



Tiakina te Taiao

Our Sustainability Monitoring Report

*Manaaki taiao
Manaaki tangata
Haere whakamua*

*Care for the environment
Care for people
Go forward*

Waka Kotahi
NZ Transport Agency
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Tuia ki te rangi,

Bind the domain of the sky,

Tuia ki te whenua,

Bind the domain of the land,

Tuia ki te moana,

Bind the domain of the ocean,

Tuia ki te here tangata,

*Interlaced by threads of human
love and compassion,*

Ka rongo te pō,

*Let peace abound
throughout the night,*

Ka rongo te ao,

And the light of day,

Tīhei mauri ora!

Behold the breath of life!



Foreword

Welcome to the second issue of *Tiakina te Taiao – Our Sustainability Monitoring Report*. In our first report I said that Aotearoa New Zealand was at a turning point, and over the past year we have indeed begun to see a groundswell of action across government and communities to address sustainability and climate change.

Transport generates 47 percent of carbon emissions in Aotearoa, with 90 percent of this coming from road transport. In May, He Pou a Rangi Climate Change Commission provided advice to government on a low-emissions future, *Ināia tonu nei*, and then Te Manatū Waka Ministry of Transport consulted on decarbonising transport through *Hikina te kohupara – kia mauri ora ai te iwi – transport emissions: pathways to net zero by 2050*. We have been working with our partners to help set the future direction for a low-carbon economy.

Sustainability is not just about reducing carbon emissions. At Waka Kotahi NZ Transport Agency, we have adopted our new strategic direction, Te Kāpehu, which reflects the importance of an environmentally sustainable land transport system. For us, this means protecting our natural and built environment, improving public health and making towns and cities safe and accessible for everyone.

Over the past year we have continued to make progress across all parts of Waka Kotahi. We have developed a resource efficiency strategy, increased the electric vehicles in our corporate fleet, and introduced a new sustainability rating process for large state highway infrastructure projects. We are delivering the government's Clean Car Programme, which encourages people to choose low-emission vehicles. In partnership with councils, investment in Innovating Streets for People projects is providing vibrant walking and cycling spaces for communities. And we continue to enhance our investment decision-making policies to better reflect environmental outcomes.

We have also announced record spending on walking, cycling and public transport in the National Land Transport Programme 2021-24, and have rebalanced the transport component of the New Zealand Upgrade Programme (NZUP), the government's investment boost into infrastructure, to focus on providing a better range of transport options. Our goal for NZUP is also to make a step change towards more sustainable ways of delivering large infrastructure projects. These are significant changes that will not only give people better access to transport choices and more liveable spaces, but will also reduce emissions and make transport more sustainable.

We are proud of the work we have done, but know that getting to where we need to be is a big and difficult job, and one that requires us all to work together. With collective action we can leave great legacies – te anamata.



A handwritten signature in black ink, appearing to read 'Nicole Rosie', written in a cursive style.

Nicole Rosie

Chief Executive

Executive summary

Waka Kotahi NZ Transport Agency is pleased to present Tiakina te Taiao 2021, our second sustainability monitoring report. Tiakina te Taiao translates as 'protecting the environment' and reflects our commitment to supporting a thriving Aotearoa by monitoring and reporting our progress towards a low-carbon, safe and healthy land transport system.

Aotearoa New Zealand is on the cusp of significant change as we navigate towards a low-emissions future. Waka Kotahi is working closely with its partners to reduce transport emissions through the urban growth agenda, national and regional mode shift plans, contributing to an EV infrastructure plan, and through implementation of the climate change priority of the Government Policy on Land Transport 2021. We are also making significant investment in walking, cycling and public transport infrastructure to support mode shift.

While we're seeing progress, more work is needed. Urban areas contribute around half of the transport emissions and even though most local destinations are readily accessible within 15 minutes by bike or e-scooter, over 80 percent of all trips in our biggest cities are made in a private car. Median commuting distances have also increased in our high-growth urban areas. Low-emission vehicles are a small fraction (0.5 percent) of our national fleet, but that is growing with over 24,000 registered by the end of 2020.

Active transport is good for people's physical and mental health, and we are committed to investing in infrastructure that makes it safer and more convenient for people to walk, bike, or scoot. The number of e-bikes and e-scooters have grown significantly. In the last year, we doubled the kilometres of walking and cycling improvements that were delivered compared to previous years, and over 500 kilometres have been added over the past five years.

Tiakina te Taiao snapshot

- » **Greenhouse gas emissions (CO₂) increased to 12,000 kilotonnes** in 2020, and 47% of the emissions were from urban areas.
- » More people using public transport contributes to the environmental and safety outcomes we seek. **24% of people in urban areas live near a frequent public transport service.**
- » Electric vehicles are an important part of a sustainable future. There are over **247 fast chargers (>50kW)** across the country and **97% of the state highway network is within 75km** of a charging location.

Heritage is connected to community wellbeing and we follow best practice guidance on conserving heritage. There are around 1800 archaeological sites within 100 metres of state highways, with over 800 included on the New Zealand Heritage List/Rārangi Kōrero. Twenty-six sites on our network – including pā, rock art caves, bridges, tunnels and culverts – are considered nationally significant. Waka Kotahi also has a role in supporting indigenous biodiversity. Around one fifth of our state highway network passes through areas with biodiversity values. We have introduced a sustainability rating scheme to evaluate and improve the environmental, social and economic outcomes of infrastructure development.

Now we require contractors to report resource efficiency information so that it can be used to improve how we use resources and enable us to report on carbon emissions from our operations. As part of the government Broader Outcomes in Procurement initiative, we are also considering not only the whole-of-life cost of procurement activities, but also the costs and benefits to society, the environment and economy.

We recognise that Māori have a responsibility and obligation of care for communities and the environment. We are starting work on a measure to help us understand how effective our partnerships and engagement with Māori are.

The active steps we took for our own corporate sustainability journey helped us reduce corporate travel emissions by 40 percent during the 2019/20 financial year compared to the year before. We are continuing to transition our vehicle fleet to low-emission vehicles and to reduce travel, and we started a programme to reduce our waste. This year we achieved our first Toitū Envirocare carbonreduce certification for our emissions calculations, and we will use this as our baseline.

Our reporting will continue to evolve as we progress implementation of *Toitū te Taiao*, which we will refresh soon. We will also align reporting with the Emissions Reduction Plan, the Carbon Neutral Government Programme and with measures for environmental sustainability introduced in Te Kāpehu, our strategic direction. The information we gather for Tiakina te Taiao will show us how the interventions we have committed to are resulting in a low-carbon, safe and healthy land transport system.

Tiakina te Taiao snapshot

- » Active travel improves public health and wellbeing, and reduces emissions. More than **70% of people live within 15 minutes by bike or e-scooter** to local destinations like schools, doctors or supermarkets. However, only **8–26% of trips are made by walking or cycling**.
- » There are around **1800 archaeological sites** within 100 metres of a state highway. 26 of these are considered nationally significant.
- » **Eight state highway infrastructure projects** have registered or are working towards registering for Infrastructure Sustainability Council (ISC) sustainability ratings.
- » Using resources more efficiently preserves them for future generations and reduces impacts on the environment. **1.5% of materials used in state highway maintenance contracts were recycled in 2020**.
- » Waka Kotahi corporate **travel emissions reduced by 40%** to 3112 tonnes CO₂ equivalent in the 2019/20 financial year.



About this report

This report, *Tiakina te Taiao*, is a companion to *Toitū te Taiao - Our Sustainability Action Plan*, which sets out Waka Kotahi NZ Transport Agency's commitment to improving environmental sustainability and public health in the land transport sector.

Tiakina te Taiao 2021 is helping Waka Kotahi understand the progress we are making towards achieving the *Toitū te Taiao* vision of a low-carbon, safe¹ and healthy land transport system by 2050. *Tiakina* makes us accountable by showing us what we have done and highlighting what we still need to do.

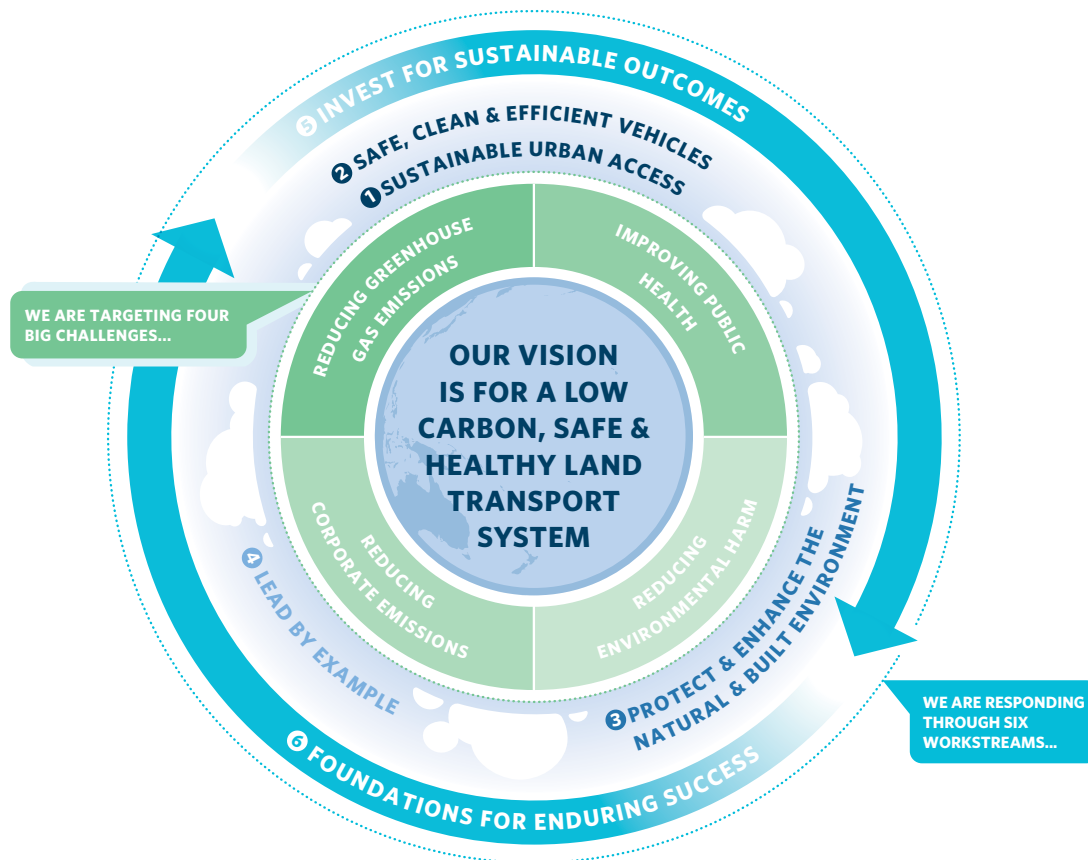
This is our second sustainability report, bringing together carbon emissions, public health, environmental and corporate sustainability data held by Waka Kotahi and other agencies. We have included progress updates on *Toitū te Taiao* actions, trend information, where possible, and summaries of the actions we are continuing to take to improve our data for future reports.

***Ko te pae tawhiti whāia
kia tata, ko te pae tata
whakamaua kia tina***

***Seek out the distant
horizons, while cherishing
those you attain***



Toitū te Taiao at a glance



1 SUSTAINABLE URBAN ACCESS

Using our planning and investment levers to reduce emissions and improve public health through interventions that:

- avoid or reduce our reliance on travel by car
- shift people to shared/active or low carbon modes.

2 SAFE, CLEAN AND EFFICIENT VEHICLES

Using our regulatory lever to reduce emissions and improve public health through interventions that improve vehicle fleet efficiency.

3 PROTECT AND ENHANCE THE NATURAL AND BUILT ENVIRONMENT

Using our planning, infrastructure management and procurement levers for system-wide environmentally and socially responsible practice.

4 LEAD BY EXAMPLE

Reducing business emissions and modelling sustainable behaviours, internally and externally.

5 INVEST FOR SUSTAINABLE OUTCOMES

Re-calibrating Waka Kotahi planning and investment settings for sustainable outcomes.

6 FOUNDATIONS FOR ENDURING SUCCESS

Establishing the building blocks for enduring success and continuous improvement.

Waka Kotahi outcomes to 2050

The diagram below shows our desired outcomes to 2050 in *Toitū te Taiao*, which are the initial focus of *Tiakina te Taiao*.

REDUCING GREENHOUSE GAS EMISSIONS

- Net zero land transport greenhouse gas emissions by 2050

IMPROVING PUBLIC HEALTH

- No harm from land transport air and noise emissions
- Land transport supports physically active and healthy travel options

REDUCING ENVIRONMENTAL HARM

- The land transport network is managed to support and enhance indigenous biodiversity
- Water bodies are protected from adverse effects of land transport stormwater run-off
- We use resources and energy sustainably

REDUCING CORPORATE EMISSIONS

- Waka Kotahi is carbon neutral

Report limitations

Data availability

This report discusses the measures Waka Kotahi has data for right now and builds on our baseline report published in 2020. It includes 2020 calendar year data except where noted otherwise (for example, corporate sustainability is reported by financial year to align with other government reporting).

For one or two measures, data from earlier years is provided because underlying research is required to update information. As noted in the baseline report, we already hold information about land transport and its effects on the environment, but there are gaps. We have started to work on those gaps so they can be resolved over time.

Greenhouse gas emissions challenge

Climate change is already affecting us. Government has declared a climate change emergency and is taking urgent action to reduce emissions and adapt to climate change. While land transport is part of the problem, we know it is also part of the solution.

Emissions



New Zealanders travelled 48.2 billion kilometres on the road network in 2020, emitting a total of **12,000 kilotonnes (kt) of carbon dioxide (CO₂)** during the year. This is an overall 2.6 percent increase from 2018, our baseline year.

Limitations

Total emissions are calculated from the vehicle fleet and the use of the road network. This is a different method to the Manatū Mō Te Taiao Ministry for the Environment greenhouse gas inventory, so the numbers are not directly comparable. This is being reconciled over time. Note also that emissions from energy and materials used in construction and maintenance of road infrastructure are covered under the resource efficiency section of this report.

Mehemea kāore he whakakitenga, ka ngaro ai te iwi

Without vision and foresight, the people will be lost

Our progress

- Collaborated across government to develop potential pathways for reducing transport emissions to net-zero by 2050.
- Updated our Investment Decision Making Framework to use the all of government agreed shadow price of carbon.
- Embedded the use of the Appraisal Summary Table (AST), which summarises the impacts and whole of life costs for business case approvals of proposed transport investments. Greenhouse gas emissions are a mandatory consideration within the AST.
- Started developing a tool to assess the greenhouse gas emissions impacts of land transport investment.
- Rolled out interim internal policy on how climate assessments will be undertaken at Waka Kotahi for transport projects that are part of the NZ Upgrade Programme or listed under the Fast COVID-19 Recovery (Fast Track Consenting) Act 2020.
- Supported development of government Clean Car Programme, which includes administering the clean car rebate to encourage people to buy low-emissions vehicles.

Emissions

Transport has a very significant role to play in lowering carbon emissions, which need to drop by 41 percent in the next 14 years if He Pou a Rangi Climate Change Commission’s first set of recommended emissions budgets are to be met. Achieving this will also improve the wellbeing of New Zealanders.

Nationally, urban areas contribute around half of our land transport emissions. These emissions are concentrated in Auckland, Wellington and Christchurch, where a large part of the population lives and where a large portion of economic activity occurs. The contribution by region was similar in 2020 compared to 2019. Transport emissions in the Auckland and Wellington regions are particularly dominated by urban travel.

Figure 1: Source of road transport related CO₂ emissions in Aotearoa New Zealand (source: Waka Kotahi)

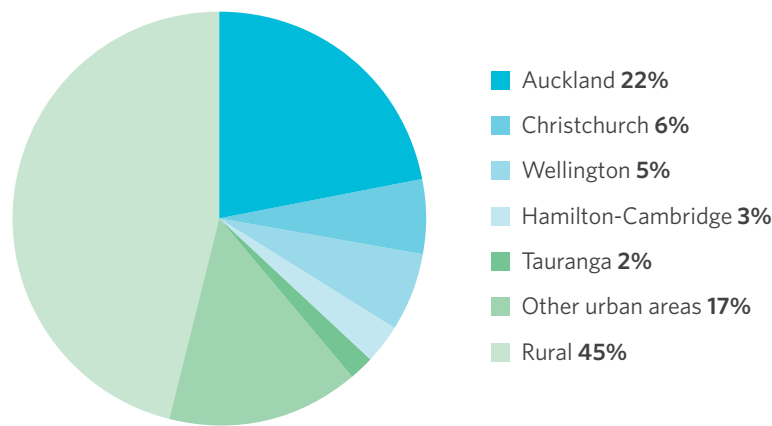
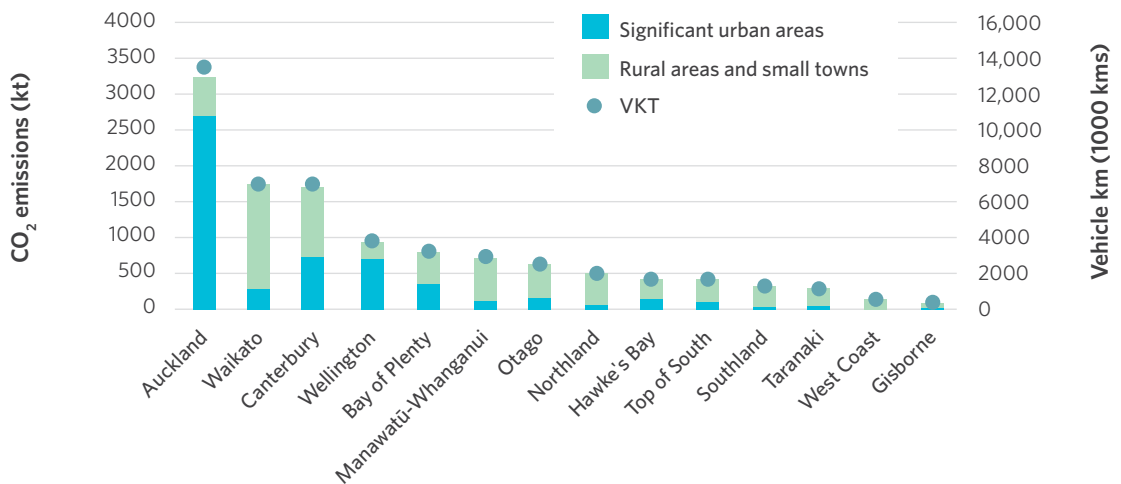


Figure 2: Annual CO₂ emissions (kilotonnes) in rural and urban areas compared to the kilometres travelled by vehicles in each region in 2020 (source: Waka Kotahi)



Rural travel accounts for the remainder of the emissions and includes a combination of freight, local travel and regional travel. Total emissions from Canterbury and Waikato are high compared to other regions (aside from Auckland), although these emissions are dominated by rural travel. Emissions in the remaining regions tend to arise from rural rather than urban travel.

We are starting to assess overall emissions from our land transport programmes, including the New Zealand Upgrade Programme (NZUP). This included a recent Climate Implications of Policy Assessment (CIPA) for NZUP,² the first time CIPA has been used for transport projects. NZUP supports a shift to greater transport choices so that projects also include new walking and cycling paths, and enable better public transport, carpooling or freight options.

Sustainable urban access

Creating a sustainable land transport system is critical for tackling greenhouse gas emissions.

When urban areas are designed to integrate a range of quality transport options, multiple positive outcomes can be achieved, including safer roads, inclusive access, less greenhouse gas emissions and improved public health. In *Toitū te Taiao* we use the globally recognised framework of Avoid-Shift-Improve to guide how we will do this.³ Waka Kotahi has a role in each of these components through our planning, investment and regulatory levers, and by partnering and influencing.

Urban form – avoiding or reducing the need to travel

Urban form – the shape and density of cities and towns – has a significant impact on transport emissions. Compact urban forms have a lower emissions footprint than more sprawling urban forms (OECD, 2020), because they enable shorter travel distances that are easier to walk or cycle.

Most local destinations are easily accessible within 15 minutes by vehicle during the weekday morning peak, but more than 70 percent of these destinations are also readily accessible within 15 minutes by bike or e-scooter. Because of this, improving the connectivity and safety of cycling and e-scooting would significantly improve access and independence for many people, including those on mobility devices. This level of accessibility has remained essentially unchanged over the past three years.

On the other hand, it is difficult for most New Zealanders to get to their jobs by any other mode other than driving. For example, in 2021 59 percent of employees could reach their job within 15 minutes driving during the weekday morning peak, but this compared with only 25 percent by cycling, 7 percent by walking, and 3 percent by public transport.⁴

Comparing these statistics on ‘access to jobs’ and data on how people travel to work (from the 2018 census) shows the gap between the *potential* to reach jobs by cycling and *actual behaviour*. Even though 25 percent of employees could reach their place of work within 15 minutes by cycling, only 2 percent do.

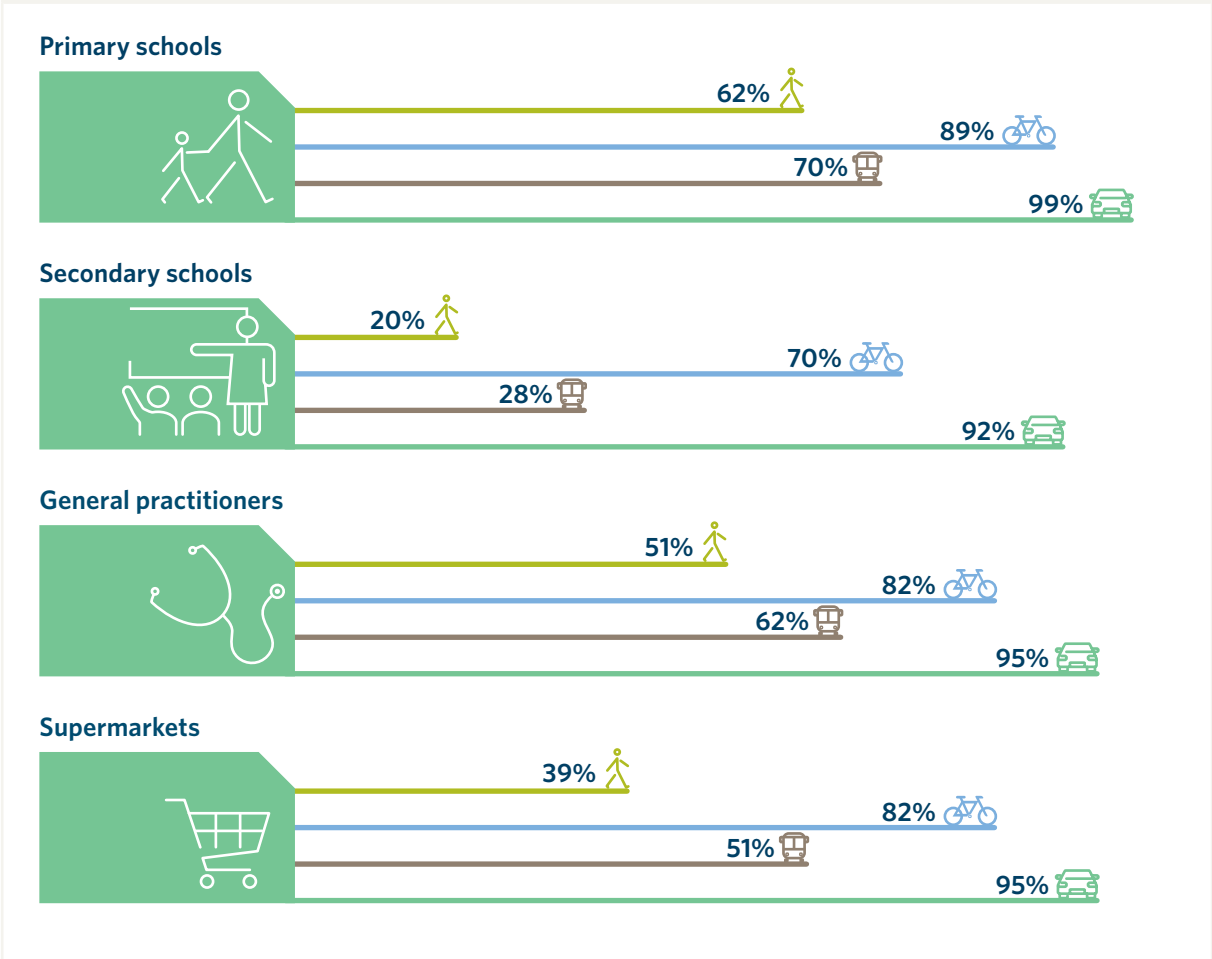
70–85%
of people could reach
local destinations
within a 15-minute
bike or scooter ride

² Climate implications of policy assessments (CIPA) are required when Cabinet makes decisions on relevant policy (as outlined in the CIPA guidance). Cabinet recently decided on changes to funding allocations for NZUP and so a CIPA analysis was undertaken.

³ The Avoid-Shift-Improve framework encourages consideration of firstly, policies that avoid or reduce the need to travel, next shift travel to low-impact modes (eg walking and cycling) and lastly improve the efficiency of vehicles – ultimately with a view to reducing the environmental and other impacts of transport (GIZ Transport Policy Advisory Services).

⁴ This information comes from analysis of data about the location of employees and employers in Statistics NZ’s Integrated Data Infrastructure (IDI).

Figure 3: Percentage of people in Aotearoa New Zealand who lived within 15 minutes of a destination in 2020, by mode (source: Waka Kotahi)



Another indicator of the quality of urban form is the percentage of people living within easy access of fast and frequent public transport services. In March 2021, 24 percent of people living in metropolitan areas had access to a nearby public transport service that ran at least every 15 minutes during the weekday morning peak, although a much lower proportion had access to services that were this frequent throughout the day. People living in these areas are more likely to use public transport to travel to work, compared with people living outside these areas. This proportion decreased in Auckland compared to 2018, but increased for Wellington and Christchurch.

Figure 4: Percentage of jobs in Tauranga that can be reached within 45 minutes by public transport or active modes, 2021 (source: Waka Kotahi)

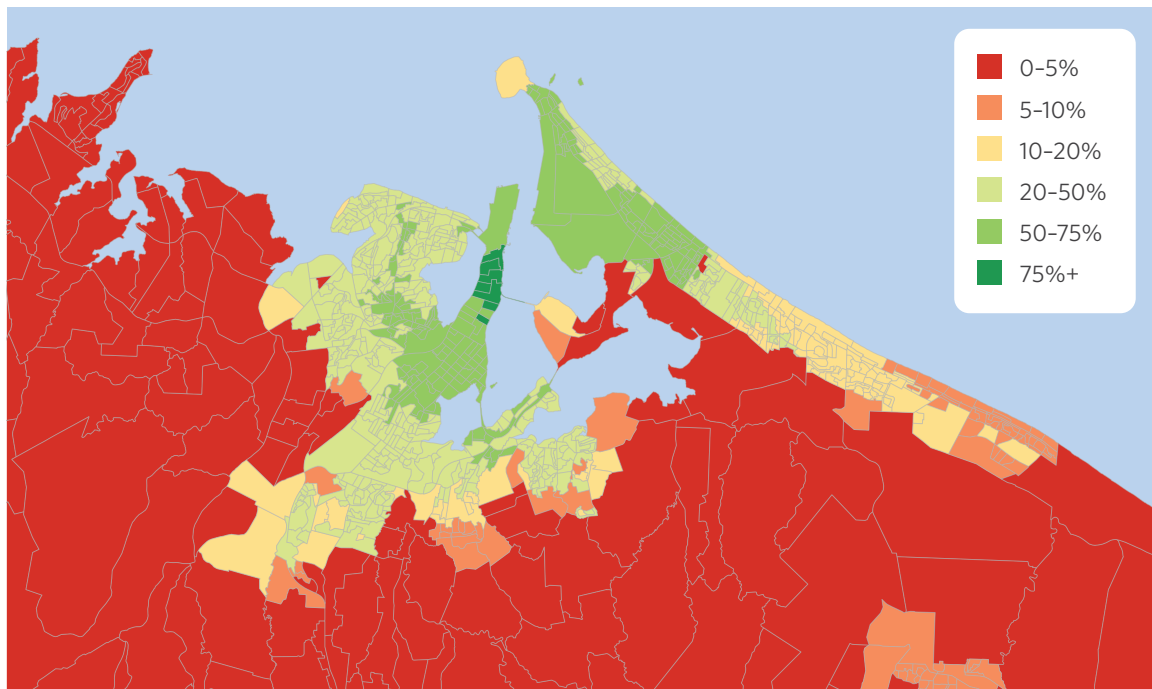


Figure 5: Population with access to frequent public transport services⁵ in Auckland, Wellington and Christchurch, 2018–21⁶ (source: Waka Kotahi)



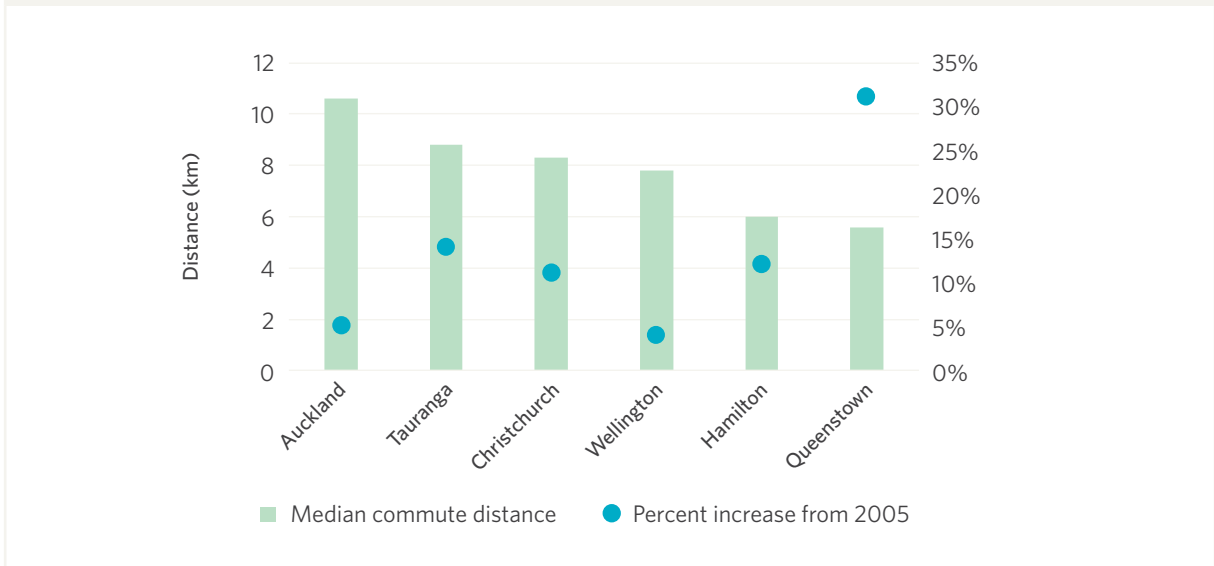
Commuting behaviours depend on a range of different factors. For occupations such as retail and construction people need to be on location for their work, whereas others can work from home. Since 2005 the median commute distance increased for all urban areas of Christchurch, Hamilton, Auckland, Wellington (including the Hutt Valley and Kāpiti), Tauranga and Queenstown (figure 6)

⁵ A frequent service is defined as scheduled at every 30 minutes for ferries or 15 minutes for other modes.

⁶ Note that this data is compiled in March each year. The Wellington data is for the whole region whereas, Auckland and Christchurch are for predominantly urban areas.

but there is a lot of variation within each urban area.⁷ The rate of growth varied from a 4 percent increase in Wellington to a 31 percent increase in Queenstown. Commutes starting in suburban areas surrounding cities have experienced the most rapid growth. For example, there was a 19 percent growth in the distance of commutes starting in Upper Hutt (within the Wellington urbanised area) and a 17 percent growth in commutes starting in Cambridge/Waipā (within the greater Hamilton area).

Figure 6: Median distance commuted in urban areas in 2020 and percentage increase in commuting distances since 2005 (source: Statistics NZ)



Auckland has the longest median commute distances, at around 10.6km one way, but this varies widely. For example, more than a quarter of employees travel over 16km. Commuting distances grew more for people with occupations that are less suitable for working from home, for example, there was an increase of 18 percent in distance among construction and retail employees. Since 2005 the number of jobs⁸ in these urban areas grew by nearly half a million and most of the commutes (80 percent) were by car.⁹ This increase in commuting creates significant pressure on transport emissions.

Median commuting distances have increased in all urban growth areas

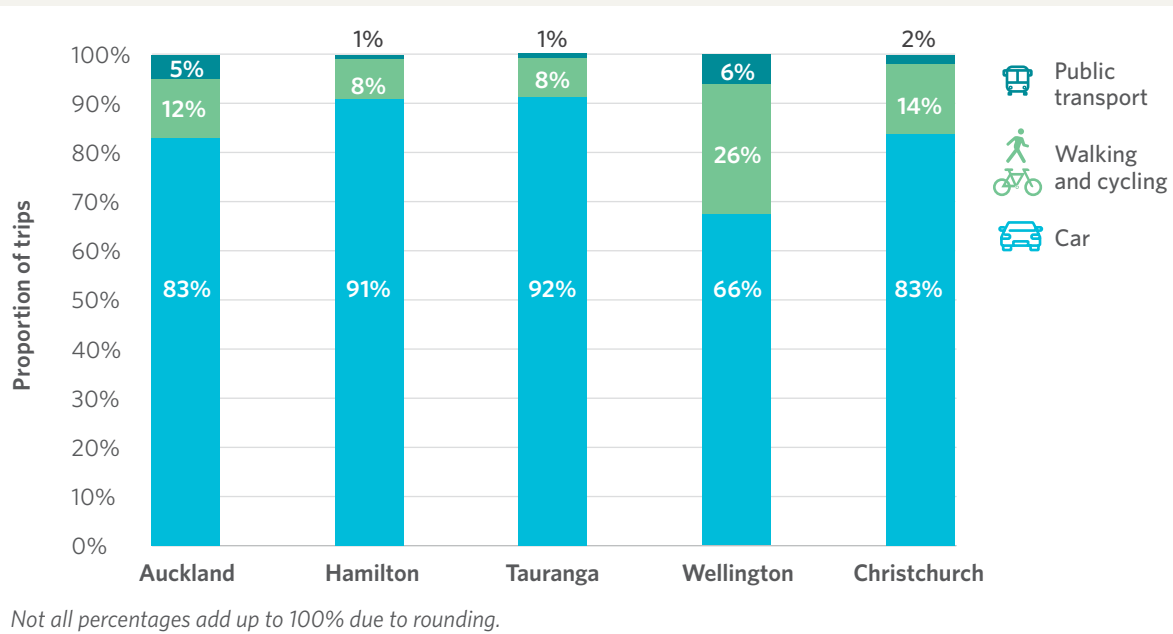
Waka Kotahi and other central government agencies are formally partnering with local government and iwi through urban growth partnerships. The goal of these partnerships is to make housing more affordable while also achieving other outcomes such as providing quality built environments, improving access to jobs, education and services, and reducing emissions. An important aspect of these partnerships is spatial planning. Spatial plans are long-term frameworks for the future development of a city or a region, and they integrate land use, transport, infrastructure, natural areas and other things that are important to communities, together in one plan. Spatial plans and associated joint work programmes are complete or under development for Auckland, Hamilton, Tauranga, Wellington, Christchurch and Queenstown.

⁷ This uses the IDI and is taken from the median employee commute distances that end in the wider urban areas of the larger cities since 2005.
⁸ Full-time equivalent roles.
⁹ From the 2018 census.

Mode shift - encouraging a move to cleaner forms of transport

Despite recent growth in public transport, walking and cycling in many urban areas, private vehicle travel is also increasing (Waka Kotahi NZ Transport Agency, 2019). Shared and active transport modes do not yet account for a significant proportion of total journeys and Aotearoa New Zealand remains a very car-dependent country.

Figure 7: Proportion of trips by mode, 2017-20 (source: Te Manatū Waka Ministry of Transport)



Apart from Wellington, over 80 percent of all trips in our biggest cities are made in a private car. The proportion of trips made by public transport, walking and cycling varies between different cities, due in part to geography but also different urban planning and transport policies that have been introduced over time.

Table 1: Change in proportion of trips by mode in major urban centres, 2015-20 (three-year average) (source: Household Travel Survey, Te Manatū Waka Ministry of Transport)¹⁰

	Car/van	Public transport	Walking/cycling
Auckland	↓	↑	—
Hamilton	↑	—	↓
Tauranga	↑	—	↓
Wellington	↓	↑	↑
Christchurch	↓	—	↑

Key

- ↑ Increasing
- ↓ Decreasing
- No change

Over the last few years, the proportion of trips by private motor vehicle has increased in Hamilton

¹⁰ Note that due to limited sample sizes in the Household Travel Survey, the changes in mode share in each city over time are close to the margins of error and other data sources would be required to verify changes in mode share.

and Tauranga, while at the same time the proportion of walking and cycling decreased. In the other major urban centres, the proportion of trips by private motor vehicles decreased slightly and the proportion of walking/cycling or public transport trips increased slightly.

Reducing emissions requires a substantial shift from travel by private car to travel by shared or active modes, such as walking and cycling. Access to alternative modes of transport may become increasingly important as we adapt to the effects of climate change. In 2021 we commissioned research into greenhouse gas emission reductions from land transport mode-shift programmes and projects (Thorwaldson, Thomas, & Carran-Fletcher, 2021) using 16 international case studies. The researchers found that mode-shift programmes that combined a range of planning, pricing, infrastructure, technology and behaviour change interventions can produce reductions in private vehicle travel and can increase walking, cycling and public transport use.

Waka Kotahi is progressing Keeping Cities Moving, our plan that aims to increase mode shift to more sustainable transport options in three main ways: shaping urban form, making shared and active modes more attractive, and influencing travel demand and transport choices. Waka Kotahi and our regional, district and city council partners have also developed six regional mode shift plans for Auckland, Tauranga, Hamilton, Wellington, Christchurch and Queenstown that focus our efforts to grow the share of travel by walking, cycling and public transport. These six high-growth urban areas have the highest potential to achieve mode shift.

80%
*of all trips in urban
areas are by car*

Innovating Streets: Knights Road Connection Project

Community input and an innovative pilot has led to better, and safer, walking and cycling around Lower Hutt's Waterloo Station.

The Knights Road Connection Project is one of 70 community projects funded by Waka Kotahi in the pilot phase of the Innovating Streets for People programme. This programme allows councils across the country to test low-cost, temporary changes that make streets work better for people. This includes trying out better street crossings, protected bike paths, traffic-free zones, reduced speed zones and new street layouts.

The aim for the Knights Road Connection Project was to create more people-friendly connections between Waterloo Station, the Beltway Cycleway and Lower Hutt's central business district. Hutt City Council particularly wanted to test a layout that would make it safer and more attractive for people to choose active modes and be able to use public transport more easily. Using active modes of transport has many health benefits for individuals, but also reduces congestion, pollution and greenhouse gas emissions, which is good for us all and our planet.

Community involvement is an essential part of the Innovating Streets approach. The Knights Road project team engaged with people who use the street in many ways – including surveys, pop-up events and workshops with residents, schools and the local community – to find out how they use the road and to get input into the design of the changes.

Innovating Streets: Knights Road Connection Project *(continued)*



Beginning in February 2021, Hutt City Council ran a first trial of a changed road layout. This included lanes for people on bikes and scooters, and signage and speed cushions to encourage slower speeds around the train station. Based on community feedback, further improvements were tested, including better separating pedestrians and people on bikes and e-scooters from road traffic travelling into Lower Hutt.

The council collected feedback and data on the trials, which showed that the new road layout:

- contributed to reduced speed overall
- reduced near misses at the intersection outside Waterloo Station by up to 30 percent
- reduced near misses for people crossing the road to the train station by 75 percent
- made no difference to journey time for cars or public transport.

Monitoring during the trial showed an increase in the number of people cycling along Knights Road.

Councils are able to make better decisions from what they learn from the Innovating Streets projects. Along Knights Road some changes are being made permanent, and further improvements are being investigated. This will make for a safer and more connected network, especially for people using active modes. That's a win for the local community, and for the environment.

Vehicles

While urban planning and mode shift are critical to achieving the shift to a low-carbon future, it is also important that the national vehicle fleet is decarbonised.

Our strong reliance on travel by car continued in 2020, with a 3.8 percent increase in vehicle ownership between 2018 and 2020. Light vehicles remain the biggest portion of the 4.55 million registered vehicles, making up 78 percent of the total (Waka Kotahi NZ Transport Agency, 2021). Older vehicles tend to have higher emissions and over 60 percent of the vehicles in the fleet were older than 10 years old at the end of 2020. On top of this, the size of vehicles has increased significantly over the past 20 years, with the average weight of light commercial and light passenger vehicles now being around a third heavier than they were in 2000 (Te Manatū Waka Ministry of Transport, 2021), potentially offsetting fuel efficiency gains in the fleet.

Electric and hybrid vehicle registrations are growing steadily, with more than 24,000 registered at the end of December 2020, although at 0.5 percent of the fleet they are still only a small fraction of the total vehicles registered (Te Manatū Waka Ministry of Transport, 2021). There are more pure electric vehicles than plug-in hybrids. Hydrogen light vehicles have also entered the fleet recently, with five registered by the end of 2020 (Waka Kotahi NZ Transport Agency, 2021).

Supporting low-emission vehicles

Price is a known barrier for people wanting to purchase EVs, but we expect that strong interest in the clean car initiatives will lead to a greater uptake of EVs. We are also working with our partners Ākina and MUMA (Manukau Urban Māori Authority) to trial sustainable leasing of low-emission vehicles to lower-income households.

By July 2020, there were 21 electric buses in the fleet of 2600 public transport buses operating nationwide. The government announced further initiatives in January 2021 to help decarbonise the bus fleet. This included additional funding and a goal of moving towards a zero-emission public transport bus fleet by 2035, with an interim target that only zero-emission public transport buses will be purchased after 2025.

Figure 8: Proportion of registered vehicles by fuel type, 2019 (source: Te Manatū Waka Ministry of Transport)

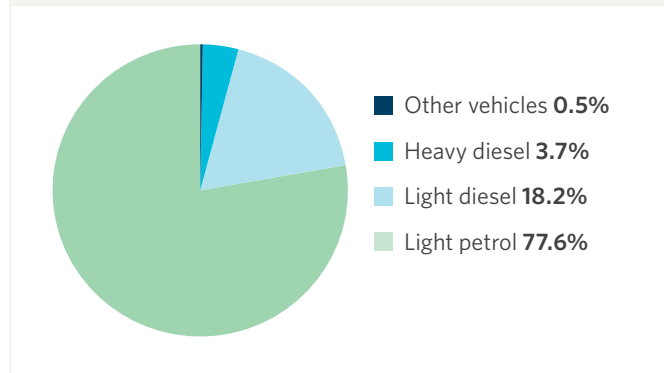
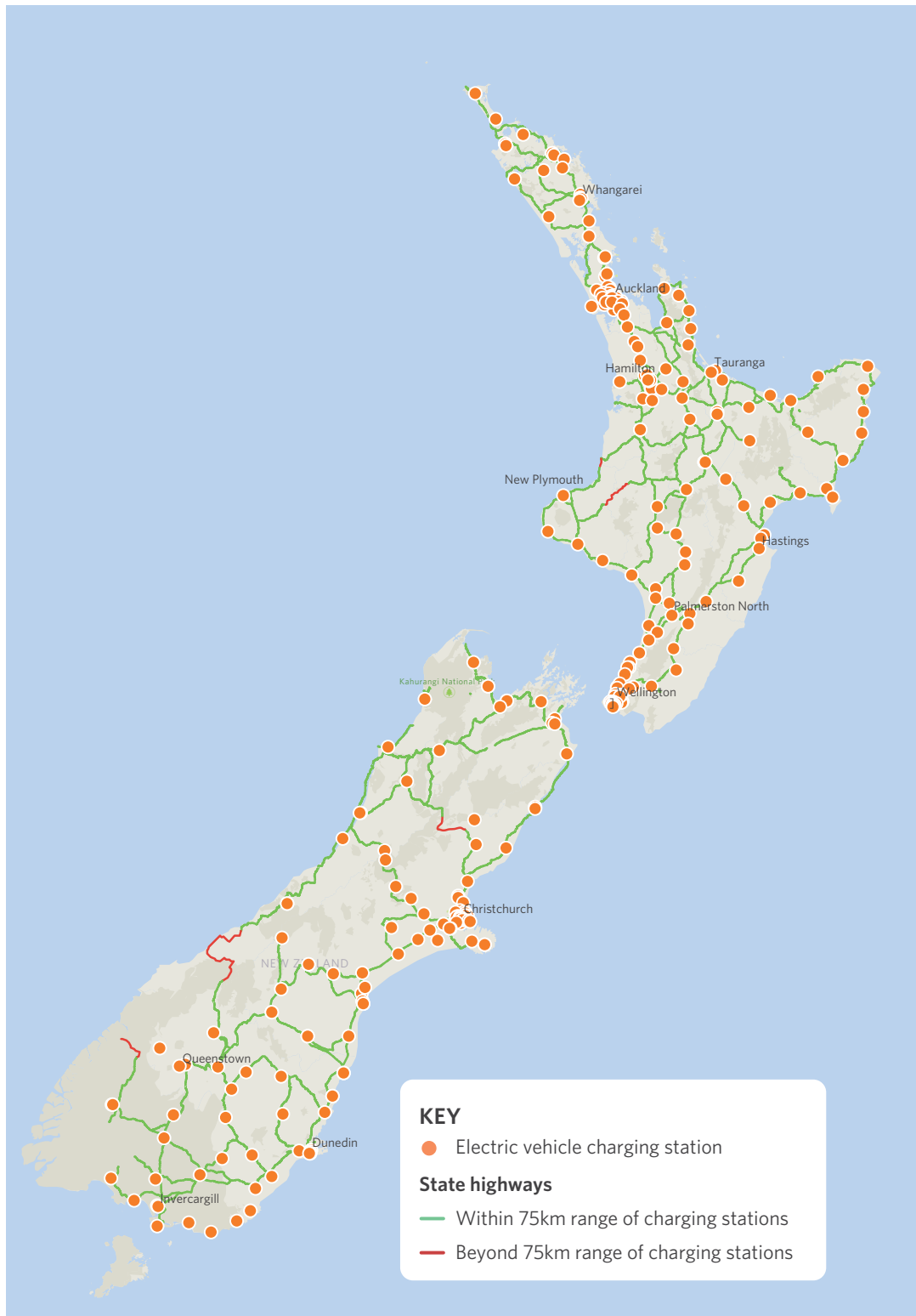


Figure 9: Electric vehicle charging network in Aotearoa New Zealand that meets EVRoam criteria, June 2021 (source: Waka Kotahi)



Improving the EV charging network

For more people to switch to EVs, we need to continue to grow and improve the supporting EV charging network. This network has been growing rapidly and by the end of 2020 there were 247 rapid chargers (50kW or higher) and 163 destination (slow) chargers that met standards suitable for EVRoam.¹¹ Around 97 percent of the state highway network is now within 75km of a publicly

247

rapid EV chargers (>50kW) by the end of 2020

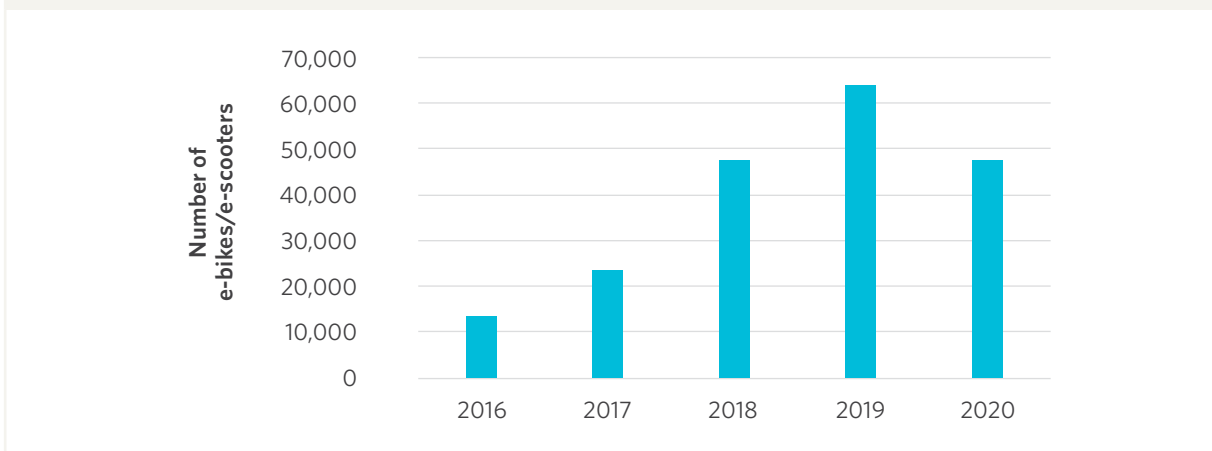
available EV charging station. As well as supporting the uptake of EVs, we are also working with Te Manatū Waka Ministry of Transport, the Ministry of Business, Innovation and Employment Hīkina Whakatutuki and Te Tari Tiaki Pūngao the Energy Efficiency and Conservation Authority (EECA) to develop a national EV infrastructure plan, including improving signage and reviewing targets for EV charging infrastructure. Our EVRoam platform is proving invaluable in these discussions.

We also chaired the Standards New Zealand technical working group tasked with developing voluntary guidelines (Publicly Available Specifications) for commercial and residential plug-in EV chargers. The specifications provide best practice information about all aspects of EV chargers, including safety requirements, electricity supply (AC or DC) and charger types.

The growth of micromobility

Micromobility – the use of small lightweight vehicles such as cycles, e-bikes and scooters – is an important component of mode shift and could contribute 3-11 percent of all urban trips by around 2030 (Ensor, Maxwell, & Bruce, 2021). Recreational and commuter e-bikes and e-scooter imports have grown significantly over the past few years, and more than 47,000 were imported in 2020. This was less than 2019 (by 26 percent) due to reduced e-scooter imports and COVID-19-related supply chain issues, but still significantly more than a few years prior. E-bike imports are estimated to make up 60-70 percent of the e-bike/e-scooter annual totals, with nearly 30,000 e-bikes imported in 2020.¹² Waka Kotahi has been supporting this uptake by increasing the walking and cycling network and associated infrastructure, enabling the use of Locky Docks¹³ on Waka Kotahi land and working with the Ministry of Transport on the Accessible Streets Regulatory Package to improve safety and accessibility of active modes.

Figure 10: Number of e-bikes/e-scooters imported, 2016–20 (source: Statistics NZ)



¹¹ EVRoam is a live database provided by Waka Kotahi of electric vehicle charging infrastructure. It collects and freely distributes real-time information from all safe and monitored public charge points around the country.

¹² Sourced from import data. The annual e-bike/e-scooter import totals include a very small percentage of e-mopeds and e-motorcycles.

¹³ Locky Docks are free secure parking and charging stations for e-bikes. See www.lockydock.co.nz.

Freight

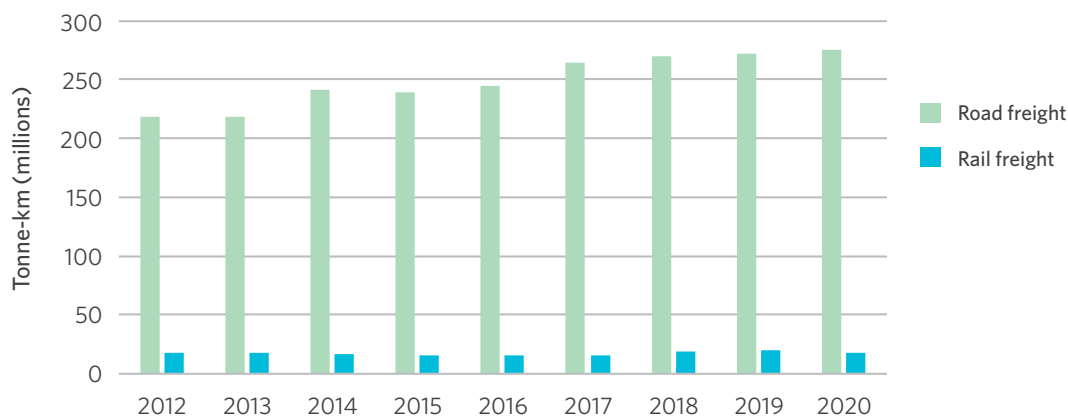
Freight is an important part of economic activity and as the population continues to grow, so too does the demand for goods. The challenge is making sure that freight delivery is not only efficient and safe, but also meets our goals to reduce emissions.

Most freight is delivered by diesel road transport (figure 11), with a small proportion delivered by rail and coastal shipping. Despite being just over 20 percent of the fleet, diesel vehicles contribute around 47 percent of the total emissions and many diesel vehicles are used for freight. Ways we can reduce emissions from freight include the use of low-carbon fuels and supporting infrastructure, and improving the efficiency of freight movements, such as shifting more freight to rail and coastal shipping.

Waka Kotahi supported the development of the first Rail Network Investment Programme (RNIP), which was approved by the Minister of Transport in June 2021. The investment aims to renew the national rail network to restore it to a resilient and reliable state, and to support freight rail and metropolitan rail growth and productivity in our largest cities, as outlined in the New Zealand Rail Plan.

Waka Kotahi has developed an action plan setting out our activities from 2021–24 for improving connections and movements of freight across the land transport system. Reducing greenhouse gas emissions will be a focus over the next three years as Waka Kotahi contributes to the New Zealand Freight and Supply Chain Strategy, which is being led by Te Manatū Waka Ministry of Transport, and the Emissions Reduction Plan.

Figure 11: Freight tonne kilometres travelled each year by road and rail (source: KiwiRail)



Next steps for tackling the greenhouse gas challenge

Following the publication of the He Pou a Rangi Climate Change Commission's final advice (He Pou a Rangi Climate Change Commission, 2021), we are now supporting Te Manatū Waka Ministry of Transport and the Ministry for the Environment Manatū Mō Te Taiao with input into the government's Emissions Reduction Plan (ERP). Waka Kotahi has a significant role in implementing the ERP by supporting mode shift, making sure we invest in the right infrastructure and services, supporting the uptake of low emissions vehicles and playing our part to ensure land use and transport are better integrated. *Tiakina te Taiao* will evolve in response to this as we work with stakeholders and communities on the transition to a low-carbon transport system.

14



TOITŪ TE TAIAO

ACHIEVING OUR OUTCOMES

- Continue developing tools to assess the carbon emission impacts of a range of land transport activities and investment decisions.
- Work with our local government partners to review and reset existing national and regional mode shift plans and develop new mode shift plans for urban areas to ensure they deliver on the targets expected in the Emissions Reduction Plan.
- Engage in the Resource Management reforms so that land use and the transport system can deliver on the expected emissions reductions targets.
- Partner to decarbonise the public transport bus fleet.
- With our co-investment and delivery partners, deliver a significant range of public transport, walking and cycling improvements through the National Land Transport Programme 2021-2024.
- Explore opportunities to reduce emissions from vehicles already in the national fleet.
- Support investigation of social leasing of safe and clean vehicles for low-income households.
- Partner to develop EV charging infrastructure plans
- Build consumer knowledge and confidence to purchase and use EVs.
- Administer the government’s Clean Car Programme.
- Initiate preliminary reporting of climate-related financial disclosures.¹⁴



TIAKINA TE TAIAO

MEASURING OUR PROGRESS

- Improve GIS models for estimating greenhouse gas emissions from road transport.
- Develop measure for CO₂ emissions by journey purpose.
- Revise measure and target for public EV charging.
- Develop a measure for the freight mode share of road and rail.

¹⁴ This reporting is to identify, understand, assess, and manage the impacts that climate change is having and will have on our organisation.

Public health challenge

The transport system plays an important role in our mental and physical wellbeing. It encourages increased physical activity, provides access to services, allows people to catch up with their family, friends and community, connects people with their history, heritage and culture, and supports recreation and employment. Providing better transport options and connections will reduce the harmful impacts of transport and provide even better outcomes for everyone.

Air quality



Nitrogen dioxide (NO₂) emissions from the road transport system increased by 6 percent from 2018 to 2020 and PM_{2.5} (fine particulate matter) emissions reduced by 13 percent.

- NO₂: 7.8 kilotonnes/year in 2020.
- PM_{2.5}: 1.5 kilotonnes/year in 2020.

*He waka eke noa
A canoe we are all
in together*

Noise

38,000 people were assessed as exposed to high levels of road traffic noise in 2017.

Cycling



Cycling trips into the central business districts of Auckland, Wellington and Christchurch **grew by 20 percent** from 2018 to 2020, with 6728 trips taken in 2020.

Limitations

Air quality: Air emissions are likely to be lower in 2020 than would be expected due to COVID-19 travel restrictions.

Noise: High noise levels are road traffic noise levels above 64dB L_{Aeq} (24hr). Noise mapping is not updated every year due to the level of effort required and because the overall national level of noise exposure is unlikely to change significantly from year to year. The next update will be for 2019 noise levels and will be produced as part of our research on the social cost of noise.

Walking and cycling: These cycle counts are from local council cordon counts and are not from continuous data. To generate this data, councils counted cyclists travelling into the central business district for one weekday and one weekend day in March, from 2015 to 2020.

Our progress

- Established the National Walking and Cycling Count Database.
- Sustainable Urban Transport Benchmarking project underway.
- Funded 63 Innovating Streets for People projects.

Physical wellbeing

Air quality and noise

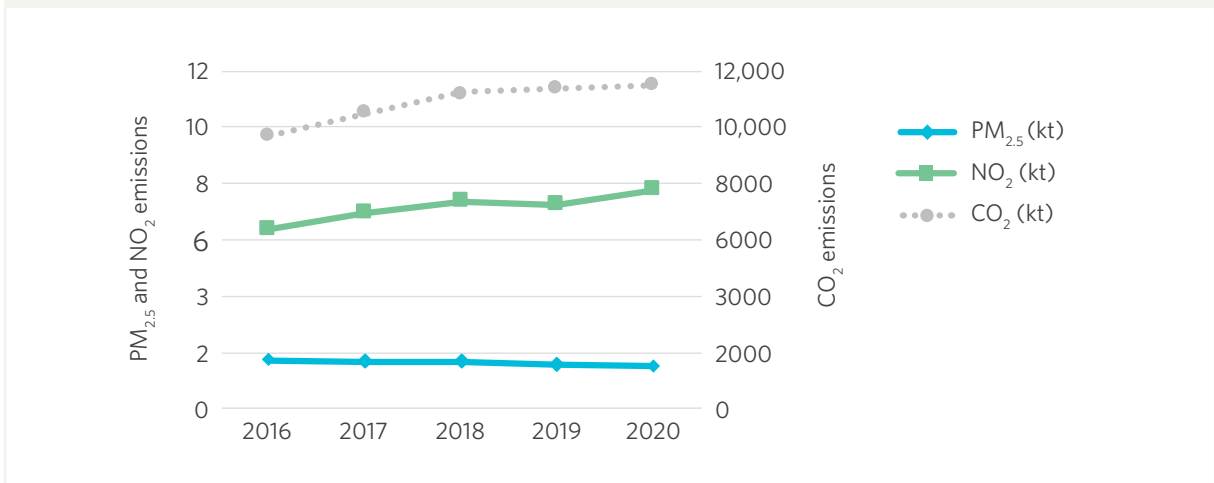
Land transport can be a significant contributor to local air pollution, and road traffic is one of the biggest causes of community noise in most cities. Exposure to air pollution and high noise levels is linked to both short- and long-term health conditions.

Waka Kotahi has a range of policies, guidance, specifications and tools in place for assessing and managing road transport related air emissions, noise and vibration. We also administer rules for vehicle exhaust emissions and noise, and manage compliance to confirm that vehicle regulations are met (entry certification, warrant and certificate of fitness).

Air quality

Air pollution from road transport includes vehicle emissions, construction and maintenance activity emissions, and road dust. The main concern is the fine particles and oxides of nitrogen that are emitted from vehicles (mainly tailpipe emissions) in urban areas. Air pollution tends to be higher along busy or congested roads, which can be made worse in the winter, when a layer of warm air can trap cold air, and the pollutants it contains, close to the ground.

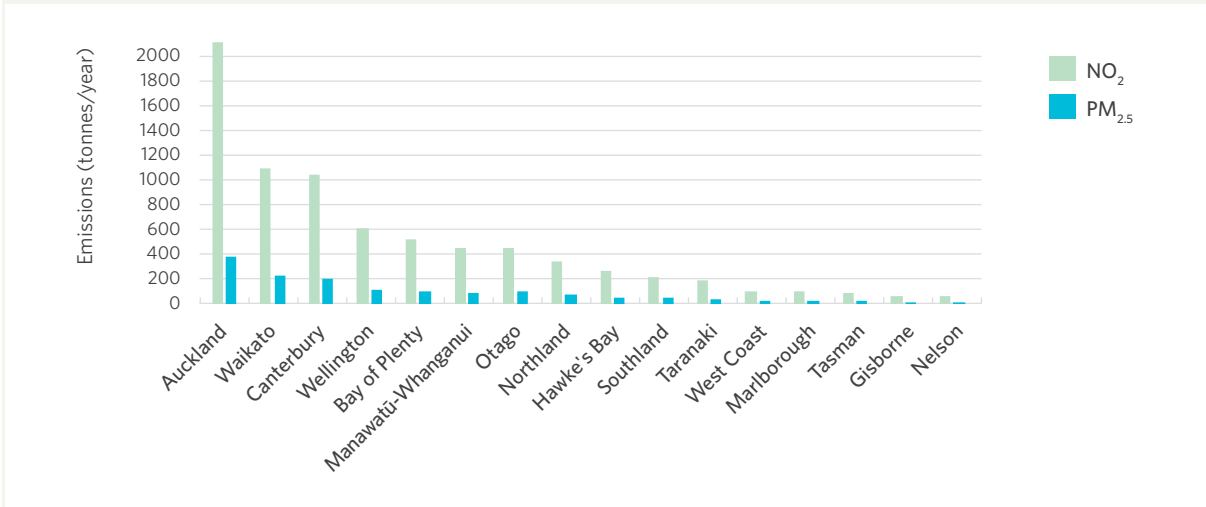
Figure 12: Annual emissions of PM_{2.5}, NO₂ and CO₂ (kilotonnes) from vehicles in Aotearoa New Zealand, 2016–2020 (source: Waka Kotahi)



Emissions coming from individual vehicles have reduced as vehicle engine technology and fuels have improved, but the benefits of these improvements have been largely offset by increases in total vehicle travel. Overall NO₂ emissions from vehicles are continuing to increase because of this increased travel, but emissions of PM_{2.5} have decreased slightly.¹⁵ The highest emissions are in larger urban areas, as is the case for greenhouse gas emissions from land transport.

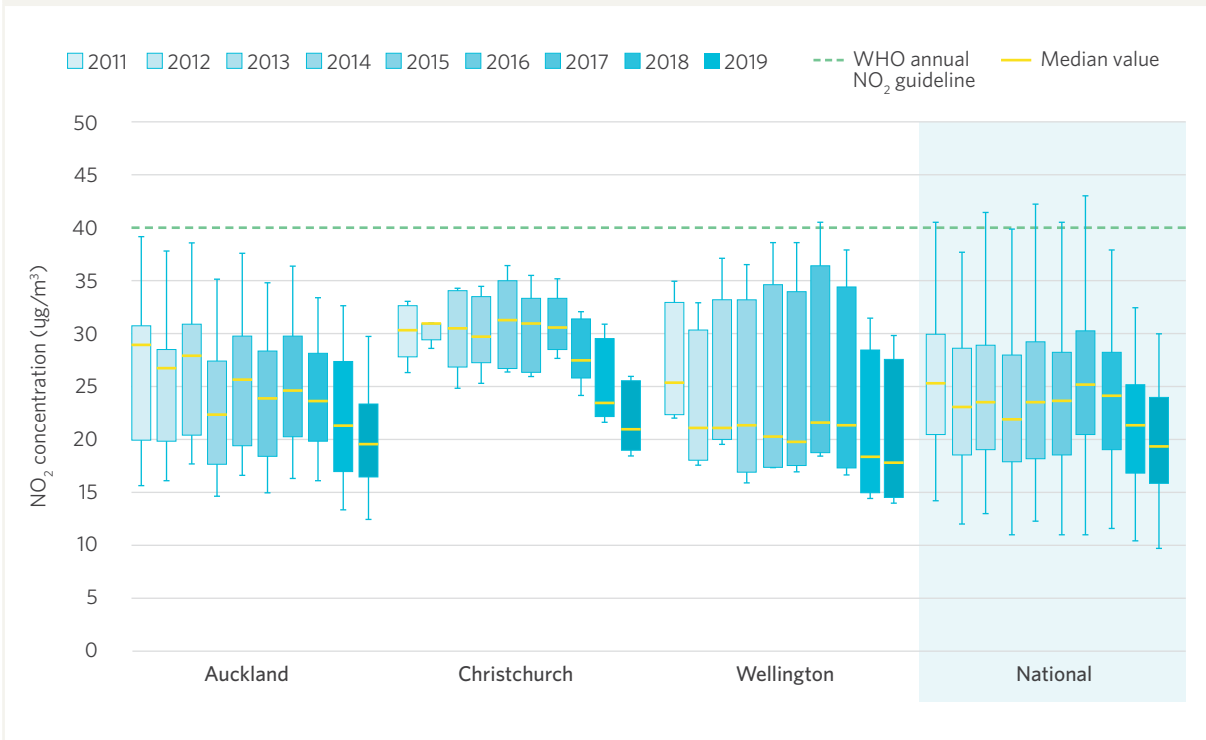
¹⁵ The total emissions from vehicles depend on how far vehicles are travelling, the engine and emissions-control technology and what fuel they use. Vehicles have to meet emissions standards when they come into the country. These standards have become stricter over time but the requirements are different for the different pollutants. The change in emissions standards for PM_{2.5} have been enough to offset the increase in vehicle travel, but the same has not been true for NO₂.

Figure 13: Total emissions of PM_{2.5} and NO₂ from vehicles in Aotearoa New Zealand, 2020 (source: Waka Kotahi)



Concentrations of NO₂ measured at monitoring sites do not just depend on emissions. They also depend on other factors such as local topography, nearby buildings, atmospheric chemistry and meteorology. Our NO₂ air quality monitoring is usually carried out near busy roadways and the concentrations at these sites have tended to decrease. NO₂ concentrations are usually below 2006 World Health Organization annual air quality guidelines.¹⁶

Figure 14: Annual average nitrogen dioxide (NO₂) concentrations (source: Waka Kotahi)



¹⁶ Note that the 2006 World Health Organization (WHO) guidelines are used in our guidance documents for assessing transport effects, but the WHO updated their guidelines in September 2021. We will consider reviewing our guidance and reporting to reflect these changes but have used the 2006 WHO guidelines in this report.

Over time, total NO₂ and PM_{2.5} tailpipe emissions will reduce as the vehicle fleet becomes cleaner, but emissions of particles from brake and tyre wear of all vehicles, including EVs, will continue to be an issue unless we reduce vehicle travel. This impacts local air quality and water quality, when fine particles settle onto the ground and run off into waterways. We have commissioned research on the health and ecological effects of brake and tyre wear, and road surface dust, along with research on the health impacts of unsealed road dust. These studies will complement the updated Health and Air Pollution in New Zealand (HAPINZ) study due for publication later this year and will be used to improve assessment of the effects of transport in our decision-making.

Noise

Road transport noise and vibration can come from construction and maintenance activities, and from normal use of the road. Exposure to road traffic noise, which occurs continuously over a long period, is more likely to cause health impacts than most short-term construction and maintenance activities.

Approximately 38,000 people were exposed to traffic noise levels above 64dB L_{Aeq} (24hr)¹⁷ from state highways and local arterial roads during 2017. Auckland, Wellington and Christchurch have the greatest number of people experiencing these noise levels, followed by Hamilton. More than 500,000 people are exposed to potentially unhealthy noise levels according to health-based criteria from the World Health Organization (WHO).

Waka Kotahi has commissioned research on the social costs of land transport noise (due for completion in 2022), which will give us a more accurate view of this issue. We have also started to identify priority locations where transport noise can be mitigated using funding that can be accessed under the low-cost, low-risk programme in the NLTP. This is a small part of a wider noise mitigation programme signalled in *Toitū te Taiao* and will benefit people who are exposed to high noise levels from state highways.

Active transport

Enabling more people to safely use active modes of transport, such as walking and cycling, contributes to better public health outcomes through increased physical activity (World Health Organization, 2018).

An increase in the number of people walking and cycling indicates a shift toward a healthier and more physically active population. To measure the change in the number of people walking and cycling, we monitor walking and cycling counts from over 300 devices across the country. The busiest counting locations in the five largest cities provide a snapshot of walking and cycling trends.

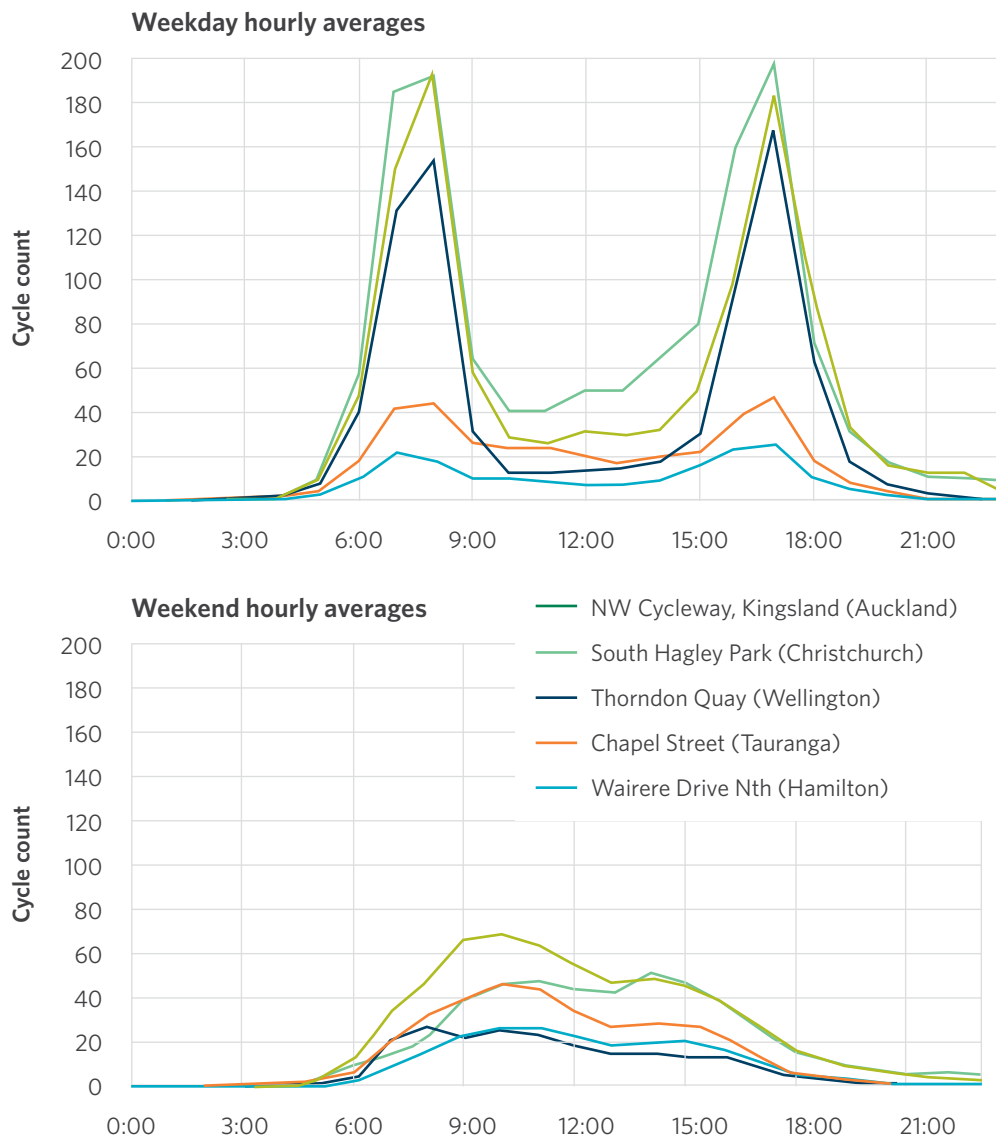
Cycling trends

Christchurch and Auckland daily average cycle counts have gradually increased since 2018. These cities have the highest cycle counts, with a daily average of over 1000 counts at the busiest count sites in 2019. In Wellington, Tauranga and Hamilton the daily average cycle count has remained about the same since 2018 (except in 2020 due to COVID-19 restrictions).

The busiest routes in Auckland, Christchurch and Wellington are primarily used for commuting. This can be seen from figure 15, which shows that the cycle counts during the weekend follow a different pattern and are a half or less of the weekday counts. However, in Hamilton and Tauranga the busiest routes are used just as much for recreation as commuting and the total numbers during the day are similar for both weekend days and weekdays.

¹⁷ This is guidance we use to protect people from land transport noise from new transport infrastructure in Aotearoa New Zealand (refer to NZS 6806). In this report noise levels are presented as an average noise level over a 24-hour period (dB L_{Aeq} 24hr) and as the 'day-evening-night' noise level (dB Lden). The average noise level is commonly used for road traffic noise in Aotearoa New Zealand and is relatively straightforward to calculate. Internationally the Lden is usually used for road traffic noise; it is more difficult to calculate but is more representative of the impact of noise on people's wellbeing.

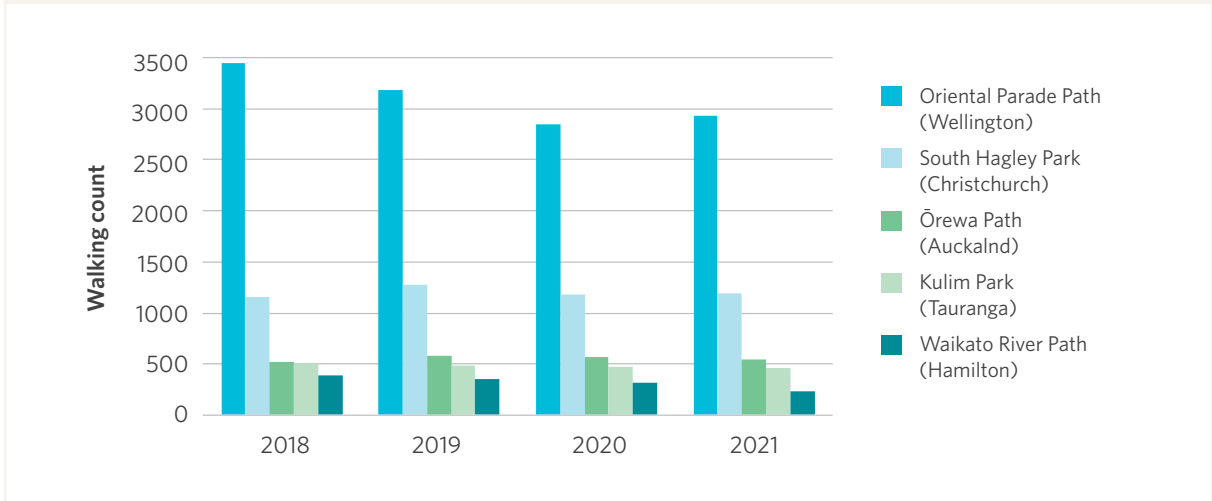
Figure 15: Average cycle count per hour at the busiest count sites in Auckland, Wellington, Christchurch, Hamilton and Tauranga, using data from 2018–21 (source: Waka Kotahi)



Walking trends

Count sites in Wellington and Christchurch have recorded the highest number of walking counts between 2018 and 2021, as illustrated in figure 16. While the daily average walking count along Ōrewa Path (Auckland) and in South Hagley Park (Christchurch) remained constant between 2018 and 2021, the number of walking counts decreased at the other locations in the same time frame.

Figure 16: Daily average walking count along the busiest walking paths in Auckland, Wellington, Christchurch, Hamilton and Tauranga, 2018-21 (source: Waka Kotahi)



Improving the network

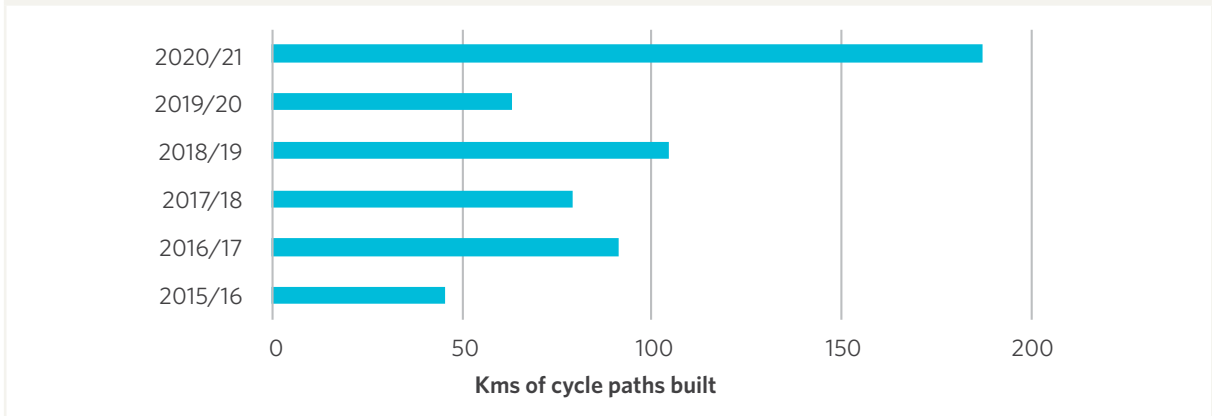
Waka Kotahi is committed to improving public health by investing in infrastructure that makes it safer and more convenient for people to walk, bike or scoot. Providing a range of reliable transport options, such as active alternatives, also gives people travel choices when they want to get to work, catch up with whānau and friends, connect with their community and access services.

We are scaling up the pace of delivering walking and cycling infrastructure through programmes such as Innovating Streets for People. In the 2020/21 financial year, Waka Kotahi doubled the kilometres of walking and cycling improvements that were delivered compared to previous years, and more than 500 kilometres have been added over the past five years.

500km
of walking and cycling improvements since 2015

Data from the counters around the country are now collated in the newly established National Walking and Cycling Count Database, which means that it can be accessed and compared from one central hub. Our next step is to establish a national baseline for walking and cycling use, measure progress and analyse trends at a regional and national level. This will help us understand the effectiveness of the current network and where more can be done to improve accessibility of active modes.

Figure 17: Kilometres of cycle paths built, 2015-2021 (financial years), as part of the Urban Cycleways Programme and Innovating Streets for People (source: Waka Kotahi)

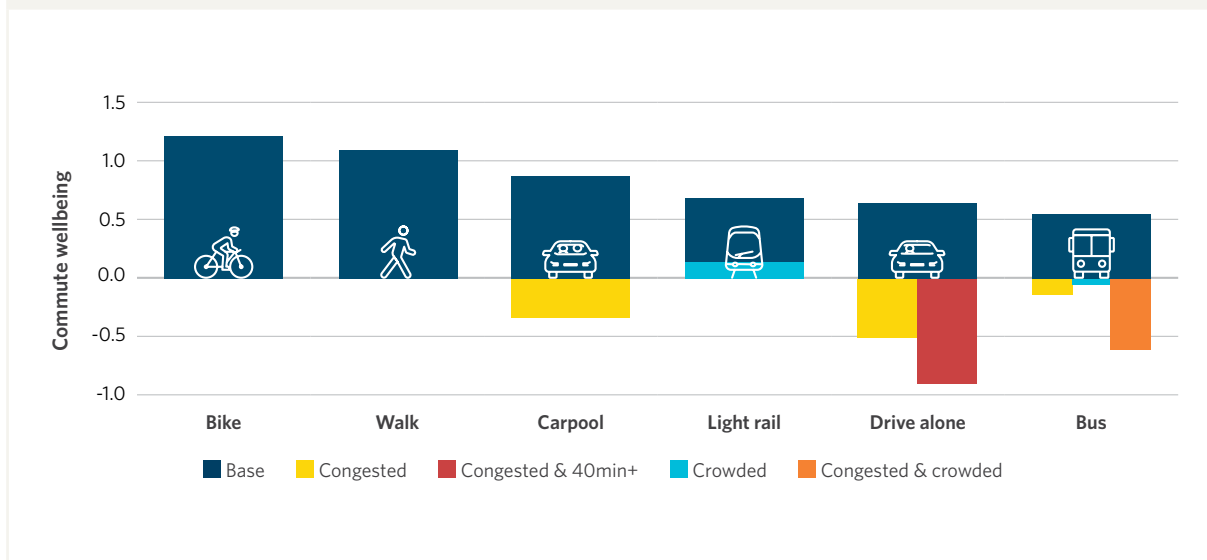


Mental wellbeing

As well as supporting our physical wellbeing through active mode choices, our transport system can also influence our mental wellbeing.

We have recently published research on the mental health impacts of transport (Wild, et al., 2021). The researchers found that high-quality walking environments in low-stress traffic conditions were positive for good mental health. People valued transport environments that make them feel included and welcomed. Of all commuting options, commuting by walking and cycling give the greatest wellbeing benefits (figure 18). In addition, low-cost and accessible transport systems support good mental health by allowing people to access employment, medical care, food, and social support without financial hardship. On the other hand, the researchers also found that aspects of the transport system in Aotearoa New Zealand are likely contributing to distress in our communities, due to factors including noise and community severance.¹⁸

Figure 18: Commute wellbeing by transport mode (source: adapted from Smith, 2017)



Waka Kotahi has a role in supporting good mental health in our cities by enabling our partners to deliver improved neighbourhood walkability and public transport, enabling active transport, reducing the impacts of noise from transport infrastructure and minimising community severance.

Heritage

Waka Kotahi recognises the connection between heritage and community wellbeing. Heritage places can have spiritual associations and cultural and social value, and can be important for identity, belonging and social interaction. For Māori, heritage is an essential component of the history, traditions, culture and identity of whānau, hapū and iwi. Heritage can make places more liveable, contribute to sense of place and can have economic benefits.

¹⁸ This is when transport infrastructure separates people from facilities, services and social networks they wish to use within their community.

We have a commitment to protect and preserve heritage and minimise conflicts between the transport system and the protection of heritage. We are bound by legislation, including the Resource Management Act 1991 and Heritage New Zealand Pouhere Taonga Act 2014, and by agreements we have made with Heritage NZ Pouhere Taonga and through partnerships with iwi. We follow best practice guidance on conserving heritage and have developed our guidelines and tools to assess heritage and archaeology in state highway projects.

Our state highway system follows many routes of early trails and roads, so the record of early exploration and settlement is frequently found whenever transport works are carried out. Cultural and historic heritage places are rich in diversity and the stories they tell us about the land and places New Zealanders call home. There are around 1800 archaeological sites within 100 metres of state highways, with over 800 included on New Zealand Heritage List/Rārangi Kōrero. Twenty-six sites – including pā, rock art caves, bridges, tunnels and culverts – are considered nationally significant.

In 2020, as part of the Land Transport Benefits Framework, we introduced a benefit 'Impact on heritage and cultural values', and a corresponding qualitative measure 'Heritage and cultural values', which takes a narrative approach to express the economic benefits of heritage within a transport project. We are also developing a geographic information system (GIS) risk-mapping tool to identify where we are likely to encounter heritage sites along the transport network, who to talk to, and if there are legal provisions related to the works.

Bringing the past into the present

A need to deliver on today's traffic requirements became an opportunity to create a new northern gateway to Blenheim/Wairau that celebrates its past and present.

When the old Opawa Bridge was completed in 1917, designer John Dudley Holmes probably expected it to be mainly used by horses and carts, and walkers and cyclists, as there were very few motorcars back then. At the time, the bridge was state-of-the-art: the first reinforced concrete bowstring arch bridge in the country – those distinctive arches led to its local nickname of 'Banana Bridge'. These qualities are why it is listed as category 1, the highest category, by Heritage New Zealand Pouhere Taonga.

Eventually it became clear the bridge was not suitable for modern times and by November 2020 a new bridge across the Ōpaoa River (formerly known as Opawa River) was completed. It was blessed and a pou whenua, made by local master carver Reg Thompsett, was unveiled. But the historic bridge has not been forgotten – in fact it's been retained and restored as a walking and cycling shared path.



Archaeological excavation showed that people have been using the area for the same things since the 1800s: crossing the river, camping and drinking.

Bringing the past into the present *(continued)*

Conservation and heritage have been key priorities throughout the new Ōpaoa River Bridge project. The Ōpaoa River has been a landmark on a major travel and trading route for centuries, and this is reflected in the pou whenua, which represents the mana whenua of the area, and interpretation panels. In creating the panels, artist, designer and storyteller Janet Bathgate worked with three local iwi, Te Rūnanga a Rangitāne o Wairau, Ngāti Toa Rangatira, and Ngāti Rārua, to gather stories about the history of Wairau.

The area around the bridges has been landscaped and is being restored to a more natural state. Indigenous plants are being planted from seeds and seedlings that have been sourced locally where possible. As well as looking attractive, these plants will protect the environment. For example, kahikatea, with deep roots, will keep riverbanks stabilised, while harakeke shades the river to manage weed growth.

The old bridge has been restored and brought into the 21st century. As part of its conservation management plan it was steam cleaned and given a special treatment to stop moss and lichen growing on it. Power cabling has been added, so it can be used for events and markets, and it has been fitted with energy efficient LED lighting for safety and also for celebration. The lights can be programmed for different colour schemes to mark different community events, such as Pride Month, International Women's Day and Matariki. The Banana Bridge is ready for its next 100 years!



Next steps for tackling the public health challenge

Over the coming year we will improve walking and cycling measures and data, and finalise research on the social costs of noise and poor air quality from the land transport system. We will also continue with the significant investment planned for walking and cycling infrastructure, through the 2021-24 National Land Transport Programme, supporting the wellbeing of New Zealanders.



TOITŪ TE TAIAO ACHIEVING OUR OUTCOMES

- Deliver the noise remediation programme (as funding allows).
- With our co-investment and delivery partners, deliver a significant range of public transport, walking and cycling improvements through the National Land Transport Programme 2021-2024.
- Engage in the resource management legislation reforms to ensure that planning for urban development and urban form reduces reliance on the need to travel by car and supports better access to public transport, walking and cycling for a wider range of social and economic opportunities.
- Explore opportunities to reduce emissions from vehicles already in the national fleet.
- Build consumer knowledge and confidence to purchase and use EVs.



TIAKINA TE TAIAO MEASURING OUR PROGRESS

- Improve GIS models for estimating emissions and exposure to land transport air and noise emissions.
- Improve walking and cycling measures.
- Support research on health impacts and social costs of land transport noise and air emissions.
- Develop methods for assessing health benefits of active modes.
- Develop measures for health benefits of active modes.


Environmental harm challenge

Aotearoa New Zealand's natural environment, healthy ecosystems and indigenous biodiversity provides many benefits such as clean air, clean water and fertile soils, which in turn underpins human wellbeing. Having oversight of 11,000 kilometres of state highways and providing funding to local transport infrastructure presents us with a unique opportunity to shape the land transport system in a way that supports our natural and built environment, creating positive outcomes for all.

Resource efficiency

-  Recycled materials made up **1.5 percent of the materials, or about 15,000 tonnes**, used in our maintenance contracts in 2020, almost the same amount of recycled material as 2019 (but a lower proportion of the total materials was used).

Compliance

-  Waka Kotahi **complied with 93 percent of its environmental consent conditions** in the first quarter of 2021 (the same as the first quarter of 2020).

*Te toto o te tangata, he kai,
te oranga o te tangata, he
whenua me te wai*

*While food provides the
blood in our veins, our
health is drawn from the
land and water*

Limitations

Resource efficiency: Includes recycled materials used in resurfacing and rehabilitation maintenance projects. This is likely to be an underestimate. National information on recycled materials used in capital projects is also not yet available. The baseline year for data on recycled materials is 2019.

Compliance: The percentage above includes both compliant conditions and conditions that have not yet been actioned. It excludes administrative permit conditions. We were not able to retrospectively get equivalent data for previous years and have therefore reported the position as of the end of March 2021.

Biodiversity and water: We are not currently able to nationally report on biodiversity and water measures.

Our progress

- Published our first resource efficiency strategy, *Hiringa o te taiao*.
- Introduced Infrastructure Sustainability Council (ISC) sustainability rating tools for new large transport projects.
- Published our *Broader outcomes procurement strategy*.

Biodiversity

Biodiversity is fundamental to life. In te ao Māori (a Māori world view) people, plants and animals are all descendants of Ranginui (the sky father), and Papatūānuku (the earth mother) and their children, which means humans are intrinsically linked with biodiversity.

The natural environment and healthy ecosystems provide many benefits that underpin our wellbeing. Our indigenous biodiversity also has deep intrinsic value. In te ao Māori, people are deeply connected to both terrestrial and spiritual worlds so any changes to maunga (mountains) or awa (rivers), for instance, can reverberate for generations to come. Our country's indigenous biodiversity is declining, with both terrestrial (land) and aquatic (water) environments continuing to face significant pressures including from the impacts of climate change (Department of Conservation Te Papa Atawhai, 2020).

Our land transport system interacts with biodiversity intimately; it traverses many sensitive habitats that contain important flora, fauna and ecosystems. More than 2100 kilometres, or 19.5 percent, of the state highway network adjoins or passes through biodiversity areas (including terrestrial and wetland areas) identified on national databases.

The ecological effects of a transport corridor can spread beyond the corridor and the immediate adjoining environment and can be significant. These are known as 'edge effects' and are a key impact on biodiversity associated with land transport (Forman & Deblinger, 2000). Common edge effects include weed invasion, noise, light and dust. Plant and animal health can be impacted and animal behaviour can change. Over the last year, we have funded research to understand the edge effects of transport corridors on our unique ecology. This research will help us improve how we support indigenous biodiversity, especially in areas that are particularly sensitive to the effects of the land transport system.

Waka Kotahi has a role in supporting high-value biodiversity¹⁹ and our herenga (commitment) to minimising the effects we have on our indigenous biodiversity is reflected in organisational policies and standards that guide our work. In the last year we have made good progress to further strengthen this by starting to revamp our *Environmental and social responsibility policy* and introducing the Infrastructure Sustainability Council (ISC) sustainability rating scheme for our larger infrastructure projects.

¹⁹ Maintaining or improving biodiversity and water quality are important outcomes for environmental sustainability in the Te Manatū Waka Ministry of Transport Transport Outcomes Framework, so that the transport system improves people's wellbeing, and the liveability of places (Te Manatū Waka Ministry of Transport, 2021).

Dimming lights for our wildlife

Natural patterns of light are greatly disrupted through the introduction of artificial light into the night-time environment. Artificial light at night can come from street lighting, building lights, domestic lighting and vehicle lights. How this can affect different flora, fauna and ecosystems depends on the type of lighting being used.

We know that swapping high-pressure sodium (HPS) lights for energy efficient LEDs can reduce power use by 40 percent, but some types of LED lights can be harmful for wildlife (Department of the Environment and Energy, Australia, 2020). Internationally, this has led to concern about the biodiversity impacts of the rapid expansion of LED light usage.

Currently Aotearoa New Zealand has very little data to inform decisions about the best lighting solution for meeting safety requirements while minimising effects on vulnerable species. Because lighting can impact different species in different ways, only broad principles from overseas research findings can be used for our flora and fauna, meaning there is an urgent need to better understand local effects and how to minimise these.

Waka Kotahi is involved in three studies that look at the impact street lighting has on our biodiversity.

How lighting affects freshwater invertebrates

The National Institute of Water and Atmospheric Research (NIWA) has partnered with several organisations to compare the impact of HPS and different LED lighting solutions on freshwater invertebrates in Ōtautahi Christchurch's Avon River and in the Kaituna River on Banks Peninsula. This will give us better information to make our streetlighting more ecologically sensitive. The number of aquatic and terrestrial flying insects attracted to operational HPS and LED streetlights is being tested. Different types of LED streetlights are included in the tests: the commonly installed 4000 K, warmer-coloured 2200 K and yellow LED-based. The experiments have finished, and the results will be available in early 2022.

Supporting the rare Westland petrel

Across on the West Coast of Te Wai Pounamu, we have taken action in Punakaiki to minimise effects of street lighting on the rare Westland petrel. Westland petrels are attracted by artificial light and can get disorientated by it. They land on the ground, making them vulnerable to being struck by vehicles or attacked by predators. There are only two Westland petrel breeding colonies in the world, and both are in Punakaiki. To minimise potential effects of Waka Kotahi streetlights on these petrels, the lights were switched off from November to January, the critical fledgling season. A Waka Kotahi funded study is underway to investigate lighting options that could minimise the effects on these birds in the future, as well as testing whether turning the lights off during fledgling season in Punakaiki is a practical solution.



Reducing impacts on bats

Solutions are also being investigated for better lighting design options in sensitive areas, with a focus on bat populations. This desktop study adds to the mix of work done in Australia and other countries to understand how best to minimise impacts of lighting assets associated with the land transport system on our unique flora and fauna.

Water quality

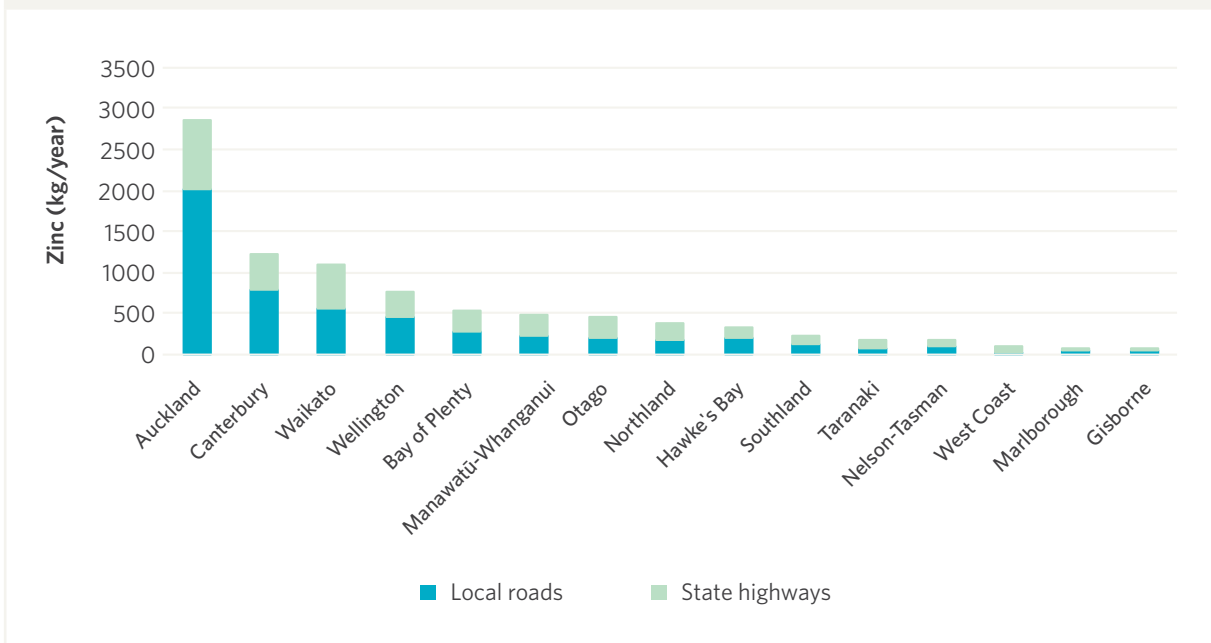
Water quality is an important issue for Aotearoa New Zealand, and poor water quality can have both short- and long-term effects on aquatic biodiversity, public health and recreation.

Potential sources of transport-related contaminants include surface water pollution from road surface run-off or spray, accidental spillage, ground water pollution from soakaway discharge, disturbance of contaminated land and work in stream beds. Erosion from construction activities, as well as stockpiling of materials, can cause sediment discharge to surface water.

Waka Kotahi manages these impacts in different ways depending on the activity. During construction we put erosion and sediment control measures in place. Methods used to manage road contaminant discharges during operation can include stormwater swales, engineered wetlands and more traditional stormwater treatment systems. Their effectiveness (and therefore risk to water quality) depends on the initial design and ongoing regular maintenance.

Brake and tyre wear can lead to pollutants such as copper and zinc ending up in stormwater and these elements are used to indicate the amount of stormwater pollution coming from road transport. Figure 19 shows the estimated total amount of zinc discharged into water each year from the roading network. The greatest discharges are from the larger urban areas, but transport makes up less than 5 percent of the total zinc discharged from all sources. This is also the case for copper discharges. The risks to aquatic biodiversity depend on toxicity and amount of contaminants, how quickly contaminants are dispersed and the sensitivity of the receiving environment. While stormwater run-off from the transport system is a known local contributor to poor water quality, pollution from other sources can often pose more significant risks to aquatic biodiversity overall (Semadeni-Davies & Moores, 2020). We continue to build our understanding of the impacts of transport on water quality, including current research on non-exhaust vehicle emissions, so we can further improve how we manage vehicle impacts.

Figure 19: Total zinc discharged (kilogrammes per year) from the roading network (source: Semadeni-Davies & Moores, 2020)



Resource efficiency

Using resources in efficient and sustainable ways can reduce environmental impacts, relieve demand for raw materials, reduce waste and reduce costs.

Recycling and reducing waste

The land transport system is heavily resource dependent, with raw materials, fossil fuels and energy all being consumed in large quantities.

In 2020 at least 15,000 tonnes of recycled material was used in our maintenance projects, which was about 1.5 percent of the total materials used in paving and surfacing that year – a similar amount to 2019. Over the last four years 1–3 percent of total materials used for maintenance and renewal projects came from recycled sources. This includes recycled materials from asphalt pavements, slag from smelting and lower-grade aggregate. We are starting to require reporting of key resource efficiency data from our infrastructure and maintenance contractors so that more accurate baselines can be developed and used to drive improvements in resource efficiency.

Figure 20 shows some of the many ways we already reduce waste during construction, maintenance and operation activities. We can improve on this and our new resource efficiency strategy, *Hiringa o te taiao* (Waka Kotahi NZ Transport Agency, 2021), and policy focuses on sustainable material use and reducing waste and energy from our construction and maintenance activities.

Reducing our carbon footprint

An important action for us is to understand the overall carbon footprint from our infrastructure activities and look for opportunities to reduce it through our supply chain. This is also required as part of the Carbon Neutral Government Programme.²⁰ To assist with this, we commissioned a study to establish baseline carbon footprints for construction, operations and maintenance emissions from land transport infrastructure, using information from Australia, the UK, USA and Aotearoa New Zealand. These initial baselines will be used to benchmark road construction projects and help set targets for reducing emissions.

The median average construction emissions estimated from the entire dataset was 2231 tonnes of CO₂ emissions per lane kilometre (tCO₂e/lane km). The largest emissions sources were materials (concrete, steel and aggregate) and fuel use (mainly diesel). Structures, such as bridges and tunnels, and large earthworks are major contributors to these emissions sources.

The study also investigated 25 operation and maintenance carbon footprints, including two local examples. The median was 68 tCO₂e per kilometre per year. This information gives us the scale of emissions from operations and maintenance and will also be used for benchmarking. The estimates do not include 'enabled' emissions – that is those from vehicles using the road once it is built – which are significantly higher again. We will continue to refine this information and use it to drive reductions in embodied carbon emissions compared to the initial baselines.

²⁰ In December 2020, the government announced the establishment of the Carbon Neutral Government Programme (CNGP) to accelerate emissions reductions in the public sector in order to be carbon neutral by 2025. It is proposed that Crown agents will need to measure their emissions from the 2022/23 financial year onwards, reduce these in line with a 1.5 degree Celsius reduction pathway and then report their emissions, reduction plans and progress by December 2023 and each year subsequently. The full scope of this work is still being finalised.

Considering whole-of-life costs

Waka Kotahi is contributing to the Battery Industry Group (BIG), a collaboration between more than 170 groups in several sectors that have large batteries in their value chain, including from electric vehicles. BIG have developed a stewardship plan for large batteries to reduce their impact on the environment, which includes whole-of-life traceability. The motor vehicle registry could be a method for traceability and would involve recording battery details when each vehicle comes into the country.

Waka Kotahi has also led cross government work on Broader Outcomes in Procurement. This is a government-wide initiative that seeks to achieve wider social, economic, cultural and environmental outcomes through procurement – the acquisition of goods, services and works. Broader Outcomes requires Waka Kotahi to consider not only the whole-of-life cost of these activities, but also the costs and benefits to society, the environment and economy. One of the four priority outcomes is reducing emissions and waste.

Figure 20: Examples of how Waka Kotahi has reduced waste during construction and maintenance

Reduce

Waitangi Wharf project – Chatham Islands 2018

- Innovative design for breakwater to protect the wharf.
- Design altered usual approach so local rock could be used.
- Around 17,800 tonnes less aggregate and concrete was used.



Recover

The Jacobs Ladder slip north of Kaikōura, caused by the Kaikōura earthquake, had material coming from a river valley which was suitable for construction. Recovered large rocks from the slip and re-used them for protecting the road.



Reuse

- Reuse damaged edge marker posts in situations where shorter marker posts could be used, for example on guardrails.
- Old asphalt is milled off, crushed and added into new asphalt. Pavements also recycled by crushing concrete and mixing with new cement for reuse.
- Glenbrook slag is highly sought-after skid-resistant roading material that is a by-product of steel production. Some ends up in the shoulder and we are looking for ways to wash and reuse it to avoid waste.



Recycle

- Guard rails that are unable to be salvaged during maintenance are sold to scrap metal dealers for recycling.
- We sometimes integrate materials such as recycled glass and crushed concrete into pavement.



Replacing the old Māngere Bridge

Re-using materials has been an important consideration for the Old Māngere Bridge replacement project.

People have had a long history of crossing the Manukau Harbour, with the first Māngere Bridge opening in 1875. The wooden bridge was replaced in 1915 with a new concrete and steel bridge and, although it eventually closed to motorists in 1983, it continued to be used for fishing, recreational boating, walking and cycling until late 2018.

Construction of a replacement bridge is well underway and will reinstate the valuable walking and cycling connection between Onehunga and Māngere Bridge, while offering the community a recreational space for fishing, meeting and boating.

Meanwhile, parts of the old bridge are beginning a new life. Some pieces of the old bridge are being salvaged to create a heritage garden and furniture on the new bridge. Steel beams will be reused for cofferdams²¹ or other temporary work during construction to reduce the new materials used onsite. And approximately 7000 tonnes of leftover parts of the old bridge will be sent to a demolition yard for reuse or recycling where possible. For example, steel reinforcing will be recovered and concrete will be crushed for future reuse. Wooden pallets used during construction will be upcycled by an Auckland social enterprise that turns unwanted timber into trendy furniture.

The community asked that the old bridge would not be forgotten so that future generations understand its history and ongoing relevance to Onehunga and Māngere. The new bridge will kōrero the story of the old bridge and surrounding area through cultural artworks that are incorporated into the structure, along with the materials from the old bridge that have been recycled as sculptural elements.



²¹ A cofferdam is a temporary structure that is built in a body of water. Once the water within the cofferdam is pumped out, it creates a dry space for working in.

Kaitiakitanga

We recognise that Māori have a responsibility and obligation of care for their communities and environments. Our environment encapsulates people, places and planet.

Waka Kotahi is responsible for delivering an integrated transport system for all New Zealanders. An important part of this is finding opportunities to better respond to Māori aspirations while delivering suitable transport solutions.

Both *Te ara kotahi*, our Māori strategy, and *Toitū te Taiao – Our Sustainability Action Plan*, highlight the importance of kaitiakitanga in Māori values. Our environment, which is people, places and the planet, is a taonga that must be managed carefully. We have begun work on developing a measure that will help us understand our partnerships and engagement with Māori. A baseline measure will be developed in the 2021/22 financial year.

The measure will be based on *Te ara kotahi*, our Māori strategy. *Te ara kotahi* outlines five strategic pou (pillars) that support te whakakitenga (the vision).

Ko koe ki tēnā ko au ki tēnei kīwai o te kete.

Waka Kotahi and Māori working together to succeed for a better New Zealand.

Each pou has captured our intentions for how we will develop in the area of working with Māori. We have identified priorities under each pou to focus our efforts and to operationalise and drive the implementation of *Te ara kotahi* in the work we do. We are undertaking a programme of work to make this happen.

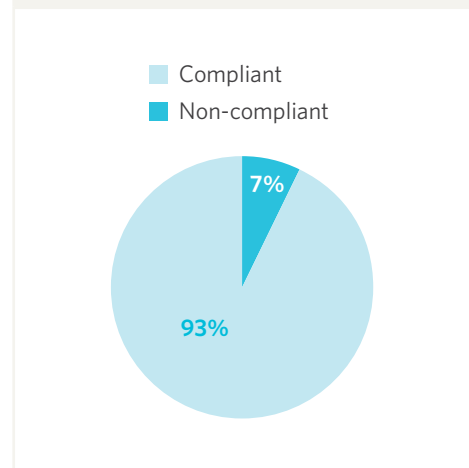
Environmental compliance

Waka Kotahi activities come under a variety of planning and environmental requirements through the Resource Management Act 1991 (RMA) and other environmental legislation. We actively manage environmental compliance with these requirements to meet our statutory obligations.

Legislative compliance is a bottom line for Waka Kotahi. We obtain legal authorisations from regulatory authorities for activities that impact the natural and built environment, culture, heritage and the conservation estate. A cloud-based environmental compliance management system (CS-VUE) is used to capture and manage compliance information for these authorisations. This system has recently been upgraded and enables Waka Kotahi to maintain an overview of consent requirements across projects.

Currently the system data shows we are 93 percent compliant with conditions that relate to the environment.²²

Figure 21: Compliance with conditions that related to the environment, as at 31 March 2021 (source: Waka Kotahi)



²² The remaining 7 percent of conditions were not yet signed off or verified as formal breaches at the time the information was retrieved. Our project managers continue to work with external suppliers and partners to improve the timeliness of information recorded in CS-VUE.

Incorporating the Infrastructure Sustainability Council (ISC) sustainability rating tool into large (\$100M+) infrastructure projects is underway following ratification of our *Sustainability rating scheme policy*. Adopting the ISC sustainability rating scheme during the design and delivery of capital works projects provides an evidence-based framework to optimise the environmental, social and economic outcomes of infrastructure.

Currently eight projects have registered or are soon to register to work towards an ISC sustainability rating, including two NLTP projects and six New Zealand Upgrade Programme projects. Additionally, one project (State Highway 58) has registered to trial IS Essentials, which is a sustainability rating for projects of less than \$100M. A number of other projects are in the initial stages of scoping their sustainability requirements and will be looking to formally register with ISC.²³

The Land Transport Management Act 2003, the Resource Management Act 1991 and the Heritage New Zealand Pouhere Taonga Act 2014 are amongst a range of laws relevant for the relationship between Waka Kotahi and Māori and the principles of the Treaty of Waitangi. Our responsiveness to this legislation will form a component of the kaitiakitanga measures being developed under *Te ara kotahi*, our Māori strategy.



²³ Waka Kotahi has been using sustainability rating tools since 2015, when it formally adopted the Greenroads rating scheme. Since then six projects have been working towards Greenroads certification. One project achieved this in 2019 and three more projects are expected to follow in 2022/23.

Next steps for tackling the environmental harm challenge

Environmental measures are still an area of focus for *Tiakina te Taiao*. We will continue to explore measures for biodiversity and will gather data on resource efficiency from our projects that require it through *Hiringa o te taiao* – our resource efficiency policy. We will also roll out and embed *Hiringa o te taiao*, finalise our updated *Z/19 Taumata taiao* – environmental and sustainability minimum standard and increase the number of projects aiming to achieve ISC sustainability ratings.



TOITŪ TE TAIAO

ACHIEVING
OUR OUTCOMES

- Review our *Environmental and social responsibility policy* for a step change in sector environmental and social responsibility practice.
- Leverage procurement for a step change in sector environmental and social responsibility practice.
- Develop an integrated national asset management system for data capture, analysis, management and monitoring of environmental assets.
- Improve performance monitoring, audit, compliance and incident management functions.



TIAKINA TE TAIAO

MEASURING
OUR PROGRESS

- Develop Māori responsiveness measures with our *Te ara kotahi* work programme.
- Develop measures for biodiversity (including fish passage), water (impacts, mitigation), and environmental incidents and breaches.
- Collate an inventory of environmental assets.
- Implement contract provisions and capture data on resource and energy efficiency, incidents, compliance and biodiversity management.
- Develop effective data storage, management and retrieval systems and processes to enable a national view of relevant data.
- Increase range of measures for wider outcomes, eg cultural heritage, landscape and urban design.
- Improve our understanding of carbon emissions related to our infrastructure activities.

Corporate sustainability

The public sector is taking active steps to reduce greenhouse gas emissions, improve energy efficiency and reduce waste. We are striving to lead the way in this important area.

Total emissions

Our total corporate emissions was **3604 tonnes of CO₂ equivalent** in the 2019/20 financial year.

Travel emissions



Waka Kotahi carbon emissions from all travel was **3112 tonnes of CO₂ equivalent** in the 2019/20 financial year, a decrease of 40 percent from the 2018/19 financial year.

I orea te tuatara ka patu ki waho

A problem is solved by continuing to find solutions

Number of vehicles



Waka Kotahi had **164 fleet vehicles** at the end of the 2019/20 financial year, the same as the previous financial year, but with **more electric vehicles**.

Limitations

Corporate sustainability data is reported here by financial year so that it can be compared with other government data. Toitū Envirocare has verified our data from July 2019 onwards and this forms the Waka Kotahi 2019/20 financial year baseline. However, note that revised freight data included in this report is yet to be verified.

Emissions calculated for the 2018/19 financial year are not audited and do not include sources such as electricity use and waste. Therefore, total emissions between 2018/19 has not been compared with 2019/20 financial years and any annual comparisons between emissions sources should be treated with care.

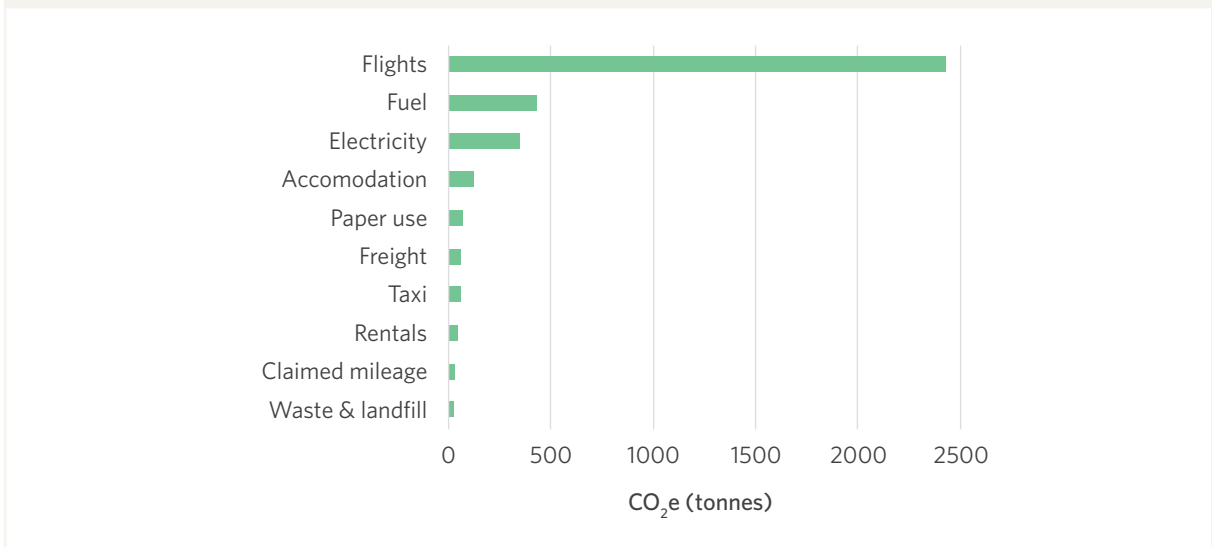
Our progress

- Achieved Toitū Envirocare carbonreduce certification for our corporate emissions calculations.
- Updated policies and promoted alternatives to travelling with the goal of reducing business travel emissions.
- Completed a pilot waste audit at one office location.

Waka Kotahi corporate sustainability

Waka Kotahi achieved Toitū Envirocare carbonreduce certification for the first time at the beginning of 2021 for the 2019/20 financial year. Toitū Envirocare is an independent organisation that supports businesses to become more sustainable through a suite of carbon and environmental programmes. Their carbon certification programmes are evidence that an organisation is taking climate-positive action. To maintain our certification, each year we will be audited on our corporate carbon emissions such as travel, waste to landfill, postage and energy use, to ensure we keep taking climate positive action in this area.

Figure 22: Contribution of different sources of emissions for Waka Kotahi corporate activities, 2019/20 CO₂ equivalent emissions (tonnes) (source: Waka Kotahi)

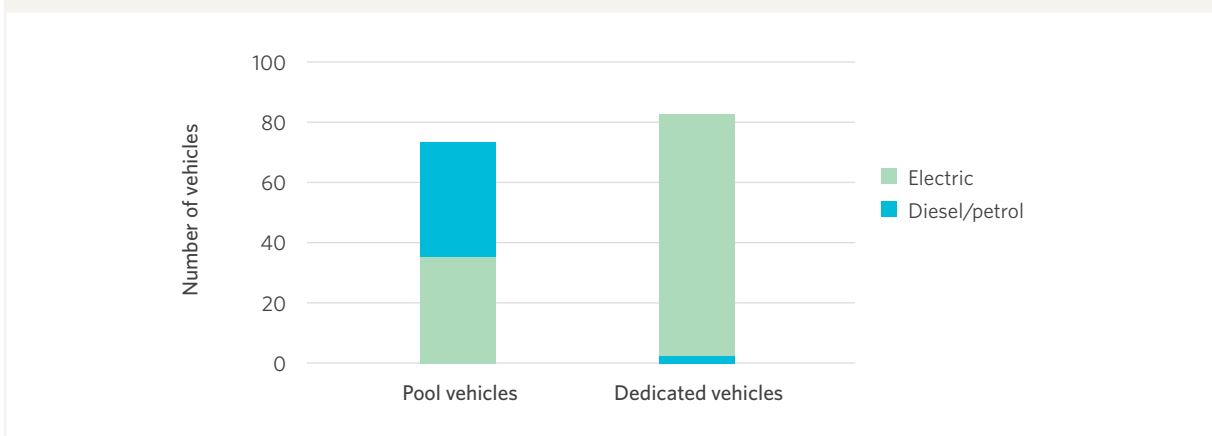


Number of vehicles

Waka Kotahi had 164 fleet vehicles at the end of the 2019/20 financial year. This included 38 EVs and 126 petrol or diesel vehicles. This was the same as the 2018/19 financial year.

As part of the Carbon Neutral Government Programme we are required to transition to electric or hybrid fleet vehicles. In the 2020/21 financial year we increased our focus on making the switch, initially concentrating on our pool fleet. From January 2021 to June 2021 we added six EVs to the Waka Kotahi fleet, and seven petrol vehicles were removed.

Figure 23: Vehicles in Waka Kotahi’s corporate fleet by the end of 30 June 2020 (source: Waka Kotahi)



Over the coming year, we will focus on transitioning petrol vehicles assigned to dedicated drivers. These people are predominantly in roles that require them to travel regularly to various project sites or around the state highway network for maintenance checks. Initially, we will conduct a pilot trial with a small number of drivers to work through some of the challenges they may encounter before we look to roll out more EVs before June 2022. We also have 35 diesel utes that will be transitioned to electric (or plug-in hybrid) vehicles when there are suitable alternatives on the market. We will closely monitor this situation so we can reach the target of being fully electric, where practicable, by 2025.

Fuel use

Waka Kotahi carbon emissions from fuel use was 431 tonnes of CO₂ equivalent in the 2019/20 financial year, a decrease of 8 percent from the 2018/19 financial year.

Flights

Waka Kotahi carbon emissions from air travel were 2426 tonnes of CO₂ equivalent in the 2019/20 financial year, a decrease of 47 percent from the 2018/19 financial year.

Travel is the largest source of corporate emissions at Waka Kotahi, making up 82 percent of total emissions. Flights are the largest single source and are 64 percent of corporate emissions. Emissions have reduced 40 percent from the 2018/19 financial year. This is partly due to the COVID-19 pandemic, which prevented anyone from travelling for several months of 2020. However, we have been actively encouraging people to use different ways of working (for example having more virtual meetings) so they can reduce their work travel.

40% less
corporate travel
emissions during the
2019/20 financial
year compared to
the year before

Other corporate emissions

As part of the Carbon Neutral Government Programme, we will be required to report on a range of corporate emissions. We have therefore included new emissions sources in this year's report, including paper use, waste sent to landfill, electricity and freight. While these emissions sources are small in comparison, they do have an impact on our overall corporate emissions.

Waste sent to landfill is approximated, but once we roll out the waste monitoring programme to all offices, a more accurate figure can be provided in next year's *Tiakina te Taiao*.

Making better use of our office waste

We've made a conscious decision to focus on our waste practices, so we reduce the amount we send to landfill. This will help to reduce our carbon footprint.

Reporting waste to landfill is new for Waka Kotahi and so in early 2021 we engaged the Sustainability Trust to complete a Your Sustainable Workplace waste audit across our sites. They found that we produce 39.3 tonnes of landfill waste per annum, which is roughly the same weight as 25 Nissan Leaf vehicles.

Only a third of what we send to landfill actually belongs there, the other two thirds can be recycled/reused or is organic material.

They also found that 94 percent of the Waka Kotahi people they surveyed for the audit were aware of our organisation's desire to minimise waste. This is great news for our organisation as it means our people will understand why we're introducing changes to what we do in our offices.

Typically, more than 80 percent of office waste can be recycled, so we are introducing many of the Sustainability Trust's recommendations, including:

- rolling out consistent signage that lines up with national colour standards across all our sites, as recommended by WasteMINZ
- adopting battery recycling stations
- removing solo rubbish bins
- introducing recycling for stationery and small items.

The Sustainability Trust has recommended that we monitor our waste regularly, and so we're setting up a waste monitoring trial in our Auckland, Tauranga and Palmerston North offices. If the trial is successful, we will expand this initiative to all our offices.



Next steps for tackling the corporate sustainability challenge

Over the coming year we will focus on reducing our carbon footprint, including reducing travel, increasing EVs in our fleet, setting targets and improving our data collection.



TOITŪ TE TAIAO

ACHIEVING
OUR OUTCOMES

- Reduce our corporate travel emissions.
- Implement requirements of the Carbon Neutral Government Programme.



TIAKINA TE TAIAO

MEASURING
OUR PROGRESS

- Improving data integrity through the Toitū Envirocare carbonreduce programme.

The way forward

We are improving on the information we have now and will look to set targets for key outcomes.

A lot of work on our environment and sustainability practices has taken place over the past year at Waka Kotahi. *Tiakina te Taiao 2020* gave us a baseline to work from, and since then we have made progress both in measuring our environmental sustainability performance and implementing *Toitū te Taiao – Our Sustainability Action Plan*. Having good measures and reporting has helped quantify what we have done and provides a basis for what we still need to do.

We will continue to build on the baseline we have established, and fill gaps in our reporting. Several measures in the performance framework introduced in *Te Kāpehu*, our strategic direction, are related to environmental sustainability. With the development and rollout of ISC sustainability rating tools and *Hiringa o te taiao – our resource efficiency policy*, we need to establish new processes to collate information from our suppliers, which will eventually flow to *Tiakina te Taiao* reporting. In addition, we will establish a national baseline for walking and cycling use and develop indicators for sustainable urban mobility. We are continuing to work on providing more information online, including additional resources such as mapping and case studies, so that the most recent information is available.

Changes to the transport system cannot be made in isolation from issues of equity, accessibility and te ao Māori. We are committed to a fair and just transition that takes everyone with us. We are also developing measures for *Te ara kotahi*, our Māori strategy, which will help us understand how we are connecting to te ao Māori in our work and how Māori can exercise kaitiakitanga.

We anticipate that our reporting will continue to evolve as we progress implementation of *Toitū te Taiao*, which we will refresh soon. Changes in reporting are also likely to be needed in response to government policy such as the Emissions Reduction Plan, the Carbon Neutral Government Programme and reforms of the Resource Management Act 1991.

Over time our monitoring will show us how the interventions we have committed to are resulting in a low-carbon, safe and healthy land transport system.

Ehara taku toa i te toa takitahi, engari he toa takitini

Our strength does not come from ourselves alone but as a collective

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If you have further queries,
call our contact centre on
0800 699 000 or write to us:

Waka Kotahi NZ Transport Agency
Private Bag 6995, Wellington 6141

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our website at www.nzta.govt.nz