Lake Baroon Catchment Care Group

Working with our co

Projects 2023/24

Obi Obi Creek

(Riparian fencing, revegetation, & stream crossing)

PROJECT PLAN

Riparian Condition Improvement & Agricultural Practice Improvement Programs

CBP2324-023

seqwater
WATER FOR LIFE

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

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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 provide a brief description of the project and includes summarised details of the stakeholders, budgets, outputs and outcomes. Appendices provide further useful information relating to budget, the Lake Baroon catchment and land use, and outlines various implementation activities of the project.

Confidentiality

Much of the information contained herein is confidential and must not be reproduced or passed on to any person outside Seqwater without prior written permission from Lake Baroon Catchment Care Group.

DOCUMENT VERSIONS & APPROVALS

Version	*Date*	*Version/Description*	*Result*
1.0	17th April 2024	Draft LBCCG Project proposal completed. Project emailed to LBCCG Committee for comments.	Approved
1.0	16th May 2024	Project proposal presented at LBCCG Management Committee meeting for approval.	Approved
1.0	8th May 2024	Project Proposal forwarded to Seqwater for approval (email)	Approved

AUTHORISATIONS

Name	*Signature*	*Date*
Prepared by: Luke Ferguson (Project Planner) & Claire Wynn (Office Manager)		21-3-2024
Approved by: LBCCG Management Committee (signed by Peter Stevens – President)		16-05-2024 (Minutes 0161.8.3)
Approved by (Seqwater): Julian O'Mara (Senior Planner – Source Protection		

Cover: Obi Obi Creek running through the property.

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.

The Landholders own a 14ha property at the head of the Obi Obi Creek catchment. The property is currently used as an agistment property and runs between 10 to 15 head of cattle. The property has 450 m of frontage to Obi Obi Creek, and currently the livestock have unrestricted access to the riparian zone. Historically, the Obi Obi 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).

Riparian fencing, concrete crossings and riparian revegetation are all control measures that will be implemented throughout this project. All of these measures are best practice management for improving water quality. The project was identified as a Preferred Project in the LBCCG 2023/24 Annual Work Plan[1].

The property is a moderate to low priority property based on its distance to Baroon Pocket Dam off take tower. However, the significance of this project is increased by the land use, riparian health, and the landholder's readiness to implement projects. Furthermore, the significance of the project is increased due to the importance of the Obi Obi Creek in the Lake Baroon catchment, and the volume of previous, planned and current projects undertaken in the surrounding area by Lake Baroon Catchment Care Group (as shown in Map 1).

Background

The property has always been used for livestock grazing and stocking rates have been adjusted seasonally. Livestock have always relied on access to Obi Obi Creek for their water supply, resulting in bank erosion, damage to the riparian vegetation, weed proliferation, poor riparian buffers and the direct delivery of faecal material (E.coli and pathogens) into Obi Obi Creek.

The Landholders have previously undertaken a number of projects on their property, that have focused on improving the health of the Obi Obi riparian zone. In 2022/23 the Landholders were involved in the Lake Baroon Catchment Care Group weed program. They have also previously carried out 125 metres of riparian fencing along Obi Obi Creek, with the help of Sunshine Coast Council's Landholder Environment Grants in 2022/23. This riparian fencing then led to the revegetation of the fenced riparian zone of Obi Obi Creek. In 2023 the landholdersr also self-funded the revegetation of a small land slip on their property. All of these projects have been successful, with over 300 trees being established. The Landholders have consistently demonstrated a strong commitment to protecting and repairing the waterways on their property.

The upper Obi Obi Creek catchment has been targeted for major on ground activities (projects) since 2009 as this sub-catchment is recognised as delivering very high volumes of nutrients and other contaminants (the sub-catchment is largely agricultural).

[1] Lake Baroon Catchment Care Group, (2023), 2023-24 Annual Work Plan – Source Protection, Maleny, Queensland

Map 1

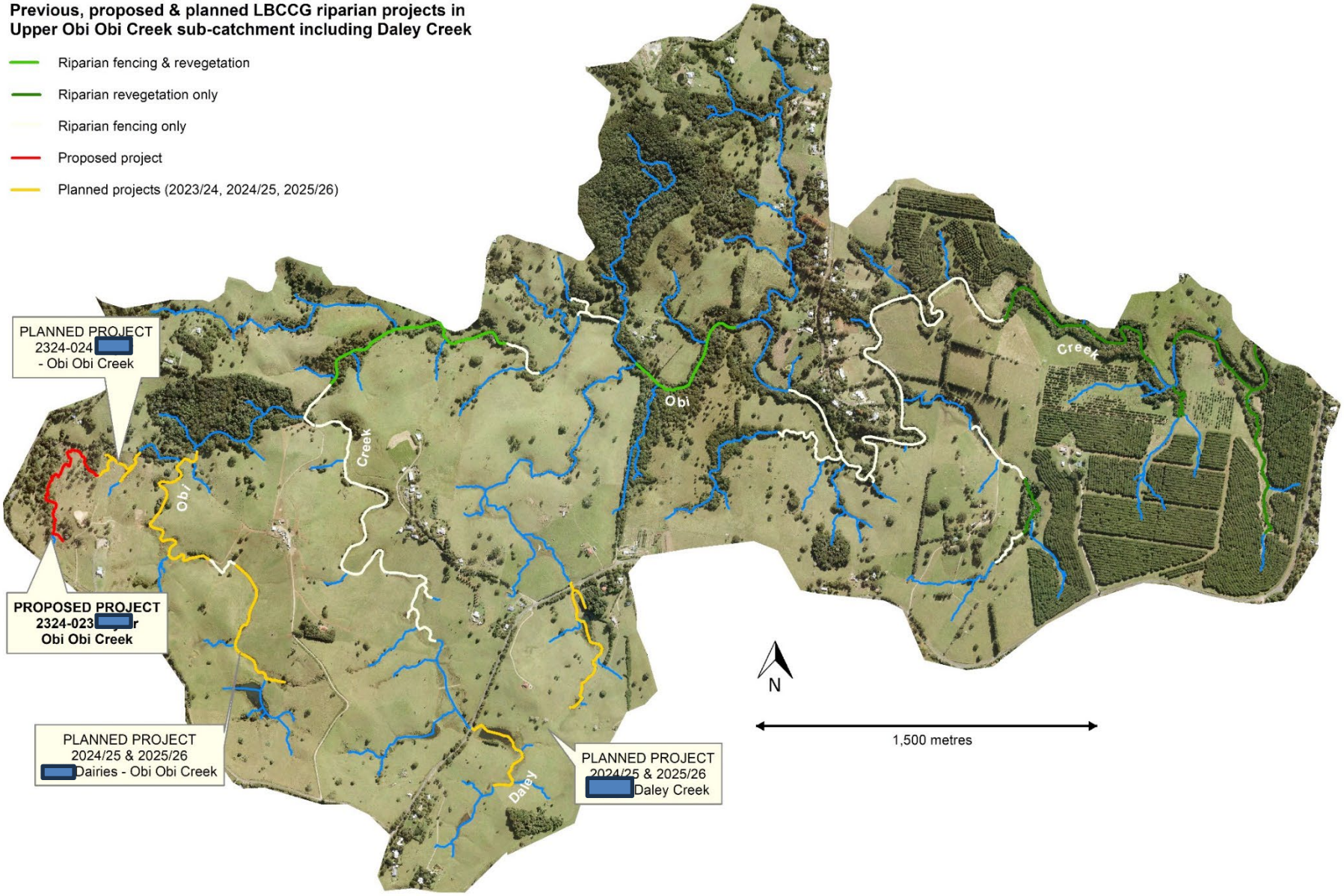

Previous, proposed & planned LBCCG riparian projects in Upper Obi Obi Creek sub-catchment including Daley Creek
Riparian fencing & revegetation
Riparian revegetation only
Riparian fencing only
Proposed project
Planned projects (2023/24, 2024/25, 2025/26)
PLANNED PROJECT 2324-024 - Obi Obi Creek
PROPOSED PROJECT 2324-023 Obi Obi Creek
PLANNED PROJECT 2024/25 & 2025/26 Dairies - Obi Obi Creek
PLANNED PROJECT 2024/25 & 2025/26 Daley Creek
Obi
Creek
Daley
N
1,500 metres

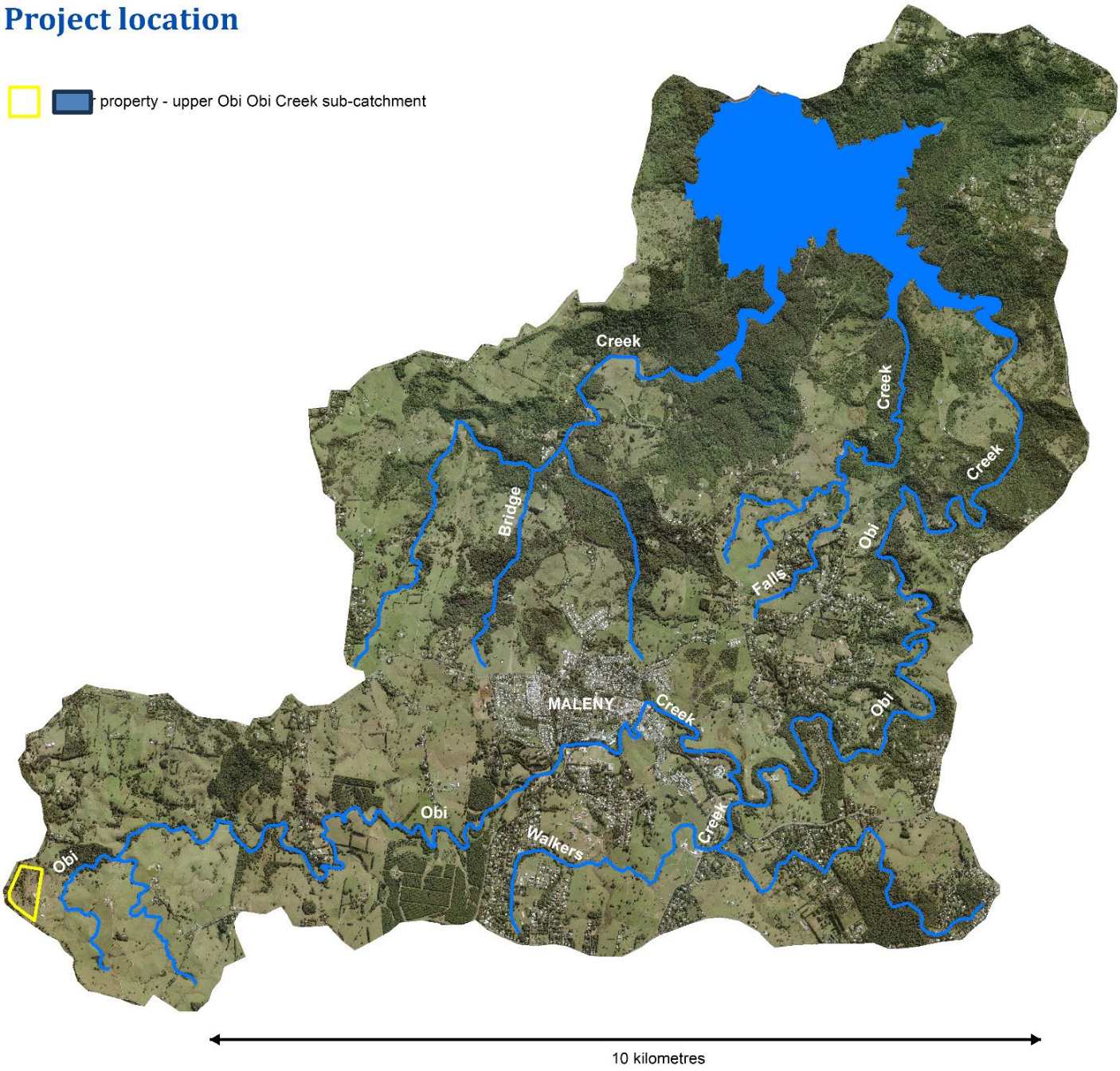
Figure 1: The property is at the head waters of Obi Obi Creek. Riparian fencing and revegetation will link with other projects in the area and will help strengthen the riparian buffer along the waterway.

Figure 2: The riparian zone is dominated by low lying wet zones. Excluding cattle from these areas, using riparian fencing will decrease the chance of pathogens entering the waterway.

Figure 3: The previous LEG project completed by the Landholders has been very successful. The project utilised fencing to protect the creek and enabled the revegetation of the riparian zone, enhancing the riparian buffer.

Figure 4: The landholders have a strong commitment to revegetation. Above is the site adjacent to a minor land slip that they have rehabilitated themselves.

Project location



Project Map


LAKE BAROON CATCHMENT CARE GROUP
CBP2324-023
Obi Obi Creek
Legend
New fencing
Landholder fencing
Existing fencing
Weed mgt & revegetation
Stream crossing
Alternative livestock water
2022 LEG project (fencing & revegtation completed)
Obi Obi Creek
Property boundary
This Plan is for Lake Baroon Catchment Care Group use only. LBCCG does not warrant the accuracy of the Plan or the information provided. Any persons relying on the information in this Plan does so at their own risk.
LBCCG. Mark Amos 2024. Scale 1:2,860
N
200 metres
seqwater
Sunshine Coast Council

Project Plan

Project title	**Obi Obi Creek (Riparian fencing, revegetation & off stream water)**	
Location	[redacted]	
Project Start Date	April 2024	
Project End Date	June 2024	
Landholder details	**Property owner / Manager**	[redacted]
	Contact details	
	Real Property description	
	Property size	
	Land use	
	Livestock numbers	
	Latitude/longitude	152.78719, -26.77597
	Water quality hazards present	1) Stock access to riparian zones 2) Moderate riparian vegetation 3) Moderate stream bank instability 4) Damage to existing native vegetation 5) Moderate weed coverage 6) Poor stream drainage

Water Quality Risk (**re-assessed** according to *2021-26 Implementation Plan for the Lake Baroon catchment criteria)*		
Distance from Baroon Dam off take	Low priority	Property is 10 km from off take
Prioritisation of land use	Medium to High	Grazing (moderate intensity)
Riparian condition	Moderate priority	No riparian fencing, moderate riparian vegetation, moderate stream bank stability,
Landholder readiness & willingness	High Confidence	High confidence – landholder sought out engagement with LBCCG, and has previously completed fencing and revegetation projects.
Complimentary funding availability	Moderate Priority	Landholder has been approved for 2023 Landholder Environment Grants (SCC) funding.
Land management weightings	Moderate Priority	Priority land use, inadequate riparian buffers, low risk project
OVERALL PROJECT PRIORITY	**MODERATE PRIORITY**	

Cash & in-kind contributions		
Project funding	Seqwater 2023-24 Riparian Condition Improvement (Water Quality) - $8,010	$ 34,454
	Seqwater 2023-24 Agricultural Practice Improvement - $21,375	
Project management	Seqwater 2023-24 Project management (RCI & API)	$ 15,280
Landholder contribution	Cash & in-kind	$ 32,010
Other contributors	Sunshine Coast Council Landholder Environment Grant	$ 5,434
	LBCCG Management Committee in-kind	$ 1,516
TOTAL		**$88,694**

Project Plan & Scope of Works			
Description of environmental hazards on site and how they are to be addressed	Livestock have unmanaged access to Obi Obi Creek	Fence waterway to exclude livestock.	
	Fragmented vegetative buffer between Obi Obi Creek and grazing	Revegetation with a diverse range of species along Obi Obi Creek, linking existing regrowth and remnant vegetation. Link with previous projects downstream.	
	Moderate vegetation diversity in riparian zone – moderate coverage of annual, perennial weeds, grasses and woody weeds		
	Minimal to moderate stream shading contributing to deoxygenation and other impacts		
	Lack of diverse native vegetation to provide complex root systems and mechanical bank stability benefits		
Activities to be delivered as part of project & Schedule of works	1. Weed management	1 hectare	April 2024
	2. Riparian Fencing	450 metres (2 gates)	May 2024
	3. Revegetation	2,000 stems	May 2024
	4. Stream crossing	2 crossings	June 2024
Future maintenance requirements	Maintenance of revegetation will be required between 3 – 5 years. Likely $4.00 per stem in first year and reducing to $0 by year 5. Other on-going costs will be borne by the landholder.		

Project Outcomes		
Improve water quality *Improve water quality of:* *a. source water in Obi Obi Creek; and* *b. raw water intake at Lake Baroon*	Improved riparian buffers in the Obi Obi Creek Catchment	Revegetation of riparian zone improves ability of buffer to trap and/or process sediment, nutrients chemicals and pathogens.
	Reduced erosion of the bed and banks of Obi Obi Creek reducing turbidity and sedimentation	
	Reduce pathogen delivery to waterways	
	Improved aquatic habitats	A reduction in turbidity, sediments, nutrients and pathogens will improve water quality and contribute to maintaining in-stream biodiversity.
	Improved land management	Protection of riparian zones, improved livestock management and health.
	Increased awareness of water quality issues and causes	Utilise the property as a demonstration site that displays the practical tools that landholders can incorporate on their land to help improve water quality.
Increase catchment biodiversity	Development of wildlife habitat corridors and sanctuary areas	Use revegetation plantings to provide wildlife corridors and habitat for native animals in the Obi Obi Creek sub-catchment. Plantings to link remnant and growth areas.

Monitoring

Seqwater's new Monitoring, Evaluation and Reporting (MER) program will be used to monitor this project. Under this new, standardised program, a project asset register will be developed for each project using Field Maps. A Condition Assessment Survey will be developed using Survey 123 and a Performance Assessment Survey will be completed for each site. All projects will be reviewed using the MER program

Drone footage will be captured for the project site. A detailed map and photo monitoring points will be created for the site. The maps and photo monitoring points will be produced annually and will provide valuable evidence of works completion, a record of changes over time, and provide an important assessment tool to evaluate the project. Whilst undertaking annual inspections after project completion, outputs such as riparian fencing, revegetation,

Figures 4 & 5 Drone deploy software is utilised to monitor the project site providing repeatable imagery over time and establishing photo monitoring points.

stream crossings and off-stream watering will be monitored and assessed for condition and fit for purpose. Project updates will be provided at monthly LBCCG meetings. The Project will also be reported on in the LBCCG Annual reports (LBCCG members and placed on LBCCG website).

Future Investment Options

The proposed plan is a 'whole property' project addressing the priority water quality risks in a single works program. Other than ongoing revegetation maintenance and monitoring, there are no future plans to develop any new projects or works.

References

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

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Gillen, R.L. , Krueger, W.C. , and Miller, R.F. . 1984. Cattle distribution on mountain rangeland in northeastern Oregon. J. Range Manage. 37: 549–553

Janicke, S. & Murray, K. (2008) Crossing Creeks – Stream crossings on farms, Department of Water, Government of Western Australia, Perth

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

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McIver, S., 2004, Using Off-Stream Water Sources as a Beneficial Management Practice in Riparian Areas – A literature review. Agriculture and Agri-Food Canada, Canada

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

Porath, M., Momont, P., DelCurto, T., Rimbey, N., Tanaka, J., McInnis,M., 2002. Offstream water and trace mineral salt as management strategies for improved cattle distribution. Oregon State University, LaGrande

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

Traill, C.B. 2007, State of the Lake Baroon Catchment, Volume 2: Appendices, AquaGen Water and Renewable Energy, Palmwoods

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.

CBP2324-023 Obi Obi Creek (Riparian fencing, revegetation, & stream crossing)

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.[2]

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.[3]

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.[4]

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.[5]

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.[6]

[2] Murton, S. & Keys, S. 2012, Seqwater Natural Asset Management Plan – Lake Baroon, Sinclair Knight Merz, Brisbane
[3] Smolders, A. 2011, Project Briefing Note: Water Quality Project – Cork's Dairy Restoration, Seqwater
[4] Department of Environment and Resource Management, Development of a water quality metric for south east Queensland, 2010
[5] 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.
[6] ibid

Presently the catchment is susceptible to a number of land use impacts; [7] 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.

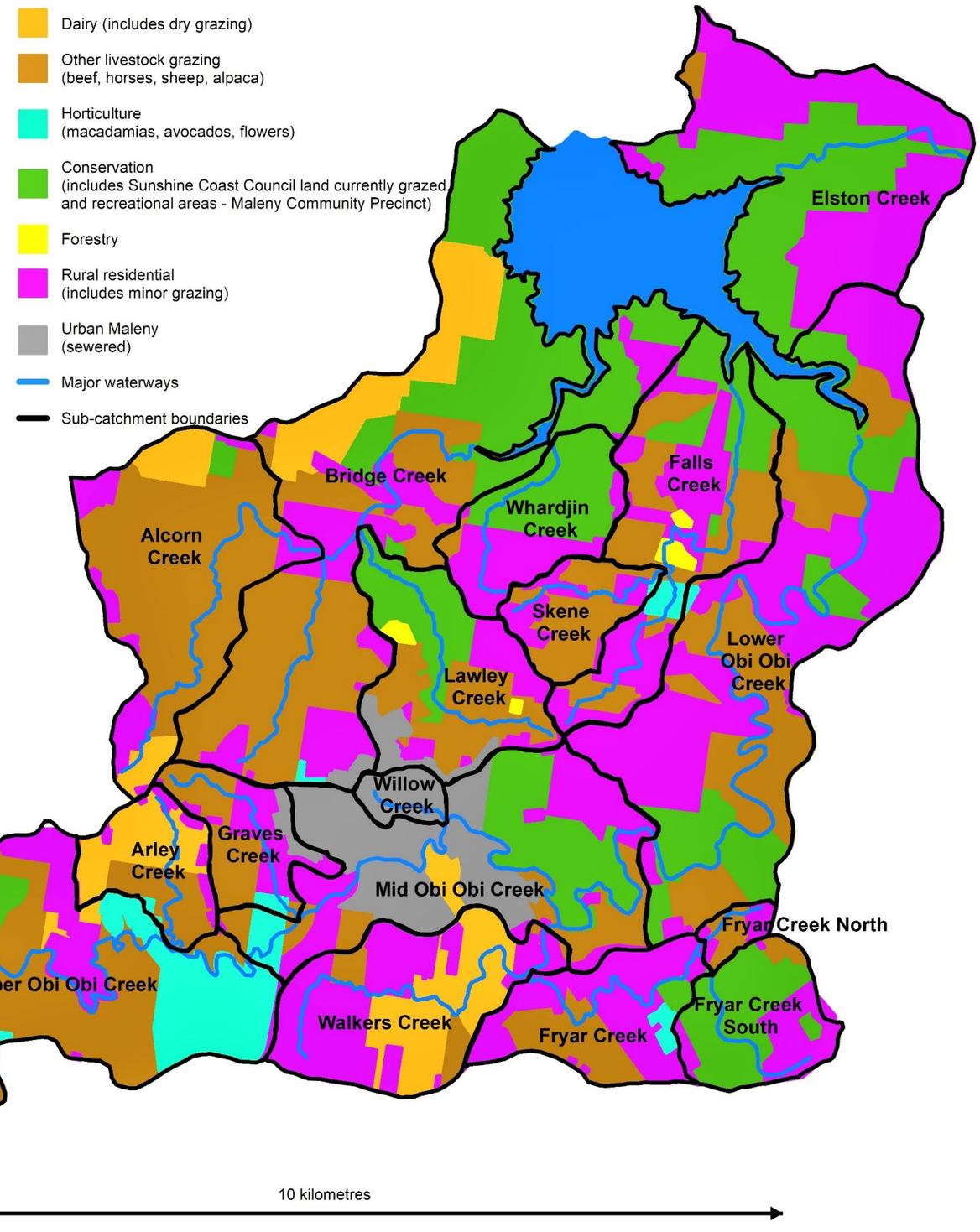
[7] Traill, C.B. 2007, State of the Lake Baroon Catchment, Volume 2: Appendices, AquaGen Water and Renewable Energy, Palmwoods

Table 1 - Lake Baroon sub-catchments and land use

Sub-catchment	Total hectares	Land use (hectares)						
		Dairy	Grazing	Horti-culture	Conser-vation	Forestry	Rural res.	Urban
Alcorn Creek	539	44	416	-	14	-	65	-
Arley Creek	135	72	49	2	-	-	12	-
Bridge Creek	1,250	166	476	-	484	-	114	10
Clark Creek	227	83	108	-	-	-	36	-
Daley Creek	127	28	87	-	-	-	12	-
Elston Creek	673	-	12	-	355	-	306	-
Falls Creek	391	-	154	12	89	11	125	-
Fryars Creek	200	-	47	6	-	-	147	-
Fryars Creek North	27	-	13	-	4	-	10	-
Fryars Creek South	164	-	8	2	104	-	50	-
Graves Creek	132	-	64	5	-	-	54	9
Lawley Creek	345	-	119	-	130	7	54	35
Lower Obi Obi Creek	935	-	296	-	140	-	499	-
Mid Obi Obi Creek	546	17	83	17	101	-	61	267
Upper Obi Obi Creek	740	95	344	124	29	-	148	-
Skene Creek	117	-	92	1	-	-	24	-
Walkers Creek	306	119	29	-	-	-	158	-
Whardjin Creek	228	-	14	-	133	-	81	-
Willow Creek	38	-	-	-	-	-	-	38
TOTAL	**7,120[1]**	**624**	**2,411**	**169**	**1,583**	**18**	**1,956**	**359**

[1] Does not include the Lake Baroon surface.

Note – sub-catchments are based on named creeks in the catchment only and do not reflect land use, area or any other particular characteristic.



Upper Obi Obi Creek Sub-Catchment

The Obi Obi Creek is the most significant watercourse in the Lake Baroon catchment, consisting of 71 km of waterway in a sub catchment of 2,880 ha. A mere 18% of the sub catchment is covered in vegetation, with much of the area significantly disturbed, mostly supporting beef or dairy cattle; but also including urban Maleny (Dunstan 2007).

The Upper Obi Obi Creek sub-catchment covers an area of 1,094 Ha, for this project Clark Creek and Daley Creek catchments have been included in the upper Obi Obi Creek sub-catchment. Beef cattle grazing is the dominant land use (49 %), followed by 19 % dairy farming, and 18 % rural residential.

The Lake Baroon Annual Plan (2021/22) considers this part of the catchment as a low priority property based on its distance to Baroon Pocket Dam off take tower, however, when you look at land use, riparian health, readiness to implement projects and the likelihood of gaining additional funding, a case can be made that this is a high priority project. Historically the upper Obi Obi Creek catchment supported dairy grazing which, along with the rural residential, likely yielded poor water quality results - high levels of nutrients (and likely pathogens).

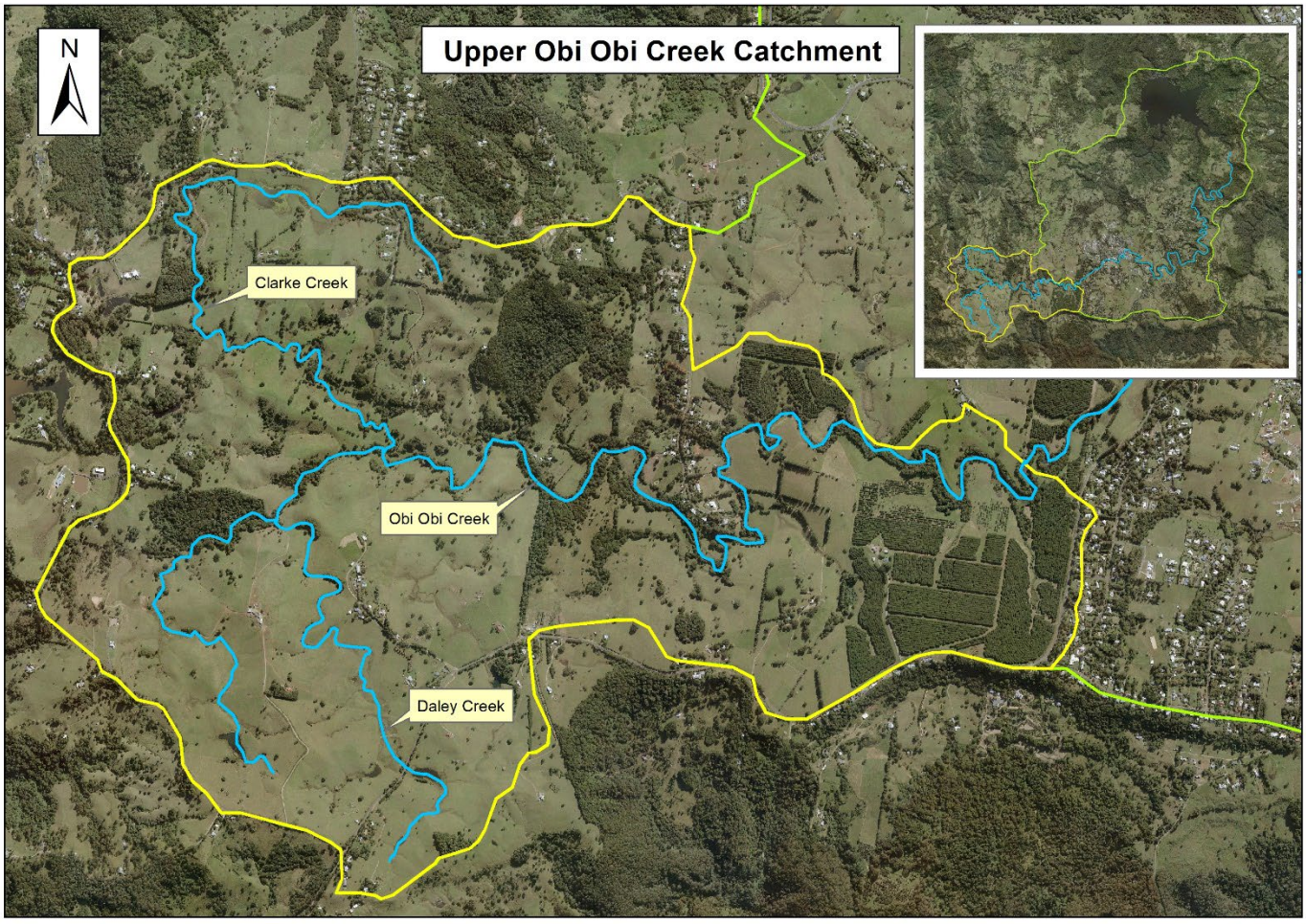


*Table 2 Riparian zone grazing assessment (as of March 2022; * indicates updated in November 2023)*

Sub-catchment	Total stream length	No livestock grazing	Managed livestock grazing	Unmanaged livestock grazing
Graves Creek	5,021 m	1,286 m (26%)	849 m (17%)	2,886 m (57%)
Arley Creek	5,857 m	482 m (8%)	1,583 m (27%)	3,792 m (65%)
Fryar Creek	8,746 m	5,523 m (63%)	0 m (0%)	3,223 m (37%)
Falls Creek*	17,806 m	15,203 m (85%)	680 m (4%)	1,923 m (11%)
Skene Creek*	5,490 m	1,689 m (31%)	288 m (5%)	3,513 m (64%)
Whardjin Creek	8,372 m	7,959 m (95%)	0 m (0%)	413 m (5%)
Alcorn Creek	20,641 m	8,296 m (40%)	3,520 m (17%)	8,825 m (43%)
Clark Creek	11,730 m	3,429 m (29%)	172 m (2%)	8,129 m (69%)
Daley Creek	5,338 m	0 (0%)	2,296 m (43%)	3,042 m (57%)
Walkers Creek	12,124 m	5,666 m (47%)	2,063 m (17%)	4,395 m (36%)
Elston Creek	24,447 m	24,257 m (99%)	0 m (0%)	190 m (1%)
North & South Fryar Creek	8,930 m	4,898 m (55%)	0 m (0%)	4,032 m (45%)
Willow Creek	913 m	913 m (100%)	0 m (0%)	0 m (0%)
Lawley Creek	12,287 m	10,672 m (87%)	152 m (1%)	1,463 m (12%)
Upper Obi Obi Creek	***34,959 m***	***9,696 m (28%)***	***6,005 m (17%)***	***19,258 m (55%)***
Lower Obi Obi Creek	***45,888 m***	***33,496 m (73%)***	***1,466 m (3%)***	***10,926 m (24%)***
Mid Obi Obi Creek	***23,368 m***	***20,572 m (88%)***	***832 m (4%)***	***1,964 m (8%)***
Bridge Creek	48,535 m	31,015 m (64%)	423 m (1%)	17,097 m (35%)
Totals	**300,452 m**	**185,052 m (62%)**	**20,329 m (7%)**	**95,071 m (32%)**

Livestock excluded from riparian zone

Riparian zone fenced but intermittent livestock grazing

No riparian fencing, livestock have unmanaged access

Note - it is unlikely 100% exclusion is possible as identified streams include Order 1 waterways that are ephemeral and are usually merely grassed swales. It is not practical or cost effective to include these waterways in funded fencing projects.

Appendix 3: Project works

Riparian Fencing

The project will see the installation of approximately 400m of riparian fencing along the Obi Obi Creek, resulting in the permanent removal of livestock from the Obi Obi Creek riparian zone. This riparian fencing 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.

This project will enhance vegetation buffers along Obi Obi 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. [8]

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

Figure 5: Currently cattle have unlimited access to Obi Obi Creek, as a result there is the potential for the faecal matter and pathogens to directly enter the creek. Riparian fencing will result in a healthier riparian buffer which will ultimately assist in improving the quality of water entering Obi Obi Creek.

Riparian Revegetation

2,000 tubestock will be planted in the riparian zone of the Obi Obi. Initially contractors will clear the site and control any woody weeds or problematic species such as blackberry. Following the weed control the site will be set out with stakes and prepared for planting. A diverse rainforest species mix will be used for the planting. In the flood zone a lomandra plant will be companion planted with the tubestock, to provide protection for the tubestock during floods.

Riparian vegetation provides a buffer between water and agricultural activities. Buffers trap sediment, nutrients and faecal material before it reaches a flowing watercourse. Additionally, any contaminants that do reach the flowing water are more likely to be processed by in-stream vegetation if present. A combination of both native woody vegetation (trees) and grasses are ideal for buffers to utilise a wider range of nutrients so 'messy' riparian zones are likely more efficient despite possibly being viewed as 'ugly'.

Riparian zones due to their nature of being the most productive with good soils and moisture tend to grow thick stands of weeds (along with grass) and require either heavy management or require revegetation with native vegetation to out compete and shade most weed species. Revegetation therefore is a long-term management solution for fenced riparian zones.

Riparian buffers comprising grassed buffer strips are effective at trapping sediments and nutrients adsorbed to sediments (such as phosphorus), but tend to be relatively poor at trapping dissolved nutrients, or for the provision of shade, food sources, in-stream structure or corridors for many species. Riparian buffers comprising taller, woody vegetation are typically good at providing shade, as a source of food and woody habitats, as a screen for light and

noise, as corridors for terrestrial fauna (to a varying extent depending on species composition), and as a means for reducing soluble nutrient inputs.

Designed riparian buffers usually incorporate multi-tiered systems of both native woody vegetation to enhance ecological function, and vegetated filter strips for the management of water quality. In essence, this approach seeks to mimic the complexity and effectiveness of a natural riparian buffer system, and often the best approach is to provide the required buffer width to enable a self-sustaining buffer of native vegetation.[9]

Figure 6: The riparian zone on the property along Obi Obi Creek. Good access to the planting site will allow efficient planting times. There are many sections of the creek that can not be planted due to significantly wet and marshy conditions.

Weed Management

Weed management is carried out for multiple reasons:

- clear weeds to replace with native vegetation;
- manage weeds to protect desirable vegetation;
- treat weeds that threaten remnant vegetation or riparian vegetation (vine weeds in particular); *and*
- manage agricultural weeds to prevent spread onto farmland.

[9] ibid

Note however that weed management should only be implemented for targeted reasons and must require a long-term plan and funding source.

Major environmental weeds pose a serious and immediate threat to native vegetation and water quality due to their ability to alter the structure and composition of plant communities. Small leaf privet can thrive in low-light conditions and over time will dominate riparian zones, out-competing native species and effectively developing mono-culture systems. Similarly, lantana and blackberry form dense thickets. Natural regeneration is reduced below sustainable levels and only mature individual native flora species persist.

Vine weeds, although requiring high light levels (and therefore not usually a major threat to robust remnant vegetation) spread easily and can rapidly envelope all other vegetation, and in time can kill those plants simply through the elimination of light and smothering. Over time weedy vines and other pest species will degrade the edges of remnant vegetation and slowly but surely decrease the total area of remnant.

Many weed species due to their ability to out compete native species and form monocultures affect overland water flow and run off, and may not filter sediments and nutrients as effectively as diverse native vegetation

Weed management almost always requires a combination of control methods for long term success:

  - mechanical clearing by machine mounted mulchers or slashers, brush cutting or mowing (always requires herbicide follow up);
  - herbicide spraying;
- biological control; *and*
- hand management (hand weeding, cut & swab, targeted spraying, stem injection, stem scrape & poison, ring barking etc).

Stream Crossings

Formalised crossings protect livestock and the river from the problems associated with unrestricted access. The benefits include (Water and Rivers Commission 2000):

- improved water quality by limiting sedimentation and nutrient enrichment;
- enhanced livestock health through access to cleaner water;
- reduced loss of productive land and livestock deaths;
- potentially the provision of a relatively cheap option for providing livestock watering;
- maintaining river pools to provide a water source that is available for longer periods of year;
- stabilisation of the river banks and bed; *and*
- improved riparian vegetation and riverine habitats.

Crossings can be designed to provide many other ecological benefits such as (Water and Rivers Commission 2000):

- having a riffling effect which aerates the water and provides a variety of riverine micro-habitats;
- allowing for fish passage;
- maintaining river pools that are important in providing summer refuges and breeding areas for certain aquatic animal species, such as crayfish; *and*
- contributing to channel stability by controlling the velocity of flow and reducing the downstream movement of sediments into the river.

Installation of a stream crossing will improve water quality, reducing nutrient, sediment, pathogen, and organic matter loads to streams. A formal crossing will also reduce streambank and streambed erosion. Stream crossings can provide cattle with improved access to pastures thereby improving grazing distribution while reducing the likelihood that cattle will be injured. Stream crossings also improve vehicle access for weed management, pasture improvement, erosion management and other activities that influence the quality of water flowing off properties. Stable stream crossings can help prevent farm equipment damage by providing a smooth entrance and exit.

A good crossing is one that serves the purpose for a long time and requires minimal maintenance. The design must allow for a range of flow conditions and sustain as little damage as possible when flooding occurs. It is also essential to ensure that the crossing will have negligible environmental impacts.

Other than providing access across a stream for people, vehicles and livestock, a well-designed crossing provides environmental benefits. Restricting crossings to one point will greatly reduce local erosion and protect riparian vegetation from stock; further stabilising stream banks, and can greatly assist in managing nutrient input to the stream system. The overall benefits include reduced sedimentation, improved water quality, creation of shelter belts for stock and habitat for native wildlife.[10]

Two concrete crossings will be installed on the property. These crossing will be installed using concrete mats, instead of the traditional full concrete slab. The concrete mats are a cost effective and highly effective measure, that can be utilized in low water flow zones and where traffic across the crossings is predominantly livestock.

Figure 7: This is the proposed site for one of the concete mats. Livestock are currently causing pugging in the creek, resulting in increased turbidity of the water.

[10] Janicke, S. & Murray, K. (2008) Crossing Creeks – Stream crossings on farms, Department of Water, Government of Western Australia, Perth

Revegetation Maintenance

Maintenance is critical for the long-term success of large revegetation projects (e.g. Bridge Creek Rehabilitation). Good maintenance is an extremely important component of re-establishing vegetation principally within the first 3 years of planting. Weed growth is very rapid on the Maleny plateau – particularly over the summer months where maintenance must be performed every six weeks. Failure to do so can result in plant mortality, weed infestation and frustrating labour – all of which results in excessive costs to 're-capture' the site.

It is desirable, if not essential, to employ specialists who have the equipment, skills and knowledge to successfully manage revegetation sites and ultimately establish a functioning buffer. Landholders are rarely capable of managing all the maintenance required on large revegetation sites (more than 500 plants) and therefore in an effort to ensure success, LBCCG provides the bulk of support for maintenance. Contractors are selected on their experience, value for money, landholder engagement skills and landholder preferences.

Grass is maintained between the rows of revegetation to reduce erosion and to act as a filter – trapping sediments and nutrients during high rainfall events. Glyphosate herbicide is sprayed immediately around the tree guards reducing competition whilst weed mats placed under the guards minimises weed growth inside the guard. The grass between the rows is occasionally slashed so that access is maintained and the site does not become over-grown.

Appendix 4: 2023/24 RCI & API projects

Estimated budgets v actual budgets & approvals

Project number, landholder name, sub-catchment & key works	2023/24 Annual Work Plan budget (includes Project mgt)	2023/24 Actual budget	Project plan status
CBP2324-002 **Falls Creek** *(Riparian revegetation)*	$ 24,928	$ 26,158	APPROVED
CBP2324-011 **Obi Obi Creek** *(Riparian fencing)*	$ 76,000	$ 83,840	APPROVED
CBP2324-013 **Falls Creek** *(Riparian fencing, revegetation, stream crossing & off stream water)*	$ 45,973	$ 52,310	APPROVED
CBP2324-023 **Obi Obi Creek** *(Riparian fencing, revegetation & stream crossing)*	$ 44,665	$49,734	PROPOSED
CBP2324-024 **Obi Obi Creek** *(Riparian fencing, revegetation & OSW)*	$ 51,300		UNDER DEVELOPMENT
CBP2324-027 **Good Neighbour Program - Elston Creek** *(Revegetation)*	$ 15,200		UNDER DEVELOPMENT
CBP2324-040 **Agriculture Practice Improvement Workshops**	$ 6,080	$6,080	ONGOING
Revegetation maintenance *(Maintenance of revegetation planted in previous years projects)*	$ 115,854		ONGOING
Totals	**$ 380,000**		