

City Rail Link

Delivering CRL Sustainably

Annual Review 2015-2016



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Foreword Project Director

E ngā hau e wha, mai i Tāmaki Makaurau ki to ao whanui.

He mihi manahau ki a koutou katoa. Topuni ki te Raki, Rakitu ki te Rāwhiti, Puketutu ki te Tonga, Oaia ki te Uru. Tāmaki herehere o ngā waka e!

Tihei mauri ora ki te whai ao, ki te ao mārama.

Sustainability - making forward thinking, connected, holistic, maintainable choices about consumption and waste while looking for opportunities to contribute to society. Not the easiest concept to come to grips with.

For the City Rail Link team it means building New Zealand's largest infrastructure project while creating the least possible waste, using minimal resources, choosing the right resource and method for the task and contributing to Auckland's social fabric.

Embedding sustainability within the thinking of the CRL management team and our contractors has been key to our current success in this area. It's not necessarily hard to make projects more sustainable. What it requires is a change of attitude and approach and the result makes sound business sense, saving money and resources now and for the future.

By its very nature, the CRL once built will provide a much improved public transport system that gives people more sustainable transport choices. In construction it offers employment and we will target those often marginalised in the workforce to gain sought after skills and experience.

Unlike the Green Star rating for buildings, there is no New Zealand sustainability standard for infrastructure, so we have embraced and enhanced the Infrastructure Sustainability Council of Australia (ISCA) framework where we are aiming for an 'Excellent' rating for CRL.

We have worked with Mana Whenua to make the tool more appropriate to a New Zealand setting and this work has been recognised by ISCA as a world first.

Our contractors (Connectus and Downer/Solentache Bachy) have taken up the challenge and that's been recognised in the recent award of a "Leading" rating for the Connectus work, and we look forward to our rating for the other works.

This document outlines the sustainability journey we've been on to date. We are just beginning and are working with others to share the experience and the learnings.

I hope, like us, you are enlightened and inspired by what's possible.



Chris Meale
CRL Project Director



CRL Project Overview

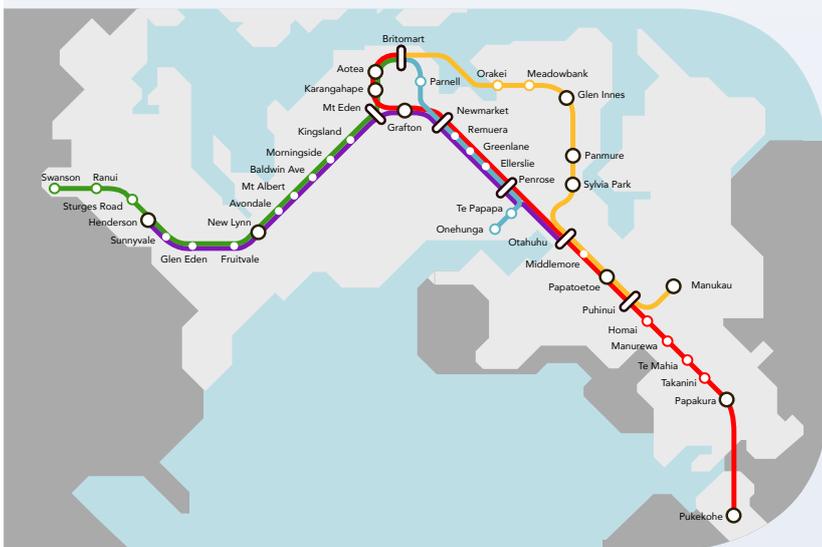
THE CITY RAIL LINK (CRL) WILL UNLOCK AUCKLAND'S RAIL NETWORK AND FACILITATE A DOUBLING OF PEAK RAIL CAPACITY WHEN COMPLETED.

It is Auckland Transport's (AT) top priority and is essential to delivering the Auckland Plan, the City Centre Master Plan, the Long Term Plan and the Integrated Transport Programme. CRL is New Zealand's largest infrastructure project.

The existing Auckland rail network comes to a full stop at the downtown Britomart Station, limiting passenger capacity in a city struggling to keep up with a rapidly expanding population and increasing traffic.

The CRL will connect Britomart with two new underground stations (Aotea and Karangahape Rd) and a redeveloped Mt Eden Station where it will join the western line and create an efficient two-way rail network. Coupled with bus improvements and major investment in other infrastructure, such as roads and highways, CRL is essential to keep Auckland and its economy moving.

FUTURE RAIL NETWORK WITH CRL



Auckland accommodates **1.5m people** and the population is **expected to GROW** by more than **700,000** in the next 30 years



work in the Auckland CBD and **16,000** occupy each square kilometre

The CRL will cater for **30,000 PASSENGERS** per hour at peak on trains **running at least every 10 MINS**

Constructing a 3.4km underground rail link in the midst of the Auckland CBD is no mean feat. Building two 7.5 metre diameter tunnels up to 42 metres below city centre streets has the potential to consume significant resources, and to create substantial waste and carbon emissions if sustainable measures are not put in place.

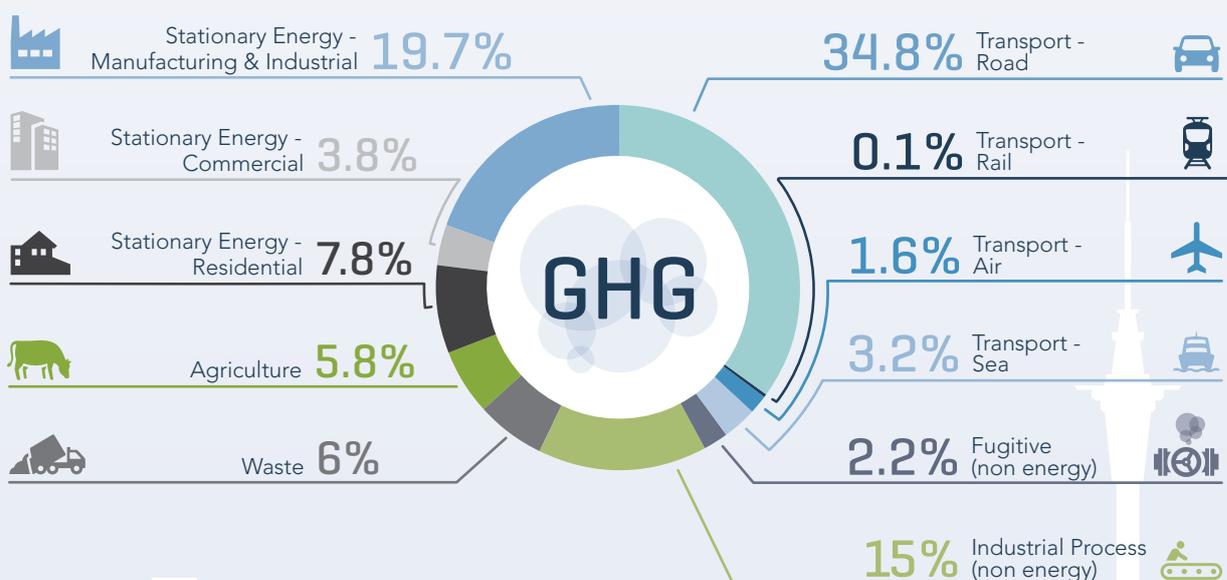
Hundreds of workers will travel to the CBD six days per week for the construction, and numerous businesses adjacent to works are being asked to accommodate access and parking changes. In addition the CRL is happening under the watch of thousands of people working, living and visiting the CBD.

When announcing that New Zealand would ratify the Paris agreement on climate change before the end of 2016, the NZ Climate Change Issues Minister noted: **“All parts of society have a part to play in the transition to a lower emissions economy, from central and local government through to businesses, iwi and communities”.**¹

In Auckland, transport is responsible for about 40% of GHG emissions, with the majority from road transport. CRL will double the peak capacity of the rail network as well as significantly reduce travel times, giving more vehicle commuters the choice of travelling by train – reducing our city’s footprint and helping New Zealand meet its international commitments on climate change.

As Auckland prepares for a sustainable future, the CRL offers major benefits for all. This report presents the first part of CRL’s sustainable journey.

AUCKLAND’S GREENHOUSE GAS (GHG) EMISSIONS (SOURCE AUCKLAND PLAN)



¹ Ref: NZ Government Press Release 17/08/2016 – www.beehive.govt.nz/release/new-zealand-ratify-paris-agreement-year.

Contracts

Construction for Contract 1 and Contract 2 has started. The remaining contracts to complete the CRL will go out to the market next year.

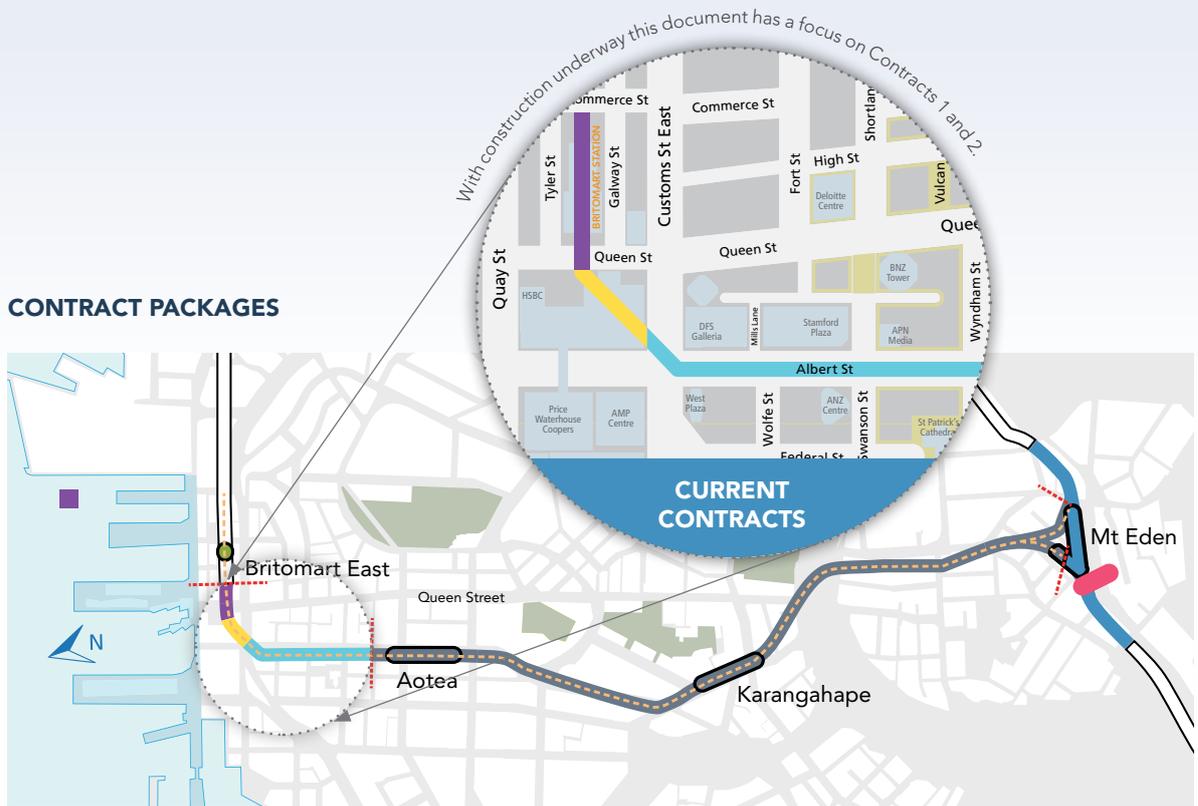
Contract 1 involves constructing a new temporary entrance facility for Britomart station in Commerce Street so the Queen Street entrance can close in January 2017. This will enable our construction partner Downer Soletanche Bachy Joint Venture (DSB JV) to build the train tunnels under the Chief Post Office and Lower Queen Street.

Contract 2, the cut and cover tunnels up Albert Street from Customs Street to Wyndham Street, the pipe-jacking of a new stormwater pipe from Swanson to Wellesley Streets and the strengthening of the Orakei main sewer are being delivered by our construction partner, Connectus.



THE FUTURE BRITOMART STATION WITH A TRAIN ARRIVING FROM MID-TOWN





Vision

The CRL will be designed, constructed and operated to the highest sustainability standards and will set the benchmark for delivering sustainable infrastructure in New Zealand. It will focus on minimising the use of materials, energy and water, striving for zero waste to landfill during construction, and targeting an 'Excellent' Infrastructure Sustainability rating. Furthermore, the project will work to support local economic development by identifying opportunities for training and employment during the delivery of CRL.

BRITOMART STATION



AOTEA STATION



These are the latest artist's impressions of the two new stations, as well as an upgraded Britomart and a redeveloped Mt Eden Station.

City Rail Link objectives:

Improve transport access into and around the city centre for a rapidly growing Auckland

- Future proof for expected growth

Improve the efficiency and resilience of the transport network of urban Auckland

- Improve journey time, frequency and reliability of all transport modes
- Maximise the benefits of existing and proposed investment in transport
- Release the rail capacity constraint at Britomart

Significantly contribute to lifting and shaping Auckland's economic growth

- Support economic development opportunities
- Provide the greatest amount of benefit for cost
- Enable a more productive and efficient city

Provide a sustainable transport solution that minimises environmental impacts

- Limit visual, air quality and noise effects
- Contribute to the country's carbon emission targets
- Contribute to the well-being of Auckland

Contribute positively to a liveable, vibrant and safe city

- Enhance the attractiveness of the city as a place to live, work and visit
- Protect our cultural and historic heritage for future generations
- Help safeguard the city and community against rising transport costs

Deliver project with a 'best for Auckland' approach

- Safety first (continual focus and education)
- Minimise disruption to the city and its people
- Provide accessible and timely information
- Proactively engage with stakeholders
- Develop design for optimal outcome



Sustainability Approach

For CRL, sustainability is about more than just recycling construction waste (although this is a good idea!). Sustainability underpins the entire CRL project from conception, design and planning through to construction. It is the first public transport project in New Zealand to measure carbon emissions associated with its construction and operation. Materials, energy and water use data will be gathered during construction, a zero waste to landfill goal is in place and the CRL has a focus on skills legacy, apprenticeships and new jobs for the unemployed.

OUR TARGETS

For the current construction works – at Britomart and the tunnels along Albert St – AT is working on four key sustainability targets with its contractors:

- An “Excellent” Infrastructure Sustainability rating
- Aspiring to zero waste to landfill
- Developing a carbon footprint
- Monthly reporting to track progress.

Read on to find out more about what all these targets mean and how the project is progressing.

For the future construction works, the project team is developing a number of targets for social outcomes (see page 34).



HIGHLIGHTS TO DATE

The sustainability team is modelling and measuring energy, water and materials use across the project lifecycle and identifying and quantifying opportunities for savings and efficiencies.

The team has calculated that the modern water efficient fittings to be installed in Britomart have the potential to reduce water usage by

MORE THAN

50%

WITH ASSOCIATED REDUCTIONS
IN UTILITY BILLS.

The CRL team and its contractors are also working to deliver greenhouse gas savings throughout construction. Initiatives include switching from a diesel generator to mains electricity to power stormwater pipe-jacking equipment and driver training for fuel efficiency (in partnership with the Energy Efficiency and Conservation Authority). Changes to piling methodology and more efficient spoil removal are also expected to reduce energy and material use.

THESE COMBINED INITIATIVES
ARE PROJECTED TO SAVE
**HUNDREDS OF THOUSANDS
OF LITRES OF DIESEL.**

Infrastructure Sustainability (IS) Rating Framework

THE CRL PROJECT HAS ADOPTED AND ADAPTED THE INFRASTRUCTURE SUSTAINABILITY COUNCIL OF AUSTRALIA'S (ISCA) RATING FRAMEWORK AS A BASIS TO EVALUATE AND IMPROVE SUSTAINABILITY PERFORMANCE.

The IS framework is a comprehensive rating and certification tool for evaluating sustainability across project design, construction and operation. The CRL project will need to meet criteria across the framework's six themes:



Management and Governance

- Management Systems
- Procurement and Purchasing
- Climate Change Adaptation



Ecology



People and Place

- Community Health, Well-being and Safety
- Heritage
- Stakeholder Participation
- Urban and Landscape Design



Using resources

- Energy and Carbon
- Water
- Materials



Innovation



Emissions, Pollution and Waste

- Discharges to Air, Land and Water
- Land
- Waste

CRL is a pilot project for the use of the IS rating framework in NZ and is targeting an ‘Excellent’ rating over the entire project.

The team has been working with Mana Whenua to identify opportunities to respond to New Zealand’s cultural context within this framework, ensuring the sustainability criteria are compatible with te Ao Māori (for more on this see page 30).

The IS rating tool focuses the project to:

- Model and measure resource consumption
- Identify and implement feasible opportunities to reduce consumption
- Achieve significant reductions in resource use across the infrastructure lifecycle.

Undertaking a pilot IS rating in New Zealand allows the CRL team to benchmark the project against international standards and test the framework in the New Zealand context. Embedding Mana Whenua cultural values across the IS framework provides the opportunity for the rating tool to respond to cultural as well as environmental sustainability.

PROGRESS TO DATE

‘Leading’ rating for Contract 2 – Albert Street Tunnels

The CRL has been awarded a ‘Leading’ Infrastructure Sustainability (IS) Design rating for Contract 2 – Albert St Tunnels by ISCA. ‘Leading’ is the highest possible rating achievement within the IS scheme.

Key sustainability initiatives planned for the Albert Street tunnels over the project lifetime include:

- The use of LED street-lighting for the Albert Street reinstatement
- Installing tree pits in the street to collect and filter stormwater runoff
- Switching from diesel generators to grid electricity during construction
- Collaborating with the Energy Efficiency and Conservation Authority (EECA) to promote efficient driving and monitor machinery during construction to reduce fuel use
- Changing excavation methods to reduce diesel and water use

Find out more about the impact of these initiatives on the following pages.





Management and Governance

SUSTAINABILITY IS EMBEDDED INTO THE MANAGEMENT SYSTEMS FOR CRL. THIS ENSURES THAT SUSTAINABLE OUTCOMES ARE INTEGRAL TO DELIVERING THE PROJECT.

It is a far bigger story than just the obvious such as recycling construction waste. When considering every issue, sustainability is front of mind - not an afterthought.

Decision making in the project involves considering environmental, social, cultural and economic implications and benefits as well as risks and opportunities.

To ensure a project of this magnitude has sustainability built into its DNA, management systems are in place to set out process and monitor performance and outcomes right through project delivery. These outcomes are reported back and any lessons learnt along the way are shared.

Decisions are made, knowledge shared and reporting undertaken on an ongoing basis – not just at the end of any one stage. In such a complex project involving numerous partnerships, this involves making sure our contractors are fully involved, are committed to our vision and also have the management tools in place to ensure targets are met.



Making sustainability real requires monitoring results.

Every month, construction teams track energy, materials and water use and report on waste generated and what diversion paths are being found. Every quarter overall reporting against the targets occurs at the management level.

Regular reporting enables us to not just celebrate success, but identify any areas of concern, and to direct efforts to improve those outcomes.

As New Zealand's biggest transport construction project, we are fully committed to setting an example for the future.



What does having a commitment to sustainability embedded in the management team thinking do? It drives and normalises the approach across the project.

A simple carbon calculator was set up during the Early Contractor Involvement phase for Contract 1 and 2, where we were looking for construction efficiencies. This enabled the construction engineering teams to quickly calculate the carbon footprint of any changes they were proposing.



Using Resources – Energy, Water and Materials

Although the completed CRL will help to reduce Auckland’s carbon footprint, enabling more Aucklanders to get out of their cars, its construction and operation will consume significant resources. The project aims to reduce these impacts as much as possible in order to contribute to regional and national greenhouse gas emission reduction targets.

The outcomes from reducing resource use in Contracts 1 and 2 are shown over the following pages. Similar initiatives are being incorporated in the planning for the remaining contracts.

CONSTRUCTION ENERGY

A number of initiatives are planned to reduce emissions associated with energy use across the first two (of nine) CRL construction contracts. These include:

- Using New Zealand’s predominately renewable electricity to replace the on-site diesel generators typically used in construction
- Changing construction techniques to reduce on-site diesel use
- Collaborating with the Energy Efficiency and Conservation Authority (EECA) to implement a fuel efficiency programme during construction
- Using locally produced bio-diesel

CRL has modelled predicted energy use, and as can be seen in Figure 1, during construction it is estimated that implementing these initiatives will reduce the energy-related emissions by over 29% and avoid the release of 2,393 tonnes of greenhouse gases into the atmosphere, saving slightly over one million litres of diesel.

This equates to a saving equivalent to 2,495 one-way economy flights between Auckland and London.²

GREENHOUSE GAS (GHG) SAVINGS C1 & C2 CONSTRUCTION

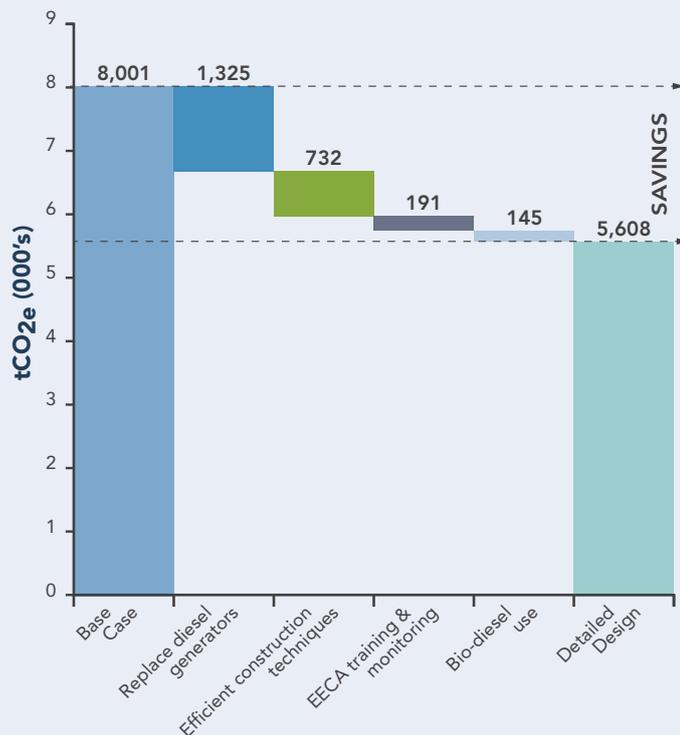


Figure 1: Construction efficiency initiatives’ predicted contribution to GHG emission savings for Britomart Station and Albert St tunnels measured in tonnes of carbon dioxide equivalent.

² Based on the International Civil Aviation Organization flight emissions calculator, assuming one way economy travel via Singapore.



OPERATIONAL ENERGY

The equipment and passenger facilities at Britomart Station and the reinstated streetscapes above the tunnels will use a significant amount of electricity over their 100-year design life. The design therefore incorporates a number of efficiency initiatives, including specifying high efficiency station plant and equipment, energy-saving motion sensors on the escalators, efficient heating and ventilation, motion and daylight sensors for the station lighting and LED lighting for the streets.

As can be seen from Figure 2, these initiatives are expected to reduce greenhouse gas emissions by close to 15,000 tonnes, the equivalent of 15,392 Auckland to London flights over the 100 year design life.

GREENHOUSE GAS SAVINGS C1 & C2 OPERATIONS OVER 100 YEARS

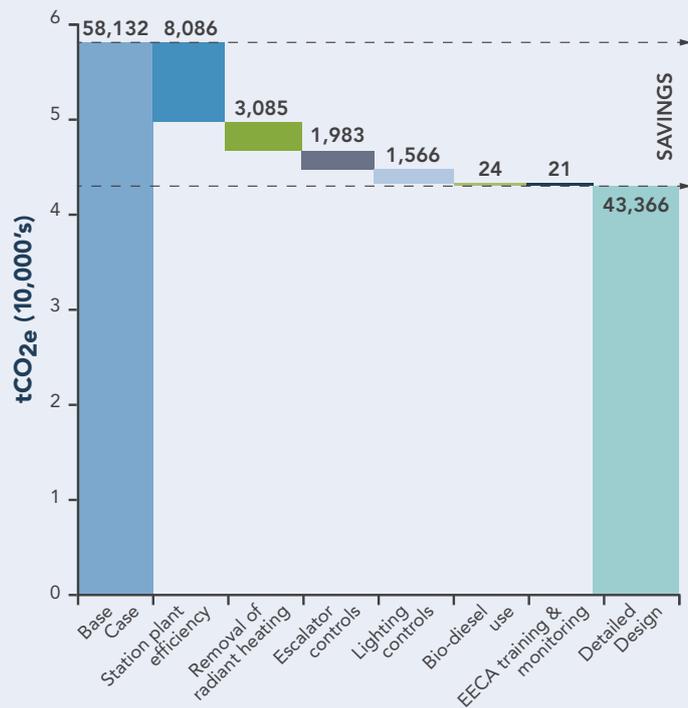


Figure 2: Operation efficiency initiatives' predicted contribution to GHG emission savings for Britomart Station and reinstated streetscapes above the tunnels, measured in tonnes of carbon dioxide equivalent.

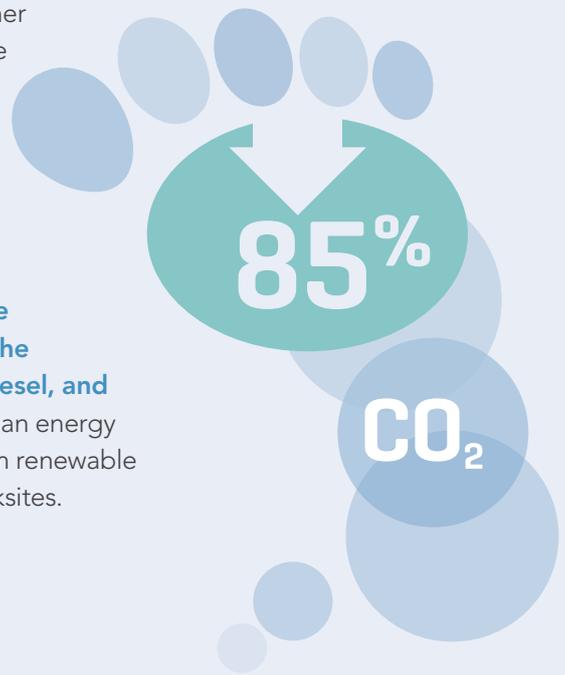
Greenhouse gas modelling validated through an independent audit by Enviro-Mark Solutions Ltd.

Using Resources – Energy, Water and Materials CONTINUED

Grid electricity

With construction underway on the Britomart to Wyndham St section of CRL, one of the key sustainability initiatives is to install grid-connected transformers as a replacement for on-site diesel generators.

Connectus has been able to reduce carbon emissions by swapping out the traditional construction site diesel generator for a transformer connected to the national grid. The Victoria One shaft site is the launch point for the tunnel boring machine that will construct a new two-metre diameter stormwater main and is where most of the spoil from the tunnelling process will be removed. As a result, the energy requirements at this location are high and it made good economic and environmental sense to use grid electricity to power the tunnel boring machine and associated pumps, fans and lighting. **This initiative is projected to reduce the greenhouse gas emissions from the electricity used at the site by approximately 85%, save almost 200,000 litres of diesel, and will eliminate generator noise and diesel fumes.** In addition, an energy retailer has been selected that produces all of its electricity from renewable sources, and additional transformers are planned for other worksites.



Energy Efficiency and Conservation Authority (EECA) partnership

Constructing the Albert St tunnels involves the excavation and transportation off site of over 200,000 tonnes of spoil to create a trench in Albert Street into which around 100,000 tonnes of concrete and backfill will be placed to form twin train tunnels and allow the reinstatement of the streetscape.

CRL is partnering with the EECA to implement a driver training and machine monitoring programme to make the excavation and haulage as energy efficient as possible.

This programme will train drivers and operators in techniques to reduce fuel use, and monitor machinery to keep track of savings and continually improve performance.

Based on the results from previous schemes run by the EECA Heavy Transport team, the CRL aims to save over 130,000 litres of diesel as a result of this partnership.

WATER

Reducing water use has a range of benefits, including reducing the amount of energy needed to process and pump water to point-of-use and for the re-processing of wastewater.

One of the big uses of water during construction is washing the wheels of trucks before they leave worksites to prevent them tracking mud onto the road. In Albert Street this will be avoided by providing a traffic deck at street level, and loading trucks using a long-reach excavator, rather than driving trucks down into the excavation. This initiative is more efficient and is expected to save around three-and-a-half million litres of water; enough to supply an average Auckland household for 22 years.³

Converting Britomart from a dead end to a 'through' station has provided an opportunity to improve water efficiency.

An audit of the existing facilities found that the public toilets are by far the largest users of water in the station, using over 80% of the total water consumed.

Installing water efficient toilets, urinals and taps in place of the existing fittings is expected to reduce water use by

53%

This will save enough water every year to supply

83 AVERAGE AUCKLAND HOUSEHOLDS

³ Based on a three-person household (the Auckland average in the 2013 census) and median water use from a BRANZ study: www.watercare.co.nz/community/Be%20Waterwise/Water%20use%20in%20Auckland/Pages/Household-water-use-in-Auckland.aspx

Using Resources – Energy, Water and Materials CONTINUED

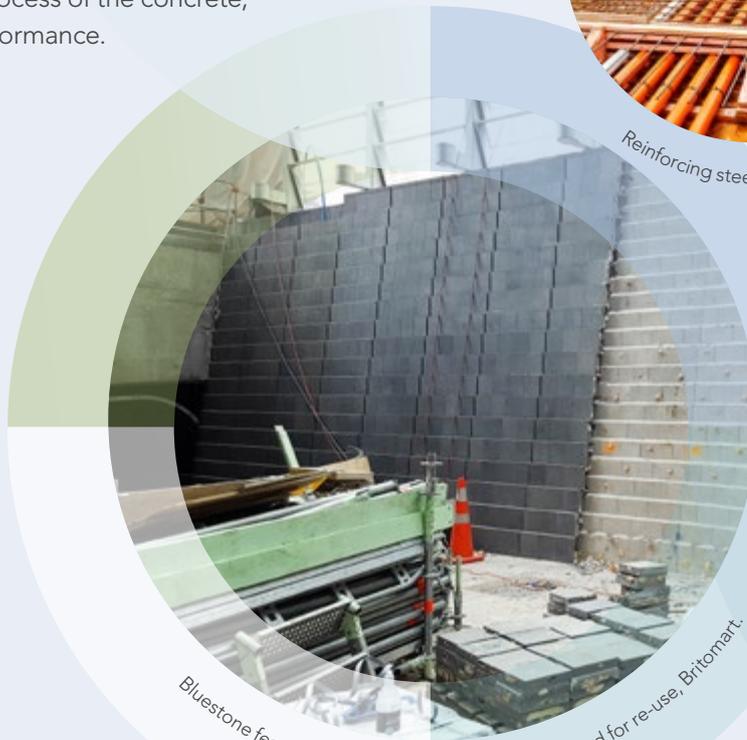
MATERIALS

The use of construction materials not only consumes valuable resources, but also generates greenhouse gas emissions during manufacture due to the energy used and the industrial processing involved. Building underground tunnels and stations requires a lot of concrete and steel, both of which have significant quantities of this ‘embodied carbon’. The CRL design team is working to minimise the use of concrete and steel whilst ensuring that the infrastructure is fit-for-purpose and long-lasting.

The team has found savings equating to almost 600 tonnes of greenhouse gas emissions on the Albert St portion of the work and over 1,200 tonnes on the Britomart portion. One approach that has helped reduce the embodied carbon of the concrete has been the specification of fly-ash, a partial cement replacement and waste product from coal-fired power stations. This not only reduces the embodied carbon but changes the curing process of the concrete, thereby improving its performance.



Reinforcing steel and service ducts for the plaza floor slab, Britomart.



Bluestone feature tiles being removed and packaged for re-use, Britomart.

Piling on Albert Street

Through focused design during the 'Early Contractor Involvement' stage, Connectus reduced the materials and carbon footprint required to complete the pile walls for the Albert Street cut and cover tunnels. By standardising to a 750mm diameter pile size and adjusting the design to maximise the spacing between piles, 1200m³ of concrete was removed from the design.

Additional concrete is expected to be saved by adopting a very accurate piling method. By reducing the likely error in pile placement, a smaller tolerance between the pile wall and tunnel box is required and therefore the quantity of concrete to fill the space is reduced.



Steel cage inserted into pile holes, to be filled with concrete.



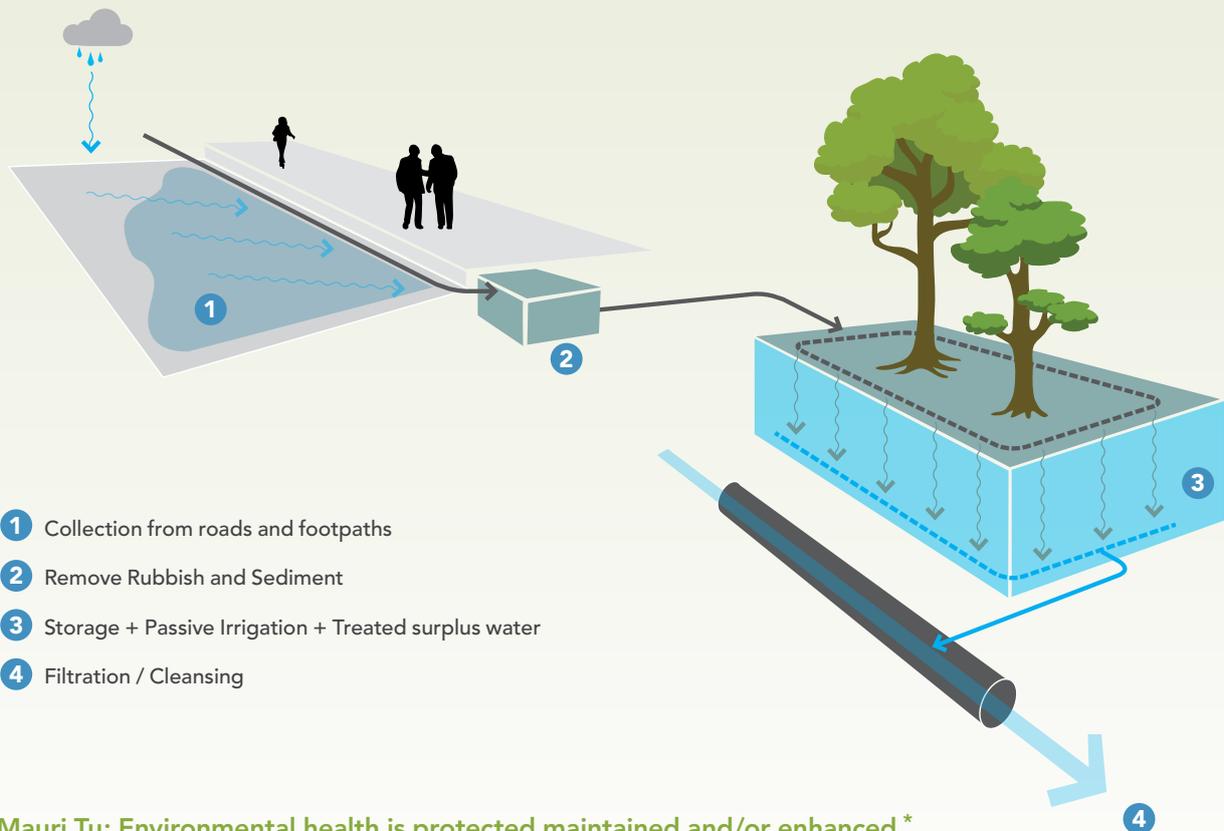


Emissions, Pollution and Waste

WATER QUALITY / WAI ORA

Post construction works, street trees will be planted in Albert Street. As an approach to improve the quality of the water that enters the Waitemata Harbour these street trees will act as 'bio-retention devices'. This approach diverts the 'first-flush' rainfall directly into below-ground tree-pits that contain the tree roots. Not only does this significantly reduce the need for watering, saving hundreds of thousands of litres of water a year, but it also improves the quality of the water running into the stormwater network and the harbour. The trees are able to filter out contaminants washed off the road when the rain first starts falling.

WATER SENSITIVE DESIGN



Mauri Tu: Environmental health is protected maintained and/or enhanced.*

* Source: Auckland Design Manual, Guidance for Te Aranga Principles (www.aucklanddesignmanual.co.nz)

Water quality

Digging holes means dealing with groundwater. To make sure that water is suitable for discharge into the stormwater system, Connectus uses a number of water treatment devices to remove sediment. In response to Mana Whenua desires, Connectus have specified 'non-chemical' biodegradable flocculants to assist with the removal of sediment from water. The product is safe to handle for staff and because it's biodegradable it is better for the environment when the water leaves site.



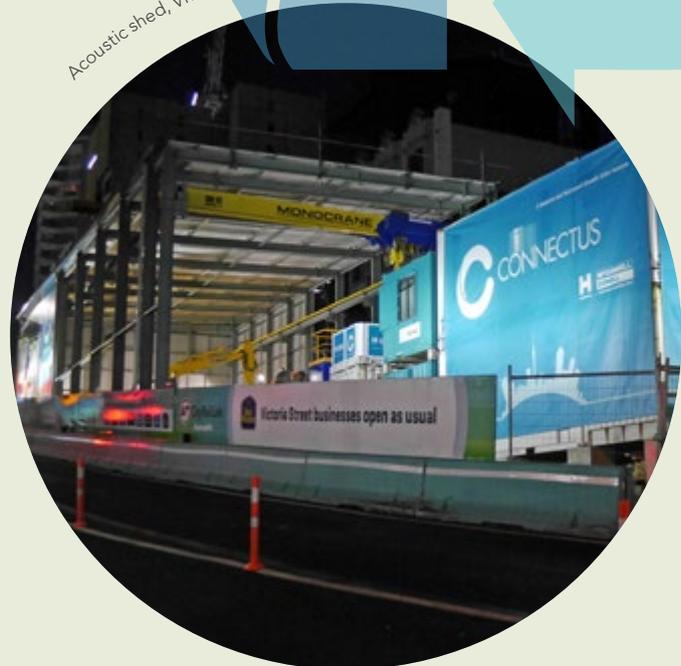
Water treatment device, Albert St.

NOISE AND VIBRATION

Noise and vibration tend to go hand-in-hand when building such a large piece of infrastructure, but the CRL is doing as much as possible to minimise the impact on our neighbours. A large acoustic shed currently established on Victoria Street aims to reduce the disturbance to local businesses while a tunnel boring machine is used to construct a new stormwater main. Powering the machine with grid electricity rather than a diesel generator further reduces noise, as well as eliminating diesel fumes. Where noisy work is undertaken outside this area, acoustic barriers are used to shield passers-by and local businesses from noise.



Acoustic shed, Victoria St.



MONITORING

The project is using the Cyclops monitoring system, which is used on similar projects around the world. Using laser targeting, Cyclops monitors the ground surface and buildings for any displacement or movement. The system is accurate to within one millimetre. It is crucial that vibration and settlement does not cause damage to nearby structures, especially heritage buildings. Before construction, adjacent buildings have also been surveyed to provide a baseline for comparison.

Emissions, Pollution and Waste CONTINUED

ZERO WASTE TO LANDFILL

Construction and demolition waste represents a significant portion of Auckland's waste to landfill and minimising this is an industry-wide challenge. In response to this challenge, and in line with Auckland Council direction, CRL is striving to send zero waste to landfill during construction by supporting and challenging our contractors to avoid, reduce, reuse, recycle and recover as much waste as practicable.



Designing for waste minimisation is a priority to support this aspirational goal, and the contractor's waste avoidance and resource recovery plans are essential. Contractors are asked to identify:

- Likely sources of waste and when they will arise
- Strategies for implementing the waste management hierarchy (avoid – reduce – reuse – recycle – recover – treat – dispose)
- Systems to monitor and report on waste
- Predicted quantities and diversion paths.



Green Gorilla

As part of CRL's aspirational zero waste to landfill goal, Green Gorilla skip bins are being used by our contractors at Britomart and Albert Street.

Waste material from the construction sites is processed locally in Green Gorilla's purpose-built Resource Recovery and Transfer Station facility in Onehunga, where...

MORE THAN
75%

OF WASTE MATERIALS ARE DIVERTED FROM LANDFILL

Green Gorilla re-purposes treated timber into biofuel by processing it into chips which replace coal in Golden Bay Cement's furnaces.

UNTREATED
TIMBER IS
CHIPPED FOR USE
AS GARDEN MULCH.



Emissions, Pollution and Waste CONTINUED

KiwiRail kiosk re-use

Located within the Chief Post Office at Britomart Station was an unused kiosk previously used by KiwiRail. The Contract 1 contractor, DSB JV has transformed the area into an unstaffed CRL information kiosk. This presents information about the whole CRL project, but will focus primarily on the Britomart works (timelines, images, artist impressions).

Some of the materials removed from the existing structure were upcycled to create a community suggestion box. This will provide a simple option for transient station users to provide valuable feedback, submit any queries or concerns, and/or sign up to receive CRL Connection updates.

KiwiRail kiosk exterior.



uPVC piping from water feature being recycled

During the deconstruction of the water feature in the Britomart Station plaza, it was discovered that much of the piping identified for removal was in excellent condition. Rather than sending it to landfill, the DSB JV team worked with the pipe's manufacturer Marley to get 100 metres of uPVC recycled.

Water Feature Piping Being Recycled at Marley Yard.*



* Image supplied by Marley New Zealand Ltd.

Office recycling

Connectus is providing waste minimisation education across its workforce and utilising waste providers like Green Gorilla to achieve diversion rates of 75% for inert and non-hazardous waste. The focus on minimising waste extends to the project office and onsite work areas where all organic waste is collected for composting by a local company “We Compost”, and the project office is using kiwi-designed and manufactured waste organisers.



Re-use in the office

For Connectus, part of rethinking business-as-usual led to sourcing many pre-owned materials from local op shops, including kitchenware and office furniture. From a social outlook this was a great opportunity to give back to the community, to procure responsibly and to be economically resourceful.

Re-use on site

Reusing and recycling materials from site helps to reduce waste. Timber formwork used to construct a spoil storage bin has been reclaimed and used again to construct a boardwalk between the Victoria One shaft site and the site office. This walkway provides a safe level walkway over a collection of water hoses and other obstacles on site.



People and Place

Supporting the community

Auckland will change significantly over the next 10 years as both public and private investment projects take off, creating new jobs, homes and a transport system linking the entire city.

Although the outcome is great for a growing population, the journey requires inevitable disruption. To mitigate any negative effects of construction activity, the CRL team will work to activate areas that are underutilised.

A current identified space is Lower Queen Street (between Customs and Quay Street), which was made into a pedestrian-only space in mid-2016 in preparation for CRL construction.

The objective for this space is to create a positive public experience by creating a city centre oasis with astro-turf, deck chairs and market stalls to support local businesses, to attract and generate trade as well as offset the impact of CRL construction.

In spaces such as Albert Street where it is difficult to activate, the CRL is working with Activate Auckland, an Auckland Council initiative to lift the urban area surrounded by construction. Activations include 'Light and Life by Janine Williams' on Kingston Street and the Griffiths Gardens on the corner of Albert and Wellesley Streets (the future home of Aotea Train Station).

Hoardings

Hoarding structures are predominately intended to secure worksites and provide a safe passage for pedestrians and traffic.

Bright colours and lots of imagery have been used to enhance the aesthetic appeal of the sites, and provide information on the CRL story; heritage; Mana Whenua; contractors; and nearby businesses.



Signage on hoardings.



Hoardings at Britomart.



Hoardings at Victoria Street.



You can follow the project on Facebook (facebook.com/SymondsStreetGarden/)

CRL sprinkles magic on vacant run-down lot

A run-down vacant lot on Auckland's CBD fringe has been transformed for its local community – thanks to a CRL initiative.

The land at the junction between Symonds Street, New North and Mt Eden Roads was among properties purchased by Auckland Transport for the CRL. The 700sq metre underdeveloped sloping site was littered with rubbish and a fence shielded it from public view. AT embarked on a scheme to improve the site and offer it to the community with no cost to ratepayers.

This involved working with the Waitemata Local Board, the UpTown Business Association, a commercial advertiser, a local landscaping firm, community groups and local volunteers. Advertising space was sold to a billsticker company which gave lump-sum up-front funding to help develop a small pocket park of green space where locals could sit, meet and relax. A community noticeboard was also placed there.

A volunteer day saw local businesses, residents and AT staff tidy, build, erect and paint the noticeboard and fence. Today it is a green space that includes attractive westerly views, planter boxes, herbs and wildflowers. Local volunteers continue to look after what has been named "The Junction".

Supporting local businesses

Recognising that local businesses are being affected by these works, regular lunches at businesses in proximity to site have been scheduled. These have included team lunches at Mexican Cantina; Shakespeare Hotel; Da Vinci's and catering for team meetings from ät Café on Victoria Street.

The CRL Connection newsletter is digitally distributed every three weeks to all local stakeholders and business associations providing updates of the project. Local businesses are featured providing them the opportunity to promote themselves.

Connectus and AT staff enjoying lunch at a business in proximity to the works.



Heritage

Although digging up Albert Street to construct the CRL tunnels is a nuisance for road users, it provides a great opportunity to investigate the city's below-ground history. The project employs an archaeologist to document, and where appropriate preserve, archaeological finds. Although excavations to date have been relatively limited, they have already unearthed some of Auckland's early utilities, providing a glimpse into how infrastructure was built in the past. The answer, it seems, is with brick.

The most interesting piece of infrastructure unearthed thus far is a disused brick barrel drain found while excavating the construction shaft on Victoria Street from which a new stormwater main will be bored. The drain was located around three metres below the surface and has an external diameter of just over one metre. When a cross-section was cut it was found that

the drain had been constructed using two layers of brick to form an inverted egg shape, with internal dimensions of around 500mm wide by 730mm tall.

This shape was favoured by Victorian drainlayers as it is strong, self-cleaning (because of the relatively high flow speed at low volumes), and requires a smaller excavation width than a circular drain, which was important when being dug by hand!⁴ Perhaps unsurprisingly it appears that the amount of excavation which was undertaken to construct the drain appears to be the least amount possible, with only 50mm of disturbed earth on either side. This is an approach modern drainlayers could do well to emulate as it reduces the amount of diesel, and associated greenhouse gases, needed to excavate and transport spoil and backfill.



Brick barrel drain in Victoria 1 shaft looking southeast. (Clough & Associates Ltd.)

⁴ Lubbock and McFarlane, 2012

CONSTRUCTION HOARDINGS AT BRITOMART SHOW THE HISTORY OF THE SITE



Judging by the type of bricks used, and its location, the archaeologist believes the drain was probably installed around the same time as the Albert Street main drain and therefore dates after 1864/65. This would put its construction around 25 years after the signing of the Treaty of Waitangi and the European settlement of Auckland, a time when the city's population was approximately 12,000.

As excavations continue it is likely that more remnants from the city's history will be uncovered, particularly around Britomart, which is on reclaimed land that could contain anything from discarded Victorian refuse to the remains of wharves and sunken vessels.



Photo showing how Lower Queen Street looked at the time the drain below was constructed.

Cross section through western end of brick barrel drain. (Clough & Associates Ltd.)



Mana Whenua

'Tikanga Māori encompasses an important system of customs and values to conserve, manage and protect natural and physical resources. In the Māori worldview, all natural and physical elements of the world are related through whakapapa (genealogy) and each is controlled and safeguarded through spiritual beings. All living things have mauri. The protection of mauri is essential.'

EXTRACT FROM 'CITY RAIL LINK PROCESS FOR MĀORI ENGAGEMENT PAPER'.

A Mana Whenua forum for the City Rail Link was established in 2012 and continues to flourish. Relationships have been established with the eight iwi who self-identified their interest in the project: Te Ākitai Waiohūa, Te Kawerau a Maki, Ngāti Maru, Ngāti Paoa, Ngāti Te Ata Waiohūa, Ngāi Tai ki Tāmaki, Ngāti Tamaoho and Ngāti Whātua o Ōrākei.

AT continues to work collaboratively with the Mana Whenua forum on all aspects of the CRL project. With the commencement of construction for Contract 1 and Contract 2, the forum's role includes cultural inductions for contractors, protocols for discovery of taonga, monitoring, and ongoing provision of mātauranga Māori input.



The aspiration of the CRL project to be exemplary in the practise of sustainability – encompassing the four well-beings (environmental, cultural, social and economic) – aligns and supports kaitiakitanga.

Kaitiakitanga, Sustainability and CRL

Ngā Mana Whenua o Tāmaki Makaurau have a special relationship with Ranginui, our Father Sky, and Papatuanuku, our Mother Earth, and their resources. Acting as Kaitiaki (guardians), Mana Whenua endeavour to protect their whānau, hapū and iwi and encourage all people to act as protectors of the earth.

Kaitiakitanga encompasses:

- Protecting, restoring, enhancing the mauri (life supporting capacity) of te Ao Māori;
- Fulfilling spiritual, emotional and inherited responsibilities to the environment;
- Maintaining mana over te taiao (the environment); and
- Ensuring the welfare of the people.

In Tamaki Makaurau it is Mana Whenua who are Kaitiaki.

Embedding cultural values in Infrastructure Sustainability

Mana Whenua have worked with the CRL team to ensure that the IS framework responds to the cultural context of Tāmaki Makaurau:

- Recognising Te Tiriti o Waitangi
- Identifying opportunities to respond to New Zealand’s cultural context within the Infrastructure Sustainability framework
- Ensuring the sustainability criteria are compatible with te Ao Māori and
- Addressing the impact of infrastructure on the cultural values of Mana Whenua.

This is a first, not just in NZ, but globally and was acknowledged in CRL’s IS certification as world leading innovation.

OUR DESIGN INTEGRATES THE SEVEN TE ARANGA PRINCIPLES



Mana – Individual and collective high quality formal relationships.



Whakapapa/Whakamana – Names and naming as a means of reconnecting iwi narratives to place.



Tohu – The acknowledgement of wider Mana Whenua cultural landmarks.



Taiao – Bring landscape elements back into urban areas.



Mauri tū – Maintaining and enhancing the environmental quality of water, air and soil.



Mauri toi – Re-inscribing iwi narratives into architecture and urban design.



Ahi kā – Exploring opportunities to facilitate a meaningful living presence for iwi.

Mana Whenua

'He horopaki ana te tikanga Māori i ngā mea whai take te hāngai ra ki ngā mahi tuku iho me ngā uara e pā ana ki te tiaki, whakahaere me te tū ārai mai mo ngā rawa tūturu, a kikokiko o te ao tūroa. He ai ki te tirohanga whānui a te ao Māori he hononga whakapapa tō ngā mea katoa o te ao me te tiakina o tēnā me tēnā mea e tōna wairua ake. He mauri tō ngā mea katoa. He mahi tōtika tonu te tiaki i te mauri.'

HE PITO KŌRERO I TANGOHIA MAI I TE PŪRONGO A TE 'CITY RAIL LINK PROCESS FOR MĀORI ENGAGEMENT PAPER'.

I whakatūria he huinga Mana Whenua mo te City Rail Link i te tau 2012 e whaihua tonu nei ia. E mau tū tonu nei ngā here me ngā iwi tokowaru i tohū i to rātou aro nui ki te kaupapa a te: Te Ākitai Waiohūa, Te Kawerau a Maki, Ngāti Maru, Ngāti Paoa, Ngāti Te Ata Waiohūa, Ngāi Tai ki Tāmaki, Ngāti Tamaoho me Ngāti Whātua o Ōrākei.

Ka mahi tonu a Auckland Transport me te huinga Mana Whenua i runga i ngā mea katoa e pā ana ki te CRL. Ka tīmata nei ngā whakahaere e hāngai ana ki te kirimana tuatahi me te kirimana tuarua a te CRL, ko te wāhi ki ngā mahi a te huinga Mana Whenua he toko i ngā tikanga a iwi ki te hunga kaikawe kirimana, he āwhina ki te taki i ngā whakahaere ina tupono te kitea o ētahi mea te hahua noa ake, te aromātai noa i nga mahi, me te torotoro tonu i ngā mea e pā ana ki te mātauranga Māori.



CRL's Project Director, Mana Whenua and ISCA's CEO at the presentation of the IS 'Leading' rating.



Ko te manako nui o te CRL kia noho taurira mai āna mahi rauora – hei korowai mō ngā whāinga oranga e whā (o te taiao, mo ngā tikanga a iwi, ngā take pāpori me ngā mahi ōhanga) – kia rārangi tonu mai hoki me tāna tautoko i ngā mahi kaitiaki.

Kaitiakitanga, ngā mahi whakarauoranga me te CRL

He whakawhirinakitanga to ngā Mana Whenua o Tāmaki Makaurau ki a Ranginui rāua ko Papatūānuku me a rāua rawa. I raro i tōna maru kaitiaki, tērā ngā Mana Whenua te ngana ki te tiaki i o rātou whānau, hapū me te iwi mā te whakahau i ngā tāngata katoa kia noho hei kaiārai mo te ao tūroa.

Ko te mahi a te kaitiaki:

- He tū kaiārai, kaiwhakaora, kaiwhakarei i te mauri o te Ao Māori;
- He toko ake i ngā kawenga tuku iho a wairua, aronganui anō hoki e pā ana ki te taiao;
- Te kawē tonu i te mana tiaki i te taiao; me
- Te oranga tonu o te iwi.

I Tamaki Makaurau, ko te Mana Whenua tonu ngā Kaitiaki.

Te whakauru i ngā uara tikanga a iwi hei papa mo ngā mahi whakarauoranga tonu

- E mahi tahi ana te CRL me ngā Mana Whenua ki te whakatairanga i te Tiriti o Waitangi
- Te whakatau aro whāinga e hei ai te hautū i ngā tikanga a iwi o Aotearoa me te waihanga pou tarāwaho whakarauoranga
- E tāea ai te kī ko ngā tikanga whakarauora e hāngai tonu ana ki tā te ao Māori
- Te tuku o taua pou tarāwaho me ngā uara ake o ngā Mana Whenua.

I whakamānawatia tēnei i raro i te maru o te CRL me tana tiwhikete IS i meinga ai kei te pito koi tonu ia o ngā mahi hou o te ao.

MANA WHENUA TOHU ON THE HOARDINGS AT BRITOMART



Social Outcomes

THE CRL HAS A WONDERFUL OPPORTUNITY TO ENGAGE POSITIVELY WITH THE LOCAL COMMUNITY THROUGH CREATING EMPLOYMENT AND RELATED EDUCATION PATHWAYS. THIS COULD SIGNIFICANTLY INCREASE THE CURRENT POOL OF WORKERS INVOLVED IN CONSTRUCTION AND INFRASTRUCTURE.

Local and international research shows that large infrastructure projects are including social outcomes in strategy and procurement. The focus has been on skills legacy, apprenticeships and new jobs for the unemployed.

CRL wants to provide pathways for quality employment which could include options such as apprenticeships and/or tertiary qualifications.

The aim is to strengthen the Auckland workforce by moving people from:

- benefit to pay cheque
- inexperienced to competent
- unskilled to qualified

The CRL procurement process can provide the opportunity to enable quality employment and workforce development.

Students from
The Southern
Initiative's Māori
and Pasifika Trades
Training.



Delivering CRL sustainably requires everyone to be collaborating to ensure best outcomes and we acknowledge the efforts of all.

Working on the client side are AT's Principal Technical Advisors (PTA)

aurecon **M** **M** **Jasmax** ■ **GRIMSHAW** **ARUP**
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