



*Let's Get Wellington Moving Technology  
Workstream*

# **Actions and Recommendations**



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# Executive Summary

In 2016, WSP Opus was engaged by the NZ Transport Agency to support the 'Let's Get Wellington Moving' joint venture between the NZ Transport Agency, Wellington City Council (WCC) and the Greater Wellington Regional Council (GWRC), to provide services for the 'Let's Get Wellington Moving Technology Workstream'. In August 2018, we were asked to update our work to reflect changes in technology and policy since the 2016 issue. This document is the updated version of the 2016 'Actions and Recommendations' report.

The purpose of the Technology Workstream is to recommend practical, short, medium and long-term technology-focused actions that could be implemented in the Wellington region. This report provides background on each of these potential actions.

Technology investment and innovation will underpin most future mobility services, and management of the transport system in Wellington. This report highlights key areas where technology can enable the development of a transport system that is accessible, provides choice, and enhances the city and region. These focus areas are:

- Innovation corridors – dedicated spaces where innovation is facilitated, supported and encouraged by local and central government.
- Electric vehicles – providing infrastructure to accelerate the uptake of EVs, and speeding up moves toward an electric public transport fleet.
- Shared mobility – supporting and incentivising shared mobility services in Wellington and integrating these services into the wider transport system.
- Bus Rapid Transit 'Integrated Mobility Hubs' – modern public transport hubs that cater for interchange between traditional transport services (public transport, taxis, etc.) and emerging services (carsharing, bikesharing, ride hailing, etc.).
- Bus Rapid Transit capacity and customer enhancements – such as boarding and alighting from multiple entrances, emerging public transport vehicle technology, contactless public transport ticketing, improved customer communications
- Mobility as a Service – integrating the region's mobility service providers into an integrated payment and journey planning platform.
- Inner City Parking – improving the provision, use and access to inner city parking through sensors, apps and novel pricing options.
- Active Modes – providing infrastructure and programs to support electric bikes, being ready for private bike/scooter share, comprehensively mapping all of Wellington's pedestrian thoroughfares, illumination to support pedestrian safety, consideration of emergent active modes like solowheels and electric skateboards, smart counting of Wellington's cyclists, and smart 'green wave' traffic signalling for cyclists

Accompanying these focus areas are a long-list of recommendations for technology actions that could be implemented in Wellington and a timeline for their potential introduction. Supporting the above areas are recommendations related to drones, enabling partnerships, data, technology procurement, cyber security, and monitoring and evaluation.

## Disclaimer

This report has been prepared by Opus International Consultants Ltd (**WSP Opus**) for the NZ Transport Agency (**Client**) in respect of the 'Let's Get Wellington Moving' Technology Workstream for the purpose agreed between the Client and WSP Opus (**Purpose**). WSP Opus accepts no responsibility for the validity, appropriateness, sufficiency, or consequences of the Client using the report for purposes other than for the Purposes.

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# 1 Introduction

WSP Opus were engaged by the NZ Transport Agency to support the ‘Let’s Get Wellington Moving’ a joint venture between the NZ Transport Agency, Wellington City Council (WCC) and the Greater Wellington Regional Council (GWRC), to provide services for the ‘Let’s Get Wellington Moving Technology Workstream’.

These services were provided across three stages, this report is the final deliverable of these:

- Stage 1 – A review of ‘Let’s Get Wellington Moving’ documents and work to date; a review of local and national technology related strategy and policy documents; and scoping of relevant technology trends and innovation’s that should be considered within the ‘Technology Workstream’.
- Stage 2 – An in-depth review of ‘inspirational case study’ examples of cities who are undertaking similar initiatives; this was presented to representatives of the ‘Let’s Get Wellington Moving’ group to confirm direction and relevance to the Wellington region.
- Stage 3 – Identification of practical, short, medium and long-term technology focused actions that could be implemented in the Wellington Region. This report provides background on each of these potential actions.

## 1.1 Report Update

In August 2018, WSP Opus were asked to update our Stage 3 deliverables to reflect changes in technology and policy since the 2017 final issue. This document is the updated version of the 2017 ‘Actions and Recommendations’ report. Let’s Get Wellington Moving.

## 1.2 Project Overview

‘Let’s Get Wellington Moving’ is an initiative aimed at taking a fresh look at Wellington’s transport system to ensure it supports how the community wants the city to look, feel and function.<sup>1</sup> To date ‘Let’s Get Wellington Moving’ has engaged extensively with the community and developed twelve guiding principles. These principles will be used as a basis for planning and assessing potential solutions and are:<sup>2</sup>

- Accessible, healthy and safe
- Better public transport
- Clean and green
- Compact city
- Demand and supply
- Future-proof and resilient
- Past, present, future
- Predictable travel times
- Set in nature
- Growth
- Travel Choice
- Wider view

<sup>1</sup> <http://getwellymoving.co.nz/about/> last accessed 22/02/2017

<sup>2</sup> <http://getwellymoving.co.nz/principles/> last accessed 21/08/2018

In late 2017/18, LGWM consulted the public again, this time focusing on four scenarios:

- A. Scenario A: Prioritise public transport, walking and cycling in the central city: Reduce speed limits and prioritise key central city streets for walking, cycling and public transport to make travelling by bus quicker and to create a safer and more attractive environment for people on foot and on bikes. Cost: \$150m - \$200m. Time to construct: 1.5 – 2.5 years.
- B. Scenario B: Improvements in Scenario A, plus BETTER CONNECTIONS TO THE EAST AND SOUTH: An extra Mt Victoria tunnel and separating east-west traffic from other movements at the Basin Reserve would deliver faster and more reliable public transport connections to the south and east, and allow mass transit from the station to Newtown and the airport. This would also make it easier for everyone, including people walking and on bikes, to get to and from the southern and eastern suburbs. Cost: \$700m - \$900m. Time to construct: 5 – 7 years.
- C. Scenario C: Improvements in Scenario B plus LESS CONFLICT WITH TRAFFIC AND REDEVELOPMENT OPPORTUNITIES IN TE ARO: A new city tunnel would remove much of the conflict between people walking and on bikes and traffic travelling through Te Aro. It would also make bus travel more reliable. It would reduce traffic on Vivian Street and Kent/Cambridge Terrace and provide urban redevelopment opportunities, including new buildings and public spaces above the tunnel. Cost: \$1.5b - \$1.8b. Time to construct: 7 - 10 years.
- D. Scenario D: Improvements in Scenario C, plus: BETTER ACCESS FROM THE NORTH AND LESS WATERFRONT TRAFFIC: Building an extra Terrace Tunnel would improve access to and from the north and reduce traffic on the waterfront quays and through the central city, making it easier to access the waterfront. Cost: \$1.9b - \$2.3b. Time to construct: 10+ years.

The consultation document also notes that ‘technology changes’ and some form of ‘changing travel behaviour’ would underlie any plans adopted.

As a result of the consultation, nine key themes were identified from public feedback:

1. Support for better public transport: now and long-term
2. Universal support for less congestion
3. Widespread support for walking and cycling
4. Opposition to new infrastructure increasing car use
5. A regional, integrated approach is required
6. It is time to act, while being mindful of cost
7. Future-proofed solutions are needed
8. Basin traffic flow issues need solving: no clear view
9. Wellington-specific solutions are required

(source: <http://www.getwellymoving.co.nz/assets/Documents/LGWM-Update-June-2018.pdf>)

This feedback has been used to guide the 2018 update of this report.

‘Let’s Get Wellington Moving’ has a spatial focus on the Ngauranga Gorge to Wellington Airport corridor. However, recognising that this route is a major regional connection, and that the mobility of people and goods facilitated by this corridor takes place within and between many different communities in the Wellington region, the ‘Technology Workstream’ has been tasked with taking a wider view of potential actions.

## 2 Policy and Strategy framework

Through a range of plans, strategies and policy documents, central and local government (in particular, local authorities in Wellington) recognise the potential for established and emerging technologies to positively impact transport and mobility locally. Likewise, both central and local government in New Zealand are consistent in the view that technology is an enabler of change, supplementing rather than replacing established solutions e.g. enhancing the efficiency of infrastructure like train lines. While not explicit in all cases, central government is generally positive and often supportive regarding the adoption and use of:

- Mobility as a service
- Vehicle-to-everything communication
- Technology enhanced network operations
- Data as a service
- Electric vehicles and associated infrastructure
- Semi- and fully-autonomous vehicles.

Proactive harnessing of technology is imperative to meeting the key strategic objectives of Let’s Get Wellington Moving (LGWM) project. While local policy is generally ready to enable change, it would be beneficial to update it to address recent learnings from overseas:

- Letting tech-enabled transport disruption happen without strategic oversight and direction poses a risk. For example, the increasing permeation of ride-hailing in many cities has led to a decrease in public transport patronage and increased vehicle kilometres travelled.<sup>3</sup>
- Electric vehicles are reducing the cost of driving: an EV’s fuel costs per kilometre are about 1/3 of its petrol equivalent, reducing the cost deterrent to driving

Proactive planning for technology can lead to technical solutions *complementing* non-driving modes, rather than replacing them.

Since the previous issue of this report the recent new public transport network rollout in Wellington has seen a shift to a hub and spoke public transport network with some route rationalisation resulting in a need for passengers to transfer more often. The implications of this in an increasingly tech-enabled transport environment are:

- -Increased reliance on Real Time Information to support increased need to transfer
- -Increased use of ride-hailing to replace missed/inconvenient transfers, particularly at off-peak times

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<sup>3</sup> For instance in the report, ‘[Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States](#)’ by Clewlow and Mishra (2017) notes that “after using ride-hailing the average net change in transit use is a 6% reduction among Americans in major cities” (p.2); “ride-hailing attracts Americans away from bus services (a 6% reduction) and light rail services (a 3% reduction)”; “49% to 61%” of ride-hailing trips would have not been made at all, or by walking, biking, or transit”.

Given that feedback can now be gleaned in real time, policy needs to adapt so that changes can be made swiftly in response to feedback and to enhance the customer experience.

## 2.1 Local Government

Wellington City Council's strategy *Wellington Towards 2040: Smart Capital* has set a clear strategic direction around the adoption of technology in support not only of Wellington becoming a smart city, but as an enabler of healthy and vibrant lifestyles for people<sup>1</sup>. This enables the transport system to be considered, not just from a utilitarian perspective, but from the point of view of people's enjoyment and satisfaction, recreation, health & activity, connecting people to the natural setting of their city and improving the traveler experience beyond just reducing delays, increasing efficiency and providing information.

In addition to *Wellington Towards 2040* both Greater Wellington Regional Council and Wellington City Council have recognised the significance of technology to delivering high-quality transport outcomes for the city, and set the scene for the use of these technologies in the following key documents:

- Greater Wellington Regional Council's Wellington Regional Land Transport Plan 2015 (and 2018 review)
- Wellington City Council's Long-Term Plan 2018
- Wellington City Council's Wellington Urban Development and Transport Strategy 2014-2043

It is clear from both Wellington City Council and Greater Wellington Regional Council that, with regard to transport, technology should be applied to support the following outcomes:

- Reliable public transport and transport routes
- Improved safety across all modes
- A resilient and low impact transport network
- Integration between modes
- Increasing active transport
- Roads and public spaces (parks) as strategic transport assets.

Greater Wellington Regional Council comments specifically on the potential of EV, ridesharing, and fast broadband as tools to reduce the impact on the environment and demand on the transport network. Wellington City Council is less explicit, noting the supplementary role that technology plays alongside other tools available to local government<sup>5</sup>, WCC has shown leadership by already working in conjunction with NEC to test centralising data to enable collaboration between agencies, and to deploy new sensors to enhance civic operations.

Outside of Wellington and the region there has also been recognition of the potential benefits of technology with respect to transport systems. For example, Christchurch City Council note the benefits for the environment and recommends that technology should be considered for integration on a case-by-case basis<sup>6</sup>. It should also be noted that post-earthquake Christchurch has been a leader in leveraging technology to engage the public<sup>8,9,10</sup>, quickly realising the potential of technology not only to reach a wider audience, but to aide people's understanding of a transport system in a state of flux and to collect their thoughts and desires for the rebuild of their transport system. This enabled a wide range of people to participate in a genuine way, technology was critical in mobilising the public to take part.

Auckland Transport's plans are more comprehensive with the agency having adopted a Technology Strategy in June 2016 and formed a Technology Partnership with the NZ Transport Agency in 2018. However, AT also looks at technology as supplementary rather than a standalone solution, commenting "a modern transport system requires technological "glue" to collect, process and utilise data to provide operational effectiveness, efficiency, safety and resilience across all transportation modes and services."<sup>7</sup> The Auckland Transport Alignment Project (ATAP 2.0), includes a technology workstream, recognises the importance of technology as a tool to manage travel demand and to enable more efficient use of existing networks. ATAP 2.0 identified "accelerating the uptake of new technologies" as a medium to long term focus and aspires to "maximise benefits" from new technologies.<sup>4</sup>

### 2.1.1 Towards 2040: Smart Capital

Wellington Towards 2040: Smart Capital Wellington's 30-year strategy for future development is a vision supported by four city goals: a people centred city; an eco-city; a connected city; and a dynamic central city.<sup>5</sup> The scenarios developed by Get Welly Moving and the investment that will take place in prioritised transport and mobility projects will be a core enabler of all four Smart Capital goals.

Wellington's transport network and central city spaces are competing for space and the city's connections to the wider region experience heavy congestion with the worst spikes in travel times at peak commuter periods of any territorial authority in New Zealand. New infrastructure and better public transport services will help to alleviate some of this burden but, certainly in the medium to longer term, Wellington will not be able to build its way out of congestion and poor connectivity by investing in hard infrastructure alone.

Technology will play a key role in the future of mobility in Wellington by helping to get people out of their cars and using more efficient modes such as public transport (on a reliable, accessible and connected network) and shared services. The impact of public and private mobility services will be 'unlocked' by technology as multi-modal trips are integrated into single online platforms that provide people with the ability to plan and pay for journeys on the fly.

The goals of Wellington's Smart Capital vision will be drivers of smart transport infrastructure investment and strategy. This approach places social and economic development at the core of transport decision making and positions transport as an enabler of growth in these areas. Intelligent mobility is not just about solving current transportation issues but about creating liveable cities that attract talent and businesses and promote a high quality of life for residents.

While setting goals for Smart Wellington, the document itself does not mandate specific investments in technology, and there are a number of challenges and influences that will shape how these goals are achieved. Technologies implemented will be swayed by public opinion, openness (or resistance) to change, the availability and reliability of technology, and 'game changing' decisions made by central government and private companies who are also active in this sector.

Any future planning for investment in technology solutions to achieve Wellington's Smart Capital goals will need to consider timing and the useful life of investments – when do you plan to implement and how long will the implementation last? There are quick wins to be made but these

<sup>4</sup> <http://www.transport.govt.nz/land/auckland/atap>

<sup>5</sup> <http://wellington.govt.nz/~media/your-council/plans-policies-and-bylaws/plans-and-policies/a-to-z/wellington2040/files/wgtn2040-brochure.pdf>

should not be at the expense of high ongoing costs, or technologies that meet Wellington's goals now but not in ten years' time.

Get Welly Moving is therefore an important enabler of Wellington Smart Capital by aligning with similar aspirations for the city and region, and investigating practical solutions to achieve these.

## 2.2 Central Government

Where local government in Wellington has set the strategic direction for the application of technology, central government provides the framework to enable to application of technology in general, and specific technologies in particular. The key central government documents that set the scene for transport and technology (more specifically Intelligent Transport Systems or ITS<sup>11</sup>) include:

- Government Policy Statement on Land Transport, 2018.
- NZ Transport Agency Technology Roadmap, due September 2018
- NZ Transport Agency Position Statement on Intelligent Transport Systems, 2014.
- Intelligent Transport Systems Technology Action Plan 2014-18, 2014.
- Ministry of Transport Domain Plan, 2016.

More generally, central government has recognised the potential of technology to transform the way New Zealand works, most recently making it a theme within the Government Policy Statement on Land Transport (GPS). It has developed a policy and regulatory framework with a focus on realising the economic, environmental and access benefits to the nation. This has involved an investment of \$1.35 billion in deploying future proofed high-speed broadband infrastructure and making sure that services over that infrastructure are affordable for households and small businesses<sup>12</sup>, as well as a regulatory review of pricing of services to ensure accessibility<sup>13</sup>.

Through the GPS 2018, central government has said it will:

- Plan and invest to take advantage of technology
- Incorporate technology and innovation into the design and delivery of land transport investment
- Take a lead role in advancing technology and innovation to deliver the best transport solution
- Invest in an appropriate mix of modes and technology to ensure high quality transport connections and easy access to social and economic opportunities
- encourage the use of innovation and technology to increase the net benefits from land transport investment and use; and
- support investment in new options that reduce the need for single occupant trips by utilising technology change and innovation

The NZ Transport Agency has recognized three strategic advances that are important enablers of these opportunities<sup>17</sup>:

- The ubiquity of smartphones and related location information
- The potential positive impact of autonomous and sensor equipped vehicles
- Improved vehicle identification technologies including in-vehicle chips and road-side sensors.

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Since 2017, the NZ Transport Agency has been transforming itself to focus on connected journeys and the customer experience, and a number of internal projects are underway that could impact on Get Welly Moving, including the development of a Transport Operating System and greater support for sustainable transport, active transport and travel demand management.

As well as a general acknowledgement of the opportunities related to ITS / emerging technologies, central government will continue to support:

- Electric vehicles - in 2016 the Ministry of Transport launched the Electric Vehicle Programme to increase uptake of electric vehicles in Aotearoa / New Zealand<sup>18</sup>.
- Autonomous vehicles - the Ministry of Transport has published guidelines for trialing autonomous vehicles in Aotearoa / New Zealand<sup>19</sup>.
- Ride-sharing - the Land Transport Amendment Bill 2016 removes outdated provisions and caters for the use of new technologies that facilitate ride-hailing, carpooling, transportation network companies and other micro-transit services<sup>20</sup>.

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## 3 Potential for technology actions in the Wellington region

### 3.1 Innovation corridors

Over the last few years, there has been a growing focus on pilots and trials for smart transport technology and many cities, including Wellington, are seeking to position themselves as test sites for innovation and development. This approach recognises the rate at which new internet-enabled technologies are emerging and evolving. Pilots and trials are an effective way for local authorities to mitigate the risks associated with a high rate of change by partnering with a range of organisations or different sizes and types (large corporates to small local community innovators) to test and validate different ideas in a real-world context. Technologies that demonstrate their effectiveness can then be scaled up, either incrementally or acutely. Learnings from those that do not succeed can be used to inform new approaches. The pilot / trial model has the added benefit that, by having third parties develop technical solutions, local government is freed up to focus on outcomes.

Internationally, smart city projects often begin by selecting a community or a corridor from which to begin their city's smart mobility transformation. This project's understanding of strategy and policy, as well as pilot projects that are already underway, suggest that Wellington is well placed to develop innovation corridors. These will offer opportunities for WCC, GWRC, the NZ Transport Agency and business, and will help bring an 'innovation buzz' to the city. Overseas experience suggests that scalability and ongoing funding requirements are two key features of successful pilot projects. Considering these from the outset can help avoid development stopping at the pilot phase.

#### 3.1.1 Ngauranga to Wellington Airport

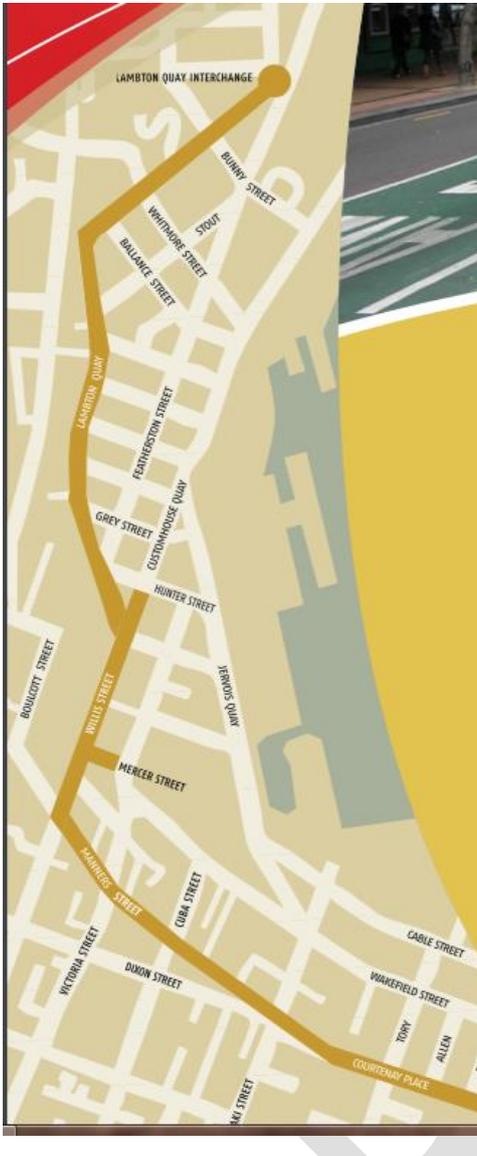
This is the focus area of 'Let's Get Wellington Moving' and includes the Wellington Urban Motorway and connections to the Wellington Regional Hospital and the eastern and southern suburbs. This corridor is primarily a thoroughfare, carrying large volumes of vehicle traffic into and through the city. The 'Let's Get Wellington Moving' Travel Demand Management (TDM) Study (conducted separately to this Workstream) recommended a range of soft and hard TDM measures. Its recommendations could be enhanced by considering the following technology solutions:

- WIFI provision on public transport.
- Developing a shared-use mobility action plan for Wellington.
- Autonomous and connected vehicle infrastructure.
- Electronic congestion charging, distance based charging, and road tolling.
- Smart parking sensors and parking management systems.

This report recommends that technology solutions specific to managing congestion and trips along the Ngauranga to Wellington Airport corridor are developed in conjunction with the TDM Study recommendations to ensure alignment in vision and goals, and appropriate application of technology to support TDM efforts.

### 3.1.2 The ‘Golden Mile’

Wellington’s ‘Golden Mile’ (Courtenay Place – Manners Street – Willis Street – Lambton Quay) is the central spine of the inner city public transport system, it is a place that has been designed to attract pedestrians visiting the retail and commercial centre of Wellington and, because it is home to a diverse range of commercial premises (ranging from retail shops and cafes to supermarkets, hotels and office buildings), it is also a key corridor for freight.



**Figure 3-1: The ‘Golden Mile’** (source <http://wellington.govt.nz/~media/your-council/projects/files/brochure.pdf>)

The Golden Mile already has some smart infrastructure in place. Electric trolley buses carried passengers along this corridor for many years, while more recently NEC has trialled automated video capture and data processing of pedestrian, cyclist, and vehicle (by type) movements through the Taranaki and Courtenay Place intersection. This corridor of road network is an attractive space to continue to develop technology, innovation and development because it caters for a wide range of people and goods movements across many different modes throughout the day.

This report recommends the ‘Golden Mile’ corridor be used to explore technology opportunities that can help balance the needs of freight, people and vehicles travelling on the corridor and reconcile conflicts, such as those between public transport and private vehicles, and between people walking and other modes. Technology solutions will also be enablers of creating an urban environment that supports safe and efficient movements of people and goods, and helps to create a safe and pleasant environment for people walking. A technology-enhanced Golden Mile would be a network corridor where local authorities and government would actively support and enable the testing of new technologies (be they sensors, ITS infrastructure, or autonomous vehicles) by non-government third parties. This would help WCC, GWRC and NZ Transport Agency to develop protocols for public (local and central) and private organisations working together and sourcing data from the same network – in essence, developing protocols for an aligned multi-stakeholder approach that delivers transport outcomes and commercial interests.

Potential technologies/learnings that could be encouraged/trialed that align with the existing vision for the Golden Mile innovation corridor, and that could help balance the interests of local freight with active transport modes (walking and cycling), include:

- Smart intersections that prioritise public transport and pedestrian movements and improve safety for people walking and cycling.
- An ‘integrated mobility hub’ which provides infrastructure to facilitate interchange between technology-enabled transportation services and the bus rapid transit system e.g. carshare, on-demand ride-hailing or bikeshare to bus.

- A smart freight corridor that allows delivery drivers to see when loading bays are available in real time and potentially ties in to a 'hub and spoke' style programme to enable efficient delivery of goods and supports a freight demand management plan that balances delivery schedules outside of the busiest times for moving people.
- Testing for deployment of emerging technologies – how can sensors be deployed along the same corridor by different providers without the need for multiple poles, fixtures and wiring? To collect information about people in motion, things in motion and vehicles in motion.
- Link to the Smart Motorway and seek opportunities to integrate information across the existing Bluetooth sensor network with new sensors and data collected on the innovation corridor.
- Ready infrastructure for future developments e.g. this corridor would be capable of supporting Vehicle to Infrastructure (V2I) communication and data sharing, and become a test corridor for automated vehicles – perhaps an automated public transport shuttle running the length of the Golden Mile.

## 3.2 Electric Vehicles

### 3.2.1 Electric Vehicles

When we discuss electric vehicles, we are generally talking about how we power the modes of transport we use today (specifically those that are currently powered using fossil fuels) as well as the vehicles/modes of the future. With clear signals from central government and the private sector, electricity will be the fuel that will power New Zealand's vehicle fleet in the near future. Thus, action must be taken at a local level to ensure that the appropriate enabling infrastructure is in place at the right time.

The transition from fossil fuels to electric vehicles is often discussed in conjunction with a shift in transport modes and how we use them (e.g. ridesharing). This is because both are significant changes that are occurring almost simultaneously. To ensure the benefits of both are maximised the disruption that the transition to electric is creating should be leveraged in support of changing transport modes and uses (e.g. ridesharing) and vice-versa.

Wellington Region's electric vehicle (EV) policy and goals are already ambitious with GWRC aiming to be the first NZ city to have an all-electric bus fleet, and WCC adopting an electric-first policy for their vehicle fleet.

EV Roam is the Transport Agency's website that helps EV drivers find local charging stations that meet certain government criteria. The public can also access PLUGSHARE to find residential chargers that are shared by PLUGSHARE's members.

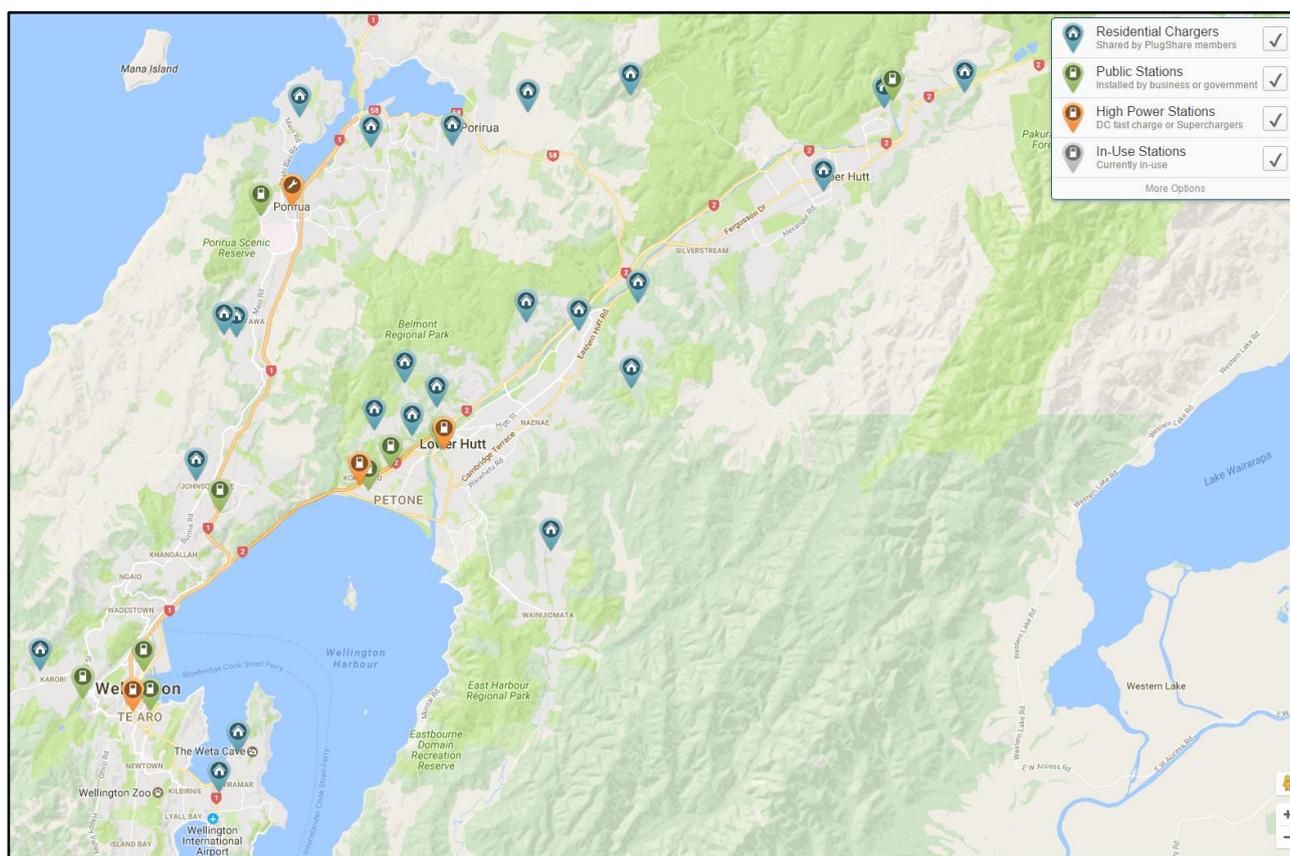


Figure 3-2: EV charging stations in the Wellington Region (source: [www.plugshare.com](http://www.plugshare.com))

The publicly provided charging network across the region is in its infancy with a handful of sites in each of the major centres. These charging units are largely provided on commercial premises such as petrol stations, shopping centres and major attractions.

A number of EV charging units have recently been installed on street in Wellington at dedicated parking spaces, a common trend overseas that both increases the visibility of EVs and provides a practical charging option for households without off-street parking or for charging vehicles while drivers go about their activities.

### 3.2.2 Electric Vehicle Actions

- The project's priority should be to provide support and charging for shared-use vehicles as opposed to private solo car drivers and there should be strong ties to the TDM workstream to encourage uptake that will have a positive impact on the transport system
- Work with shared-use EV schemes (carshare and rideshare) to understand infrastructure needs to increase network coverage and ensure this sector is supported as part of the region's mobility service network and in a way that compliments public bus and rail. Provision of infrastructure and working with EV car share providers is already taking shape in Wellington, most recently with the introduction of Mevo.
- Continue to expand public provision of EV charging units across Wellington Region and drive the shift to electric public transport. Identify opportunities for public-private partnerships, or to facilitate private investment, in new EV charging units in urban areas or at 'integrated mobility hubs'. Strong targets for geographic coverage and number of units should be set in this space.

- 2016 saw the release of the first international standard for “Wireless Power Transfer for Light-Duty Plug-In/ Electric Vehicles and Alignment Methodology”. This opens the door for deploying wireless charging stations on street in the short to medium term, and as electric buses are deployed on the Golden Mile, roadway wireless charging could be implemented (medium to long term).<sup>6</sup>
- Promote the use of electric vehicles as light goods vehicles and then focus on heavy vehicles.

### 3.3 Shared Mobility

At the heart of any smart mobility plan lies a shift away from single occupancy car driving towards shared mobility. In addition to growing bus and rail patronage, which will continue to form the spine of Wellington’s mobility system, Wellington will also need to harness the potential for the new technology-enabled transport services to augment these services, both to plug low-patronage first/ last leg gaps in the network, and to supplement services during lower-frequency periods of the day / week. Presently, providers of shared mobility services are mostly developing their systems in isolation from any central or regional planning, although in the last two years, Wellington City Council developed a policy that accommodated carshare vehicles in designated on-street parking spaces, including peer-to-peer; a small bikeshare set up and began operating during 2017 too. A more collaborative approach will ultimately provide a more integrated system that will better meet the needs of the public and business. The onus is on local and regional authorities to form relationships with shared mobility service providers, to understand their business and include them in the wider mobility system. Wellington may wish to develop a plan like Los Angeles’ Shared-use Mobility Action Plan, use and perhaps partner with Auckland Transport as they progress their Shared On-Demand Mobility Plan.

The other reason to focus on growing shared-use mobility in the short to medium term is to leverage the disruption that the transition from fossil fuels to electric vehicles will create. There is the opportunity to piggyback on this transition to form the foundation for a shared, autonomous, connected, electric future for small passenger vehicles. Without achieving this transition, there is a risk that people will simply shift from solo car driving to solo travel by electric-autonomous vehicle, which does nothing to solve congestion and could potentially make it worse if, for example, it is cheaper to send a car home after you have arrived at work or school, than to park it for the day. This might reduce demand on inner city parking but could increase peak time trips.

The new technology-enabled services include:

- Bikeshare, particularly point-to-point bikeshare systems (refer section 3.8.2).
- Carshare (community carshare, peer-to-peer and city-wide schemes).
- Microtransit services (e.g. Bridj and Ride Chariot).
- Ridesharing or shared ride-hailing (e.g. UberPool or Lyft Line).
- Carpool, particularly dynamic carpool system e.g. Scoop.

Other trends include services that are combining freight and passenger transport, so that, effectively, they are co-subsidising each other’s trips e.g. BridjBox (no longer operating) and these sorts of efficiencies should be encouraged, particularly on a corridor with multiple uses. Shared mobility aimed at helping transport kids with vetted caregivers is another tech-enabled shared mobility solution, for instance, [HopSkipDrive](#).

<sup>6</sup> Source: <http://standards.sae.org/wip/j2954/> last accessed 22/2/17

### 3.3.1 Shared Mobility Actions

- Consider developing a shared mobility action plan to enable to effective integration of new technology-enabled modes with the existing network (Auckland Transport are in the process of commissioning a similar piece of work).
- Set targets for change (passengers/ users/ trips) and relate these to services required (i.e. as LA has done- increased trips on bikeshare have been translated into number of bikes required in the system).
- Identify opportunities for first/ last leg partnerships to extend the reach of mass transport networks (also see ‘integrated mobility hubs’).
- Support policy change to enable ridesharing, following the approach taken by Wellington’s partner city, Sydney, New South Wales and consider inviting ‘expressions of innovation’ as New South Wales has done, for mobility on demand.
- Identify communities suitable and potentially willing to transition to a ‘shared fleet’ model (as San Francisco proposed in their Smart City Vision).
- Develop an approach to attracting more rideshare, ride-hailing and micro-transit providers into the New Zealand and Wellington marketplace (through incentives, procurement models and international outreach) or to grow this technology at home (incubators and needs-based innovation challenges/ competitions).
- Place emphasis on the inclusion of bikeshare and carshare as part of TDM programmes for example at Victoria University.
- Initiate a business co-operative carshare scheme which enables a group of local businesses to transition from pool or company cars to a shared pool of cars (short term); once this has been established, facilitate the transition/ encourage uptake of a MaaS scheme to encourage multi-modal trips.
- Change travel surveys or other data gathering approaches to capture multi-modal journeys and use of new modes of transport.
- Target TDM outreach efforts to educate citizens and visitors about how to use the new shared services, including both online and real-world communication platforms.
- Provide access to carpool software that enables dynamic matching and automates cost sharing; this should be rolled out in conjunction with e.g. pilot of new HOV lanes (temporal or tidal) on existing infrastructure.
- Consider transportation network companies or similar (shared taxis) to replace rural bus services with low ridership, potentially improving access for less money.

### 3.4 Bus rapid transit ‘integrated mobility hub’

Los Angeles’ ‘Shared-use Mobility Action Plan’ includes a number of ‘Integrated Mobility Hubs’ at its mass transit stations. These are this decade’s public transport interchanges but unlike traditional interchanges which usually only cater for bus-rail interchange, commuter cycle parking, taxis and perhaps some park-and-ride the new ‘Integrated Mobility Hubs’ will accommodate seamless transfers between technology-enabled shared-use modes and rapid/ mass transit routes, while still focusing on keeping all travellers safe and informed as they travel through the interchange. Some of the new ‘mobility hubs’ are also supporting activities that are not traditionally the domain of passenger transport e.g. providing refrigerated lockers to allow travellers to pick up groceries on their way home or received other items, adding to the convenience of using shared modes for their journey. This integration of different activities represents a major opportunity to optimise the functionality of trips. LA’s Action Plan describes the Integrated Mobility Hubs as

being particularly attractive to their “super sharers” i.e. travellers who embrace shared modes and often don’t own a private car.

This report recommends developing Wellington/New Zealand-specific design guidance for integrated mobility hubs using best practice overseas mobility hub guidance as the foundation. Identify locations and staging of mobility hub development in Wellington. Some possible locations to fast-track mobility hub development include public transport hubs like the Golden Mile, public transport station with significant parking pressure or locations to stimulate transit/ mobility oriented development in an area earmarked for growth.

### 3.4.1 Integrated Mobility Hub Actions

Develop a Wellington design guide for ‘Integrated Mobility Hubs’ to support the development or upgrade of rapid public transport stations and to support mobility-oriented development as the city’s population grows. Identify locations and staging of mobility hub development in Wellington

## 3.5 BRT (or LRT/MRT) – Capacity and customer enhancements

In order to appropriately support development of bus rapid transit (or light rail) in Wellington, it is imperative to consider appropriate capacity and customer enhancements which will support efficient operation and customer uptake of public transport. This will have the effect of improving system performance, improving the value proposition of public transport over private vehicles and providing positive customer experiences.

Multi-entrance loading and alighting of vehicles can reduce dwell times and thus travel times and improve reliability and technological advances, smart card ticketing can support this.

Similarly, technological advances have blurred the lines between buses, light and heavy rail. The most cost-effective while maintaining high quality services, public transport vehicles for Wellington may be something like rubber-wheeled trams. It may be worthwhile to undertake a public transport technology study to understand what vehicle type would be optimal for Wellington’s context.

Public transport ticketing is evolving in ways that offer higher convenience for customers and potentially fast boarding and alighting. Contactless virtual smart cards (often where one swipes a smart phone which may be connected to a system like Google Pay) are likely to become more common and lower in cost over time. Any ticketing solution should be future-proofed to allow for this development.

Animated bus maps are not new technology and they would be delivered by the TDM workstream, but since they are technology, and they haven’t been used in New Zealand to market bus services to date, they are mentioned here. In the UK, numerous location-centric animated bus maps have been used to market public transport choices to potential commuters or visitors; it should be noted that these are not real time maps, these are animations that show which services come into and out of an area, the user can then click through to find out more timetable information for the routes of interest to them. These maps have been around for over fifteen years, they are inexpensive to create and could be a ‘quick win’ for Wellington if developed for key locations or events. One of the videos can be viewed here: <http://www.quickmap.com/movie1vic.htm>

Meanwhile, smartphones and other technical developments are enabling more customer-centric communication via apps and other emergent channels, enabling public transport authorities to

provide relevant travel advisories in real-time, supporting more customer-centric, demand responsive services. This allows customers to adjust their travel in real time when there are bus disruptions or delays. In theory, public transport authorities could work with transportation network companies (like Uber) to provide more demand responsive alternative transport options in real time – perhaps by negotiating special fares so that customers are not inconvenienced and do not end up paying more for their travel when there are system disruptions.

### 3.5.1 BRT (or LRT/MRT) – Capacity and customer enhancements - Actions

Some actions to support BRT in terms of capacity and customer enhancements include:

- Develop policy of multi-entrance PT loading/ticket validation – include in transport service specifications, develop customer information/driver training accordingly.
- Consider emerging PT vehicle technology – possibly supported through a study/review of emerging public transport vehicle technology. This may require re-examination of patronage forecasts, consideration of induced patronage via ‘density by mobility’ (this term describes the potential effect of using technology-enabled transport services to connect people to e.g. a rail station), wider economic benefits associated with different modes available, earthquake resilience etc.
- Ensure future public transport ticketing models (can) use contactless virtual smart cards.
- Develop animated bus maps for key locations and events.
- Enable communications with customers via public transport ticketing apps/other emergent channels to provide relevant travel advisories in real time (e.g. if there is a bus disruption alerting of delays and viable alternative travel options).

## 3.6 Mobility as a Service

Current public transport services are designed to enable users to plan trips based on where and when they want to go, not having to concern themselves with the mode of travel nor the service provider of that mode. In that respect, public transport can be considered mode neutral. However, the integration between different modes is usually limited to e.g. synchronised timetabling that does not adapt to reflect changing circumstances (such as the needs of individual users from different demographics), and smaller private providers of e.g. carshare or ride-hailing services cannot usually be accessed within the same journey planning apps. Mobility as a Service (MaaS) is a natural extension of the outcome-focused approach taken by public transport services, enabling people (and goods and services) to more effectively meet their transport needs by integrating services offered by different modes and service providers on a unified platform, coordinating those different services, and streamlining payments.

MaaS also complements shared services as it also supports the shift away from personally owned modes of transport that will be critical to reducing congestion, as well as the adverse effects of the transport network on amenity, health and safety, and the natural environment.

A key limiting factor for MaaS solutions is access to real-time information about transport services and user demand / needs. Related to this is scale i.e. the number of people using the MaaS solution. Where real time information is available it becomes possible to deliver more reliable services for users. As real-time information becomes more comprehensive and demand for MaaS

increases, then demand responsive transport becomes possible i.e. services that adapt (routes, timetables etc.) to meet the needs of transport users.

As with shared mobility services it is important that MaaS is supported and guided by local authorities to ensure interoperability of technology platforms. Future models such as Mobility as a Service will require both public and private transport services to have integrated ticketing and journey planning systems available to customers. At present Wellington's public transport service is well catered for through Metlink and the Metlink Commuter app, both of which support journey planning. This forms a robust foundation for the shift to MaaS where such a platform will be needed to act as a neutral interface, coordinating private and public service providers. However, it may be that as the functionality required of the platform increases, that government is not the entity best placed to develop the platform itself. Based on the experience of international cities including Portland, Oregon and Helsinki, Finland this report recommends that Wellington works with an experienced vendor to develop a MaaS platform, or joins up with the NZ Transport Agency to develop and roll out 'Choice', the new government-provided MaaS service in Queenstown, freeing local authorities up to focus on coordinating local transport service providers.

### 3.6.1 MaaS Actions

- Leverage Wellington's position as a fast-follower by partnering with a city more experienced in delivering MaaS to expedite implementation in Wellington e.g. Portland, Oregon.
- Work with the Transport Agency to discuss using Choice, the government-provided MaaS app launched in Queenstown in 2017.
- Understand delivery model that works for Wellington's travellers, such as monthly subscription based services and what these would include (public transport, taxi/ride hailing trips, shared rides, shared vehicle access) and/or pay-as-you-go services. Also, how people in different parts of the Wellington Region might have different needs for MaaS – those who commute into and out of the central city each day will have different needs/wants to those who walk to work in the central city but travel out for recreation at the weekend. What would be the likely cost of these offerings?
- Explore key success factors that have been identified internationally, for example, how well is Wellington able to provide for such things as: guaranteed services (people must know that they will be able to get home), ease and speed of use should allow for freedom of movement. What actions need to be taken to ensure these things.
- Access to real-time information should be accessible to all. For many people, this may be via smartphone, but access should also be provided by other methods (for example by way of a kiosk) for people who don't have access to a smartphone.
- Need to develop public education campaigns that include comparing offerings to the true cost of car ownership/use so that people can fully evaluate their transport options.
- Establish partnerships with transport service providers (including public and private, and large and small scale providers) and develop a business model that enables all service providers to participate in a MaaS solution, including sharing data and information.
- Explore procuring and testing a next generation MaaS platform from experienced vendors (e.g. Moovel in the USA, Whim app in Helsinki) and engage with the NZ Transport Agency to work together towards a model that can be applied across NZ and not just in Wellington.
- Explore how pricing could be used to control/flatten the demand for public transport. For example, Singapore provides free trips in the morning pre-peak to encourage people to travel earlier. Such measures allow for more people to be moved with the existing infrastructure.

### 3.7 Inner-city parking

Wellington has already started the installation of smart parking sensors and web/mobile enabled payment platforms for public parking in the city centre. Apps like PayMyPark and phone2park let users pay for parking time remotely, and in-vehicle units can also be installed to do the same.

This report recommends a continuation, and geographic expansion, of current approaches to parking management technologies in Wellington CBD, and an investigation of where coverage could be expanded to. Key functions or outcomes that will be a focus of any investment in parking technology are:

- Payment platforms, including pre-booking of parking spaces.
- Real-time mapping/communication of parking availability and prices.
- Demand responsive pricing for parking to manage availability.
- Detailed understanding of parking use by space and zone, ties into automation of responsive pricing.
- Better overall management of parking stock, including where parking can be reduced to return valuable inner-city land to more productive social and economic uses.
- PPP to increase parking availability in a particular area to support greater use of PT or even bike & ride; will required using an app like Parkable or Iungo and working with the private sector to identify underused parks to 'sweat' – this approach could be a stepping stone before a 'mobility hub'.

This system is currently disconnected from off-street parking facilities which generally have private operators. If demand responsive parking prices is a potential future TDM measure for Wellington, then some level of collaboration between public and private providers of parking will be necessary to provide benefit for the transport system.

### 3.8 Active Modes

There are a number of developments in technology that can be used to better support travel by active modes.

#### 3.8.1 Electric Bikes

Electric bike (e-bike) technology has developed rapidly over the last 10 years and the price of e-bikes has dropped steadily in response. Permeation of e-bikes into the bicycle vehicle fleet has been rapid and is likely to continue as e-bikes become more affordable. E-bikes are particularly well-suited to Wellington given the hilly topography of the city. Note that the recent introduction of bike racks on the bus fleet will further support growth in bicycling, including e-bikes, by facilitating bike movement options, such as for example getting one's bike home on a rainy day. From a strategic transport planning perspective e-bikes have the potential to increase the demographics of people biking (e.g. less fit, older), to expand the geographic catchments for cycling trips (e.g. hillier areas, further distances) and the speed at which people are cycling<sup>7</sup>.

<sup>7</sup> Refer <https://nacto.org/wp-content/uploads/2012/02/E-bikes-and-Transportation-Policy-Insights-from-Early-Adopters-Dill-et-al-12-4621.pdf>

### 3.8.1.1 Electric Bike Actions

Managing and harnessing the ‘e-bike’ revolution includes actions including:

- Considering higher cycling speeds, volumes and wider catchments in infrastructure design
- Integrating e-bikes into any bike share schemes (also called ‘electric assist’ bike share or ‘pedelecs’). Evidence from Birmingham, Alabama suggests that e-bikes can be ridden five times as much as conventional bikes in bike share schemes. Bike share e-bikes can be re-charged via solar-power equipped docking stations, or tapping into the electricity network via a close-by lamp post.
- Consider a local community-based e-bike trial. Select a community where topography/distance may have traditionally been a barrier to cycling (e.g. Highbury, Southgate, etc.), buy a fleet of e-bikes and allow participants to trial them for week or month-long periods. A local bike shop may provide some funding support for this if they can advertise or provide support alongside. If successful, further e-bike trials can be implemented in other communities.
- Consider funding/support initiatives for workplaces to support e-bikes via subsidies e.g. to support installation of powerpoints in cycle storage locations, purchase of fleet e-bikes etc.

### 3.8.2 Bike/Scooter Share

A number of cities now have bike share – most often in the form of more traditional local-authority-sponsored bike share with docking stations or newer, typically private point-to-point bike share systems. The latter are the newer tech-enabled version so are discussed in more detail here as there is plentiful widespread guidance available around more traditional bike share systems.

Private dockless bike (and now scooter) share is increasingly permeating cities which offers both an opportunity (increased access to bicycles and push scooters) and risk (many cities have had issues with private bikeshare bikes clogging up footpaths, causing a general nuisance, and sometimes having aggressive and confusing pricing structures for consumers). With appropriate rules/policies these new systems may offer a fun and convenient way for people to get around and offer local authorities improved accessibility for their communities with, potentially, less hassle and subsidy from the council. Wellington’s environment is particularly constrained and so private operation of bike/scooter share needs to be carefully managed. A number of cities overseas have achieved this by developing conditions which private operators must abide by in order to operate in their cities. NACTO recently released ‘Guidelines for the Regulation and Management of Shared Active Transportation’ which includes standards for “for cities to manage companies that are not otherwise overseen or selected through competitive procurement processes or contracts, and sets minimum standards that all cities should require for managing this new industry on city streets, including:

- Permitting frameworks.
- City/company communication mechanisms.
- Standards for communicating with the public.
- Data requirements.
- Minimum equipment safety standards.

- Customer privacy standards.<sup>8</sup>

**Action:** Develop strategy around private bike/scooter share by reviewing best practice and guidance (what works/doesn't) for regulation overseas. Seattle may serve as a good case study in producing guidelines for private operators wishing to operate in Wellington

### 3.8.3 Mapping Wellington's Pedestrian Thoroughfares

Within Wellington's central city are a vast number thoroughfares and passageways through buildings and laneways that are legal thoroughfares for pedestrians. These shortcuts are sometimes mapped in online maps, but a number are missing from maps and knowledge of their existence is tucked away in documents like consent conditions for new buildings. Publishing these in open source maps for journey planning and incorporating them into Google Maps and Open Street Map would make them more accessible and increase access for people walking in the city.

This project will contribute to the principles of an 'accessible, healthy and safe', a 'compact city' 'and ensuring 'past, present and future' infrastructure developments are integrated within the built environment. This is achieved by providing pedestrians with a range of safe routes through the central city and increasing the liveability of the city centre by promoting it as a pedestrian-centric urban space.

### 3.8.4 Illumination to Support Pedestrian Safety

A hazard that is becoming increasingly prevalent is people looking at their smartphones while they walk, sometimes called, 'smartphone zombies'. Some cities in [the Netherlands](#) and [Melbourne](#) have trialled innovative illumination to support pedestrian safety. This has included illuminated zebra markings and guidelights. Such treatments can reinforce pedestrian priority to other road users and, in the case of guide lights, potentially preventing pedestrians from walking out in front of cars using a visual cue in the direction that their faces may be if pedestrians are looking at their phones.

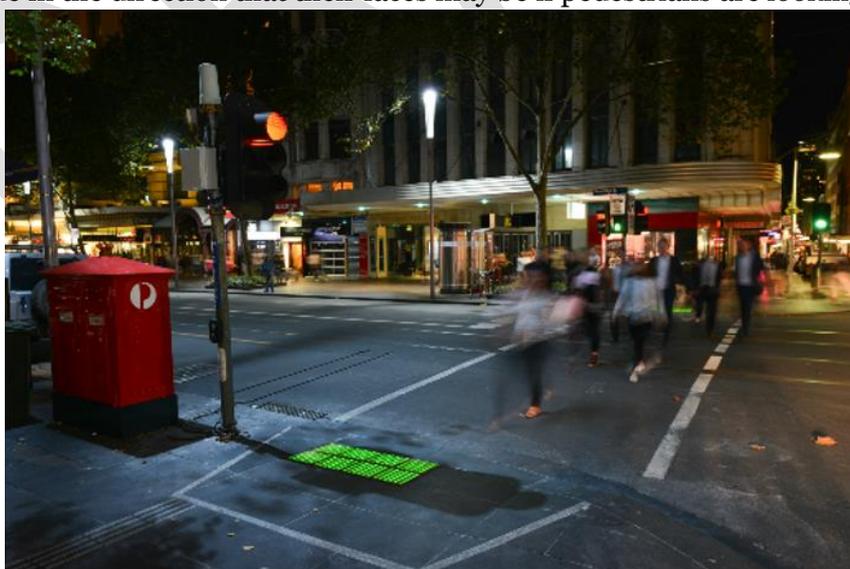


Figure 3: Illuminated guidelights trialled in Melbourne. Photo courtesy of <https://www.ipwea.org/blogs/intouch/2017/04/02/heads-down-thumbs-up-saving-pedestrian-lives-with-visual-clues>

<sup>8</sup> <https://nacto.org/2018/07/11/shared-active-transportation-guidelines/>

### 3.8.5 Emerging Active Modes

Advances in technology have enabled the emergence of many other power-assisted active modes. For instance, the bike lanes of San Francisco have many people riding electric skateboards (also called boosted boards). Hoverboards and single wheel (solowheel) mobility is also emerging (and various combinations and iterations of such devices). What this means from a transport planning perspective is still to be determined. Reviewing any specific requirements (e.g. bylaws) to limit/cater for such technology in Wellington whether on the streets or footpaths would be beneficial in ensuring the safety of all street users and possibly support encouragement of these emergent modes where/if considered desirable. This could be achieved through a local review/policy development or possibly at a national level, taking learnings from WSP's work on this subject with local government in San Francisco.

### 3.8.6 Counting Wellington's Cyclists

Many major cycle ways are established across the Wellington Region, and these routes attract large numbers of commuter and recreational cyclists to them daily. Installation of electronic bike counters on major cycleway routes to highlight usage of these both to users and to drivers passing by.

While not directly incentivising cycle trips themselves, this infrastructure would help celebrate the principles of 'travel choice', demand and supply' and 'clean and green' mobility in Wellington.

### 3.8.7 'Green Wave' Cycle Signalling

A rather modern, yet already 'tried and tested' technology (e.g. in Copenhagen, San Francisco) is timing traffic signals to support a 'green wave' for cyclists. Green waves rely on timing traffic lights for a 20km/h speed to better favour cyclists rather than cars and buses. This speed supports cyclist to maintain an even flow, decreasing their travel times and the number of times they must stop. Some adaptive systems have even been rolled out using data from traffic sensors and buses' GPS dynamically to prevent buses from being delayed on bus corridors where green waves are established.<sup>9</sup> Another potential benefit is slower vehicle speeds that match that of cyclists which may be associated with safety benefits.

**Action:** Consider a 'green wave' trial on a key cycling corridor of Wellington.

## 3.9 Drones (aka Unmanned Aerial Vehicles - UAV's)

While a full review of the development and deployment of drones is beyond the scope of this report, drones are becoming increasingly common, have some useful potential but may also pose some risks without careful strategic consideration and management. Drones are already being used by engineers and surveyors for several purposes and may be useful for collecting transport data – though it is acknowledged that the Transport Agency has a policy banning their use along state

<sup>9</sup> <https://www.centreforpublicimpact.org/case-study/green-waves-bicycles-copenhagen/>,  
<https://www.sfmta.com/press-releases/sfmta-unveils-new-and-enhanced-bicycle-friendly-green-waves>

highway networks. For the LGWM project there may be potential to set up regular drone monitoring of key intersections to quickly gain snapshots of data.

From a commercial perspective a number of companies, like Amazon are looking at the potential to use drones for package delivery or other purposes.

While there are many potential applications for drone technology in Wellington, especially with Wellington's difficult topography (e.g. for package deliveries), Wellington is also a windy city and the potential for drones to pose a nuisance through crashes is a risk which is worthy of attention.

**Action:** it is therefore recommended to undertake a 'light' study about performance/issues of drones in the wind in Wellington and develop strategies/policies accordingly based on the recommendations.

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## 4 Key Enablers

Note: this section has been included in this draft document as discussion points with the Get Wellington Moving Group. It contains recommendations at a higher level than technology focused enablers of mobility in Wellington, but are relevant as guiding approaches and large-scale investment in improve the technology underpinning the region's transport network.

A partnership approach and the use of data are common themes across many of the recommendations and actions included in this report. Expanding on these, we consider it valuable to discuss the more general benefits of public-private partnerships and a data-focused approach to technology investment and innovation.

### 4.1 Partnerships

One common trend internationally has been the increasing emphasis on partnerships between government and smart mobility service or equipment providers. The US DOT Smart City competition required applicants to have partnerships in place with a value of US\$40m or greater. This is a change to current procurement models and would require the establishment of an alliance/ coalition or like foster these relationships within Wellington. Changes to procurement models are needed to ensure that, for example, where a private enterprise has secured a premium market position through government support or endorsement, this should take place through a fair and open selection process that allows all interested parties to compete for the work.

- Wellington 'Smart Mobility' alliance – group that works with private providers of technology and mobility services to ensure all groups are working toward a shared vision, and are complementing, or at least aware of, each other where possible.
- Engage with private organisations (NZ and overseas) and establish working relationships to encourage new entrants into the sector to work with a shared vision for future mobility and community outcomes in the Wellington region.
- Develop strategic business models for Public Private Partnerships in the technology space.
- Establish a partner city who is embarking on a similar journey – (e.g. Portland or Columbus).
- Understand the approach and success of ATEED and Auckland Council's incubator/ innovation hub; this has been set up with the purpose of fostering a series of pilots to test proof of concept for smart initiatives which, collectively, will build up an evidence base to inform the next long-term plan (LTP) update.
- Understand what are the barriers for private organisations innovating and implementing new things and what local/central government can do to remove these.

### 4.2 Data

Data collected from and associated with transport activities across investor, asset manager and customer perspectives is becoming an increasingly valuable resource for public transport authorities.

Data in itself does not answer anything, but is vital to the design and supply of information. The information that can be created from data, particularly trends, is important for evidence-based decision making, to set the policy agenda, business cases and for improving transport service provision – leading to better value outcomes for all stakeholders.

The NZ Transport Agency through its Connected Journeys solutions team, has embarked on a number of initiatives to improve how transport data is handled. For example, it is in the process of developing a transport operating system, which will centralise the management, handling and analysis of its numerous data sets. This is a significant step forward from the bespoke, and typically project driven approach of previous years, which resulted in many suppliers supplying many datasets, in many formats across many data platforms. While this still happens outside of the Agency, realisation of value return from IT occurring in “siloes” isolation, and is materially hard to scale because of the predefined project parameters. At a national level, this equates to much less value for New Zealand at much higher bespoke costs.

These perspectives are important to understand before considering an appropriate data solution for Wellington City Council, which will help contain costs whilst maximising benefits.

The Get Welly Moving project should:

- Aim to use or reuse existing datasets and data contracts to reduce procurement costs
- Collaborate with the Transport Agency to understand how it can support and benefit from the new Transport Operating System.
- Monitor other Smart Cities globally and locally to determine low cost – high value data investment initiatives.
- Leverage existing transport and supplier partnership arrangements.
- Make best use of existing data and data collection infrastructure.
- Utilise internal and open source IT analytics capability.

There are broader actions that can be undertaken by WCC and GWRC to increase the value of their data, help translate data into knowledge, and ensure data is available to meet the city and region’s transport vision and needs:

- Understand what the quality and nature of data/information is that different groups need:
  - Public.
  - Network operators/managers.
  - Private groups.
  - Decision makers.
- Identify data gaps in the context of specific projects/goals (e.g. MaaS) and undertake a tiered approach to plugging data gaps that includes the private sector – local and central government should not expect to capture and manage all relevant information but rather identify opportunities to collaborate with external organisations for co-benefit.
- Development of an integrated data platform (such as an API) that is built on data standards to ensure vendors are providing information to WCC and the NZ Transport Agency in a consistent manner. Looking at opportunities for developing a Wellington Transport API that is accessible for uploading and downloading of information by both public and private organisations, while protecting the privacy of individuals – look to what is taking place in Auckland and Christchurch with their APIs and play a role in centralising NZ transport data in a single API, or network of APIs that are compatible with each other).
- Recognise tipping points for data sharing – when does an integrated system/shared data become so valuable that everyone starts getting on board?

### 4.3 Technology Procurement Policy

In order to allow the seamless integration of data and systems from different partners, it would be useful for LGWM partners to develop and adopt a procurement policy which ensures that procurement of infrastructure, services and such follows a progressive approach that supports innovation and new technology. This includes for instance, ensuring adoption of Open Application Programming Interfaces, requiring operators to provide data, in a consistent, useful format, in an open data stream where appropriate, as a contractual condition, and possibly having contracts subject to a tech-review to make sure solutions being secured are future-proofed (e.g. do not rely on technology likely to become redundant in a short timeframe).

### 4.4 Cyber Security

With transport digitalisation, transport companies/operations can be targets for hackers. Cyber security will ensure the smooth continued operation of transport systems and services, plus protect users' privacy.

**Action:** Develop transport-focussed cyber-security program. (What this involves requires more detail/development beyond the scope of this report).

### 4.5 Monitoring and Evaluation

Robust evaluation of measures is important to:

- Pre-initiative evaluation to guide spending, prioritise initiatives and ascertain the likely return on investments.
- Undertake ongoing monitoring of initiatives to track how well projects are performing against anticipated outcomes, enabling review of investment priorities. Some tools have recently been released to help evaluate pre-implementation and ongoing monitoring of smart mobility initiatives (see below under 'Actions').
- Support and accelerate the development of a centralised or connected evidence-base that can be used to inform policy updates and provide evidence for using innovative or technology-based approaches.

One of the benefits of ongoing monitoring and evaluation is to support 'story-telling' creating a sustainable transport culture which encourages, supports and celebrates mode shift and, of course, to justify continued spending on smart mobility. For instance, a recent technology-enabled TDM campaign focused on reducing peak time travel into the central Sydney CBD achieved an 11% reduction in the number of vehicles entering the CBD during the morning peak and a 9% increase in public transport use over two years. The aim was to reduce the number of cars entering the CBD during peak hour, alongside unprecedented levels of public and private construction that reduced road capacity. The 11% reduction was achieved while the number of people entering the CBD by all modes continuing to increase. While trips into the central city grew, the mode shift curtailed a growth in car trips at peak times.<sup>10</sup> This is an example where monitoring showed the actual results in mode shift – the likely savings in travel time and reduced congestion would have justified continued investment in the travel demand management program.

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<sup>10</sup> <http://www.mysydney.nsw.gov.au/travel-choices> last accessed 19 August 2018

In addition, with the increasing amount and quality of data available, there is an opportunity to develop easy-to-use transport trends dashboards as is common in many progressive cities worldwide. This offer a fun and interesting interactive tool for both the community and decision-makers to use to monitor multi-modal transport trends in both real time and historical performance in an accessible form. Such a dashboard can support government accountability, development of more demand-responsive transport systems.

**Actions:**

- Perform pre-initiative evaluation to determine return on investment to inform prioritisation of initiatives. Recommended tool: Trip Reduction Impacts of Mobility Management Strategies (TRIMMS). Available here: <https://mobilitylab.org/calculators/>
- Undertake ongoing monitoring of initiatives using the TDM Return on Investment Calculator, available here: <https://mobilitylab.org/calculators/>
- Develop an easy-to-use dashboard and tools to monitor multi-modal use of the transport system to provide real-time and historical trends. This needs to be accessible to public and non-data-literate. This could possibly be achieved through integration from existing data sources such as: <https://opendata-nzta.opendata.arcgis.com/>, [Satori](#) or other emerging data sources
- Centralise evidence to support evidence based policy making and begin to standardise evidence bases used to justify new investment.

## 5 Summary of key technology-related actions

Category	Action	Benefits	Time Frame*	Responsibility/Owner	Cost Estimate (very rough order indicative cost)
Innovation corridors	Smart intersections along the 'Golden Mile'. Prioritise public transport, cycling and pedestrian movements, improve safety for pedestrians and cyclists in line with the Vision Zero (GPS) initiative. (Sensors detect these modes and give them priority treatment)	Provides a safe and accessible city for all modes, and improves efficiency for priority vehicles/travellers.	Short term (2-5 years), as part of DBC	WCC	TBC during DBC
	Smart freight corridor in road network surrounding the Golden Mile.	Delivery drivers can see available loading bays in real-time, support real-time freight demand management that balances schedules around network demand from other modes. Facilitates efficient business activity and balances the needs of the transport system across modes.	Short term (2-5 years)	WCC	\$500k
	Testing deployment of emerging technologies.	An enabler of innovation and learning, test how sensors can be deployed in the same space by multiple providers without developing many unique systems, understand physical requirements of these sensor networks, collect information about people in motion, things in motion and vehicles in motion. Ensures that the transport system is future-proofed and responsive to the latest technology.	Immediately and ongoing (1+ years)		\$250k
	Link to existing 'smart' technologies. Link central city smart corridors to the Smart Motorway and Wellington's Bluetooth sensor network, develop integrated data and decision-making platforms that can be scaled.	Leverage off lessons already learned and ensures a cohesive approach to investment in technology, systems and capability.	Short term (2-5 years)		\$50k
	Develop a test corridor capable of supporting V2I communication, and a test corridor for automated vehicles (including on-road trials).	<ul style="list-style-type: none"> <li>Ready infrastructure for emerging vehicle technologies.</li> <li>Learning is relevant for both Wellington, New Zealand and internationally. Future-proofs the local system to well signalled changes in technology, contributes to international learning of new technology testing.</li> </ul>	Short-medium term (2-10 years)		\$500k-2m
Electric vehicles	WCC and GWRC to prioritise actions in developing charging network, and supporting shared-use models for EVs.	Provide required infrastructure to support notable change in fleet to EVs, encourage uptake of EVs that is not just a continuation of current 'single occupancy' trip model. Strengthens public-private partnerships and the delivery of a cohesive transport system where all service providers are working to a common goal(s).	Immediately (1 year)		
	Set aspirational targets for geographic and number of publicly available EV charging units in the region.	Develops a timeline by which to benchmark investment (public and private) in EV infrastructure and uptake. Strong metrics for investment increase likelihood of delivery and set a vision for priority areas, EV is a significant step-change for a sustainable fleet.	Immediately (1 year)		
	Keep up with emerging technologies, e.g. wireless charging infrastructure, and identify opportunities to introduce these.	The system is future-proofed and resilient to emerging technologies and change.	Immediately and ongoing (1+ years)		
	Hasten shift to electric public transport fleet. -emerging technology (i.e. Init) provides informed 'block and duty' scheduling for PT electric vehicle fleet, accounting for charging/capacity of electric bus fleet in scheduling.	GWRC leading from the front in terms of a sustainable public transport fleet.	Short to medium term (2-10 years)	GWRC	See MRT review

	Promote EVs as light goods vehicles and then work on heavy vehicles.	Increase visibility of EVs and reduce noise and air pollution from freight.	Immediately and ongoing (1+ years)	GWRC/WCC partnership. Maybe a contestable EECA fund?	c. \$100k
Shared (vehicular) Mobility	Examine AT On-demand shared mobility study outcomes and produce similar tactical roadmap for Wellington, including: <ul style="list-style-type: none"> <li>likely, flex route services for areas with lower frequency PT headways/poor accessibility currently and first/last mile connections, possibly pilots like Devonport/King County Metro</li> <li>Plus, likely, some of the below initiatives</li> </ul>	<ul style="list-style-type: none"> <li>Improved first/last mile connections</li> <li>Possibly more demand responsive shared transport options for areas with poorer accessibility</li> <li>Potential long-term cost savings</li> </ul>	Short term (2-5 years)	GWRC/WCC partnership	\$300k for roadmap, analyse access benefits & set targets & business case \$1-2m for running 1-2 pilots
	Set targets for shared mobility uptake.	Refer to the LA Shared-use mobility action plan, which sets targets for the number of trips by each of these 'new' modes and then translates that into the number of additional vehicles required.	Immediately (1 year)	WCC/GWRC	Part of shared mobility roadmap
	Support policy which enables ridesharing.	Break down barriers to new mobility models, including ride sharing, to encourage innovative services and a re-think on how people and goods can be moved around out city. Leverage off overseas examples to increase transport choice in Wellington.	Immediately (1 year)		
	Enable carpooling	There is a government provided national carpool platform; need to make matching and cost sharing easier (more similar to e.g. Chariot's model – dynamic matching with automated cost sharing) and encourage carpooling through provision of high occupancy vehicle lanes (could be temporal or tidal).	Short term (2-5 years)		c. \$0.75M for pilot repurposing of infrastructure & supporting TDM programme
	Provide incentives for new entrants into the ridesharing and ride-hailing marketplace.	Currently there are a small number of providers offering services. Competition in this space is important to increase the coverage, quality and price of services. Major barrier at present is uptake so other incentives are necessary to encourage new entrants. Note: incentives need to be carefully balanced to attract market sector while ensuring ride-hailing does not substantially replace public transport ridership.	Short term (2-5 years)		
	Support or encourage city-wide bikeshare and carshare as part of TDM programmes for local education providers and businesses. Target TDM outreach efforts to educate the community about shared services.	Helps to embed shared modes of travel or vehicle ownership in Wellington's travel culture and promotes a shift away from single occupancy trips. Helps to create a more sustainable transport network with improved travel times if congestion is reduced.	Immediately (1 year)		\$50k
	Consider transportation network companies or similar (shared taxis) to replace rural bus services with low ridership	Provide access in a cost-effective way and potentially improve the customer experienced	Short term (2-5 years)	GWRC	Potential cost savings
Bus Rapid Transit 'Integrated Mobility Hub'	Develop Wellington/New Zealand-specific design guide for integrated mobility hubs using best practice overseas mobility hub guidance as the foundation. Identify locations and staging of mobility hub development in Wellington.	Greater integration of mobility services and improves the functionality and experience of trips made in the region.	Short-term (2-5 years)	NZTA/GWRC	\$200k
BRT/LRT/MRT – Capacity and customer enhancements	Develop policy of multi-entrance PT loading/ticket validation – <ul style="list-style-type: none"> <li>include in transport service specifications</li> <li>develop customer information/driver training accordingly</li> </ul>	<ul style="list-style-type: none"> <li>Faster boarding/alighting to reduce dwell times, improving reliability and reducing travel times.</li> <li>Improved customer experience</li> <li>Improving value proposition of public transport over private vehicles</li> </ul>	Medium term (5-10 years)	GWRC	\$60k

		<ul style="list-style-type: none"> <li>Help justify spending for higher quality services (e.g. for larger vehicles like rubber wheeled trams)</li> </ul>			
	<p>Consider emerging PT vehicle technology like rubber wheeled trams – undertake study</p> <ul style="list-style-type: none"> <li>Possible re-examination of patronage forecasts. If not already included, consider induced patronage by ‘density by mobility’ i.e. make use of technology-enabled shared use and active modes to connect people to the PT network</li> <li>Examine wider economic benefits associated with different PT modes available (e.g. agglomeration, health &amp; wellbeing benefits, streetscape/amenity benefits, environmental etc.)</li> </ul>	Hybrid of BRT/LRT that provides capacity enhancements, resilience (for re-routing in the case of earthquakes) at a lower cost.	Immediately (1 year), as part of DBC	GWRC to lead as part of wider LGWM project	\$130k
	Future public transport ticketing to include contactless virtual smart cards (swipe smartphone) with connection to systems like Google Pay	More positive, convenient customer experience. Faster boarding times	As part of national ticketing project Medium- Long term	NZ Transport Agency	TBC
	Select locations or events and develop animated bus/transport maps	Make it easier for customers to understand travel choices			\$10k-250k  10k is do minimum (e.g. city centre & airport) 250k is widespread adoption & developing maps for key events
	Enable communications with customers via public transport ticketing apps/other emergent channels to provide travel advisories in real time (e.g. if there is a bus disruption alerting of delays and viable alternative travel options)	Provides a customer-centric, demand responsive service	Short term (2-5 years)	NZ Transport Agency (as part of national ticketing program?)	TBC
Mobility as a Service	Explore key success factors of MaaS offerings overseas and, if available, Choice in Queenstown.	Benefit from other cities work to date and apply this experience locally to improve the viability of MaaS. Review & visit costs	Immediately (1 year)		\$20k
	Understand and develop a delivery model that works for Wellington’s transport and people’s needs.	Provide attractive options for non-car based travel that are practical for all people to use, and easy to access.	Immediately and ongoing (1+ years)		Included in shared mobility roadmap cost
	Explore MaaS options for Wellington e.g. Choice, partnering with other local authorities or using a platform from experienced vendors (probably overseas).	Note: this activity may already be underway at GWRC	Short-term (2-5 years)		Dependent on current stage of progress (local MaaS program may be underway)
	Establish partnerships with transport service providers.	Gain procurement advice and develop pro-forma contracts; explore Public Transport Operating Model implications	Immediate to short-term and ongoing (1-5+ years)		\$30k
Inner-city parking	Continue to invest in smart parking infrastructure and expand coverage.	Already budgeted in LTP??	Immediately and ongoing (1+ years)		
	Invest in and promote online or app based payment, booking, and mapping platforms, linking in to MaaS where appropriate.	Making parking location/payment systems more convenient for customers may help offset any reductions in parking supply and ensure maintenance of parking revenue. Easier to use parking data generated.	Immediate and ongoing (1+ years)		\$200k

	Evaluate demand-responsive, variable pricing systems in the context of wider network pricing/tolling, learn from e.g. Auckland Transport's experience.	<ul style="list-style-type: none"> <li>Better utilises parking so that a smaller supply is required – opening space for more infrastructure development (like cycle lanes)</li> <li>Ensures that people can always find a park as supply and demand are better balanced via pricing</li> </ul>	Short-term (2-5 years)		\$50k for a study
	Explore options for making parking pre-bookable at park & rides or expanding parking availability by partnering with private parking owners or under-used e.g. shopping centre parking, adjacent to a P&R or a bus stop/ rail station without parking to create 'pocket park & ride' or expand parking for the first/last leg by car	<ul style="list-style-type: none"> <li>Use existing parking assets to grow ridership on PT</li> <li>A good option as a stepping stone between now (when parking demand exceeds supply) and a future mobility hub (which should reduce the need for parking by providing attractive shared options for the first/last leg of the journey to transit)</li> <li>Potential to 'slug' using this model too</li> </ul>	Immediate and ongoing (1+ years)		\$40k to identify locations, identify an app provider, work with providers and potential pay lease costs for parking (could generate some revenue too over time)
E-bikes	E-bike 'proof' infrastructure: Considering higher cycling speeds, volumes and wider catchments, in infrastructure design	<ul style="list-style-type: none"> <li>Future-proofed cycling infrastructure. Proactive management of emergent e-bike risks – notably pedal cyclist/e-bike conflicts associated with different cycling speeds</li> </ul>	Ongoing, but possible initial study to confirm best practice	TBD – NZTA Research project?	
	Integrate e-bike into any bike share scheme	Likely higher bike share uptake and geographical coverage of bike share	As required	WCC	As required
	Consider a local community-targeted e-bike trial. Select a community where topography/distance may have traditionally been a barrier to cycling (e.g. Highbury, Southgate, etc.), buy a fleet of e-bikes and allow participants to trial them for week or month-long periods. If successful, further e-bike trails can be implemented in other communities.	Increased awareness/adoption of e-bikes, possible reduction in private vehicle trips	Short-term (2-5 years)	WCC or GWRC	\$40k (for bikes and program support)
	Consider funding/support initiatives for workplaces to support e-bikes via subsidies to support installation of charging plugs in cycling arrival locations, purchase of fleet e-bikes etc.	Increase prevalence of e-bikes, possibly managing private vehicle demand and increasing cycling uptake	Immediately and ongoing (1+ years)	WCC or GWRC	\$40k
Active Modes	Develop strategy around private bike/scooter share by reviewing <a href="#">NACTO guidance</a> and best practice (what works/doesn't) overseas – Seattle likely to be a good case study and produce guidelines for private operators wishing to operate in Wellington	Private dockless bike (and now scooter) share is increasingly permeating cities which offers both an opportunity and a risk. With appropriate rules/policies these new systems may offer a fun and convenient way for people to get around without the hassle/subsidy from TLA's to manage. However, pile ups of bikes have posed a nuisance in other jurisdictions and Wellington's environmental is particularly constrained so this needs to be carefully managed.	Immediate and ongoing (1+ years)	WCC	\$60k
	Map all pedestrian thoroughfares in Wellington including rights of way through buildings. Consider developing a 'smooth walking route map too.	Directly contributes to an accessible and compact city, providing pedestrians with a detailed network of safe and convenient routes to navigate their way through the city. Creates a sense of place as people get to know the inside of major buildings and laneways that would otherwise have appeared to be private space.	Immediately (1 year)		\$150k
	With 'smartphone' zombies becoming an increasing pedestrian safety risk, consider trialling innovative illuminated pavement markings (e.g. see <a href="#">this</a> ) or <a href="#">guide lights</a> in key locations	Further indicates pedestrian priority, provides safer walking environment for pedestrians and other road users	Immediate or short term?	WCC	~\$350k – but could confirm with other cities

	Consider other emerging active modes and whether anything specific needs (e.g. bylaws) to be done to cater for/limit them – e.g. electric skateboards, solowheels etc.	Will ensure that the city has a proactive, prepared response to transport disruption from these emerging modes and can respond to any customer complaints/comments accordingly	Immediately (1 year)	WCC	\$5k
	Electronic bike counters on major cycleways.	<ul style="list-style-type: none"> <li>Increases the visibility of demand for cycle infrastructure and provides a direct metric of use that can be used for decision making around new infrastructure.</li> <li>Creates sense of place/ownership for users of the infrastructure who become one of the many citizens who value this investment.</li> </ul>	Immediately (1 year)		\$30k
	Develop 'green wave' cyclist signalling along key cycling routes (signals timed to cyclist speeds so that cyclists don't get stuck at intersections). (refer: <a href="#">Copenhagen</a> , <a href="#">San Francisco</a> .) and associated signage to alert all road users	<ul style="list-style-type: none"> <li>Higher quality, more enjoyable cycling experience for people on bikes without having to stop/start, reduced travel times</li> <li>Private vehicle speeds likely to lower to match cyclists so that they can also catch a 'green wave'</li> <li>Signage further reinforces cycling culture</li> </ul>	Trial immediately (1 year)?	WCC	\$140k
Monitoring & Evaluation	1. Perform pre-initiative evaluation to determine return on investment to inform prioritisation of initiatives. Recommended tool: Trip Reduction Impacts of Mobility Management Strategies (TRIMMS). Available here: <a href="https://mobilitylab.org/calculators/">https://mobilitylab.org/calculators/</a>	Will provide robust evaluation of measures, providing evidence of likely outcomes and informing investment prioritisation.	Pre-implementation (now) / Immediately (1 year)	LGWM (NZTA?)-led?	\$50k
	2. Undertake ongoing monitoring of initiatives using the TDM Return on Investment Calculator  Tool is available here: <a href="https://mobilitylab.org/calculators/">https://mobilitylab.org/calculators/</a>	Ongoing monitoring will help track how well projects are performing against anticipated outcomes and will potentially enable re-jigging of investment priorities.	Ongoing	Each project lead party	Minimal
	Develop an easy-to-use dashboard and tools to monitor multi-modal use of the transport system to provide real-time and historical trends. Needs to be accessible to public and non-data-literate.  Consider use of integration from existing data sources such as, <a href="https://opendata-nzta.opendata.arcgis.com/">https://opendata-nzta.opendata.arcgis.com/</a> . Numerous emerging data sources	<ul style="list-style-type: none"> <li>Accountable government, enables citizens to understand and ask government to respond to transport issues</li> <li>Promotes demand responsive transport</li> <li>Creates a culture around transport use</li> <li>Useful for transport planners etc. for passenger counts, dispatching systems, performance monitoring etc.</li> </ul>	Immediately (1 year)	WCC to own/lead with inputs from other partners	\$100k for development, ongoing funding for operation
Drones	Undertake 'light' study about performance/issues of drones in the wind in Wellington and develop strategies/policies accordingly based on the recommendations - Note NZ Transport Agency policies/strategies around UAV's in SH corridor	<ul style="list-style-type: none"> <li>Proactive and informed drone strategy will leave LGWM parties future-proofed as drone transport becomes more widespread for deliveries, data collections etc.</li> <li>Drones may be particularly suited to Wellington's topography with difficult accessibility to some properties</li> </ul>	2-5 years, but could commission study sooner	Ministry of Transport/Civil Aviation Authority	~\$40k for study, more for policy/strategy
	Consider use of drones to collect transport data (e.g. at intersections)	Lower cost/more reliable method to collect data about travel movements	Ongoing	As/if parties are interested, could begin with trials	\$75k
Cyber-security	Develop transport-focussed cyber-security program	With transport digitalisation transport companies/operations can be targets for hackers, cyber security will ensure the smooth continued operation of transport systems and services, plus protect users' privacy	Immediately (1 year)	NZ Transport Agency to lead and work with local/regional partners as necessary	
Technology procurement policy	Develop procurement policy to ensure that procurement of infrastructure, services etc. follows a progressive tech-enabled approach (e.g. requirements for data sharing or APIs in contracts; alliances & co-working; expressions of innovation or other challenges to drive needs-based innovation)	Will trigger the alliance/ partnership model to deliver shared mobility services and other technology that is integrated into one transport system	Immediately (1 year)	NZ Transport Agency (CJ's) to lead but provide to TLA's for considered local adoption also	~\$150k

\*The timeframes and costs presented here are an estimate only and are considered independently of each other, they do not consider cost and time to secure funding or the potential interdependencies of specific actions on others listed here or in external policy and strategy documents.

