plan has been prepared by, and all enquiries to be directed to:

Luke Ferguson
Project Manager – Riparian Condition Improvement (WQ)
- Agriculture Practice Improvement

PO Box 567 (455 North Maleny Rd)
Maleny, 4552
Email - luke@lbccg.org Phone - (07) 5494 3775

Disclaimer

While every effort has been made to ensure the accuracy of this Project Plan, Lake Baroon Catchment Care Group makes no representations about the accuracy, reliability, completeness or suitability for any particular purpose and disclaims all liability for all expenses, losses, damages and costs which may be incurred as a result of the Plan being inaccurate or incomplete.

How to read this Plan

This Plan has been developed to provided a brief description of the project and includes summarised details of the stakeholders, budgets, outputs and outcomes. The attached appendices provide further useful information relating to Project Plan Budget, Lake Baroon and its catchment, and outlines various implementation activities of the project.

Previous Plans

2021 – 012 Falls Creek Riparian Fencing & Off Stream Watering (Ferriday) Stage 1

Confidentiality

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DOCUMENT VERSIONS & APPROVALS

Version	*Date*	*Version/Description*	*Result*
1.0	1/9/2021	Draft LBCCG Project Proposal completed. Project emailed to LBCCG Committee for comments.	n/a
1.0			
1.0			

AUTHORISATIONS

Name	*Signature*	*Date*
Prepared by: Luke Ferguson - Project Manager, LBCCG		
Approved by: LBCCG Management Committee (signed by Peter Stevens – President)		
Approved by (Seqwater):		

Cover: The Ferriday property and its proximity to Lake Baroon, located in the background.

Contents

Introduction

Maintaining water quality is critical to providing safe bulk drinking water for the population of South east Queensland. All of the raw water storages managed by Seqwater are located in catchments which are developed to varying extents and support active and growing communities, including important industrial and rural economic activity. To provide a multi-barrier approach to the supply of drinking water, Seqwater must influence the management of land not owned by, but which exert an influence on Seqwater's core business.

Falls Creek Riparian Fencing & Off Stream Watering, Stage 2, will be implemented in a high priority area, that delivers very high volumes of nutrients, sediment and faecal material (E.coli and pathogens) to Falls Creek and ultimately Baroon Pocket Dam. This project is the final stage of a two-stage project plan. Stage 1, delivered in 2020/21, focused on the installation of an off-stream watering system. Stage 2 will involve the installation of riparian fencing to exclude and manage livestock grazing in the riparian zones on the Ferriday Property. This project was identified as a priority in the LBCCG Annual Work Plan 2021/22.

Fred and Catherine Ferriday own 16.1 Ha of land located in the lower half of the Falls Creek Catchment, where they run 30 cows and calves and a number of horses on the property. The property has around 750 m of waterways that feed into Falls Creek, and currently the livestock have unrestricted access to the riparian zones.

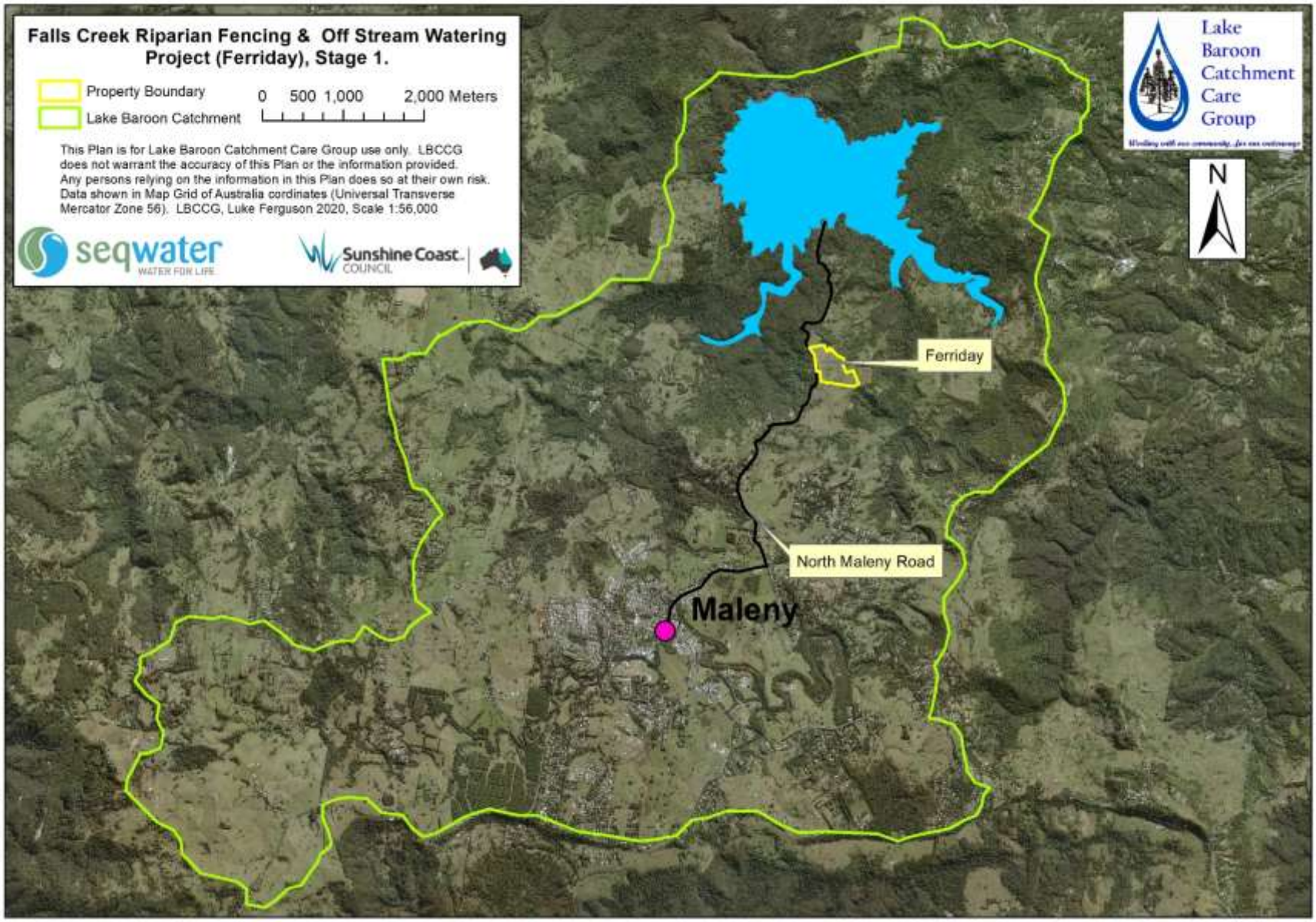
Off stream watering, riparian fencing, concrete crossings and weed control are all control measures that will be implemented throughout this multistage project. All of these measures are best practice management for improving water quality.

The Falls Creek catchment is characterised by relatively un-intensive beef grazing, considerable areas of rural residential and minimal vegetation, particularly along the watercourses. The Ferriday property is a high priority property based on its distance to Baroon Pocket Dam off take tower, land use, riparian health, and the landholder's readiness to implement projects. Historically the Falls Creek catchment supported dairy grazing which, along with the rural residential areas, likely yielded poor water quality results - high levels of nutrients (and likely pathogens).

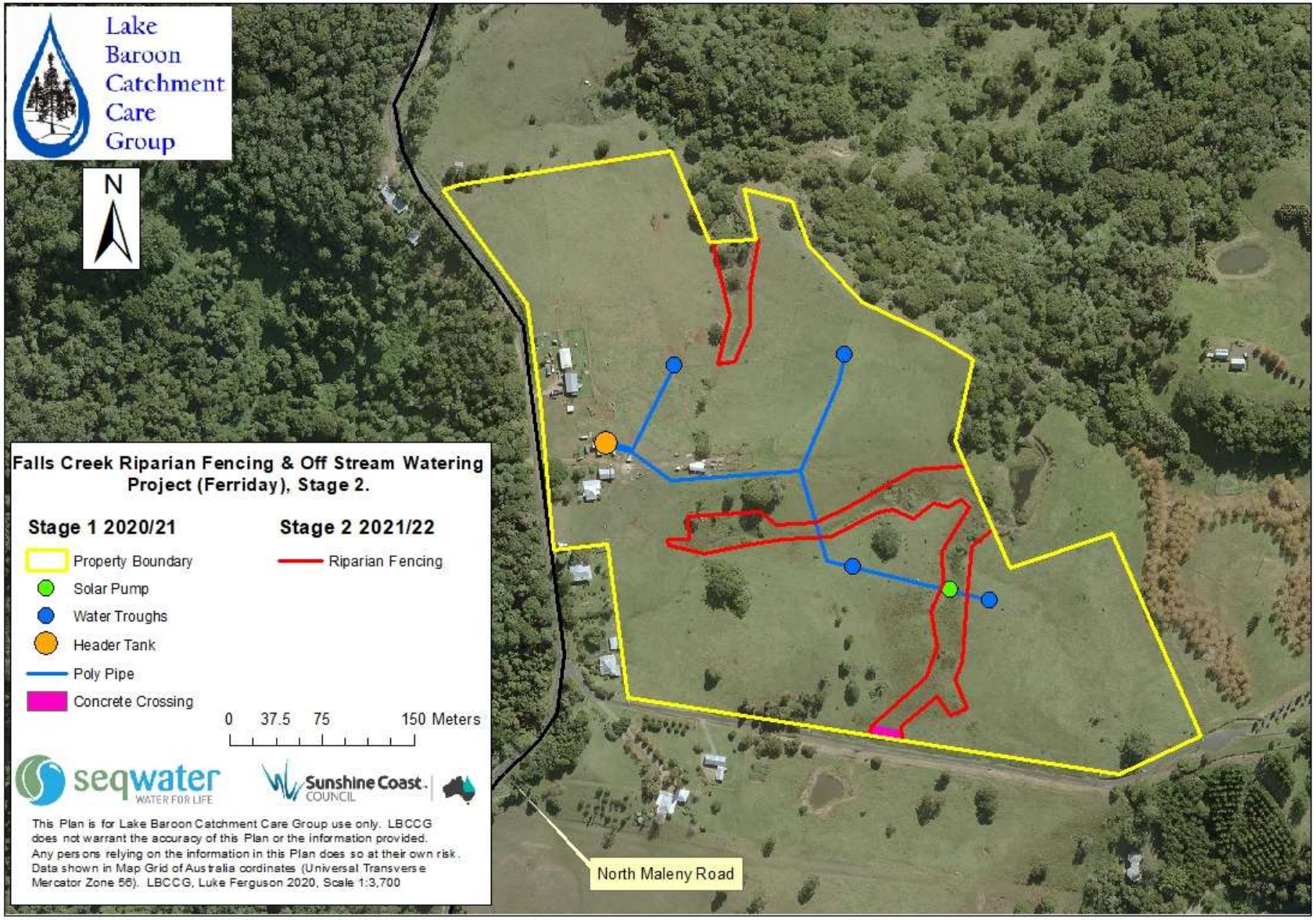
Background

Seqwater has recently purchased the northern half of the Ferriday's farm. The resulting realignment of the northern boundary has given the Ferriday's the opportunity to reassess the management of their grazing operation. As a result, Fred and Catherine Ferriday have approached LBCCG to assist in the redevelopment of their property, located on North Maleny Road. With Falls Creek being primarily a grazing region, the priority action is to reduce livestock contact with natural water through riparian fencing, restore riparian buffers, provide alternative watering and install stream crossings.

Project Location



Project Map


Lake Baroon Catchment Care Group
N
Falls Creek Riparian Fencing & Off Stream Watering Project (Ferriday), Stage 2.
Stage 1 2020/21
Property Boundary
Solar Pump
Water Troughs
Header Tank
Poly Pipe
Concrete Crossing
Stage 2 2021/22
Riparian Fencing
0 37.5 75 150 Meters
seqwater
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This Plan is for Lake Baroon Catchment Care Group use only. LBCCG does not warrant the accuracy of this Plan or the information provided. Any persons relying on the information in this Plan does so at their own risk. Data shown in Map Grid of Australia cordinates (Universal Transverse Mercator Zone 56). LBCCG, Luke Ferguson 2020, Scale 1:3,700
North Maleny Road

Project Plan

Project Plan Name	**Falls Creek Riparian Fencing & Off Stream Watering (Ferriday), Stage 2**	
Site	426 North Maleny Road, Maleny, QLD, 4552	
Project Start Date	October 2021	
Project End Date	June 2022	
Landholder details	**Property owner / Manager**	[redacted]
	Contact Details	
	Real Property description	
	Property Size	16.1 hectares
	Land use	Horse and Cattle grazing
	Stock carried	5 Horses and 30 Cattle
	Latitude/longitude	-26.728881 152.872660
	Water quality hazards present	1) Stock access to riparian zones 2) Poor riparian vegetation & groundcover 3) Moderate stream bank instability 4) Damage to existing native vegetation 5) Moderate weed coverage

Water Quality Risk (assessed according to *Scope of Works: Development of an implementation plan for the Baroon Pocket Catchment Water Quality Improvement Program)*		
Distance from Baroon Dam off take	Moderate Priority	Property is 2-5 km from off take
Prioritisation of land use	Moderate to High	Intensive beef grazing
Riparian condition	High Priority	Poor riparian health – Livestock have unrestricted access to unnamed Falls Creek tributaries
Landholder readiness & willingness	Moderate Confidence	Moderate confidence, relationship established with the landholder interested in possible projects
Complimentary funding availability	Low Priority	Less likely to receive additional funding
Land management weightings	High to Very High Priority	Intensive grazing, no riparian fencing in place.
OVERALL PROJECT PRIORITY	**HIGH PRIORITY**	

Cash & in-kind contributions (Seqwater funding stream – Agricultural Practice Improvement [API])		
Project Funding	Seqwater 2021/22 Agricultural Practice Improvement	$ 33,000
Project Management	Seqwater 2021/22 Riparian Condition Improvement & Agricultural Practice Improvement	$ 17,020
Landholder contribution	Cash & In-kind	$ 36,200
TOTAL		**$ 81,220**

Project Plan & Scope of Works			
Description of hazards on site and how they are to be addressed	Livestock access to 750 metres of tributaries of Falls Creek	Installation of off-stream watering system (Stage 1, 2020/21 - Completed) in conjunction with riparian fencing along the tributaries of Falls Creek (Stage 2, 2021/22)	
	Very limited vegetative buffer between tributaries Falls Creek and grazed paddocks	Remove reliance on natural streams for livestock water by installing alternative watering system (Stage 1 - Completed). Install riparian fencing to manage grazing in riparian zone and enhance the buffer to overland flow (Stage 2)	
	Lack of vegetation diversity in riparian zone		
	Minimal stream shading contributing to deoxygenation and other impacts		
	Lack of diverse native vegetation to provide complex root systems and mechanical bank stability benefits		
	Lack of wildlife corridor		
	Erosion and turbidity produced from livestock and vehicle movement across tributary	Concrete stream crossing (Stage 1- Completed)	
Activities to be delivered as part of project & Schedule of works	1. Riparian Fencing	1300 m, 10 gates	Oct 2021
	2. Internal property fencing	TBD (landholder responsibility)	June 2022
	3. Weed Management	1 hectare (landholder responsibility)	June 2021
Future maintenance requirements	No foreseen maintenance requirements, any on-going costs will be borne by the landholder.		

Project Outcomes		
Improve water quality *Improve water quality of:* *a. source water in Falls Creek; and* *b. raw water intake at Lake Baroon*	Improved riparian buffer in the Falls Creek Catchment	Installation of riparian fencing and off-stream watering will reduce the time free ranging cattle spend in or immediately adjacent to watercourses. This shift assists the riparian buffer zone to trap and/or process sediment, nutrients and faecal material.
	Reduced erosion of the bed and banks in the catchment of Falls Creek reducing turbidity and sedimentation	Riparian fencing of the tributaries of Falls Creek and off-stream watering to allow the management of cattle in the riparian zone. Concrete crossing
	Reduce pathogen delivery to waterways	Off stream watering, riparian fencing and livestock management in the riparian zone will prevent the direct faecal deposition (nutrients and pathogens) into the waterways.
	Improved aquatic habitats	A reduction in turbidity, sediments, nutrients and pathogens will improve water quality and contribute to improving in-stream biodiversity.
	Improved land management	Support Ferriday to improve management of livestock in riparian zones and environmentally sensitive areas.
	Increased awareness of water quality issues and causes	Utilise the Ferriday property as a demonstration site that displays the practical tools that landholders can incorporate on their land to help improve water quality.

Monitoring

Monitoring of rehabilitation activities, will be split into periodic and episodic monitoring. Periodic monitoring is important to measure the effectiveness of the activities over time and will occur at various times throughout the project, but will be generally be undertaken on an annual basis by LBCCG (refer to below table for more detailed monitoring information).

Episodic monitoring will occur following significant storm/rainfall events (or extended dry periods). This may, depending on the severity of the event, be achieved by a phone call to the landholders.

Data will be collected at the beginning of the project to establish a baseline that will allow for future monitoring of the project. Photo point monitoring and mapping will be carried out at the beginning and completion of the project. Photo point and mapping will then be undertaken annually for 3 years. Footage will provide valuable evidence of works completion, a record of changes over time, and provide an important assessment tool to evaluate the project.

Figure 1. An example of the mapping of the Ferriday's property using the drone which will be used for monitoring the project.

Figure 2,3 & 4. Show the three different photo monitoring areas, displaying the individual points established for each of the tributaries on Ferriday's property.

Water quality testing will be also be undertaken at the beginning of the project and then annually for 3 years. This testing will involve water sampling that will look at faecal levels, nutrients, pH, dissolved oxygen, toxicants and water clarity.

Groundcover monitoring both within the fenced riparian zones and in the adjacent grazed paddocks will assist with evaluation of the effectiveness of riparian zone fencing providing a buffer to overland flows. The water infiltration rate will also be monitored, both inside and outside the riparian fencing, providing us with data that will assist in monitoring the health of the soil profile.

Whilst undertaking annual inspections after project completion, outputs such as stream crossings, off-stream watering will be monitored.

Project updates will be provided at monthly LBCCG meetings.

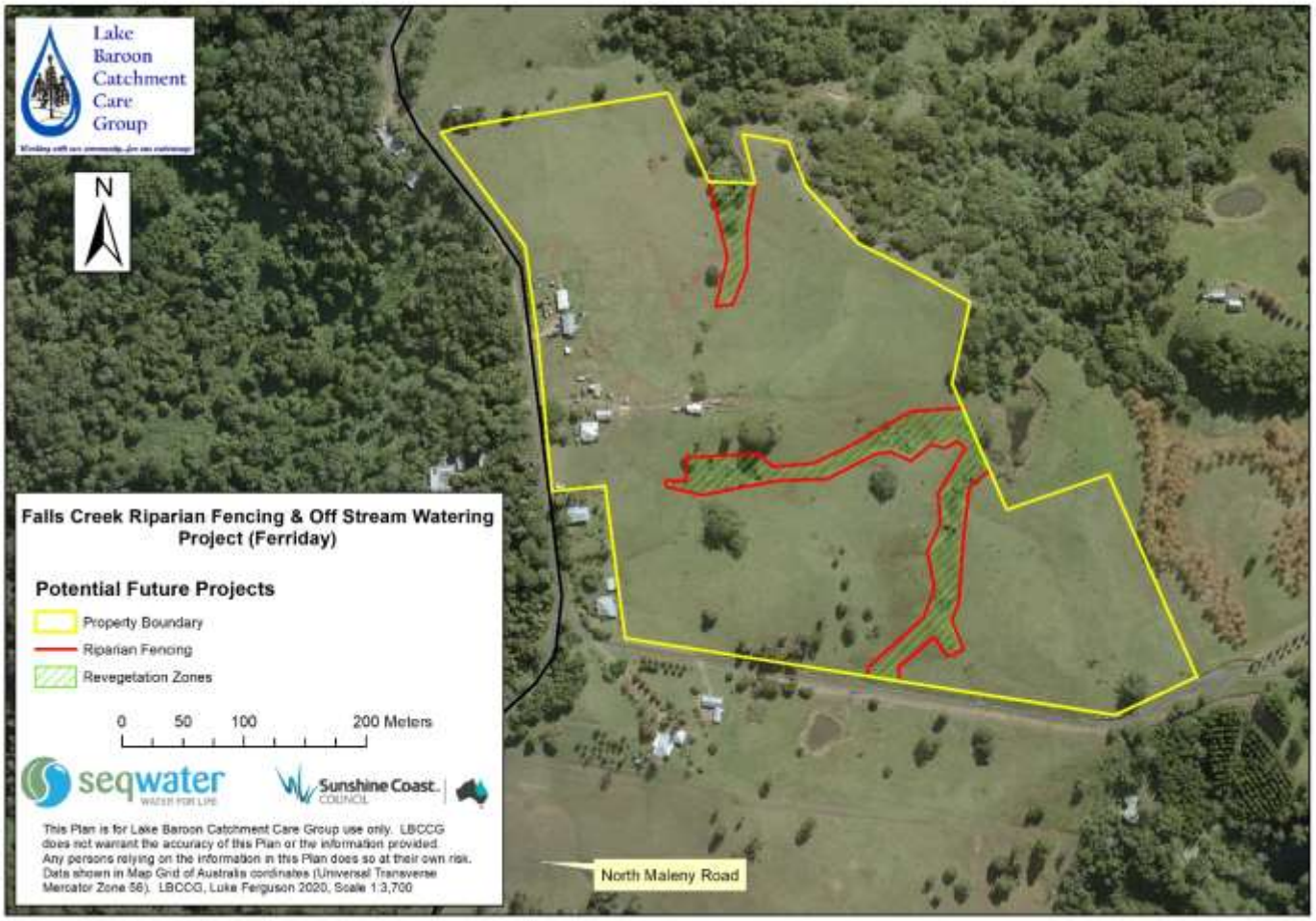
Project will be reported in the LBCCG Annual Report to Seqwater.

Output/Outcome	What will be monitored	How will it be monitored	Monitoring Frequency
Riparian Fencing	Metres installed	Metres installed against planned	At completion of project
	Visual inspection	Is the fencing stock proof, excluding livestock form the riparian zone, photo monitoring.	Annually for 3 years
	Impact on wildlife	Wildlife deaths due to fence	Annually for 3 years
	Groundcover	% groundcover, photo monitoring.	Annually for 3 years
Off-stream watering	Troughs, header tanks, poly pipe, solar pump	In good condition and providing water to trough network.	Annually for three years
	Visual Inspection	No significant erosion around base of trough, no leaks and road base in good condition.	Annually for three years
Stream crossings	Visual inspection	In good condition and preventing erosion	Annually for three years
Water quality	Faecal Indicators	Water sampling	At commencement of project and then annually for 3 years
	Water Temperature	Thermometer, temperature logger	At commencement of project and then annually for 3 years
	Nutrients - Nitrates, Phosphates	Water sampling	At commencement of project and then annually for 3 years
	Dissolved oxygen	Dissolved oxygen probe	At commencement of project and then annually for 3 years
	Water clarity	Clarity tube	At commencement of project and then annually for 3 years
	Rubbish	Visual Assessment	At commencement of project and then annually for 3 years
	pH	pH meter	At commencement of project and then annually for 3 years
	Toxicants	Water sampling	At commencement of project and then annually for 3 years
Groundcover	Groundcover	% of groundcover, photo monitoring	At 3, 6, 9, and 12 months, then annually for 3 years
	Water infiltration rate	Testing infiltration times	At commencement of project and then annually for 3 years
	Stock grazing pressure	Evidence of grazing (High, medium, low, nil)	At commencement of project and then annually for 3 years

Future Investment Options

Location	Future Work Options	Priority	Indicative Cost
Riparian zone, tributaries Falls Creek	1.5 Ha Revegetation	Low	$48,750*

*There are currently no plans to implement the revegetation of the riparian zones.



References

Seqwater (2020), *Scope of Works: Development of an implementation plan for the Baroon Pocket Catchment Water Quality Improvement Program*, Seqwater, Ipswich.

Lake Baroon Catchment Care Group (2020), *2020-21 Annual Work Plan*, Lake Baroon Catchment Care Group, Maleny.

Lake Baroon Catchment Care Group (2020), *1920-001 Upper Falls Creek Riparian Fencing and Revegetation (Warner)*, Lake Baroon Catchment Care Group, Maleny.

Appendices

Appendix 1: Budget

LBCCG has a policy of keeping Project Budgets confidential as individual project costings vary and can give misleading information. Detailed Budgets can be supplied on request. Please contact the LBCCG Project Manager on info@lbccg.org.au for further information.

Appendix 2: Background Information

Lake Baroon Catchment Care Group

Lake Baroon Catchment Care Group (LBCCG) is a not for profit community group focussed on reducing the risks to water quality in the Lake Baroon catchment - primarily through the implementation of on-ground remediation projects. This aim is consistent with Seqwater's objectives of producing high quality, competitively priced potable water for the Sunshine Coast (and greater South east Queensland) region.

LBCCG reduces risk to water quality by working with private landholders in the catchment. Supporting landholders to improve land management provides multiple beneficial outcomes; water quality improvements and broader environmental benefits while enhancing property management and productivity. Catchment activities not only benefit the raw water flowing into one of south east Queensland's most important water storages (hence Seqwater's significant support) but by providing a range of other environmental outcomes generates support from other funding providers.

Reducing risk to water quality is critical to providing safe bulk drinking water for the population of south east Queensland. All of the storages managed by Seqwater involve catchments that are developed to varying extents and support active and growing communities, along with important industrial and rural economic activity. (Murton 2012[1]).

The activities of LBCCG are supported by Seqwater as they align with Seqwater's commitment to the NHMRC Framework and to environmental stewardship by supporting catchment planning and targeted remediation for reduction of catchment-based risks to water quality (Smolders 2011[2]).

As this project is consistent with the shared aim of reducing risks to water quality from erosion, nutrients and pathogens, and impacts on native vegetation from livestock and invasive species, the activities to fence and restore riparian buffers, enhancing the ability of watercourses to trap and process water contaminants, are considered beneficial to support.

Catchment Land Use and Associated Impacts

An estimated 80% of sediment and 35% of nitrogen in the waterways in south east Queensland comes from non-urban diffuse loads; sources such as unmanaged livestock grazing. Reduction of these loads clearly represents a major target for action if significant improvements in water quality are to be achieved in South East Queensland (DERM 2010[3]).

Despite the extensive clearing, 22% of the Lake Baroon catchment is still moderately forested; a significant proportion in the immediate area around the dam, although much of this is degraded by environmental weeds. Today, the catchment is susceptible to impacts associated with an increasing diversity of land use (Keys 2009[4]).

[1] Murton, S. & Keys, S. 2012, Seqwater Natural Asset Management Plan – Lake Baroon, Sinclair Knight Merz, Brisbane

[2] Smolders, A. 2011, Project Briefing Note: Water Quality Project – Cork's Dairy Restoration, Seqwater

[3] Department of Environment and Resource Management, Development of a water quality metric for south east Queensland, 2010

[4] Keys, S., Murton, S., Costanzo, S. & Thompson, A. 2009, Catchment and In-Storage Risk Assessment for Water Quality – Baroon Pocket Dam, Sinclair Knight Merz, South Brisbane.

The area closest to the dam is popular with “tree changers” and has seen land use change from intensive grazing to increasingly smaller rural residential properties. This has resulted in the fragmentation of larger tracts of agricultural land into smaller parcels with a large increase in the number of on-site wastewater treatment systems in the catchment (Keys 2009).

Presently the catchment is susceptible to a number of land use impacts (Traill, 2007[5]; Dunstan, 2007[6]) including:

- poorly managed dairying and cattle grazing;
- new developments and increased stormwater runoff;
- runoff from impervious surfaces of existing developed areas;
- irrigation of treated effluent associated with the Maleny Sewage Treatment plant;
- uncontrolled stock access to the lake and its tributaries;
- lack of riparian vegetation and integrity – a result of extensive vegetation clearing;
- abundance of weeds – shift in land ownership from land managers (e.g. farmers) to inexperienced residents has potentially led to the spread and proliferation of weeds (including emerging weeds); *and*
- varying pollution sources related to increased population.

Maintaining a healthy riparian system is essential for a productive landscape. When a riparian area is healthy it contains lush, thick vegetation, providing habitat for wildlife and aquatic species, maintains stream bank stability, influences morphology and provides shade which in turn lowers water temperatures and increases the oxygen carrying capacity of the stream. Additionally, riparian vegetation filters, utilizes and stores nutrients, thus preventing them from entering major watercourses. Weed invasion is an indicator that the riparian system is in decline and has the potential to alter the vegetation structure to such an extent that habitat and water quality outcomes are threatened.

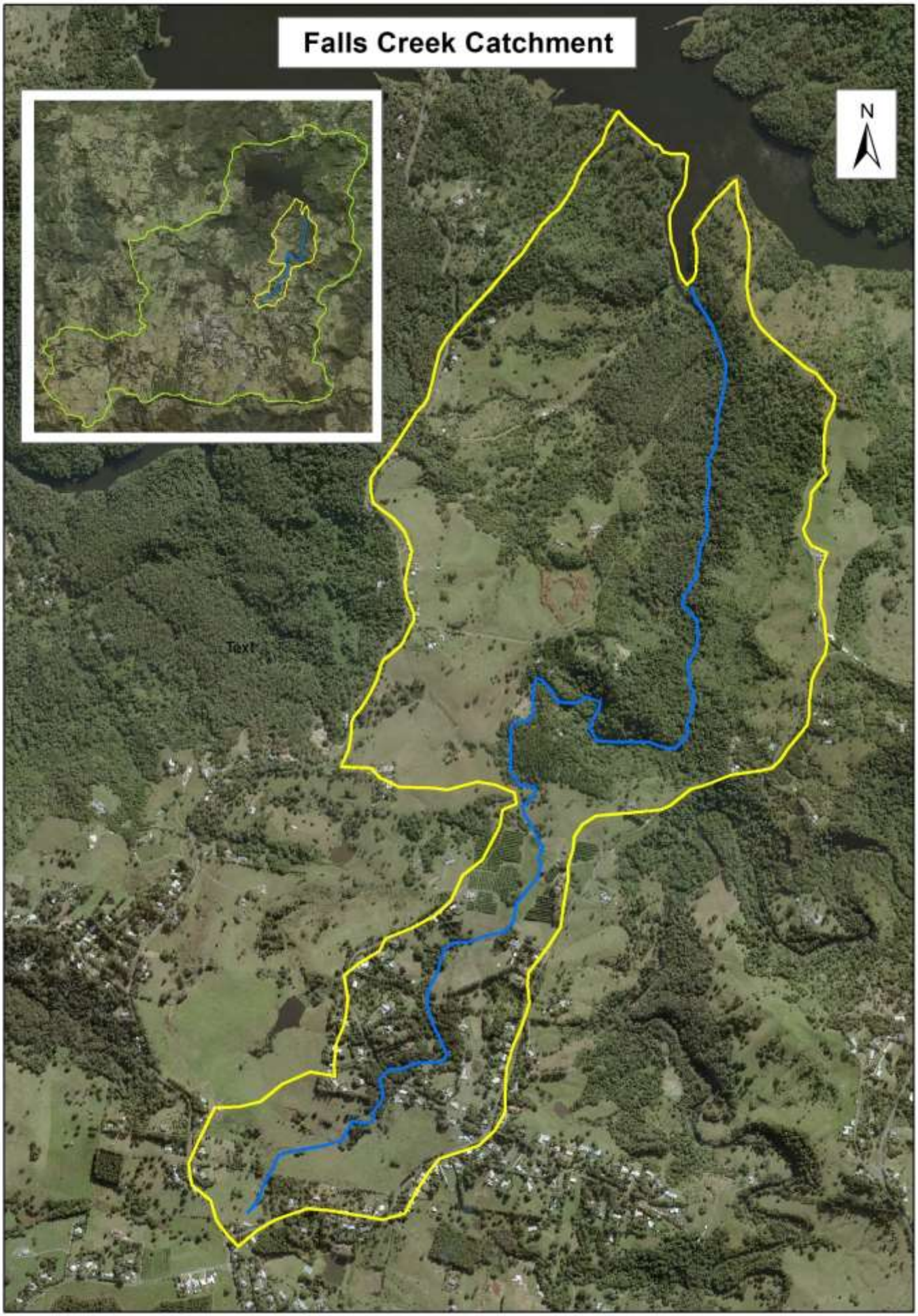
Falls Creek Sub-Catchment

Falls Creek is a relatively small sub catchment covering 391 Ha, representing approximately 5.5% of the Baroon Pocket Dam Catchment area. The Falls Creek catchment is characterised by relatively un-intensive beef grazing (39%), considerable areas of rural residential (32%) and moderate vegetation, particularly along the watercourses.

Beef grazing has replaced dairying as the dominant land use. The upper catchments gentle slopes are stable despite having little vegetation cover. The lower reaches however are steep with large areas uncleared or permitted to return to regrowth vegetation. The slopes closest to the Dam are generally very unstable with many large landslips which impact the water storage.

The Lake Baroon Implementation Plan (2021-26) considers this part of the catchment as a high priority property based on its distance to Baroon Pocket Dam off take tower, land use, riparian health, and the landholders readiness to implement projects. Historically the Falls Creek catchment supported dairy grazing which, along with the rural residential, likely yielded poor water quality results - high levels of nutrients (and likely pathogens).

[5] Traill, C.B. 2007, State of the Lake Baroon Catchment, Volume 2: Appendices, AquaGen Water and Renewable Energy, Palmwoods
[6] Dunstan, M 2007, Lake Baroon Catchment Implementation Plan, AquaGen Water & Renewable Energy, Palmwoods


Falls Creek Catchment
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Appendix 3 Project Activities

Riparian Fencing

Stage 2 will see the installation of riparian fencing along the tributaries of Falls Creek. There are three main creek systems that flow through the Ferriday property, resulting in 1.3 Km of riparian being installed. This riparian fencing will provide an enhanced vegetation buffer for over 600 m of the Falls Creek tributaries. The fence will be a permanent wooden split post fence with 4 strands of barb wire.

Livestock grazing is a land use that has the potential to alter the condition of a stream and riparian area if not managed properly. Improper livestock use of riparian areas can negatively affect riparian areas by changing, reducing or eliminating the vegetation within them.

In the sub-tropics, the majority of overland flow events occur during the summer to early autumn period. Conversely during the winter and spring months, most faecal contamination in water channels occurs from an animal defecating directly into the water. Any practice that reduces the amount of time cattle spend in a stream will therefore reduce the manure loading and decrease the potential for adverse effects on water from grazing livestock.

The direct effects of improperly managed livestock grazing on riparian vegetation include:

- change, reduce, or eliminate vegetation;
- decrease the vigour, biomass and alter species composition and diversity;
- change the channel morphology by widening and shallowing of the streambed;
- alter the stream channel through trenching or braiding depending on soil and substrate composition;
- alter the water column by increasing water temperatures, nutrients, suspended sediments and bacterial counts;
- alter the timing and volume of water flow;
- cause bank sloughing leading to accelerated sedimentation and erosion; *and*
- decrease wildlife habitat and species.

However, when tightly controlled, fencing can be an invaluable, and sometimes essential tool to manage grazing in riparian zones whether permanent exclusion or managed grazed is performed.

The project will enhance vegetation buffers on the tributaries of Falls Creek. The effectiveness of a riparian buffer to provide multiple environmental and water quality benefits varies depending on several key factors, namely bank slope, vegetation species composition and age, and soil type. Slope gradient appears to be the most important variable in removal of sediment or particulate pollutants, whereas buffer width is most important for the effective removal of dissolved nutrients[7].

[7] Barwick, M, Wassman, D & Pitman, K. 2009, *Maleny Community Precinct Environmental Management Scoping Document*, Australian Wetlands Pty Ltd, Caloundra, Qld

Above: Cattle on the Ferriday farm are free to graze and move through the riparian areas as they please. Riparian fencing combined with off stream watering will improve the management of cattle in the riparian zone, decreasing the risk to water quality.

Below: Currently cattle have unrestricted access to the waterways, and as a result erosion and the destabilization of stream banks is occurring.

Weed management

Normally LBCCG does not actively manage woody weeds in riparian zones as any vegetation in riparian zones is better than none (except for a few key species that have a detrimental impact on water quality). Weed management is only completed where:

- Priority weeds are present (Chinese elm, Madeira vine, Cats claw creeper);
- There is a long-term plan to ensure the weeds do not return (revegetation);
- Weedy vegetation is affecting water quality (blocking flows, causing erosion, diverting flows etc).

Several methods of weed control are utilised:

- Initial knock down with excavator or tractor mounted mulcher;
- Follow up spot spraying of re-shooting weeds;
- Cut and paste of larger weeds that cannot be mulched or sprayed (particularly important within and adjacent to remnant or good quality regrowth vegetation);
- Regular follow up over several years (as part of revegetation maintenance).

In this project the landholder is responsible for all onsite weed management.

Above: Riparian vegetation on along the waterways on Ferriday's block is impacted by woody weeds (primarily lantana, wild tobacco, yellowberry and blackberry).

Stage 1, 2020/21 Outputs

Outputs	1. Off stream watering system	4 troughs 1 solar unit 1 header tank 1 km poly pipe	Completed Dec 2020
	2. Internal property fencing	TBD (landholder responsibility)	Ongoing
	3. Stream crossings	1 x low level concrete	Completed June 2021
	4. Weed Management	1 hectare (landholder responsibility)	Ongoing

Off Stream Watering – Solar pump, header tank and 4 water troughs installed and completed, December 2020.

Above: The solar pump installed, which lifts water to a header tank. The water is then gravity fed to four waters troughs. A trough is highlighted that will provide water for livestock, following the fencing of the riparian zone.

Above: One of the four water troughs installed. All troughs have road base around the troughs to prevent bogging.

Concrete Crossing – One concrete crossing has been installed, which will assist livestock and vehicle movements between paddocks, once the riparian fencing is installed in Stage 2. Another crossing was improved with gravel, and a third piped crossing was installed to assist landholder access to their paddocks.

Above & Left: Formalised crossings protect livestock and watercourses from the issues associated with unrestricted access, they improve water quality by limiting sedimentation and nutrient enrichment. When the crossings are installed in conjunction with riparian fencing the risk to water quality is significantly reduced.

Weed Control –

Above: Fred Ferriday has continued to carry out weed control over his property targeting lantana, wild tobacco and devils fig.