



Te Wairepo Project





Auckland Point

Washington Valley

NELSON

Saltwater Creek

York Stream

Nelson South

Te Wairepo

Place People Participate

Te Wairepo is a tributary of Project Maitai/
Mahitahi funded by Nelson City Council

Contents



- 3** Introduction and Project Scope
- 4** Mural Project
- 6** Race Unity Day
- 7** Breathe
- 8** Schools Involved
- 9** Breathe Workshops
- 11** Sensor Housing and Stream
- 12** Output Array
- 13** Museum and Victory Workshops
- 14** Resource Launch and Media
- 15** Matariki
- 18** Team Up to Clean Up
- 19** Next Steps
- 20** Thanks and Acknowledgements

Introduction &

Project Scope

The initial Te Wairepo proposal set out to create a multi-faceted project that used events, creative projects and outreach to increase the involvement of the Nelson South community in the care and protection of their local waterway, Te Wairepo/York Stream.

The plan's success would be demonstrated by;

1. A greater understanding within the community of the potential for harm in disposal of toxic materials into the stream (eg. household cleaners and paints)
2. A decrease in solid waste material going into the stream
3. And an increase in riparian planting and weeding activity in the riparian strip

The overall objective is to increase of the awareness of the waterways - how community and individual actions affect them at the local level, and how they are connected to the other waterways in Nelson and eventually to the sea.

Artist Vicki Smith was contracted as Project Champion for Te Wairepo and undertook the following to help establish some baselines;

- Walking Te Wairepo/York Stream from the source to the sea, identify neighbourhoods, tributaries and commonly reported issues (with NCC and Nelmac staff)
- Creating a project plan and timeline for implementation (February-June 2017)
- Creating a budget identifying deliverables and the costs associated
- Developing some ideas for quantitative/qualitative baselines and outcomes to tell the story of change in attitudes toward the local environment, its treatment and place in the wider ecology.

This initial scoping was designed to help create a project that could be replicable across other waterways of the local catchment and also disperse across other councils.



The first step was to write a funding application for a public mural project, which would launch the project within the community and act as a baseline for future actions.



A sign was attached to the containers describing the work and acknowledging all the students' and public involvement. It reads; Te Wairepo/York Stream flows below ground here Our native freshwater species thrive in an environment free of rubbish, toxic substances and cooled by riparian vegetation. Let's all work together for the benefit of these creatures and ourselves

Mural Project

With the help of Victory Community Centre and local school students, a mural was designed and painted on two containers adjacent to the Victory Community Centre car park. The containers house the Koha Shed, which attract a large number of local residents. They are adjacent to the beginning of the well-used public walk and cycle way (Railway Reserve) at the end of St Vincents Street.

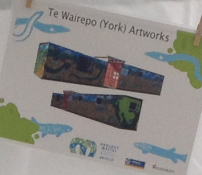
The design for this work sought to showcase native freshwater inhabitants and a local species of gecko. This project uses public art to celebrate and highlight the stream, and is a continuation of a previous art project on the debris trap gates adjacent to where Te Wairepo/York Stream goes underground before re-emerging at Haven Road. Over the last three weeks of the school term the containers were cleaned, prepped and painted with the assistance of school students and some local residents. Visitors to the area watched the work develop and were engaged in conversations about the environment it depicts.

Three Nelson College for Girls students have completed work on a mural for four sides of the two-container complex that makes up the Koha Shed at Victory Community Centre. Year 9 and 10 students worked with artist Vicki Smith to create the design elements representing an environment populated with plants, fish and gecko such as would be found in a healthy stream ecosystem. The Nelson City Council's Project Maitai (Mahitahi) provided a match-funding community grant to support the project, a 'resurfacing' of the environment of the Te Wairepo/York stream, which runs under the Koha Shed. The Council allocates this support to match the contribution of goods and services towards the mural most notably the generous donation by Resene of most of the paint. The Koha Shed has been created out of donations and the mural project is continuing this tradition. Throughout the painting process the senior school students also helped groups of students from Victory Primary School to add their own marks to the project in the form of 'kohatu' or stones in the stream. There has been huge interest in the process and excitement about the outcome; the efforts of the creative team have created a significant colourful artwork to enhance the Victory Community Centre carpark and Koha Shed. Artist Vicki Smith said the students worked incredibly hard to complete the mural. "It was fantastic to work on projects that enable students to create art works for their community, and to engage the local community in thinking about the inhabitants with which we share our environment."



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Te Wairepo (York) Artworks

Te Wairepo (York) Artworks



Race Unity Day



The tagline in the name for Te Wairepo (Place, People, Participate) serves to underline the place of Te Wairepo/York Stream within the community.

One of the first planned outcomes was to reconnect the waterway back into people's consciousness and to encourage a local-leadership approach to stream care. With this intention the project champion submitted an application to take part in the Nelson Multicultural Council's Race Unity Day, an annual event that gathers a large number of the Nelson South Community at Victory Square.

Te Wairepo emerged as a stall adjacent to St Vincent's Street to connect as closely as possible with the stream running underground. A 'story-map' idea was proposed to help identify local residents and advocates. A large satellite map was printed and hung along the back of the stall. Individuals identified their 'place' along the waterway and mapped their anecdotal assessments of the condition of the waterway in the form of colour coded stickers.

People were also able to add their details to an online database of local champions for future events. A number of connections local to or familiar with the original stream talked about their concerns for the health of the waterway. Many through the comments thanked the project for initiating the opportunity to help with its care and improvement. As well as gathering material the project gave away trees and information relating to the project outputs.

Stream Ecologist Mel McCoglan was instrumental in drawing visitors into the stall through the presentation of her engaging and informative 'play-station', that enabled visitors young and old, to view and discuss stream inhabitants, learning as they did about the invertebrate life and its ability to indicate stream health.

Project Maitai/Mahitahi staff were also on hand to discuss the waterway and answer specifics about council projects regarding local waterways.

With this collection of a database of people who want to help we can now begin to weave a network of enthusiasts for the Te Wairepo/York stream project through their attachment and interest in the waterway itself.



The Race Unity Day event was held just days after the passing of the bill Te Awa Tupua for the Whanganui River, an important reminder of the ecological place of waterways. For Te Wairepo, tracing the path of the waterway and showcasing the artworks along it gave us an opportunity to listen and learn about the relationship people already have with the stream and to begin to map the project through local connections.



Breathe

Breathe is an art, science and technology project that creates a visual representation of the temperature of water along the length of Te Wairepo/York Stream- a local canalised stream- via a series of internet connected fish replicas. Water temperature relates to the amount of dissolved oxygen, which correlates to the ability for fish to breathe. The project continued efforts to encourage the kaitiakitanga (guardianship) for each group of their part of the waterway.

In this iteration Breathe was a stand-alone project, its intention is that it could be reproduced along other waterways, and by councils nationally. It is released under a Creative Commons Attribute and Share-alike licence.

Forty students from four Nelson South schools took part in two workshops to learn about the cultural and scientific aspects of stream ecology and how data can creatively communicate important messages. They then helped construct an IoT (internet

of things) in the form of the data gathering sensors, which would be used to record the temperature of the water in Te Wairepo/York Stream, adjacent to their school.

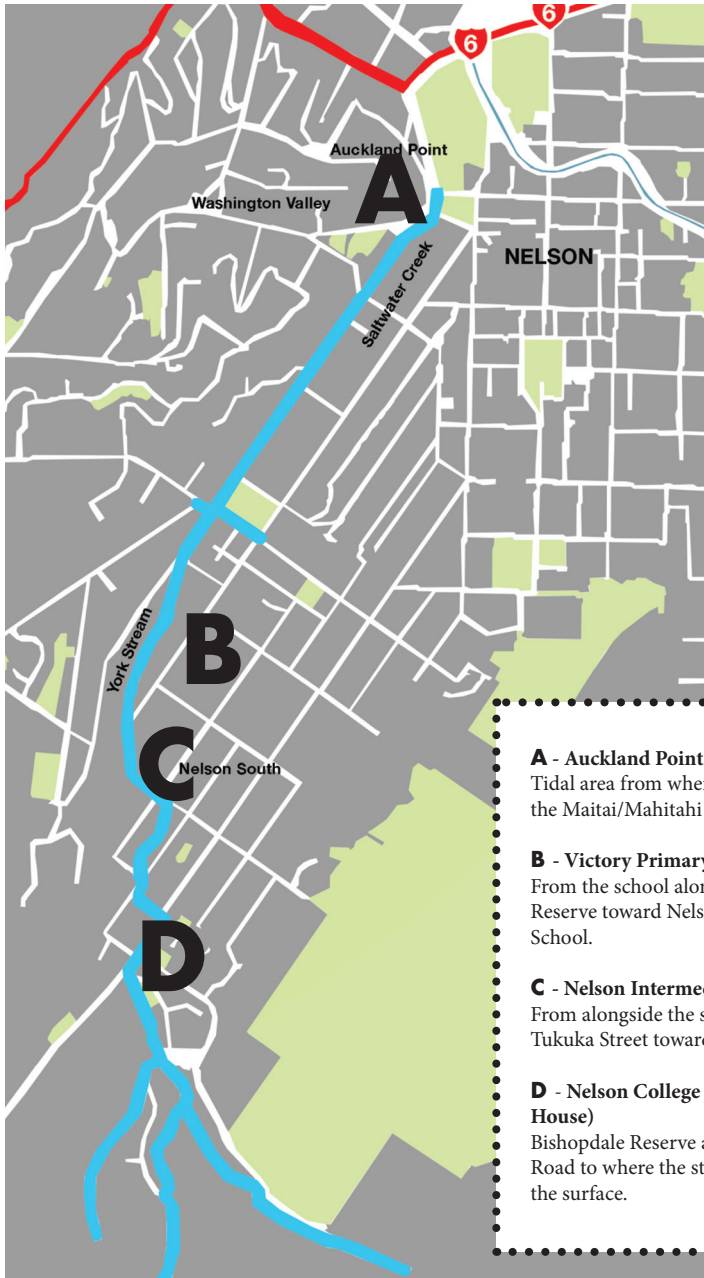
The Breathe artwork went up for public display in the Trafalgar Street windows at the Nelson Provincial Museum, relaying real-time data of water temperature through the colour of the LED lights illuminating the fish.

Key Individuals

*Vicki Smith artist
Mel McCoglan stream ecologist
Andrew Hornblow data sensor technologist
John Paul Pochin developer*

With thanks to Light Nelson Artist Collective members; Frog and Hazel Twizzell and Jonathon Neil, and Redpaths for donating cabling for the data sensors

Schools Involved



A - Auckland Point School

Tidal area from where the stream joins the Maitai/Mahitahi River.

B - Victory Primary School

From the school along the Railway Reserve toward Nelson Intermediate School.

C - Nelson Intermediate

From alongside the school then from Tukuka Street towards Waimea Road.

D - Nelson College for Girls (Bronte House)

Bishopdale Reserve and along Waimea Road to where the stream returns to the surface.

Breathe Workshops

The workshop begins with a karakia. This places the work within the kaupapa of a maori world view. It raises the profile of the waterway and describes care for the stream from the perspective of four fresh water species. This happens by looking at ideal conditions and things that will impact or assist the fish. There was also a brief look at the insects and what they tell us about water conditions.

The participants then explore the creative process of developing a vehicle to communicate ideal conditions – temperature - with the public/ community. They do this by marking patterns and symbols onto a laser cut acrylic fish, seeking to describe cool, clear and flowing.

Mauri and Toi - River Ecology, Art and communication

Both	Introduce the idea of artworks being able to tell a story Breathe artwork as a whole, what it will look like and the outcome
Key question:	How do you think fish breathe?
Ecologist	Starts with a karakia – what it is and why we do it (cover the mauri and why we do it) Each fish and what they need Inanaga – lowland species short lifecycle and spawning now Koaro – galaxiids how they got their name Bullies - bit tougher: Up to tuna (Eel) – long life cycle Even if cleaning up the stream takes a long time it is still going to benefit them in the future
Key Questions	What do they have in common? (All require oxygen to enable them to breathe) What are the ideal conditions to keep these critters happy? Cold clear flowing (discuss temperature and oxygen)
Artist	Mark making and how to individualise the fish through original patterns Using the korero from Mel to try and describe what are good conditions for the fish through pattern (or reflect water patterns or other designs)
Key question:	What patterns do you notice in nature?
Both	Hand out the fish replicas Students can ask questions and talk about their ideas about the stream (what they observed) while we each make marks on our own fish

The technology, data gathering machines are created and tested within a local environment, ideas for future outputs will be discussed

Technology and Sensor - data and communication:

Materials: Picaxe breadboard, temperature sensor, LED
 Radio 433mHZ radio link to transmit to receive (serial ASK data link)
 Different temperature reading opportunities (a glass of ice, a fan heater etc)

Facilitators	Introduce the outcome for the day (of creating a data sensor)
Key question:	What is an important thing to record in terms of available oxygen in streams?
Creative Technologist	Overview of the Picaxe technology Set everyone up with components to create a series of sensors
	Using a breadboard solder free process the students create a circuit, and construct devices that can relay information about the immediate environment including constructing of the temperature sensor. While doing so they gain an understanding of how the technology works and how the data will be transmitted and received. Once set up the students are able to see the changes in the temperature readings through putting the temperature sensor in a range of environments (eg. in their hand, out the window and in a glass of ice)
Key question:	What patterns might we notice after the data has been collected over 24 hours or over a week or a year?

Students can ask questions and talk about their ideas (what they observed) and what they might already be interested in thinking about in terms of their data.

The initial workshop showed the temperature as a series of flashing lights (via LED). The students counted flashes to figure out the temperature (eg long for tens, quick for ones, very quick for decimals).

At the end of the Workshop, collect the completed Fish & Sensors. Check all are named to ensure the correct correlation of the data for the output array.



Sensor Housing and Stream

A group from the Light Nelson Artist Collective built the sensors housings. In future iterations, the group creating the work would ideally be supported to undertake this themselves as a way of engaging wider participation and audience for the work.

The unit has a wire soldered to a bolt, which is mechanically attached to a length of tensile wire to extend the aerial. The temperature sensors were also extended with extra Cat 5 cable to ensure enough length.

The small sealed containers were housed inside Marley pipe (sourced from the recycle centre) and with an additional treated ply and painted roof. The unit was bolted through the pipe with the aerial externally attached. In deployment the whole thing was cable tied to either a piece of reinforcing steel or existing structure along the stream.

The students were not required to be responsible for deploying the sensors in the stream due to Health and Safety considerations although actively involving the students in the placement of the sensors (to determine how best to understand the difference in stream conditions) would be the most useful and might encourage more protection of the units.





Output Array from the water to the fish

The data is initially delivered via a gathering device, in this instance a Picaxe receiving the radio signal and transferring it to a raspberry Pi to upload to the internet.

The output array describes the data received from each sensor, and assigns it to the individual fish via a publish and subscribe protocol MQ Telemetry Transport (MQTT) a machine to machine transfer becoming increasingly popular with IoT (Internet of Things) applications.

The potential of using the MQTT protocol is that it allows individuals to set-up a means of accessing their own data. For the Breathe artwork four wemo devices drive each school set of fish. The wemo instructs the LED string to light up individual fish using a varying colour depending on the water temperature, from blue for cold through to red for hot dangerous conditions for aquatic life.

The final work relays the temperature data for each school. In order to have all fish operating the programme currently 'fills' any missing sensor with data from those adjacent. It ignores the data from the air temperature sensor from that process.



Museum & Victory Workshops

The students involved in the initial workshop series are invited back to engage in a further workshop to embed the learning from their creation of the fish and sensor array. The intended outcomes being a greater understanding of the creatures inhabiting the waterway, why stream data is important and an understanding of stream-care and plans for local efforts.



Workshops were held at the Nelson Provincial Museum and a day workshop at Victory Primary School. The format was as follows:

- Stream Model and Insect Indicators: Use a model to explore how the stream changes from source to sea; learn to identify some of the freshwater insects and discover what they can tell us about stream water quality.
- Freshwater Fish: Meet the locals. In ideal conditions you would find them in your stream – decipher what conditions they like and don't like.

- Data Stories: Meet a local scientist and learn about how the type of data your sensors are collecting tells the story of the waterways and its inhabitants.

- Mapping your stream: Get a closer look at your part of te Wairepo/York Stream, find storm-water paths and make plans for how you can help care for and improve the waterway and share this with others.

Workshop Facilitators: Mel McColgan (Waimaori), John Campbell (Nelson provincial Museum), Dr Roger Young (Cawthron), Jo Martin (Nelson City Council), Vicki Smith (Te Wairepo)

Resource Launch & Media

The Breathe project was released as a resource for others to reproduce in their own waterways. The project release included an event and a series of follow-up workshops for the students who built the sensors and marked the fish. The resource launch at the Nelson Provincial Museum, was attended by Council Staff, participants in the work and local scientists. Breathe was also one of the artworks in the illuminate project run by Uniquely Nelson.

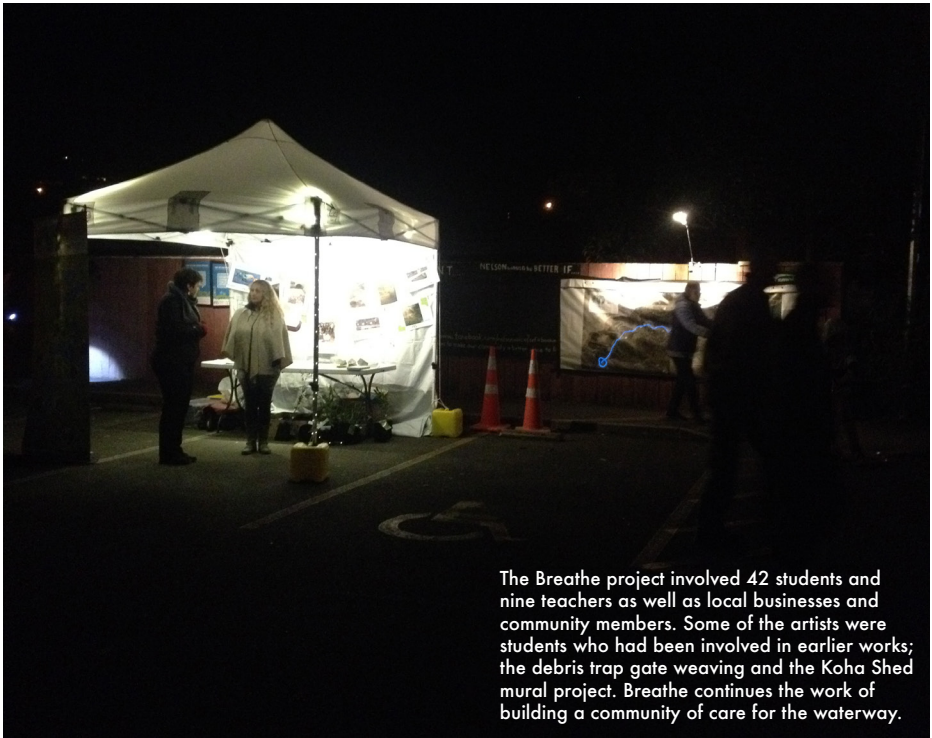
<https://www.stuff.co.nz/nelson-mail/news/94442826/art-meets-science-in-student-exhibition-at-nelson-museum>

Awards

The Breathe project won the illuminate (Nelson light-art in windows) award. This contributes \$200 to each school for use in projects associated with care of their environment.

Breathe was longlisted for the 2017 River Story Awards

Six Students from Victory Primary School used the project to create a submission as part of the Cawthron SciTech festival and shared first prize for the Youth leadership; The best investigation focused on sustainability and community award (\$300)



The Breathe project involved 42 students and nine teachers as well as local businesses and community members. Some of the artists were students who had been involved in earlier works; the debris trap gate weaving and the Koha Shed mural project. Breathe continues the work of building a community of care for the waterway.

Matariki

On June 14, Te Wairepo joined the Matariki celebrations at Victory Community Centre (VCC). Inclusion in this event aligned with the planting cycle and the knowledge sharing kaupapa of Matariki. It provided an opportunity to demonstrate progress and to establish a timeline for the ways the community can engage in the proposed art projects and events for 2017-2018.

The opportunity to officially have a stall at the annual Victory Community Matariki event increased the mana of the project and again put it squarely in front of the community it seeks to engage. The ability for 'kanohi ki te kanohi' is important in really embedding the previous instances of the project, of which this area has formed a large part, (especially in the number of art works nearby). People-to-people communication has the greatest ability to reach, engage and motivate the community towards the outcomes of the project – especially where we can reflect the progress already made back to the community.

The large canvas printed map of the waterway, including the 'database' of contributions, in the form of stickers for levels of concern, was on display. The waterway was picked out in blue 'elwire' (a neon like flexible glowing wire). This time, community were invited to map where they would plant trees we handed out, to show how they will be contributing to the 'greening' of the local area and especially the waterway.

It was a synchronistic theme for the Matariki event this year coming as it did on the heels of the success of the movie Moana. The scene is set in the Village of Victory. It tells the tale of how a young girl uses the stars to navigate her way up the local awa (Te Wairepo /York Stream) to return the eyes of Te Wheke that had been stolen by the demi-god Maui in order to restore life back into her Village.

The restoration of life, expending effort to wrong ills and 'regreening' the environment all underpin the intentions of Te Wairepo/York Stream project.





Fifty trees donated by Nikau Gardens were handed out. Community members discussed meeting and planting them together so that their care could also form a continuing community gathering activity.



Team Up to *Clean Up*

The first iteration of Te Wairepo ended with the Matariki Celebrations. Since then, while the project champion worked on developing the second series of artworks and events, a bridging occasion has been organised and delivered under the umbrella of the Keep New Zealand Beautiful week. The event Team Up to Clean Up became a celebration of community and as well as working bee and shared kai.

Teams were identified and the area they worked in mapped onto the Te Wairepo map, which was hung in the Victory Community Centre in the week leading up to the event, on Saturday September 16.

Teams could begin whenever they wished with the organising team setting up at the Victory Community Centre at midday. Some groups came to the centre first and collected bags and gloves while others started from their street and worked towards the centre.

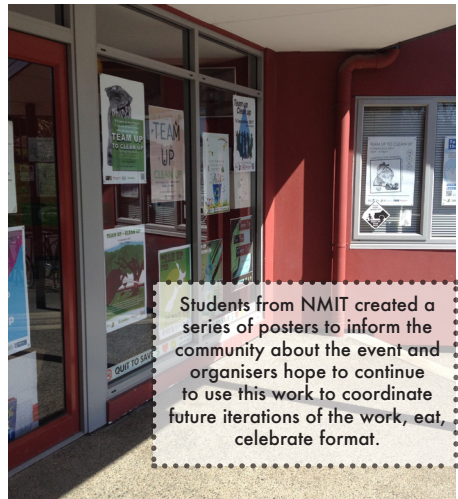
The teams worked along streets, the railway reserve, Victory Primary School and through public areas. Attention was given to accessible waterways and the pathway of rubbish from street to storm water systems, streams and eventually the sea was highlighted

Recyclable things went into clear plastic bags and rubbish in the black bags, which were collected at

Victory Community Centre. A full high sided trailer and the back of a Ute were filled with rubbish.

The workers were given soup, bread, sausages and cake and the event was rounded off with the planting of a kawakawa tree in the garden alongside the centre.

The kaupapa was blessed by Cindy Batt who began the ceremony with a karakia and shared her knowledge of the tree, its uses and its symbolism in the intention of encouraging and reconnecting the heart of the community.



Students from NMIT created a series of posters to inform the community about the event and organisers hope to continue to use this work to coordinate future iterations of the work, eat, celebrate format.

Next Steps...

NIS Poolside Painting Waters - *Source to Sea informs a Mural project*

Breathe - *Prepare for reinstallation of stream sensors and output @ Nelson City Council*

Kaitiaki - *workshops for school groups to develop a Kaitiaki atua which will be printed onto tree protectors. Students will 'tag themselves' to specific trees to encourage ongoing care*

Race Unity Day - Sunday 18 March 2018 - *Community weeding project preparation for April Planting*

Walking the Chalk, Talking the Walk - *a walking event linking cultural creative and scientific perspectives of the waterways with their communities*

Matariki Celebrations - *Calendar distribution and project conclusion*
Community Planting events
Project completion and final report - telling important stories

And beyond...

Embed the stories in the flow of the water - create opportunities for people to walk the waterway and hear the stories as they wish - and add hopes and dreams and stories of their own, connected with the music you might hear from the houses around.



Thanks

Initiated by Jo Martin

Team Leader Science and Environment, Nelson City Council/Te Kaunihera o Whakatū

This project was originally instigated following an engagement in the art project to create a weaving on the debris trap gates adjacent to Victory Primary School. It created a plan and proposed artworks and events to assist and promote the care and attention for a waterway.

The project champions are in the community already committed to care for Te Wairepo/York Stream and in the employees at Nelson City Council who guide and care for its progress.

The outcomes outlined above doubled the original input into the Te Wairepo project through the kindness and generosity of the schools, community and businesses who collectively donated time, goods and money for each stage.

Mural project :

Resene paints
Victory Community Centre

Race unity day:

Nelmac
Feral Arts
Elise hair Dressing

Breathe:

Breathe is a collaborative artwork possible thanks to the efforts and generosity of a large number of individuals and organisations:

The students and staff of - Auckland Point School, Victory Primary School, Nelson Intermediate and Nelson College for Girls (Bronte House).

Nelson Provincial Museum

Cawthron Institute

Redpaths Nelson

Maker & Co

Fluid Power Solutions

The Goodwins

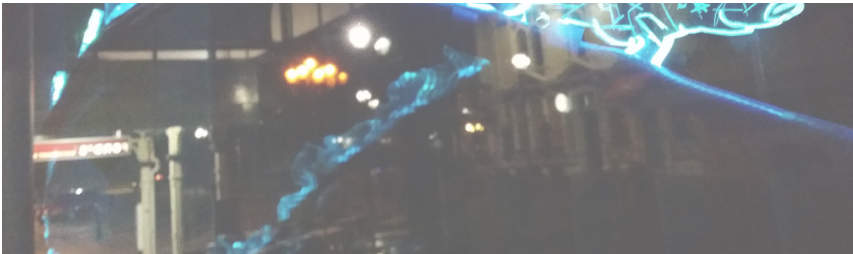
Community Art Works

Team Up 2Clean Up:

NMIT (wonderful students!)
Nelson New World
KNZB
VCC

Matariki:

Nelmac
Nikau Gardens
VCC





[flow]

By re-introducing the community to their waterway we renew the conversation between people and nature to remediate 'the four ways a 'landscape is lost' loss of beauty, loss of freedom, the loss of wildlife and vegetation and the loss of meaning'. [1] Te Wairepo/York stream project metaphorically raises the wai (water) back into the community consciousness and alongside that comes a call to become involved and care.

[1] Oliver Rackham quoted from the book *Landmarks* by Robert McFarlane Pg 9



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