



**LAKE
BAROON
CATCHMENT
CARE
GROUP**



Projects 2011-12

Bridge Creek Riparian Remnant Fencing



PROJECT PLAN

Project No. 1112-003

This Project proposal has been prepared by:

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PROJECT VERSIONS & APPROVALS

<i>Version</i>	<i>Date</i>	<i>Version/Description</i>	<i>Result</i>
1.0	10/4/2012	Draft Project Proposal	n/a
1.0	12/4/2012	Project presented to LBCCG Committee	Approved (Minutes 53.6.9)
1.0	17/4/2012	Project Proposal forwarded to Seqwater for approval (email)	Approved 30/4/2012

supporting the **Sunshine Coast Rivers Initiative**

Cover photo: Small eroding stream on Cork property.

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i. EXECUTIVE SUMMARY

PROJECT TITLE: Bridge Creek Riparian Remnant Fencing

PROJECT NUMBER: 1112-003 **DATE:** March 2012

PROJECT SUMMARY:

The project will remove livestock from the riparian zone of a Bridge Creek tributary and protect an ‘Of Concern’ area of remnant vegetation. We will enhance the filtering and buffering capacity of the degraded waterway and reduce nutrient, sediment and chemical export. This will be the first step in addressing serious erosion on the property and livestock access to waterways.

APPLICANT/LANDHOLDER DETAILS

<i>Names</i>	Col & Stacey Cork
<i>Postal Address</i>	[REDACTED]
<i>Phone Numbers</i>	[REDACTED]
<i>E-mail</i>	[REDACTED]

PROJECT / SITE LOCATION

<i>Property Address</i>	189 Bridge Creek Road, Maleny		
<i>RP Number (Lot)</i>	RP889840 (221)		
<i>Property Size (ha)</i>	67.76 hectares		
<i>Existing Land-use</i>	Dry dairy/beef cattle		
<i>Stock Carried</i>	100		
<i>Sub-Catchment</i>	Bridge Creek		
<i>Management Unit</i>	BR2		
<i>M.U. Priority (LBCCG IP)</i>	High	<i>M.U. Priority (Pollution)</i>	Moderate

PROJECT PARTNERS/STAKEHOLDERS & ROLES

<i>Lake Baroon Catchment Care Group</i>	Project coordination, administration & reporting, monitoring & evaluation
<i>Seqwater</i>	Project funding (\$5,486)
<i>Col & Stacey Cork</i>	Landowners, cost share, labour & maintenance (\$3,320)

PROJECT DETAILS

<i>Project Start Date</i>	April 2012	<i>Project Completion Date</i>	June 2013
<i>Fencing Required</i>	325 metres		
<i>Remnant Vegetation Protected</i>	1.25 hectares		
<i>Waterway Protected</i>	300 metres		



1.0 INTRODUCTION

Lake Baroon Catchment Care Group is an on-ground implementation, not for profit community group focussed on improving water quality in the Lake Baroon catchment. 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.¹



Above: The Cork property from Bridge Creek Road. Note the areas of significant erosion and patches of remnant vegetation.

¹ Smolders, A 2011 Project Briefing Note: Water Quality Project – Cork's Dairy Restoration, Seqwater

2.0 RATIONALE²

An estimated 80% of sediment and 35% of nitrogen in the waterways in South East Queensland come from non-urban diffuse loads. Reduction of these loads clearly represents a major target for action if significant improvements in water quality are to continue to be achieved in South East Queensland.

Modern agricultural activities have been identified as a major source of diffuse pollutants into waterways (Polyakov et al, 2005). Land management practices, such as stocking rates, grazing pressures, land clearing and the application of fertilisers have significant impacts on pasture and land condition. These practices can result in erosion processes, decreased infiltration of soils, and excess nutrient and sediment run-off, all of which impact on local water quality.

Diffuse pollutants are:

- Aggregated within a catchment; but delivered from sources dispersed throughout the catchment;
- Random in nature with weather playing a critical role in the process of pollutant delivery;
- Difficult to monitor on a continuous basis for a reasonable cost (Qureshi and Harrison, 2002).

Despite these barriers, evidence suggests there is an opportunity to reduce the contribution of non-urban diffuse source pollutants to prevent further water quality degradation throughout south east Queensland. Providing incentives for landholders to change management practices is one strategy to improve water quality.

Sediment generation identified from private agricultural land is considered to derive from 3 key sources of erosion:

- Hill-slope erosion is the wearing away of soil particles, chiefly by rain and water flows over the land instead of in channels. Although hill-slope erosion may occur on soil surfaces that are covered with vegetation, it is more prevalent on bare soil (SEQHWP, 2007)
- Gully erosion is the removal of soil along drainage lines by surface water run-off. It occurs when run-off concentrates and flows at a velocity sufficient to detach and transport soil particles, eroding channels (a concentrated flow path for water leaving a field or watershed) into a hill-slope (Ziebell and Richards, 1999)
- Stream bank erosion is the detachment of soil particles by concentrated flow paths occurring along stream bank channels. Stream bank erosion is especially prevalent where riparian vegetation is degraded (SEQHWP, 2007)

These three sources of erosion deliver a high level of sediments and nutrients to the waterways of south east Queensland. The velocity and volume of water delivery to major channel erosion sites, poor soil structure and land use disturbances are all causes of channel erosion throughout south east Queensland. The channel origin of the sediment means that attention needs to be directed to stream and gully stability, and the prevention of hill-slope erosion.

A survey examining barriers to the adoption of best land-use management practices by farmers concluded that economic barriers pose the biggest constraint (Slack-Smith, 2005). Investment in south east Queensland catchment management has historically been quite sporadic and not well targeted, especially in rural catchments (Faulkner, 2008). Cost effective investment, targeted at the most important non-urban diffuse pollutant sources throughout south east Queensland, is required to efficiently achieve a large reduction of sediment and nutrient loads with a limited budget (Olley et al., 2006).

² Department of Environment and Resource Management, *Development of a water quality metric for south east Queensland*, 2010)

3.0 LOCATION

3.1 THE BRIDGE CREEK CATCHMENT

The Lake Baroon Catchment Implementation Plan 2007 describes the Bridge Creek sub-catchment as dominated by natural vegetation, though dairying and cattle grazing is a significant land use in several Management Units. The sub-catchment covers an area of 2,134 hectares and has a total significant stream length of 52 km. Approximately 43% of the sub-catchment has vegetation cover although much of this is significantly disturbed and degraded by environmental weeds.³



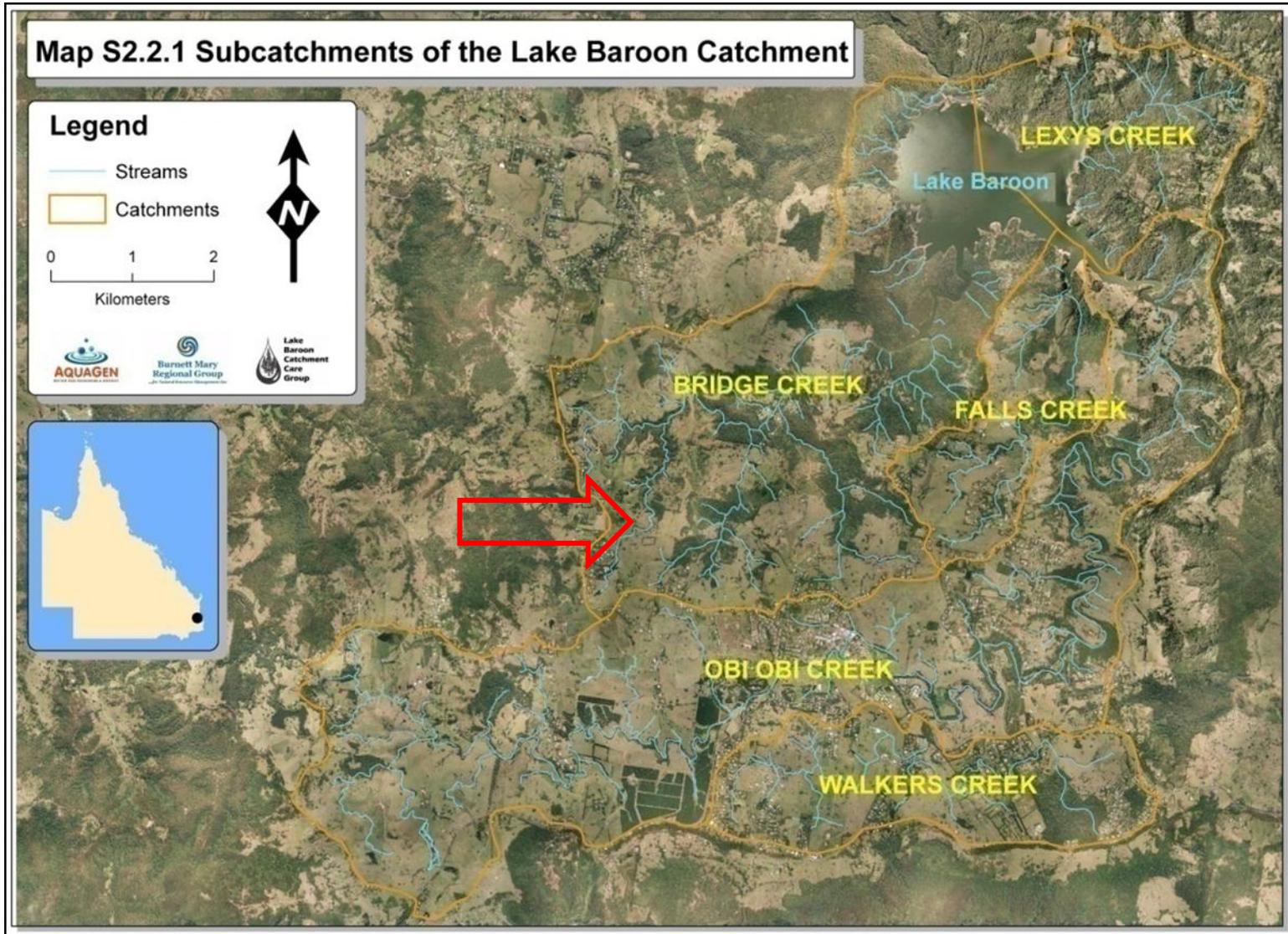
Left: Bridge Creek has good riparian vegetation and displays excellent bed diversity and bank stability. The creek however is threatened by sediment loads entering the waterway through excessive erosion in the catchment – particularly in the headwaters.

Bridge Creek has been divided into six management units that reflect property boundaries, physiography, vegetation, land use, point and diffuse source impacts, and administrative convenience. The project site is in Management Unit BR2.



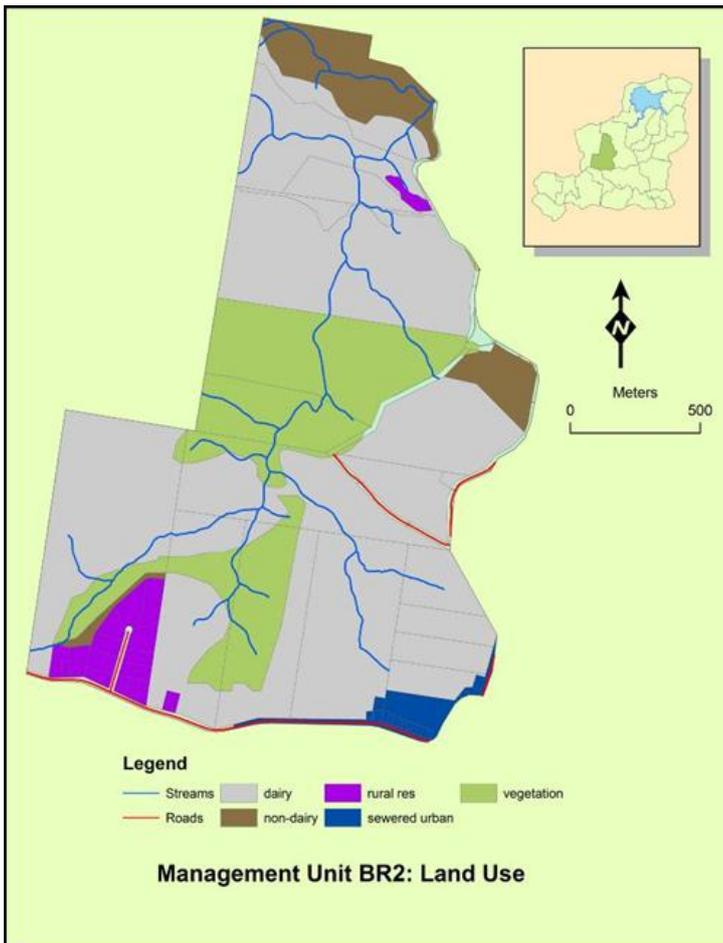
Left: The Cork property from the air.

³ Dunstan, M. 2007, Lake Baroon Catchment Implementation Plan, Aquagen Water & Renewable Energy, Palmwoods.



Above: The Cork property in the mid to upper reaches of Bridge Creek.

3.2 LAND USE



The proposed project is located within Management Unit BR2. This MU is 323 ha in size and has 98 km of significant waterways. Riparian vegetation is present alongside 85% of the waterway length, although much of this is in a degraded condition from environmental weeds.

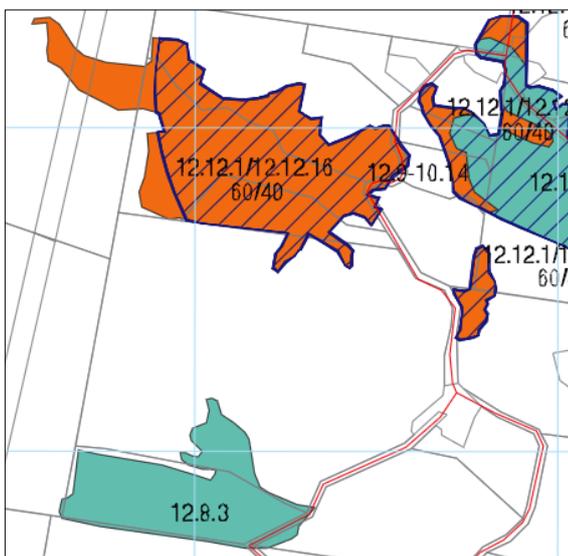
The Bridge Creek catchment is experiencing a rapid shift from livestock grazing (dairy and beef) to rural residential land use (no dairies remain in the catchment), and several urban developments in the headwaters.

Once dominated by dairy grazing, the Management Unit is now predominantly used for non-dairy grazing with a large area covered with vegetation, some areas of rural residential, and a small area of sewered urban.

Above: The Bridge Creek catchment is experiencing a rapid shift from livestock grazing (dairy and beef) to rural residential land use (no dairies remain in the catchment), and several urban developments in the headwaters.

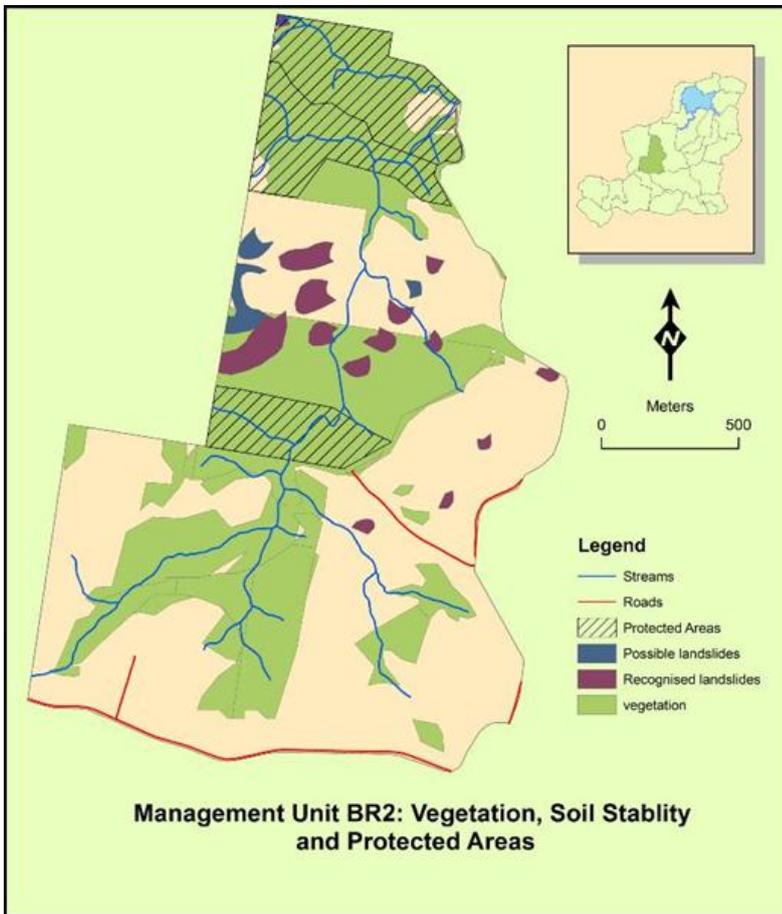
The Cork land parcel however remains as one of the last large primary production properties in the catchment.

Despite this, the property has approximately 15% covering of vegetation although much of this is severely degraded by environmental weeds. Included in the 15% is approximately 5 hectares of remnant vegetation.



Left: Remnant vegetation on the Cork property. The orange shaded area is RE 12.12.1 Simple notophyll vine forest (Biodiversity Status – Of Concern). This area is also considered Essential Habitat under the Vegetation Management Act. The green area at the bottom of the figure is RE 12.8.3 Complex notophyll vine forest.

3.3 GEOLOGY, SOILS & STABILITY



The catchment is characterised by its steep slopes, lack of vegetation in the headwaters, and the inability of the soil to absorb nutrients and moisture.

Despite this the upper reaches are relatively stable with nutrient inputs relatively moderate.

The middle reaches of the Management Unit have areas prone to slips and mass movement – the most obvious occurring on the Cork property.

Left: The Cork property is situated in the lower middle of the figure.



Left: Serious land slips on the Cork property.

4.0 WATER QUALITY

The relatively steep nature of the land, moderate instability (50% of land unstable) and lack of natural cover in some areas of the catchment means that there is high erosion potential, and minimal filtering of run-off, therefore inputs of nutrients are significant (40% of samples exceeding guideline levels).⁴

4.1 STATISICAL ANALYSIS OF WQ DATA – WELLS ROAD (BRIDGE CREEK)

Water quality monitoring and analysis (1999-2005) taken at the Bridge Creek crossing (Wells Road) shows, despite much of the catchment being vegetated, the catchment contributes significant nitrates, ammonia, phosphates, phosphorus and faecal coliforms.

<i>Parameter</i>	<i>pH</i>	<i>Turbidity</i>	<i>NOx (N)</i>	<i>NH3 (N)</i>	<i>PO4 (P)</i>	<i>Total P</i>	<i>Faecal Coliforms</i>
<i>(units)</i>	<i>(pH units)</i>	<i>(NTU)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(number/100 mL)</i>
Guideline Value	6.5-8.2	<25.0	<0.040	<0.010	<0.030	<0.030	<100
Max	8.2	85.6	0.316	0.166	0.068	0.335	1480
Min	6.7	0.6	0.000	0.000	0.001	0.005	0
Mean	6.9	3.6	0.059	0.026	0.023	0.043	233
Median	6.9	1.4	0.036	0.010	0.013	0.027	60
Std Dev	0.3	16.0	0.214	0.183	0.047	0.068	4627
20th Percentile	6.8	1.0	0.003	0.006	0.008	0.020	20
80th Percentile	7.0	2.3	0.118	0.040	0.041	0.050	390
Count above GV	0	1	23	24	17	22	20
Count	51	51	50	50	51	50	51
% above GV	0.00	1.96	46.00	48.00	33.33	44.00	39.22

⁴ Dunstan, M. 2007, Lake Baroon Catchment Implementation Plan, Aquagen Water & Renewable Energy, Palmwoods.

5.0 PURPOSE & OBJECTIVES

A healthy aquatic ecosystem is one that is stable and sustainable; maintaining its physical complexity, biodiversity and resilience. It has the ability to provide ecosystem services that provide good water quality, wildlife habitat and recreation.

The Lake Baroon Catchment Implementation Plan (2007) rates BR2 a HIGH priority for rehabilitation works. However, when assessing the Management Unit using a modified version of the Prioritisation Process, which prioritises MU's on pollution input levels and land instability parameters, BR2 rates as a MODERATE priority.⁵

The project will remove livestock from the riparian zone of a Bridge Creek tributary and protect an 'Of Concern' area of remnant vegetation. We will enhance the filtering and buffering capacity of the degraded waterway and reduce nutrient, sediment and chemical export. This will be the first step in addressing serious erosion on the property and livestock access to waterways.

5.1 PRIORITY ACTIONS (IN PRIORITY ORDER) FOR BRIDGE CREEK⁶

1. Revegetate first order streams throughout the sub-catchment to maximise buffer capacity and reduce erosion potential.
2. Provision of advice, encouragement and incentives to landholders to maintain adequate riparian buffers and erect riparian fencing and manage stock access to waterways. This includes the provision for off stream watering, shade and hardened waterway access points and livestock laneways.
3. Encourage good farming practices, particularly on floodplains and steep slopes which reduces the rate of soil loss to below that of natural soil forming processes.
4. Actively support SCC Land for Wildlife, NRM Small Grants Scheme and legal covenant agreement initiatives that protect and rehabilitate remnant vegetation and enhancement projects.

5.2 PROJECT TARGETS

- | | |
|-----------------------------|---|
| Project Objectives: | <ul style="list-style-type: none">* provide community benefit through water quality improvements in Baroon Pocket Dam* protect remnant vegetation* enhance habitat* demonstrate best practice management |
| Specific Objectives: | <ul style="list-style-type: none">* exclude livestock from 1.25 hectares of remanet vegetation* exclude livestock from 300 metres of waterway |
| Targets: | <ul style="list-style-type: none">* 325 metres of permanent fencing |

⁵ Dunstan, M. 2007, Lake Baroon Catchment Implementation Plan, Aquagen Water & Renewable Energy, Palmwoods.

⁶ Traill, C.B. 2007, *State of the Lake Baroon Catchment, Volume 2: Appendices*, AquaGen Water and Renewable Energy, Palmwoods.

5.3 OUTCOMES

Healthy catchments lead to healthy waterways. Through the prioritisation and implementation of riparian protection and rehabilitation throughout rural catchments – particularly headwaters, we can provide multiple beneficial outcomes.

1. Reduce nutrient delivery to waterways.

Nutrient delivery to waterways is continuous and increases during episodic rain events.

Vegetative buffers intercept run-off contaminated with excessive nutrients from diffuse rural and urban sources (stormwater).

2. Reduce sediment delivery to waterways.

Soil from erosion leads to high turbidity and is transported to Baroon Pocket Dam and beyond.

Vegetative buffers stabilise eroding riparian zones and intercept run-off contaminated by sediments. Our project will protect riparian vegetation that will slow flows reducing erosive potential while capturing sediments.

3. Improve aquatic habitat.

Riparian vegetation plays a critical role in the creation and maintenance of aquatic habitats in freshwater ecosystems.

Riparian vegetation provides shade, limits nuisance aquatic plant growth, provides vegetative inputs that serve as habitat and food, and provides bank and bed stability.

4. Raise community awareness.

The majority of land in the Lake Baroon catchment is privately owned and without landholder and community support activities improving catchment health and water quality is impossible.

The project will demonstrate the importance of excluding livestock from riparian zones to improve water quality – both throughout the catchment and Lake Baroon. On-ground works provide the opportunity for land managers to apply their knowledge and experience at the local level whilst contributing to landscape scale outcomes increasing the skills in the community. The upper Bridge Creek catchment and in particular the landholder has been identified by Seqwater Environmental Coordinator as of interest due to the properties unstable nature (land slips).

5. Improve farm productivity.

Watercourses and riparian zones are difficult to manage in the farm management context.

Excluding livestock from riparian zones and watercourses can improve the health of livestock (providing off stream watering that provides cleaner water and less disease), facilitates easier mustering and reduces the risk of injury through misadventure.

6. Whole farm approach to property management.

Clear property management objectives that take into account environmental considerations lead to efficient and effective projects.

The landholder has a clear Property Management Plan and property objectives to ensure all activities will be implemented in a permanent and cost effective manner.

8. Protect remnant vegetation.

Remnant vegetation in the catchment is isolated to small pockets that are fragmented and threatened by grazing, weeds and disturbance.

The project will protect a small area of 'Of Concern' remnant vegetation ensuring long term protection from threatening actions and processes.

9. Provide terrestrial habitat including 'Essential Habitat'.

Riparian vegetation provides important habitat for the adult stages of aquatic insects and amphibious organisms such as frogs and turtles.

The project will protect riparian and associated vegetation providing, in time, valuable habitat for a variety of native fauna. EPBC listed species will benefit from the protect (and enhancement) of remnant vegetation.

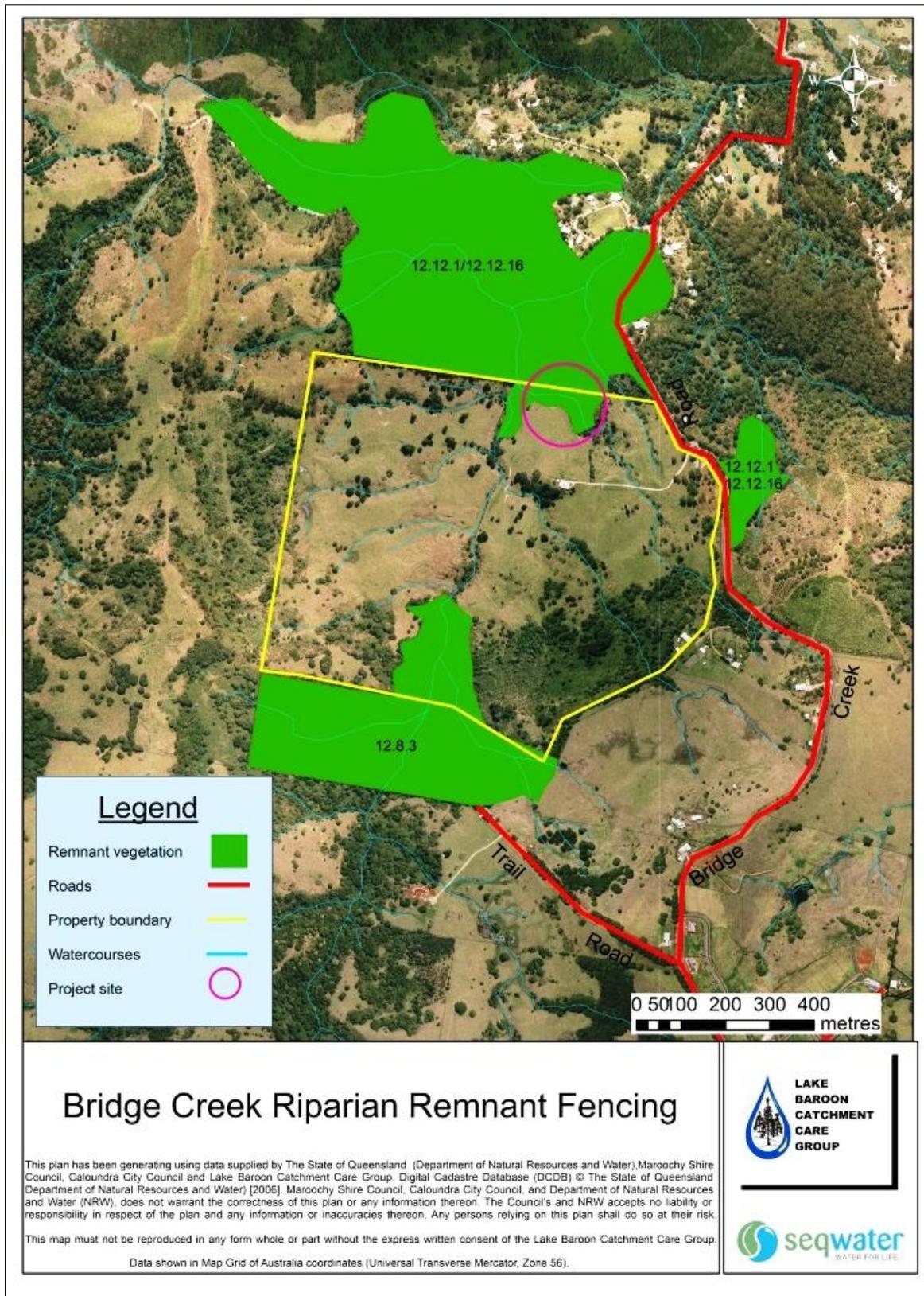
10. Reduce chemical delivery to waterways.

Improved water quality monitoring and analysis by Seqwater has identified pesticide and herbicide contamination in Baroon Pocket Dam.

The project will protect riparian vegetation on 1st and 2nd Order streams adjacent to agricultural land providing a buffer to pesticides and herbicides.

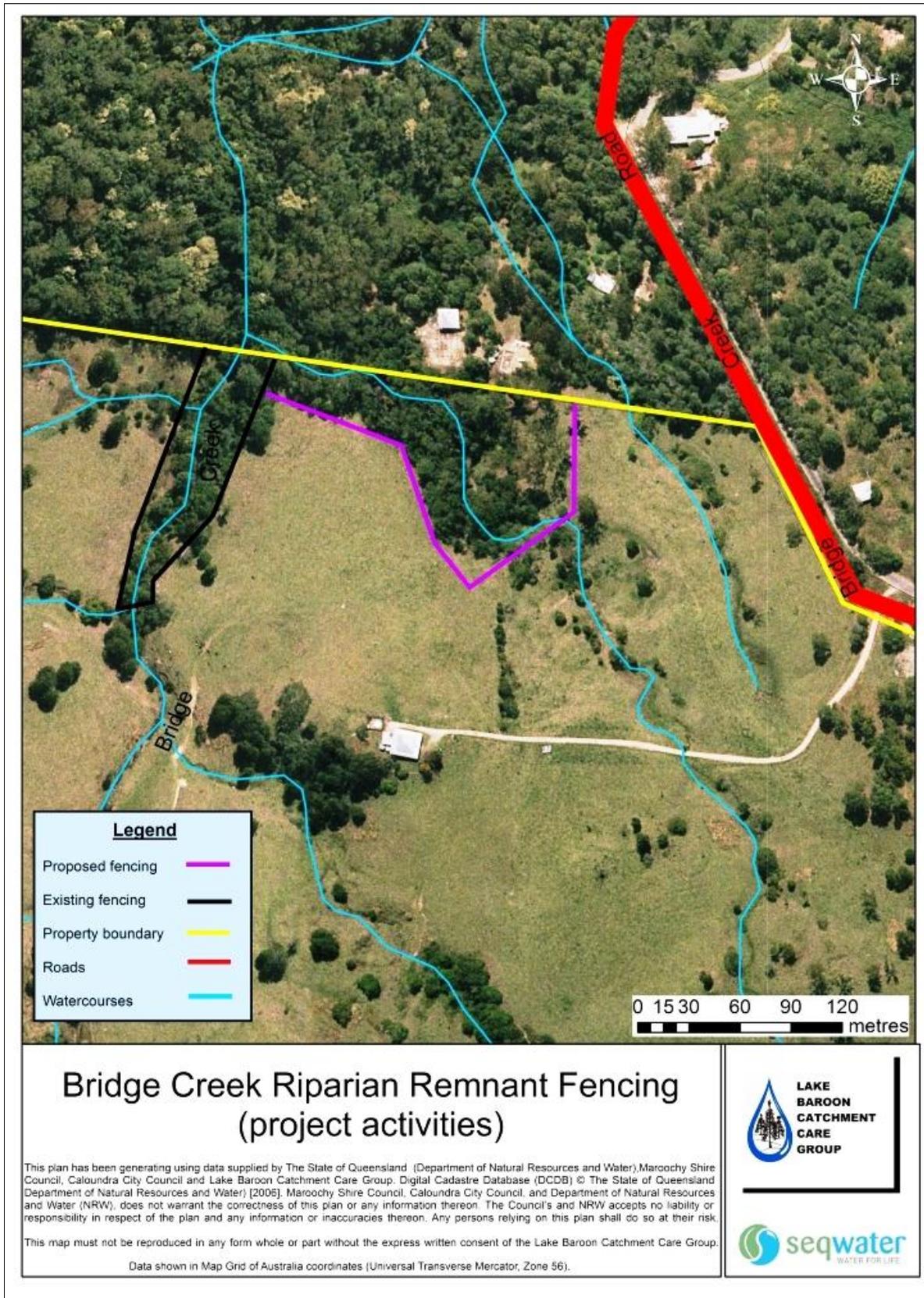
6.0 IMPLEMENTATION

6.1 PROPERTY OVERVIEW



Above: Property Overview.

6.2 ACTIVITIES



Above: Project Overview - proposed on-ground works.

6.2.1 FENCING



An area of ‘Of Concern’ remnant vegetation and area classed as ‘Essential Habitat’ under the EPBC will be permanently fenced from livestock. Approximately 300 metres of waterway will be included inside the fence and also includes a waterlogged, unstable area of pasture.

The landholder has expressed an interest in placing a covenant on the area and signing up to the Land for Wildlife program.

Fencing existing vegetation is far more cost-effective than re-establishing vegetation and as we are only required to fence one side of the remnant the project delivers efficient and prudent outcomes.



*Top: Remnant vegetation.
Left: The Cork property is unstable with erosion commonplace.
Bottom left: Waterway flowing off the property and through remnant vegetation.
Bottom right: Remnant vegetation.*



6.3 FUTURE ACTIVITIES



Above: Land slips on the Cork property following the wet summer of 2010/11.

Mass movement in the Lake Baroon catchment has come under increasing notice by Seqwater representatives and staff – primarily because of the risk to dam safety and water quality.

The vast majority of land slips in the catchment are on private, usually agricultural land. To implement mitigation or remediation activities the landholders must be engaged and supportive of Seqwater (or other organisations) staff. This is best achieved by developing relationships that are mutually beneficial to both parties. Landholders generally do not respond well to being told that their practices are poor and they must do what they are told.

Col (and Stacey) Cork are interested in commencing activities to remediate the land slips on their property and the small remnant fencing project is an excellent way of building trust.

They have also suggested that they would be willing to fence out the rest of Bridge Creek on the property – this could potentially be a focus of the 2012-13 Carbon Initiative Biodiversity Fund program.

7.0 ALIGNMENT WITH LAKE BAROON CATCHMENT IMPLEMENTATION PLAN

The project's outcomes are consistent with the Lake Baroon Catchment Implementation Plan (2007) which takes into account the Burnett Mary Regional Group Country to Coast: A Healthy Sustainable Future management actions.

<i>LBCIP Activity Theme</i>		<i>Implementation Activity</i>	<i>BMRG Program</i>
On ground	OG1	Develop on ground works for water quality improvement and aquatic biodiversity maintenance & improvement	Water Quality & Equitable Use
			Biodiversity Conservation
On ground	OG2	Support and develop on ground works for habitat recovery	Biodiversity Conservation
On ground	OG3	Locate high value areas within catchment and target for protection and remediation	Biodiversity Conservation
Catchment management	CM1	Develop a program where by all landholders involved in on ground activities initiate PMP's as part of application process	Biodiversity Conservation
Catchment management	CM2	Property Management Planning Toolkit	Sustainable Use
Catchment management	CM4	Adoption of BMP for point and concentrated diffuse pollution	Community Capacity and Partnerships
Catchment management	CM6	Community involvement	Community Capacity and Partnerships
Catchment management	CM7	Stakeholder Survey	Community Capacity and Partnerships
Catchment management	CM8	Transition in NRM practice	Community Capacity and Partnerships
Catchment management	CM11	Industry involvement in NRM	Community Capacity and Partnerships
Catchment management	CM12	Training and skilling stakeholders in NRM	Community Capacity and Partnerships
Monitoring & research	MR1	Water quality hotspots	Water Quality & Equitable Use

8.0 PROCUREMENT

8.1 COST ESTIMATION METHODOLOGY

Costings for fencing are standard rates provided by Langdale Fencing and RW & CA Ludwig Fencing; gates include the steel gate, fittings, two strainer posts and stays, and labour. Machine hire is a conservative estimate of use of a standard tractor with blade and bucket attachments – including operator. In-kind labour costs are standard figures used in Commonwealth funding applications.

8.2 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.

9.0 ACTION PLAN

Action	Responsibility	Start Date	Completion Date	Measurable Output
Project Proposal	LBCCG Coordinator	Mar 12	Apr 12	Project Plan
Project presented to LBCCG Committee for approval (includes Seqwater rep).	LBCCG Coordinator & Committee	Apr 12	Apr 12	-
Pre-works monitoring	LBCCG Coordinator	Apr 12	Apr 12	Photo & data set

WORKS IMPLEMENTATION	Riparian fencing	Contractor	Apr 12	Jun 12	325 metres
	Post-works monitoring	LBCCG Coordinator	May 12	Jun 13	-
	On maintenance (on-ground works completed & inspected for compliance with Project Plan – Report.	LBCCG Coordinator & Committee	Jun 12	Jul 12	On Maintenance Report
	Project completed/signed off.	LBCCG Committee	Jun 13	Jul 13	Final report

10 MONITORING & EVALUATION

10.1 INTRODUCTION

Monitoring and evaluation strategies are essential components of any environmental rehabilitation project. Evaluation is the best way to improve our knowledge about what works, what doesn't and how we can best direct our rehabilitation efforts. Monitoring strategies are key components of the overall evaluation process that allows you and others to learn from the project and assess whether rehabilitation aims have been met.

Photo point monitoring will provide valuable evidence of works completion, a record of changes over time, and provide an important assessment tool to evaluate the project.

Furthermore, monitoring results and information will be used to:

1. Raise awareness and encourage further remediation works with priority landholders (primary producers and large landholders in the Lake Baroon catchment).
2. Promote cooperative projects between Lake Baroon Catchment Care Group, Seqwater, and other Natural Resource Management organisations.
3. Critically examine techniques and methods used throughout the project to continually improve the service to landholders conducting on-ground works in the catchment and improve best practice management.
4. Develop cost-effective strategies and techniques to perform on-ground activities.
5. Continue to develop monitoring and evaluation program that meets the requirements of funding bodies, but also provides the relevant information and feedback to the LBCCG and Seqwater to improve project delivery.

Monitoring of rehabilitation activities, particularly the laneway rehabilitation component will be split into periodic and episodic monitoring.

Periodic monitoring is important to measure the effectiveness of the activities over time and will occur on a quarterly basis by LBCCG with assistance from the landholder.

Episodic monitoring will occur following significant storm/rainfall events and will check all project activities - particularly the crossing integrity.

10.2 REPORTING

Reporting on the progress of the project is an essential component of delivering successful on-ground outcomes. Therefore the following reporting schedule will be implemented to ensure all stakeholders are informed in a comprehensive and timely way.

<i>Report</i>	<i>Recipients of Report</i>	<i>When</i>
Progress Reports (presentation & brief summary).	LBCCG	Monthly
Progress Reports (written report). Based on Project Action Plan (see above)	LBCCG Seqwater Stakeholders	Quarterly
On Maintenance Report	LBCCG Seqwater Stakeholders	On-ground activities completed (excluding maintenance).
Final Report (includes evaluation & further recommendations for project)	LBCCG Seqwater Stakeholders	Completion of project

11.0 AUTHORISATIONS

<i>Role</i>	<i>Individual</i>	<i>Organisation</i>
Project Sponsor	Tim Odgers	Seqwater
Project Approval	Brad Heck	Seqwater
Project Owner	Peter Stevens	LBCCG
Project Committee	Steve Skull	LBCCG

	Keith Schelberg	LBCCG
	Gillian Pechey	LBCCG
	Marek Malter	LBCCG
Project Manager	Mark Amos	LBCCG

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