

**NOMINATION FOR
2019
CAERNARFON AWARD**

Baldwin's Quarry

***Construction
Of a
Wetland -
A Natural Solution***

The Institute of Quarrying New Zealand (Inc)



BALDWIN'S QUARRY - CONSTRUCTION OF A WETLAND - A NATURAL SOLUTION

Kerry Reilly presented the paper “**Baldwin’s Quarry, Construction of a Wetland – a Natural Solution**” at the Auckland Branch meeting on 19 March 2019. It received a fantastic response as evidenced by the large number of questions and feedback.

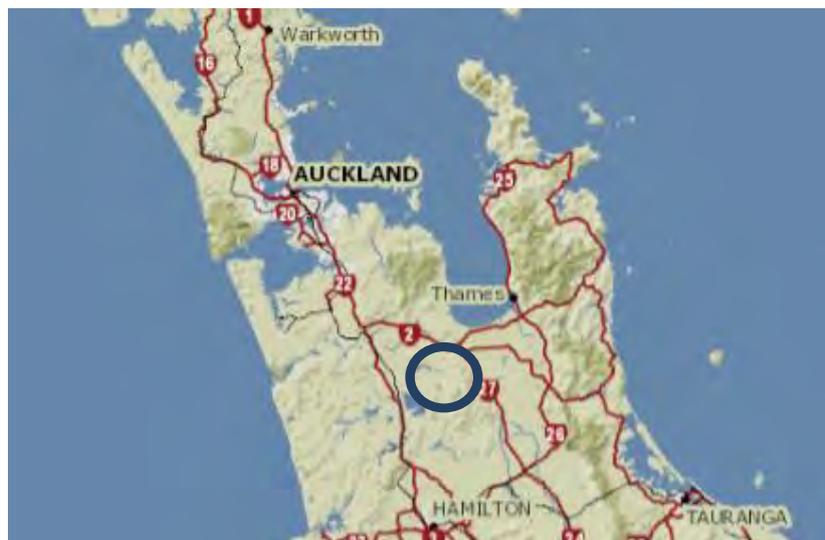
The Institute of Quarrying New Zealand (Inc) nominates **Kerry Reilly**, a member of the Auckland Branch for the **2019 Caernarfon Award**.

Executive Summary

Having purchased the quarry 20 years ago, Kerry Reilly has designed and constructed a wetland to provide natural filtration of quarry runoff to protect the adjacent Whangamarino Heritage Wetland. In addition to removal of sediments from the quarry site it also services the adjacent Buckley dairy farm. The now well-established trees, shrubs and grasses are also home to various fauna including bird-life. The development is a fine example of how one man’s dedication has contributed to producing a magnificent environmental asset.

Background

Baldwin’s Quarry is located on Falls Road, Meremere approximately 75km south of Auckland Central and 10km from State Highways 1 & 2.



Kerry Reilly purchased Baldwin’s Quarry in late 1999 and was granted resource consent to open a commercial aggregate quarry. The quarry was sold to Higgins Aggregates in 2011 and later to Winstone Aggregates in 2015.

The land is steep and had little flat area for stockpiling or processing in the early stages. The challenge was to open up stockpile areas, haul roads, and processing areas. In particular, there was a requirement to mitigate the effects from any run off to the stream which drains the large catchment area of the Buckley farm surrounding the quarry, through the



operational quarry area and then exits through adjacent farm land owned by Peter Buckley and finally into the Whangamarino Heritage Wetland.

Driven by the need to move overburden, but with respect for the environment and neighbours, he saw the opportunity to solve the initial construction challenges by the formation of a wetland on the Buckley Farm which would enable the treatment of any silt-bearing stormwater prior to it entering the Whangamarino Heritage Wetland.

His experience told him that if the flow of water could be slowed it would enable use of natural methods of plant filtration and be a more cost effective and sustainable solution. It would also provide supplement the on-site settlement systems and silt ponds within the quarry itself.

The plan was developed from firstly observing the water flows during and following heavy rainfall. *“I climbed the hill overlooking the Buckley farm and the Whangamarino swamp and came up with the master design. Instead of excavating ponds on the Buckley land, I decided it would be more beneficial to create the ponds by encapsulation, whilst also building roads and an observation island in the centre of the new wetland”*. Kerry said.

This method had a number of benefits including:

- allow the use of a larger volume of over burden and negate the need to excavate into the sensitive Wetland Peat Swamp
- simultaneously creating a roading network to enable access for machines to maintain the wetland in the future and for visitors to view the fish & birdlife.

He designed an island as a centre piece of the wetland which solved several challenges; it provided an ideal viewing area that overlooks the entire project and assists to create a larger pond network and longer water flow path which allows filtration of any microscopic fines to be achieved.

In the early days the local iwi (Maori community) grew and harvested flax in the swamp. The flax was exported to Australia and manufactured into rope and hemp. Over-harvesting, and disease, killed off most of the flax and the Whangamarino then became over run by willows a non-native tree introduced by the early NZ settlers.

The creation of this new wetland has allowed for the clearing of the willows from the area. This has enabled unrestricted access for ducks, swans, fish, frogs and birds which can now be observed breeding in the wetland.

The Waikato Catchment Ecological Enhancement Trust (WCEET) has sponsored the supply and planting of over 15,000 native trees and shrubs to beautify and enrich the whole development. In addition, Kerry grew and planted hundreds of cabbage trees and flaxes obtained by harvesting seeds from existing plants already growing within the Whangamarino wetland.



This project has been a win/win for all concerned. The adjacent neighbour (who is a past chairman of the Regional Council) can demonstrate that farming discharge water can be naturally enhanced by this wetland. The quarry owner can sleep at night when the rain is pouring down, knowing the discharge water is not polluting the environment. The Iwi and public can see that a solid commitment has been made to protect our precious waterways, and the fish and birds thrive in a clean healthy environment.

Dairy NZ saw this as an opportunity to demonstrate the quarry owner and farmer's joint commitment to caring for the environment, by facilitating in 2012 a field day at the wetland when they hosted a large contingent of overseas guests, and local farming managers, together with District and Regional Council representatives.

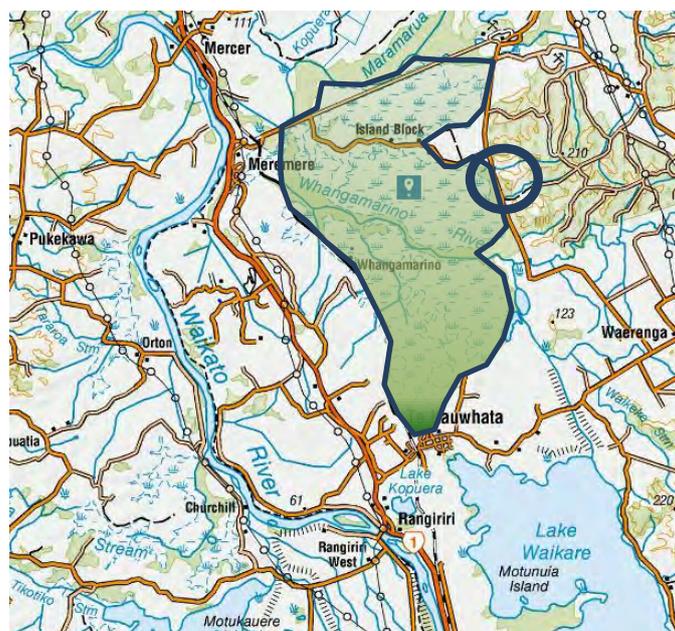
Kerry said *"It was encouraging to have the confidence of our neighbours, The Waikato District Council and Environment Waikato for issuing the necessary consents to allow this project to proceed and the sponsorship of W.C.E.E.T. for their contribution of funding for the trees and shrubs.*

I am confident that this will help lead the way for other industries and farmers to co-operate and demonstrate that we can all work together to create a cleaner NZ."

Whangamarino Wetland

The importance of wetlands in our environment is well documented.

The Whangamarino Wetland encompasses approx. 7200 hectares, is the second largest swamp / wetlands in the North Island, and was granted world heritage status in 1989. It stretches from the small township of Te Kauwhata in the south to Meremere in the north.



Whangamarino Wetland, location of quarry (circled)



The Whangamarino Wetland is rich in mosses and 13 new species have been added to the list of New Zealand flora from this area. Lichens are also well represented.

Birdlife include bittern, grey teal, spotless crane, and the North Island fernbird.

Plants - a number of threatened plants have been recorded within the Wetland including the water milfoil, the swamp helmet orchid and the club moss.

Weather Bombs

When severe weather events strike the volume of sediment-laden stormwater runoff generated can be horrendous. Not allowing silt-laden runoff to enter directly to the Whangamarino wetland was of utmost priority in the development programme for Baldwin's Quarry.

Photos below of the runoff generated during a 2017 weather bomb provide a graphic example of filtration requirements.



Torrents of runoff cascade over the face





The quarry haul road became the main overland flowpath



After the storm event clear water exits the quarry wetland

Why a wetland?

The main reasons for considering a wetland? Low cost, low maintenance sustainable water treatment option. Its creation was enabled by the need for a stockpile area at the Baldwin's Quarry. This allowed removal of overburden to be done in a responsible manner with the neighbour (dairy farming operation) and quarry operator agreeing on joint benefits.

As described above it was an opportunity to treat sediments, and allow clear water to drain to the Whangamarino Heritage Wetland.

Development

The development included an island designed as a centre piece of the wetland which solved several challenges, as already described above mainly creating multiple ponds, a long water path flow path, enabling greater pond retention times and promoting filtration of microscopic fines through the vegetated wetland.



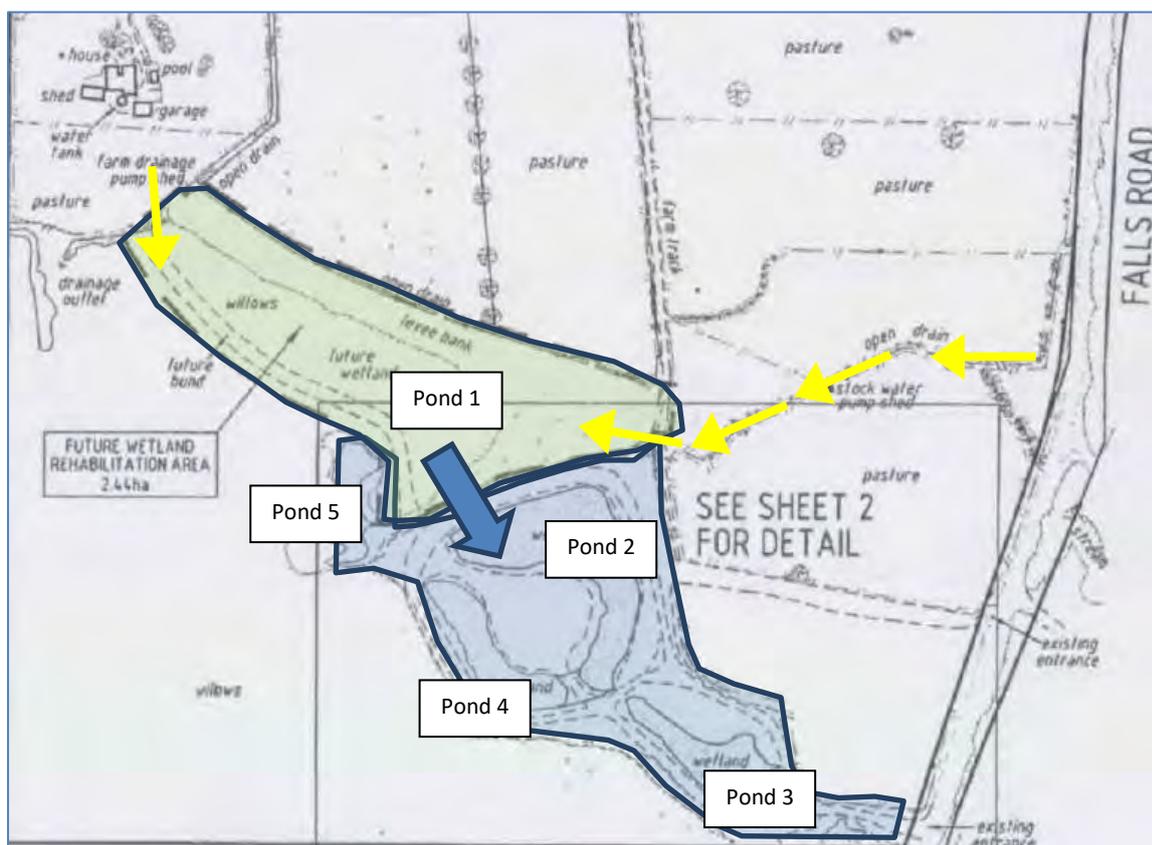
Although work on the development of the wetlands project had been underway for nearly three years, the Waikato Regional Council had no hesitation in retrospectively approving a Resource Consent (May 2008). This was due mainly due to the “full compliance” status issued at a previous audit of the Discharge Consent conditions in the Resource Consent issued for Kerry’s quarry operations.

The wetland Resource Consent was very simple:

Place quarry overburden and clean fill onto rural land in order to create a wetland area that drains into the Whangamarino Wetland.

Key resource consent conditions included management of noise, dust, landscape, rock spillage, and trimming of vegetation (to maintain sight distances along the roading network).

The wetland construction plan was based on a two stage operation. Stage 1 is shown shaded in blue; Stage 2 shown in green.



Approved Wetlands Plan (Stages 1 and 2)



Wetland Construction

Wetland development commenced in 2005.

Of interest is the construction of the road network providing access around and within the pond complex. All roads were constructed on peat which requires preload to allow moisture to dissipate and the peat to settle and compress. Without the luxury of drilling and placing vertical wick-drains to speed up the removal of moisture from the peaty soils, the preload process had to be taken slowly. Construction in too short a period could have resulted in the roads rolling over into the surrounding peat like a piece of clay on top of a balloon.

Wetland construction is best described by the series of photos below:



Tractor and roller used in conjunction with dozer for road construction



View of wetland construction/stripping dump area on Buckley block after development of wetland (Stage 1) Observation Island and associated roading works (2010) prior to planting of native vegetation.





View of wetland construction/stripping dump area on Buckley block showing coaches parked beside the observation platform and visitors looking out from the top of the platform (2012).

Coaches were used to transport overseas visitors from Dairy NZ conference to wetland area as an educational site visit to promote the results of the farming owners working in conjunction with the quarrying company to achieve an outstanding new conservation habitat, which adds to the value of the Whangamarino Heritage Wetland.





2013 - Wilding willows were removed in Stage 2 from the area shown and since planted with native plants to blend in with the existing areas of native planting.

The clearing of willows took several years. The Waikato Catchment Ecological Enhancement Trust (WCEET) sponsored the supply and planting of over 15,000 native trees and shrubs to beautify and enrich the whole development.

Summary

This project was a win/win for :

- Adjacent neighbour (past chairman of the Regional Council). The project demonstrated that farming discharge water can be naturally enhanced by this wetland,
- Quarry owner - can sleep at night when the rain is pouring down, knowing that the discharge water is not polluting the environment,
- Iwi & public – a solid commitment has been made to protect our precious waterways, and the fish and birds can thrive in a clean healthy environment.

