LAKE BAROON CATCHMENT CARE GROUP

seqwater WATER FOR LIFE

# Projects 2011-12

# Ruddle Dairies Laneway Rehabilitation

## PROJECT PLAN

**Project No. 1112-006**

This Project proposal has been prepared by:

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**PROJECT VERSIONS & APPROVALS**

| ***Version*** | ***Date*** | ***Version/Description*** | ***Result*** |
|---|---|---|---|
| 1.0 | 28/2/2012 | Draft Project Proposal | n/a |
| 1.0 | 15/3/2012 | Project presented to LBCCG Committee | Approved (Minutes 52.6.2) |
| 1.0 | 4/3/2012 | Project Proposal forwarded to Seqwater for approval (email) | Approved 5/3/2012 |

***Cover photo:*** *Eastern laneway on Ruddle Dairies.*

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# i EXECUTIVE SUMMARY

**PROJECT TITLE:** **Ruddle Dairies Laneway Rehabilitation**

**PROJECT NUMBER:** **1112-006** **DATE:** **February 2011**

**PROJECT SUMMARY:**

The proposed project will reduce sediment and nutrient run-off from degraded laneways on the Ruddle Dairies property which sits in the headwaters of Arley Creek – a significant tributary of the iconic Obi Obi Creek. Well-constructed laneways significantly reduces pugging and subsequent erosion during high rainfall events. Nutrient and pathogen run-off to down-slope watercourses is minimised and livestock spend less time negotiating laneways resulting in less deposition of manure in non-productive areas. Livestock movement, health and dairy cleanliness is improved resulting in improved productivity.

**APPLICANT/LANDHOLDER DETAILS**

| | |
|---|---|
| **First Name/s** | Peter & John |
| **Surname** | Ruddle |
| **Postal Address** | [redacted] |
| **Phone Numbers** | [redacted] |
| **E-mail** | [redacted] |

**PROJECT / SITE LOCATION**

| | | | |
|---|---|---|---|
| **Property Name** | Ruddle Dairies | | |
| **Property Address** | 72 Reesville Rd, Reesville, 4552 | | |
| **RP Numbers** | SP153440 | RP184198 | SP192177 |
| **Lot Number** | 3 | 23 | 13 |
| **Property Size (ha)** | 47.57ha | 22.41ha | 50.43ha |
| **Existing Land-use** | Dairying | | |
| **Stock Carried** | 300+ (250 milked daily) | | |
| **Sub-Catchment** | Obi Obi Creek | **Management Unit** | OB4 |
| **M.U. Priority** (LBCCG IP) | **Moderate** | **M.U. Priority** (Pollution) | **Moderate** |

**PROJECT PARTNERS/STAKEHOLDERS & ROLES**

| | |
|---|---|
| **Lake Baroon Catchment Care Group** | Project coordination, administration & reporting, monitoring & evaluation |
| **Seqwater** | Project funding ($33,684) |
| **Peter & John Ruddle** | Landowner, cost-share, labour & maintenance ($27,045) |

**PROJECT DETAILS**

| | | | |
|---|---|---|---|
| **Project Start Date** | May 2012 | **Project Completion Date** | June 2014 |
| **Laneway Hardening** | 1,230 metres | | |
| **Provision of Funding** | LBCCG, Landowner | | |
| **Project Maintenance** | Landowner | | |
| **Provision of Labour** | Landowner | | |

# 1 PROJECT BACKGROUND

Ruddle Dairies is the second largest dairy property in the Lake Baroon catchment milking 250 cows - down from 300 a year ago due to milk quota reductions by National Foods. This has substantially impacted on profitability with at least two other dairy farms in the catchment recently ceasing operations. Consequently property maintenance, in particular laneway maintenance and upgrades are often the first area to be neglected. With little respite expected in the near future, laneway rehabilitation is an effective method of improving the quality of run-off from dairy farms and improves on-farm productivity.

Therefore any investment in laneways is expected to be maintained by the landholders.

Furthermore this project will complement other nearby LBCCG projects. Arley Creek Wetlands is being conducted immediately downstream of the Ruddle property. Upper Obi Obi Creek Restoration is being conducted both downstream and adjacent to the Ruddle property.

*Left: The lack of a formal laneway results in multiple tracks forming and erosion over a wide area.*

## 1.1 Water Quality Data

Water quality monitoring and analysis taken at King's Lane Weir (Obi Obi Creek) indicates, as would be expected from the land use, in the catchment, the catchment contributes significant nitrates, ammonia, phosphates, phosphorus and faecal coliforms.

**Statistical analysis of water quality data recorded from Kings Lane Weir (Obi Obi Creek)**

| *Parameter* | *pH* | *Turbidity* | *NOx (N)* | *NH3 (N)* | *PO4 (P)* | *Total P* | *Faecal Coliforms* |
|---|---|---|---|---|---|---|---|
| *(units)* | *(pH units)* | *(NTU)* | *(mg/L)* | *(mg/L)* | *(mg/L)* | *(mg/L)* | *(number/ 100 mL)* |
| *Guideline Value* | *6.5-8.2* | *<25.0* | *<0.040* | *<0.010* | *<0.030* | *<0.030* | *<100* |
| *Max* | 8.9 | 25.5 | 0.368 | 0.510 | 0.117 | 0.167 | 11900 |
| *Min* | 6.6 | 1.0 | 0.001 | 0.000 | 0.003 | 0.009 | 0 |
| *Mean* | 7.1 | 3.6 | 0.068 | 0.077 | 0.021 | 0.043 | 540 |
| *Median* | 7.1 | 2.2 | 0.018 | 0.030 | 0.012 | 0.035 | 36 |
| *Standard Deviation* | 0.3 | 4.6 | 0.091 | 0.110 | 0.022 | 0.033 | 2079 |
| *20th Percentile* | 6.9 | 1.6 | 0.007 | 0.006 | 0.006 | 0.023 | 20 |
| *80th Percentile* | 7.3 | 3.7 | 0.122 | 0.120 | 0.031 | 0.051 | 106 |
| *Count above GV* | 1 | 1 | 25 | 38 | 14 | 37 | 14 |
| *Count* | 65 | 65 | 62 | 61 | 64 | 63 | 63 |
| *% above GV* | 1.54 | 1.54 | 40.32 | 62.30 | 21.88 | 58.73 | 22.22 |

## 2 RATIONALE

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 [(3)].

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).

(taken from: Department of Environment and Resource Management, *Development of a water quality metric for south east Queensland*, 2010)

## 3 LOCATION

The Obi Obi Creek is by far the longest waterway in the Lake Baroon catchment, consisting of 71 km of waterway in a sub catchment of 2880 ha. A mere 18.45% of the sub catchment is covered in vegetation, with much of the area significantly disturbed mostly supporting beef or dairy cattle.

*Left: Obi Obi Creek is the largest sub-catchment of Lake Baroon.*
*Maleny's water supply comes from two weirs on the waterway – the proposed project is in the headwaters of the waterway; upstream of King's Lane Weir. This reach of Obi Obi Creek is threatened by sediment and nutrient loads entering the waterway through erosion in the catchment.*

Obi Obi Creek has been divided into nine management units that reflect property boundaries, physiography, vegetation, land use, point and diffuse source impacts, and administrative convenience. The Ruddle property is in Management Unit OB4.

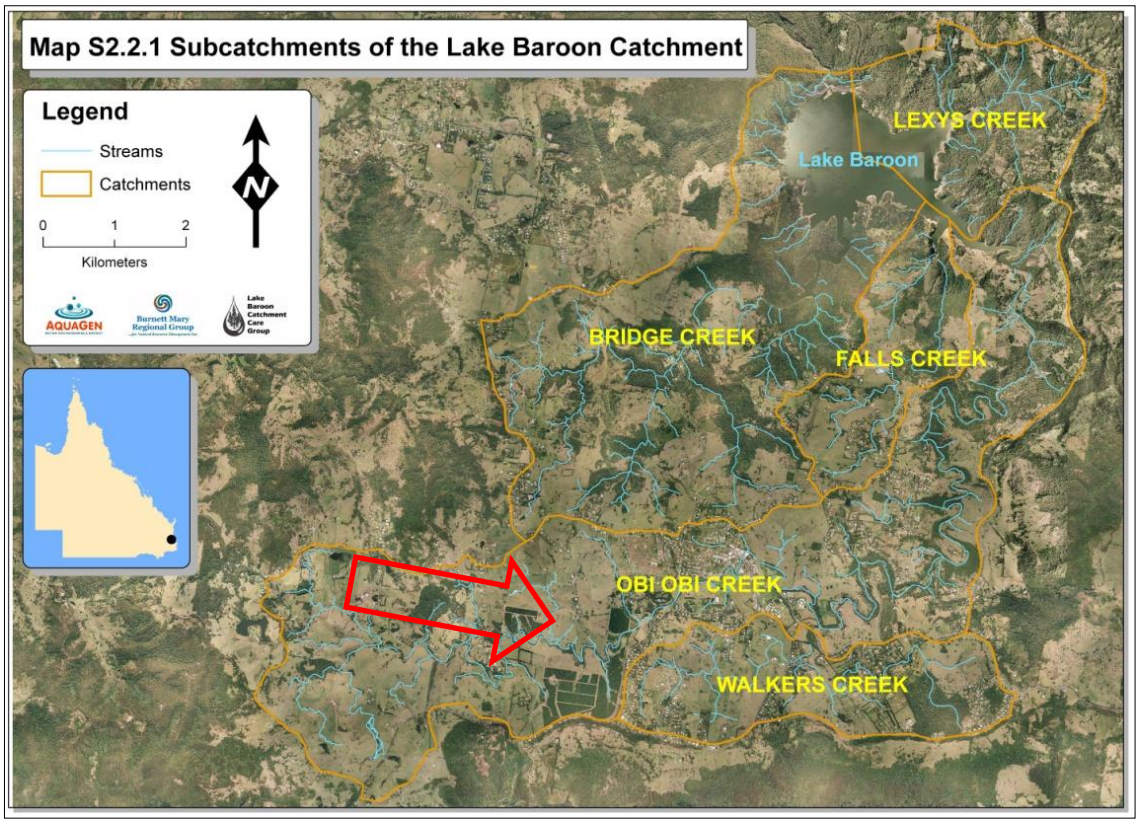
Land use in the Management Unit is almost equally split between dairying, non-dairy grazing (beef production) and horticulture (macadamias). Ruddle Dairies is the second largest dairy farm in the Lake Baroon catchment. Other minor land use includes minor rural residential and cut-flower production. Kings Lane Weir on the Obi Obi Creek is in OB4.

Less than 3% of the sub-catchment is vegetated, although approximately 30% of the waterways have riparian cover. There have been vast improvements to the state of the waterways in this MU over past years as landowners have revegetated large lengths of waterway and enhanced habitat corridors and the small patches of rainforest that remain.

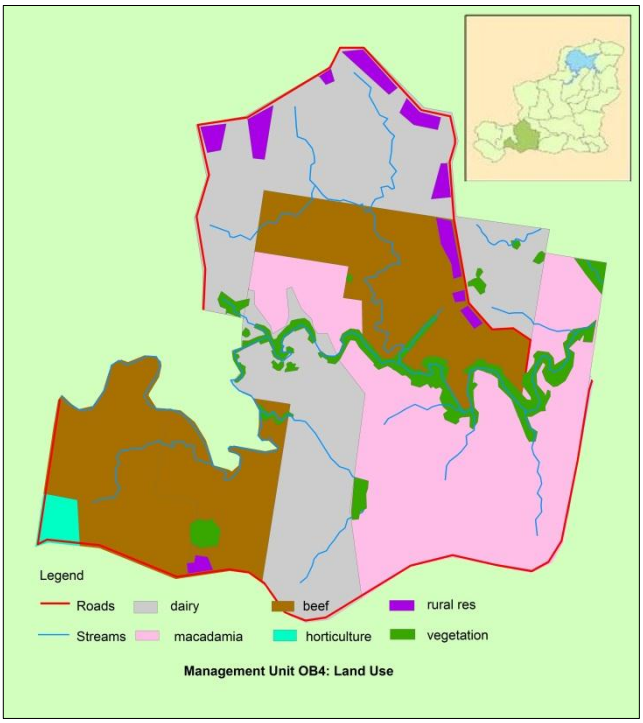
Despite the extremely stable geology of OB4, the MU contributes a significant nutrient load to the waterway (more than 70% of samples exceeded guideline levels).

**The Lake Baroon Catchment Implementation Plan (2007) rates OB4 a MODERATE priority for rehabilitation works. 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, OB4 also rates as a MODERATE priority.**

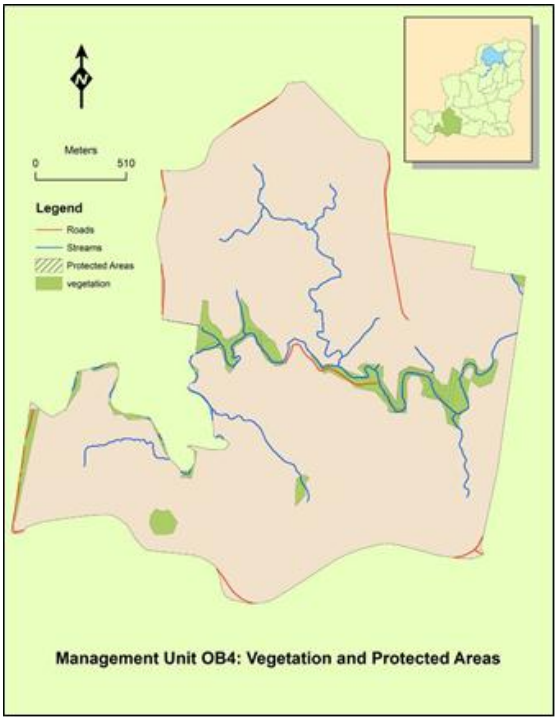
(1) Dunstan, M. 2007, Lake Baroon Catchment Implementation Plan, Aquagen Water & Renewable Energy, Palmwoods.




*Above: Ruddle Dairies sits in the headwaters of Arley Creek – a significant tributary of Obi Obi Creek.*




*Above: Land use in the MU is equally split between dairying, non-dairy grazing (beef) and horticulture (macadamias).*




*Above: The MU is geologically stable; however the lack of riparian vegetation contributes to the high nutrient inputs to the catchment's waterways.*

## 4 PURPOSE & OBJECTIVES

Cleaner dairy production not only protects the environment but also reduces operating costs, streamlines processes, boosts productivity, and improves sustainability. Maintaining a profitable business in dairy farming is becoming increasingly challenging, with Dairy Deregulation in 2000 and the recent National Foods 30% quota reduction.

Most on-farm decisions are made to improve production, however when developing farm infrastructure, significant environmental (and water quality) gains can also be achieved through careful design and construction.

Poorly designed or constructed laneways are prone to erosion and pose health risks for the dairy herd. Mud from boggy laneways must be washed from cows before milking, therefore extended wet periods imposes extra labour (and water) burdens. Boggy laneways increases the time taken (and energy expended) to travel between the paddock and dairy (for cows and vehicles). Poor access to grazing pastures, particularly during wet periods, limits efficient pasture use which can have a detrimental effect on run-off (overgrazed paddocks increases nutrient and sediment run-off).

The farm environment is greatly improved by hardening laneways, not only because erosion is minimised but also cows tend to move faster between paddock and dairy resulting in less manure deposited on laneways and therefore lessens the risk of nutrients entering drainage lines and watercourses.

Carefully designed laneways are shaped with strategic cross drainage (whoa-boys) to shed water to the sides (onto pasture) rather than directly down the laneway.

*Above: The Ruddle property during heavy rainfall. Arley Creek can be seen in the foreground.*

# 5 OUTCOMES

The primary aim of the project is to improve the water quality of Obi Obi Creek and the waterways that flow directly into Lake Baroon. By reducing erosion and the associated sediment and nutrient inputs into the properties waterways, the quality of water in the Obi Obi Creek catchment will be significantly improved. Ultimately this improves the quality of water entering Lake Baroon which leads to a lowering in drinking water production costs, as well as improving the recreational and amenity value of Obi Obi Creek and the storage.

**Specific Outcomes**

**1. Reduce nutrient delivery to waterways.**

*Nutrient delivery to waterways is continuous increasing dramatically during episodic rain events.*

Rehabilitated laneways direct run-off contaminated with excessive nutrients to pasture that can trap and filter nutrients, rather depositing directly to watercourses.

**2. Reduce sediment delivery to waterways.**

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

Rehabilitated laneways significantly reduce erosion in high stock traffic areas resulting in less sediment run-off. Good drainage directs any sediment onto pasture that can trap and filter top soil.

**3. 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 reducing erosion and the associated delivery of sediments, nutrients and pathogens to the catchment's waterways (and ultimately to water storages on Obi Obi Creek and Baroon Pocket Dam).
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.

**4. Improve farm productivity.**

*Dairy laneways are difficult to manage in the farm management context.*

Rehabilitated laneways improve livestock movement throughout the property reducing mustering costs and improving general property movement. Less mud on cows lessens the possibility of contamination and generally improves the health of livestock.

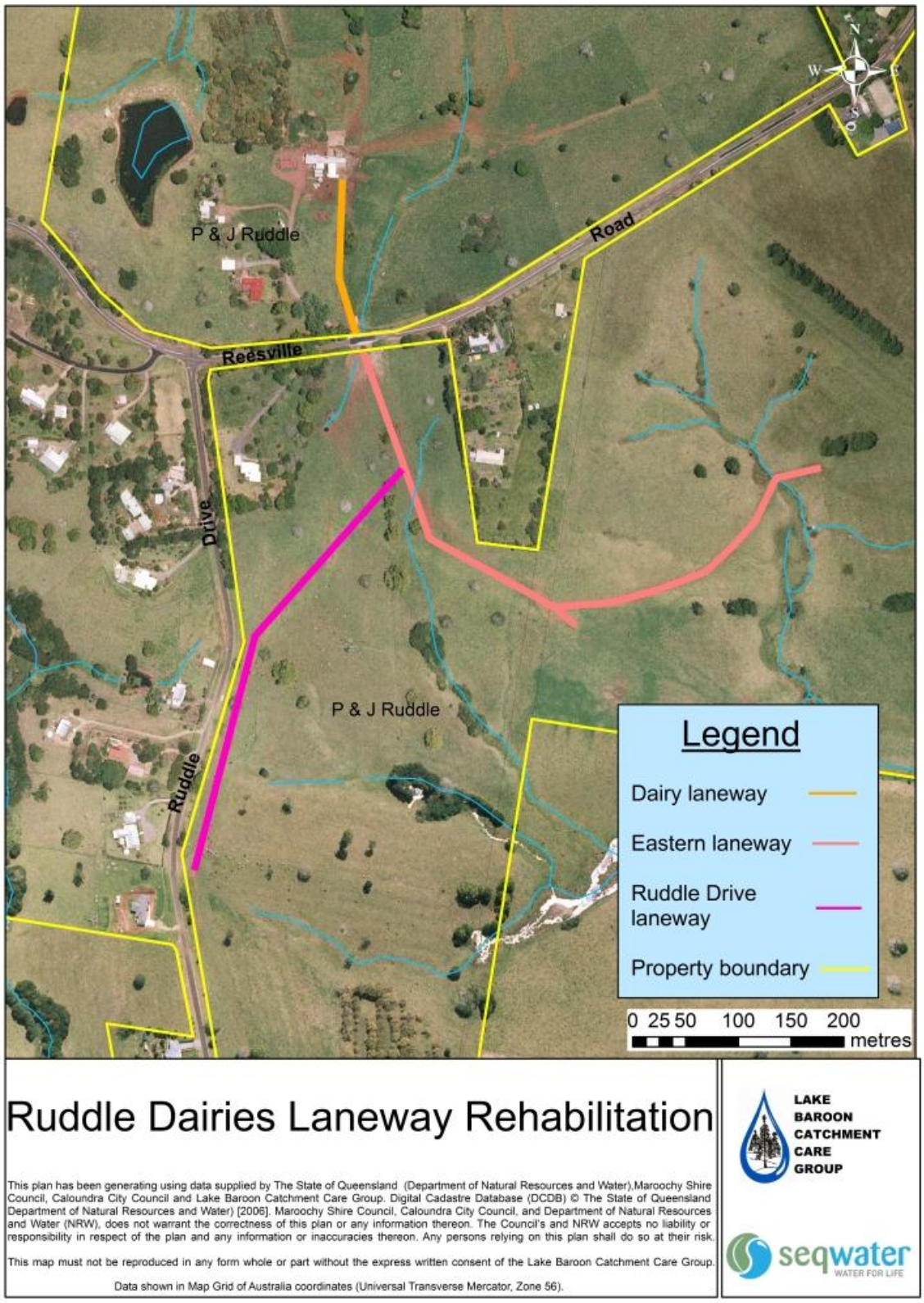
**6. Whole farm approach to property management.**

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

Experienced dairy farmers have clear Property Management Plans and property objectives to ensure all activities will be implemented in a permanent and cost effective manner.

# 6 IMPLEMENTATION

## 6.1 Project Overview




*Above: Project Overview - proposed on-ground works.*

## 6.2 Site 1: Eastern Laneway Rehabilitation.

*Left: The eastern laneway can be clearly seen in this 2010 aerial photo.*

The eastern laneway runs from Reesville Road servicing the south eastern paddocks of the property.

The laneway is severely degraded despite attempts in the past to harden a short section with coarse rock – which has left the laneway very uneven and hard on livestock hooves. As a consequence the laneway does not effectively shed water resulting in deep muddy holes and livestock reluctance to use it. A wider, unhardened laneway adjacent is used when the main laneway is un-trafficable resulting in significant erosion of topsoil.

The laneway requires significant re-shaping to improve run-off and the placement of pipes to divert paddock flows safely onto pasture that can filter sediments and manures.

Road-base and compaction will harden the laneway reducing erosion and resultant sediment and nutrient run-off.

This laneway will be constructed to a width of four metres to allow sufficient passage for the large herd.

*Above: The eastern laneway suffers from poor drainage.*

*Right: A poorly drained gateway mid-way along the eastern laneway.*

## 6.3 Site 2: Ruddle Drive Laneway Rehabilitation.

The Ruddle Drive laneway branches from the eastern laneway and runs parallel to Ruddle Drive servicing the southern paddocks on the property.

The laneway has been partially hardened in the past and therefore will cost less to rehabilitate. The laneway requires re-profiling to improve drainage and a skin of road-base to eliminate channelling and reduce erosion.

A water trough near the end of the laneway requires several loads of road-base to reduce erosion.

*Left: The Ruddle Drive laneway can be clearly seen in this 2010 aerial photo.*

*Above: The Ruddle Drive laneway in places suffers from very poor drainage.*

*Above: The stock trough near the end of the laneway requires road-base placed to reduce erosion.*

## 6.4 Site 3: Dairy Laneway Rehabilitation.

*Above: The dairy laneway can be clearly seen in this 2010 aerial photo.*

The dairy laneway links the property on the southern side of Reesville Road to the dairy.

This laneway receives the heaviest traffic and therefore requires significant and regular rehabilitation and maintenance.

The landholders will fund the rehabilitation of this laneway.

Road-base and compaction will harden the laneway reducing erosion and resultant sediment and nutrient run-off.

*Left: The dairy laneway*

# 7 ALIGNMENT WITH LAKE BAROON CATCHMENT IMPLEMENTATION PLAN

The project's outcomes are consistent with the Lake Baroon Catchment Implementation Plan (2007)

| ***LBCIP Activity Theme*** | | ***Implementation Activity*** | ***BMRG Program*** |
|---|---|---|---|
| On ground | OG1 | Develop on ground works for water quality improvement and aquatic biodiversity maintenance & improvement | Water Quality & Equitable Use<br>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 | 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 | CM12 | Training and skilling stakeholders in NRM | Community Capacity and Partnerships |
| Monitoring & research | MR5 | Identification of point and concentrated diffuse pollution | Water Quality & Equitable Use |
| Monitoring & research | MR6 | Groundwater management | Water Quality & Equitable Use |
| Monitoring & research | MR7 | Deoxygenated water roll over abatement | Biodiversity Conservation |
| Monitoring & research | MR8 | Research support | Biodiversity Conservation |

## 8 BUDGET

All figures exclusive of GST.

***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 ACTION PLAN

| Action | | Responsibility | Start Date | Completion Date | Measurable Output |
|---|---|---|---|---|---|
| Project Proposal | | LBCCG Coordinator & landholder | Feb 12 | Mar 12 | Project Plan |
| Project presented to LBCCG Committee for approval (includes Seqwater rep.) | | LBCCG Coordinator & Committee | Mar 12 | Mar 12 | - |
| Pre-works monitoring (including photo points) | | LBCCG Coordinator | Feb 12 | Mar 12 | Photo & data set |
| WORKS IMPLEMENTATION | Site preparation | Landholder | Mar 12 | Jun 12 | - |
| | Laneway rehabilitation works | Contractor & landholder | May 12 | Jun 12 | 1,230 m hardening |
| | Fencing | Landholder | Jun 12 | Aug 12 | 1,270 m fencing |
| Post-works monitoring. | | LBCCG Coordinator | Jun 12 | Jun 14 | Photo & data sets |
| On maintenance (on-ground works completed & inspected for compliance with Project Plan - Report | | LBCCG Coordinator | Jun 12 | Jul 12 | On Maintenance Report |
| Continuing quarterly progress reports. | | LBCCG Coordinator | Jun 12 | Mar 14 | 11 Progress Reports |
| Project completed/signed off. Final Report. | | LBCCG Coordinator & Committee | Jun 14 | Jul 14 | Final Report |

**Note – the Project Action Plan will be used as the basis for Quarterly Reporting**

## 10 MONITORING & EVALUATION

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 laneway integrity.

## 11 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.

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

## 12 AUTHORISATIONS

| *Role* | *Individual* | *Organisation* |
|---|---|---|
| **Project Sponsor** | Tim Odgers | 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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