



Mahu City Express Project HKA1.2.6: E-scooter rental and recharging on e-coaches



Executive Summary

1. Introduction

The New Zealand Transport Agency Waka Kotahi launched the Hoe ki angitū – Innovation Fund in 2022 to catalyse, enable and accelerate innovative projects in the transport sector. In response to Challenge 2 of the Hoe ki angitū fund: Integrating low-emission first- and last-mile solutions, Mahu City Express applied for \$41,000 to fund a trial of on-board electric scooters.

The Mahu City Express is an express commuter coach service operating two 40-seater, fully electric luxury coaches – the first and only zero emissions coaches in New Zealand. We run two services each weekday, transporting up to 500 commuters weekly between their homes in the Warkworth or Snells Beach, and their places of work or study in Auckland.

The scooters would be carried on board Mahu City Express commuter coaches, allowing commuters to make a fully integrated, multi-modal journey using a mix of zero-emission options from the first to the last mile. The project also fits in with Mahu's highly innovative approach that strives to bring about change in people's commuting habits.

This research report summarises the objectives, implementation, outcomes and evaluation of the trial. It also describes insights and lessons learned.

2. Objectives

The objective of this project was to reduce commuter car trips within the Mahurangi region and to and from Auckland. Our innovative approach was to provide electric scooters on our coaches and to integrate bookings and payment with the coach booking app.

The outcomes that we hoped to achieve from this trial are:

- Replace the first-mile car journeys in Snells Beach and Warkworth with electric scooter journeys using the onboard scooters (as no commercial scooter rental operators service this area).
- To a lesser extent, replace any last-mile journeys made in Auckland which used a car.
- Attract new passengers from those that do not have access to a car for the first mile journey.

3. Methodology

The deliverables of the project are noted below, along with some notes about the implementation:

- Research and procurement of suitable electric scooters: 8 scooters were purchased, along with helmets, locks, and GPS tracking tiles. We took advice from a few sources and selected three different kinds of Freed Electric Scooters that we made available on each coach.
- Installation of scooter racks in the luggage bays: we designed and prototyped several iterations of the racking system, and settled on individual free-standing scooter racks which could be placed in the coach luggage hold or removed to accommodate passengers' own scooters or bicycles, or other luggage.
- Electrical upgrades to support on-board charging of the scooters from the coaches' power supply: we upgraded the coaches' electrical system and added charging capability to the luggage area so the scooters could be charged while stored on board. We also installed a second 20kw charger at our base to allow both buses to charge overnight, along with the scooters. This was not originally planned but was needed to provide more resilience in the case of power cuts (that were experienced in early 2023) and because we learned the scooters could not fully charge while on the 1 – 2-hour bus ride, they take 4 – 6 hours to charge.
- Deployment by 24 February 2023 and trial over a 16-week period, ending 16 June 2023.

- A research report documenting the projects outcomes and findings (this report).

4. Key Findings

The key finding of this trial is that the scooters were used less than expected, with 10% of the daytime capacity used over the trial period, with one person representing 50% of this usage.

We found no interest in using scooters to replace car journeys between people's homes and bus stops in Warkworth or Snells Beach. One factor is that people often do not work in the city on consecutive days and did not want to take scooters overnight if they could not return it the next day. Another factor is the roads are semi-rural and are not suitable or safe for scooter trips. We also found there was less demand than expected for last-mile journeys to people's workplaces in Auckland. There were several who trialled this option, with a couple adopting it for every trip and experiencing great benefits.

A survey and direct feedback from those that trialled the scooters revealed some other insights. The weight of the scooters was a deterrent, and there was a sense that walking would be more convenient than taking a scooter for a short trip. Before this scooter project, we designed our commuter route to support walking, and this shows we succeeded in that.

The provision of the scooters has prompted some people to bring their own scooters and bikes, which has been a positive, albeit unexpected, outcome.

Our go-live was delayed by 5 weeks, mostly as a result of the extreme weather events in January and February, which impacted us directly and indirectly (by affecting many of our third-party suppliers). Ultimately, these delays allowed us more time to learn and make positive adaptations. For example, as a result of power outages, we installed an additional DC charger which has given us greater operational resilience. While we had other issues, such as poor performance or delays from third-parties (some still ongoing), we were able to adapt, and we still deployed and trialled the scooters, albeit 5 weeks later than planned.

Finally, we hoped the publicity about the trial would demonstrate our commitment to innovation and sustainability and would generate an increase in patronage. While we did not experience a noticeable increase, the survey response data indicated potential changes to the service that might encourage more people to use the service.

5. Next Steps

We will continue make changes to the coaches and our systems to encourage more use of the scooters. For example, we will keep making improvement to the rack system and consider lighter scooter models as technology advances. At this stage we will continue to make the scooters available free of charge, while uptake is still quite low. We will also continue to improve our administration. New stops could attract new scooter users. We have added stops in Albany, but so far increased demand for the scooters has not materialised.

Commute and Scoot – trialling e-scooter rental and recharging on Mahu City Express commuter coaches

1. Background

Who are we?

The Mahu City Express is a commuter bus service, transporting hundreds of passengers each week between their homes across the region from Warkworth to Mangawhai, and their workplaces, schools and universities in Auckland. The demographic of these commuters is predominantly professional, administrative and managerial, with the majority in the 35-60 age bracket. Many are parents who chose to live in the Mahurangi region as an attractive place to raise children.

To encourage a switch from commuting by car, we offer a different service: luxury coaches running an express service, with online booking and other ‘premium’ features. We recognised right from our inception in 2015, that the typical bus service with urban buses designed for shorter trips (less comfortable seats) and multiple transfers between buses does not provide a compelling alternative to driving.

With a desire to continually look for new and innovative ways to further improve the experience, we were also the first in New Zealand to operate zero-emission, fully electric coaches. We transitioned both of our commuter coaches to electric coaches in 2021. We currently run two return services to the city each day, except on Fridays where we run a single service due to lower demand. The single Friday bus has been in place since Covid although we hope to return to two services on Fridays soon, which was the case before the Covid. See [Appendix 1](#) for route maps and timetable information. Our 40-seater electric coaches have a total capacity of 760 rides per week. During the trial period our weekly ridership was 350 - around 45% of our capacity.

We welcome passengers who bring bicycles which they use for the first and last mile, and we carry these in the luggage space beneath the coach at no charge. We were also aware that other passengers still had to make a connecting journey in Auckland to their destinations which in some cases are Grafton, Newmarket and Ponsonby, requiring a long walk, or a connecting bus journey.

We have been considering the merits of providing electric bikes or scooters on-board to assist these passengers with a lengthy last-mile journey, and to continue with our tradition of innovation. It also helps to attract new people to our services. This benefits our community and our business as we seek to reach full commercial viability.

The New Zealand Transport Agency Waka Kotahi launched the Hoe ki angitū – Innovation Fund in 2022. Allocated over two years, the \$15 million Innovation Fund will support private and non-government sectors to solve some of the most critical transport problems through innovation to move towards a safer, more environmentally friendly, accessible and better-connected transport system. When we became aware of the challenge set in the first round of the fund, integrating low-emission first and last-mile solutions, we saw a perfect opportunity to collaborate with Waka Kotahi to develop and test this idea.

What did we do?

Mahu City Express applied to the fund to trial on-board electric Scooters, to be available for commuters to use for the first- and last-mile. This was in response to Challenge 2 of the Hoe ki angitū fund: Integrating low-emission first- and last-mile solutions.

We envisaged a fully integrated solution, with our zero-emissions commuter coach service. The scooters could be on our own booking platform and the scooters will be charged on-board while being carried in the luggage compartment. Commuters could then book a scooter alongside their commuter ticket, take the scooter from the coach when they alighted, and use it to reach their destination. They could then bring the scooter back to the coach for their return journey, and it would get recharged for the next person to use.

Waka Kotahi contributed \$41,000 of funding, to be used for:

- Electric scooters \$25,000
- Scooter storage under coaches \$8,000
- Electrical upgrades for on-board charging of scooters \$8,000

2. Objectives

What were our objectives, and the success criteria we would use to measure success?

The objective of this project is to reduce car use for short and longer commuter trips between Snells Beach and Warkworth and Auckland City, by making electric scooters available on our coaches for use at either end of the journey. Our innovative approach was to integrate scooter bookings with the coach booking app, to provide a single ecosystem for commuters to book and pay for a multimodal journey of up to three legs: a first mile electric scooter journey between their home and the coach in Snells Beach or Warkworth; a commuter coach journey into Auckland; and a last-mile electric scooter journey in Auckland to their destination.

The outcomes that we hoped to achieve from this trial were:

- Replacement of first-mile car journeys from Snells Beach and Warkworth with electric scooter journeys using the onboard scooters (as no commercial scooter rental operators service this area, this was the only way to provide a rental scooter alternative to car travel).
- To a lesser extent, replacement of any last-mile journeys made in Auckland which used a car.
- Attract new passengers on the Manu City Express for those that do not have access to a car for the first mile journey.

The deliverables as agreed in the funding agreement were:

Deliverables	Performance measures
A trial of e-scooter carriage and hire on an electric coach	<ol style="list-style-type: none"> 1. Conversion of two electric coaches, including electrical upgrade work and storage racks for scooters 2. Upgrade of booking system to enable scooter hire 3. Purchase of suitable scooters 4. Increased exposure, interest, and uptake of service by new users due to the scooter solution 5. Data collection from operation of scooters collated

<p>A research report that documents the trial and outcomes</p>	<p>6. A report to Waka Kotahi which will include:</p> <ul style="list-style-type: none"> • a description of the work undertaken using the funding from Hoe ki angitū • the result of the work undertaken and the outcomes of the trial detailing the findings, data collected and emerging insights from the pilot including the: <ul style="list-style-type: none"> ○ percentage of on-board scooter capacity being used ○ frequency of use of scooters ○ number of new passengers • lessons learned from undertaking the Innovation Activity • your next steps for the Innovation Activity.
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The wider benefits of the project are presented in the following table. It also shows that we intend to measure our success through usage data from our online booking system and surveying passengers.

The following table presents the objectives, the associated benefits, and the measurement methods used:

Ultimate Objective	Benefits	Contributory objective	Measurement
Reduction in car journeys by replacing with scooter journeys	<ul style="list-style-type: none"> • cost reductions (saving on fuel and other costs associated with driving) • emissions reductions • freeing up park & ride spaces for the rest of the community to use 	Reduction in car journeys between home and the bus (the 'first mile')	<ul style="list-style-type: none"> • Scooter usage data from booking system (number of trips, number of users) showing overnight use of scooters • assumed to replace car journeys (follow-up surveys to confirm)
		Reduction in car journeys between the bus and passengers' ultimate destination (the 'last mile')	<ul style="list-style-type: none"> • Scooter usage data from booking system (number of trips, number of users) showing day-time use of scooters • Follow-up survey to determine whether these replaced car journeys or walking/public transport journeys)
Increasing overall commuter numbers through improved accessibility and increased exposure	<ul style="list-style-type: none"> • reduced emissions and congestion • Improved health, wellbeing and productivity • Improved access to work and study opportunities 	facilitate access to our service for those currently unable to reach us as they don't have a car to cover the distance required between their homes and the bus stops	<ul style="list-style-type: none"> • New user data from booking system • Data from booking systems showing correlation between new users and scooter bookings
		Generate increased overall awareness and therefore patronage of our service	<ul style="list-style-type: none"> • New user data from booking system • Survey data showing correlation between scooter option and changes to passengers' commuting behaviour

For full context, we describe the benefits associated with electric bus transport, combined with electric scooters below:

Cost-savings	Commuting costs are high with recent fuel price hikes – sharing the costs of a coach compared to multiple cars is far more efficient. Adding a scooter option to cover the first and last mile further reduces the costs for those who currently have no alternative to using the car to make the short journey from their home to join our service each morning, and again each evening.
Emissions reduction	just one conventional coach can remove up to 85% of commuting emissions (from the equivalent 40 cars) – a zero-emissions eCoach removes 100%. This emission reduction benefit is further increased by reducing the number of single-occupancy car journeys used to access our commuter service in the morning.
Wellbeing and productivity	Wellbeing and productivity are improved through a more relaxing commute to and from work – allows people to bring their whole selves to work – and home again.
Health and safety	Commuting by coach vastly reduces the risk of having an accident while driving home from work tired. And private commuting services like ours are far less risky than public transport in a post-pandemic world.
Congestion	One coach can take up to 1km of traffic off the road. Single-occupancy car journeys used by passengers to connect to our commuting service in the mornings take up parking space which will be freed-up for other people if a first- and last-mile option using electric scooters is made available.

Overall, by providing transport services to people who do not currently have an alternative to travelling by car, benefits not just those individuals who can now access greater work and study opportunities through more affordable transport options, but also their employers, their families and their communities and other road users. In addition, it provides a benefit to society by reducing emissions and addressing climate change.

3. Implementation

Implementation objectives and outcomes

Implementation did not go exactly as we planned. Severe weather events earlier in 2023 caused challenges for us and for the providers we were relying on for engineering solutions for the rack system and electrical upgrades. This has been covered in the Post Implementation Review dated 31 May 2023, included as [Appendix 2](#). In summary:

Performance Measure	
1) Purchase of suitable scooters	Initially, 8 scooters were purchased, along with helmets, locks, and GPS tracking tiles. We took advice from a few sources and eventually selected Freed Electric Scooters, based in Auckland, as our supplier. Several models were

	<p>demonstrated, and we decided to provide a range of models, to cater for a variety of user preferences, and to evaluate the most popular before adding more:</p> <p>2 x Zero10 - specifications 4 x Zero9 – specifications 2 x Zero8 – specifications</p> <p>The scooters were available for trialling from December 2023, and while they were ready for deployment in time for the original go-live date of 24 Feb, deployment was subsequently deferred (as explained below) to 3 Apr 2023. See Appendix 3 for images of scooters and vehicle modifications.</p>
<p>2) Conversion of two coaches, including electrical upgrade work and storage racks for scooters</p>	<p>Delivery dates were delayed from mid-February to mid-March and then again to early April as a result of the severe weather events in January and February 2023.</p> <p>While frustrating, these delays allowed us more time to refine the design of the racking solution, which changed as we discovered an unexpected side-effect – more passengers bringing their own bikes and scooters onboard, which required a more flexible design.</p> <p>Initially we designed and prototyped several iterations of a fixed racking system, with sliding trays to allow scooters to be pulled from a second row when the first row had been taken. However, it was too cumbersome and inflexible and we eventually adopted a more flexible system of individual free-standing scooter racks which could be placed anywhere in the luggage hold or removed completely to accommodate passengers’ own scooters or bicycles, or other luggage.</p> <p>Two factors changed our approach to recharging the scooters. One was the impact of the weather events in early 2023, which highlighted the need for greater resilience in general, as we may not be able to charge all the time due to power cuts. Accordingly, we upgraded our charging regime to keep the coaches fully charged as much as possible (rather than alternate-day recharging). The second was the realisation that scooters needed 4-6 hours to fully recharge and so simply topping up during the commute (1-2 hours) may not be sufficient: we needed to be able to charge the scooters overnight, while the coaches were on charge (and powered off).</p> <p>These adaptations led to us installing a second 20kw charger at our base, allowing both coaches to be placed on charge overnight. Yutong engineers were engaged on multiple occasions: NZ-based, and China-based, either remotely or visiting NZ. Their expertise was needed to determine the safe and correct way to add additional charging in the luggage space to the coaches’ electrical system, allowing the scooters to access the coaches’ power supply even while the coaches are turned off and charging.</p>

	<p>In the meantime we adapted our operating model, manually checking the charge on scooters each night and taking them away for overnight charging where necessary. Such adaptations to our operating model meant we were able to meet our (rescheduled) go-live date of 3 April, even whilst delivery of the charging and racking solutions was ongoing.</p>
<p>3) Upgrade of booking system to enable e-scooter</p>	<p>The original plan was to incorporate scooter booking in a new booking app which was under development. Ultimately, issues with the third-party app developer (Mobli) led to us abandoning the development of a new app. Instead, we reconfigured our existing booking system (Mindbody) to support scooter booking. In doing this we still delivered on our commitment to provide an integrated commuter coach and scooter booking platform. However, it was also necessary to reschedule delivery of this milestone, from 24 Feb to 3 Apr 2023. Appendix 4 shows the screens and the booking journey configured through our existing booking app.</p>

Post-implementation – deployment and trial of scooters and integrated booking platform

Deployment

We purchased 8 scooters, and equipped both coaches with the following complement of scooter types, along with helmets, chargers and scooter storage systems:

- 1 x Zero10
- 2 x Zero9
- 1 x Zero8

Users had flexibility to take a scooter from either coach in the morning and return it to either coach in the evening, but this could result in an imbalance with most scooters and helmets ending up on one coach. We configured the booking system to make just four scooters bookable at any time, with a waitlist for others. This provided us with a level of comfort that we would not overbook the number of scooters available on any coach at a given time, and the waitlist allowed us to control any overflow. We were also able to implement a rolling maintenance system, allowing two scooters to be out of service at any time for servicing or maintenance.

Once deployment was complete, we ran a trial for a period of 16 weeks, from Monday 3 April to Friday 21 July. [Appendix 5](#) is a list of the activities undertaken to publicise the trial. We also had informal conversations with customers while onboard.

Pricing

We configured the booking system to make the scooters available free of charge to encourage as many users as possible without price being a barrier. We hoped this would help maximise the amount of use and feedback received, which would allow us to optimise wherever possible.

We intended to introduce a daily price as patronage stabilised. We sought feedback from users on a reasonable price and established that a price at around the \$5/day was reasonable. Our research indicated this was a competitive price compared to commercial on-street rental companies Lime, Beam and Neuron, and it would provide enough revenue to cover ongoing operational costs such as repairs and maintenance. However, we ended up leaving them free of charge for the duration of the trial, so as not to impact or distort usage patterns, which were lower than we had expected.

Data collection

We collected data captured through our booking system (all scooters had to be booked through our standard commuter booking app, along with the commuter's bus reservation) and used this to analyse usage patterns. We ran a survey on 21 June that included a question about whether passengers would like to use a scooter to travel between their homes and the bus stops. We also ran a survey from 19 July, to gain insights about passenger drivers, barriers, and other feedback we could not gain from the data alone.

The conclusions from analysis of the use data and the survey are presented in the next section on outcomes.

4. Outcomes

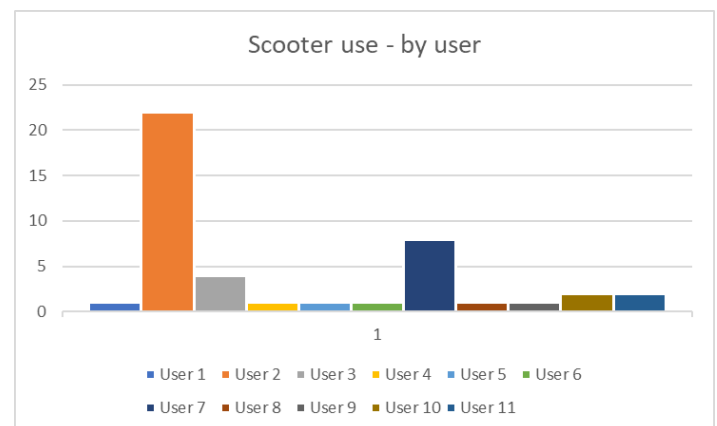
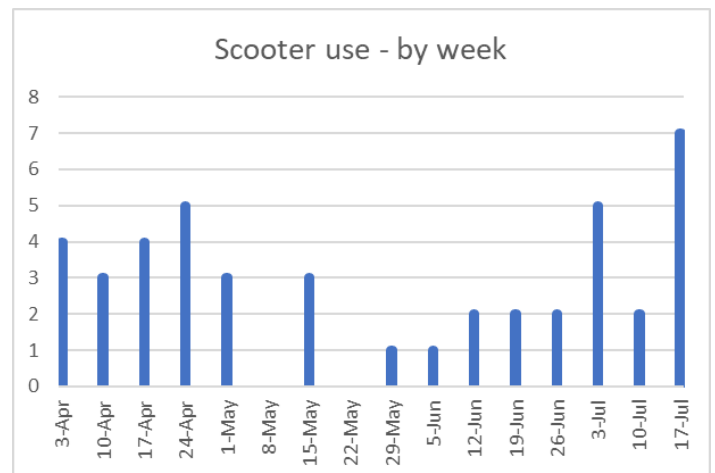
What were the outcomes - did we meet our Success criteria?

The tables and graphs are shown in Appendix 6 present the results of our empirical and survey data analysis. We present here two graphs that show the number of users each week and how often each of the eleven users took scooters over the trial period.

We summarise the results below:

Overall / daytime use

- Uptake of the scooter option was not as high as we had expected, and overall, only 10% of the daytime capacity was utilised over the trial period, with one person representing 50% of this usage.
- Survey responses to understand the low uptake mostly indicated that passengers considered a scooter unnecessary for the short journey between the bus stop and their ultimate destination.
- Secondary reasons included inconvenience and perceived risk, or lack of experience/understanding – but a secondary question did not show strong interest in orientation sessions to support an increase in usage.



Overnight use

- No users accepted the option to replace their journey between home and the bus with a scooter – and when we asked about this in the survey, 87% of respondents said they were not interested in this.
- This is disappointing as it indicates that we had little success in replacing car journeys with zero-emission scooter journeys which could have delivered the greatest impact in terms of reduced car journeys, or increased access to our service for people who did not have a car.
- We had also hoped to attract new passengers as a result of offering and thought they might take the scooters home overnight. But we did not have any overnight users. All of the scooter users were existing passengers, so we did not attract any new passengers.
- One factor is that since Covid people work from home some days of the week, so there is less chance of people using the bus on consecutive days. People did not want to take a scooter if they were not certain they would return it the next day. The other factor is the roads on which the first mile journeys are made are semi-rural and are not suitable or safe for scooter trips.

Increased commuter numbers

- There was no other evidence (no significant uplift in new users overall, or from the survey data) to suggest that new users were attracted by the offering of scooters.
- However, it is quite hard to ascertain a direct link between the promotion of the scooters, and a person's ultimate decision to become a passenger. Based on the assumption that all publicity is good publicity we still consider the project a success as a result of the additional publicity that it generated.
- The survey results provided some evidence that the promotion could result in a little additional use of the service by existing passengers or new passengers. Question 5 of the survey shows that 61% of passengers' behaviour would not be impacted by the provision of scooters, 23% indicated they were more aware of the service and 15% indicated their usage was likely to increase. Most of these responses came from passengers who identified as occasional users, so we could consider that a successful outcome (although whether they actually do increase their use remains to be seen).

Other information provided by users who trialled the scooters but not become regular users

We surveyed all of these users directly to understand their feedback, and the reasons they did not become regular users.

- Almost all mentioned the weight of the scooters and the difficulty and amount of time taken to load or unload them.
- One mentioned stopping when a price was introduced.

Additional Benefits and Highlights

Improved operational resilience

The project did not lead to any further partnerships or funding. However, a definite additional benefit arose from the installation of a second 20kw DC charger. Not only does this allow us to charge the scooters overnight on both coaches, but it has made our overall operating model a lot more resilient. We previously had a single charger shared between two coaches, and each coach would take it in turns to get a full overnight charge on alternate nights and then run for two days on that charge. This worked for our basic commuting service thanks to the range of the coaches being around 350km, enough for two days of commuting (a round trip commute to Auckland being around 150km). However it did expose us to risks such as: no ability to charge if there was a power cut; failure of that charger was a key risk as we had no alternative; coaches could not do any additional work on top of the commutes, and if there were accidents, road closures and detours this could be a risk for the coach which was on its second day since charging. Installing a second charger has reduced all those risks significantly.

Increased use of bicycles and scooters overall

Another additional benefit has been that we have seen an increase in passengers bringing their own bicycles and scooters since we began the trial: it seems to have prompted more people to consider bringing their own last-mile transport on board. This has forced us to rethink how we use the space under the coach to accommodate this, but we consider it a good outcome.

5. Lessons

Why didn't we meet our success criteria?

Weather

It is likely that poor weather played some part in the low usage – wet weather prevented use on safety grounds, and it has been a particularly wet year. NIWA indicates that most of Auckland has experienced more than a standard year of rainfall in the first six months of 2023.

Distance travelled

Survey data also indicates that for most passengers, a scooter is considered unnecessary for the length of journey between a passenger's ultimate destination, and the place where they alight from the bus. Walking is sufficient (and preferred) for most passengers' last-mile journey.

Cost

We maintained a no-cost use model throughout the trial period, ruling out price as a blocker to uptake. However, one trial user did mention that they discontinued on the understanding that a price was being introduced and their transport costs were already high enough.

Weight, difficulty

Other feedback from users who trailed the scooters indicated that they found the scooters heavy, and difficult and time-consuming to manoeuvre on and off the bus.

Other

We did not experience any regulatory or other barriers and can only conclude that the use cases for a scooter are limited to a small number of passengers who have a long last-mile journey. For these passengers however, it has been transformative, significantly cutting down the long walk from the bus to work (and back) allowing more time at work.

Other insights and lessons

Disconnect between stated demand and actual usage

Although market research among our passenger base had indicated a strong desire for scooters, this exercise was a demonstration of why trials and pilots are important. This is not the first time we have observed a difference between what passengers say they want, and then what they actually use when it is provided. We have seen this before with various services we have trialled in response to demand. In that sense, the trial was a success as it revealed the existence of this gap in the case of scooters for the first and last mile.

Racking improvement

Given the feedback related to the difficulty of unloading and loading the scooters, we are still looking at racking designs and how we might make these easier and quicker. For example, a tray that slides out of the luggage space altogether. – but the amount of space available on the pavement could be an issue, as some of our downtown stops are beside busy pavements with lots of passing pedestrians. We will continue to refine the storage options as much as possible.



Risks and operating procedures

One discovery we made was the increased risk associated with unloading and loading of scooters at stops. There was the risk of injury as people tried to lift a heavy scooter from a confined space. We also discovered that the increased number of passengers opening the luggage doors at stops had caused an increase in the risk of a driver moving the vehicle without noticing that a passenger had opened the luggage door. This represented a serious operational risk with potentially fatal consequences. As a result, we reviewed our procedures and made changes. The drivers would keep the luggage doors locked and get off the bus to open them at stops. This would function as a control against drivers moving the vehicle with a luggage door open. We did consider other automated controls such as alarms, lights etc but felt that any of those controls could fail. We decided that we really needed to increase driver diligence as the first line of defence.

Along with this, we considered whether the drivers should be the only ones to load and unload scooters but we felt this creates more risk for our drivers as well as potentially taking too much time at stops and so we have decided not to implement that at this stage.

Admin overheads

The amount of admin related to the scooter rental also came as a surprise. We needed to:

- constantly keep track of how many scooters and helmets are on each coach
- check the level of charge of each scooter
- manage high frequency of maintenance, including logistics of getting scooters to and from the Freed Store for services
- provide space required for other scooters and bikes
- allow for time to load and unload
- keep track of who was booked and associated space requirements.

As a result, we spent a lot more time supporting the on-board scooter model than we had anticipated. We were able to adapt to this, but there is no doubt it has increased the demands on our team.

6. Next steps

Applying lessons

There is little we could, or would, do about the relatively short distance of the last-mile journey in the city, which meant scooters are not being used. In fact, we consider it a success that we have configured our route to provide passengers with such a short walk to their final destination. But for those passengers who could use a scooter, but are not, we could attempt to address some of the barriers identified during this trial, which include:

- The scooters are heavy and cumbersome to unload and set up:
 - We could research other scooter models to see if there are any lighter ones which still meet our requirements for power and range. At the time of purchase there were no better models but as technology advances, we may find some new models on the market which are a better fit.
 - We could (and will) continue to consider improvements to the racking system to see if we can make it easier for passengers to unload and reload the scooters.
 - We have offered orientation sessions to show passengers how to quickly unload and set up scooters, but there has not been a great deal of interest shown in these (19 July Survey, Q4)
- Pricing:
 - We have maintained free-of-charge pricing for the time being to try and promote use as much as possible, but we are only seeing a couple of regular users at the moment and very few new users. Again, wet winter weather is probably a major factor here – we look forward to spring, where warmer drier weather may encourage more people to try the scooters.

We thought some of our new stops might attract new passengers. We have amended our timetable to include stops at Albany, as we had many enquiries from people wanting to use our services to reach Albany high schools, or Massey university. We expected there could be a good case for these passengers to use scooters to continue their journeys from Albany station, but so far, this stated demand has not materialised.

Moving forward

We intend to continue to develop and innovate to increase uptake of the scooters. We will continue making improvements to the coaches to make it easier for users to access the scooters and lower the admin burden on our team. We will continue to explore ways to encourage use of scooters overnight, to avoid the car journeys to bus stops each morning. So far this has not proved appealing, but we anticipate this could change as Warkworth develops and becomes more urbanised.

But so far, the key lesson is that electric scooters are not the right first and last mile option for most of our commuters, at this time.

Appendix 1 – Mahu City Express routes and timetables

Mahu City Express timetables

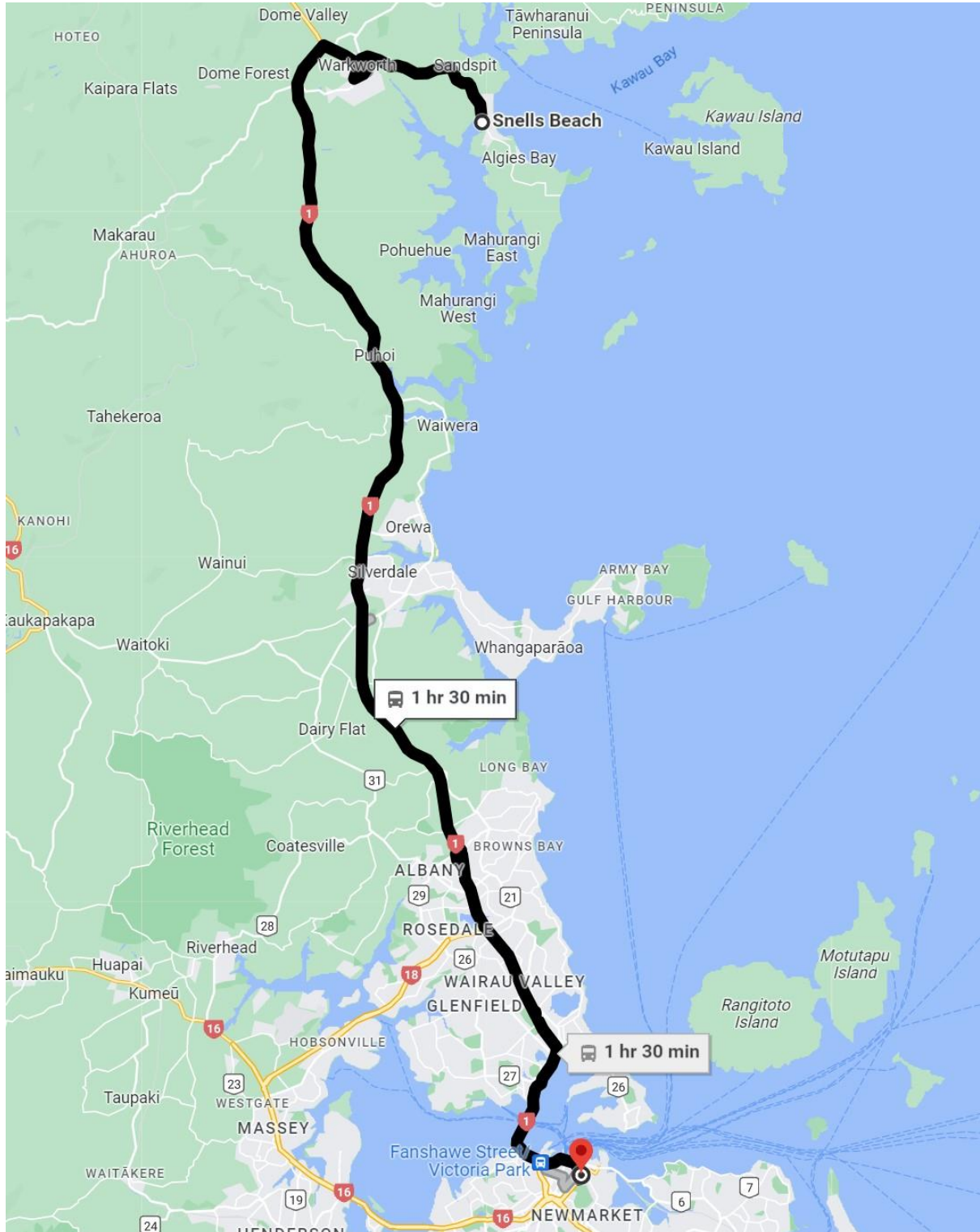
Morning Services to Auckland

		630 service		715 service
Snells Beach	Iris St / Warehouse / Tamatea / Muncaster	06.15	▼	07.00
Warkworth	BNZ Neville St	06.30	▼	07.15
Warkworth Park+Ride	Platform A	06.35	▼	07.20
Albany Park+Ride	Platform D	07.10	▼	07.50
Smales Farm	Platform D	07.20	▼	08.00
Akoranga	Platform D	07.25	▼	08.05
Victoria Park	Fanshawe St Stop 1315	07.30	▼	08.15
Britomart	Customs St	07.35	▼	08.20
University	Anzac Ave	07.40	▼	08.25
Parnell	Beach Rd Stop 7183	07.45	▼	08.30

Evening Services from Auckland

		445 service		530 service
Parnell	Beach Rd Stop 7183	16.20	▼	17.05
Britomart	AT Stop 1323	16.45	▼	17.30
Victoria Park	AT Stop 7036	16.50	▼	17.35
Akoranga	Platform D	16.55	▼	17.40
Albany Park+Ride	Platform A	17.05	▼	17.50
Warkworth Park+Ride	Platform B	17.50	▼	18.35
Warkworth	BNZ Neville St	17.55	▼	18.40
Snells Beach	see map for stops	18.05	▼	18.50

Mahu City Express route map



Appendix 2 – Post-Implementation Review

Recipient Name: HKA 1.2.6 Mahu City Express

Project: E-scooter rental and recharging on e-coaches

Date: 31 May 2023

Project Overview

What we aimed to deliver

(Source: HKA1.2.6 funding agreement, schedule 2)

Problem Statement:

The project was conceived to address a perceived gap in the provision of integrated, low-emission first- and last-mile transport options. Our solution set out to deliver the first/last-mile option carried within the long-distance mode, providing the full door-to-door journey option all in a single ecosystem

-

Key deliverables:

- A trial of e-scooter carriage and hire on an electric coach

Due date:

- 24 Feb 2023

Performance Measures:

1. Conversion of two coaches, including electrical upgrade work and storage racks for scooters
2. Upgrade of booking system to enable e-scooter hire
3. Purchase of suitable scooters and booking platform upgraded

What we delivered

Key deliverables:

- A trial of e-scooter carriage and hire on an electric coach – **delivered**

Due date:

- 24 Feb 2023 – **delivered 3 Apr 2023**

Performance Measures:

1. Conversion of two coaches, including electrical upgrade work and storage racks for scooters – **partly delivered: racking delivered; electrical upgrades still pending**
2. Upgrade of booking system to enable e-scooter hire – **delivered**
3. Purchase of suitable scooters – **delivered**

Project Implementation Review

What went well

Performance Measure 1 (PM1):

- Tested prototype racking systems. – flexible approach allowed for test and learn which ultimately resulted in more suitable solution than originally planned for
- Jan, Feb – delays due to flooding and weather but contingency was built into plans which **initially** buffered the impacts of this, but ultimately a replan was required
- Able to pivot operating model (scooter recharging) to mitigate unavoidable delays in the coach electrical upgrades

PM2:

- Ended up with simple automated booking process within single booking app, which covers health and safety requirements with minimal manual effort. Using existing booking system (mindbody) made driver training much easier.

PM3:

- scooters delivered and trialled early, allowing feedback (all positive)
- Several different models were used allowing different options for different user

What did not go well

PM1:

- Jan, Feb delays due to flooding and weather events – replanned go-live to March 13, then ultimately to April 3
- Delays to upgrade the electrical systems in the coaches could not be mitigated – reliant on engineer availability from China.

PM2:

- New Booking platform (Mobli) implementation was delayed and ultimately abandoned – alternative option to reconfigure existing mindbody booking system to support scooter rentals, was delayed by bug in mindbody. Several rounds of testing and reconfiguration were required before mindbody configuration could be deployed

PM3:

- Maintaining scooters requires more effort than expected: weekly checks together with frequent visits to workshop (on a rolling basis) to maintain standards and address any issues.
- Tracking in scooters not as reliable as expected and requires manual setup effort

What would we do differently

- Build more flexibility into plans – much of the project’s success arose from being flexible and adapting to unforeseen issues and obstacles.
- Considering every planned deliverable and ensuring there is at least one viable alternative would assist in risk management for future pilots which are by their nature risky.

Key learning and next steps

Key Learning:

- As above: the ability to pivot, to configure booking in existing system was a key success factor, otherwise delay and ultimate cancellation of Mobli deployment, originally believed to be a dependency, would have been a blocker.
- Having a flexible test-and-learn approach to racking systems was a success and allowed for multiple and rapid trials to learn which systems worked best in production.

Next steps:

- Complete electrical upgrades
- Continue with pilot – develop, validate, and run survey to capture user insights. Combine with data analysis to inform final report to Waka Kotahi, due August 2023

Team

Primary Contact

Position	Name	Email	Mobile
<i>Director</i>	<i>Julian Ostling</i>	<i>julian@mahucityexpress.co.nz</i>	<i>021 507 621</i>

Alternative contact 1

Position	Name	Email	Mobile
<i>Admin</i>	<i>Roxanne Halliday</i>	<i>Roxanne@mahucityexpress.co.nz</i>	<i>09 425 5566</i>

Appendix 3 – Scooters and vehicle adaptations

Mahu City Express coach with scooters



Side view giving perspective of scooter storage in relation to vehicle



Zero8 scooter



Zero9 scooter



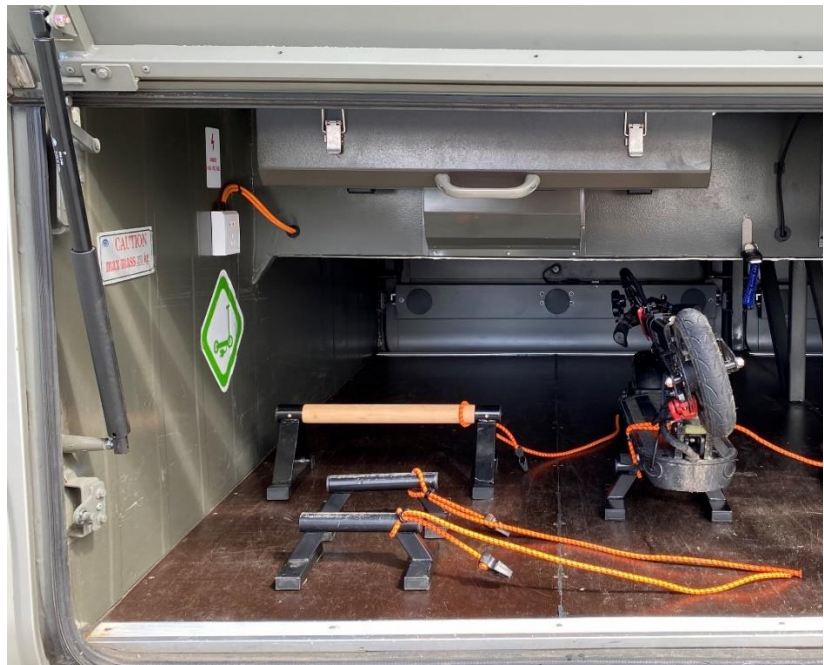
Zero10 scooter



Early prototype of fixed racking system with sliding trays to accommodate six scooters



Examples of moveable stands (small and large size) with quick-release cords, and one scooter secured on stand



new charger on left, installed adjacent to original charger and fuse box

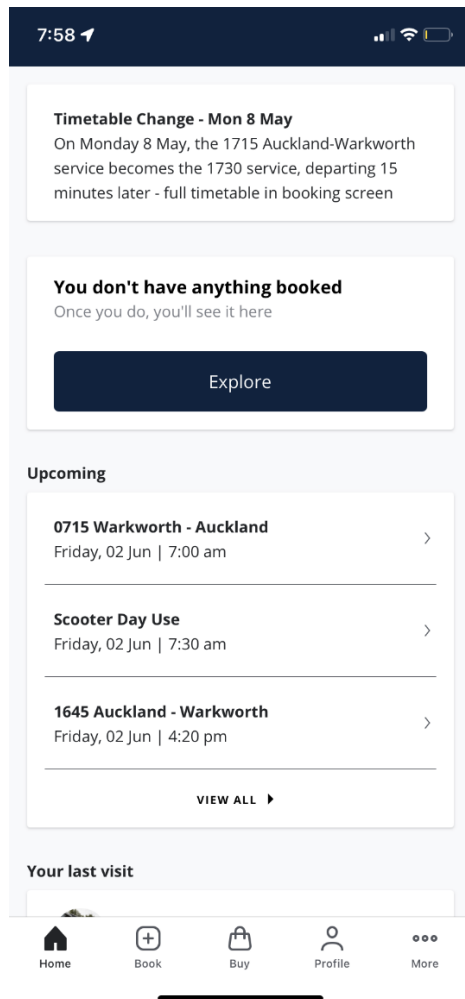


Close up of new charger installation

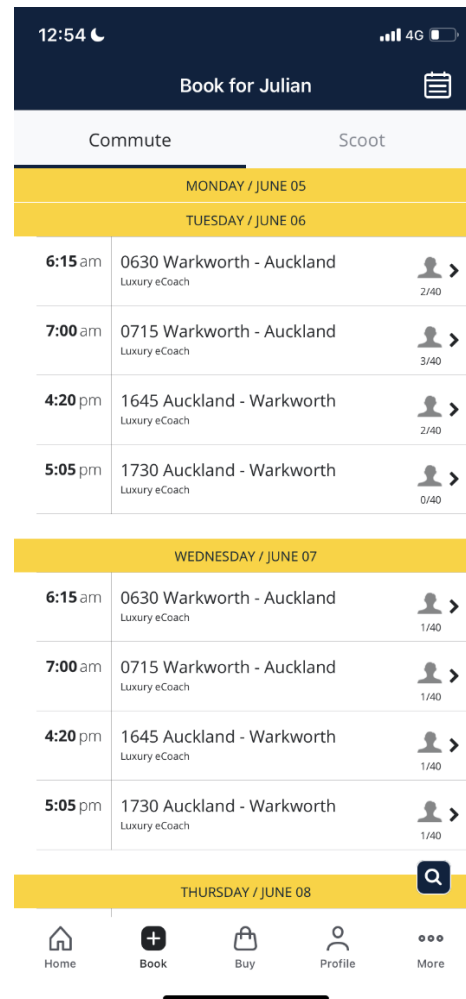


Appendix 4 – Booking app screenshots

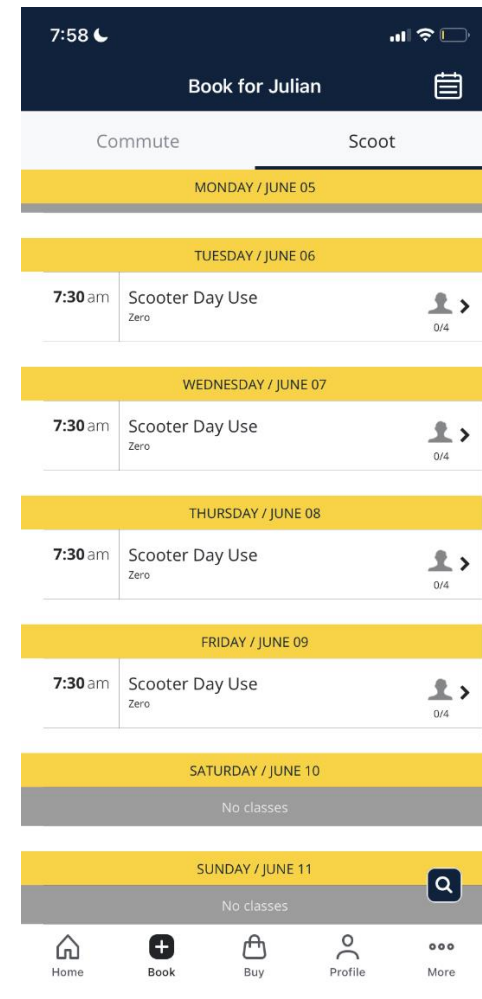
Home Screen showing all upcoming availability:



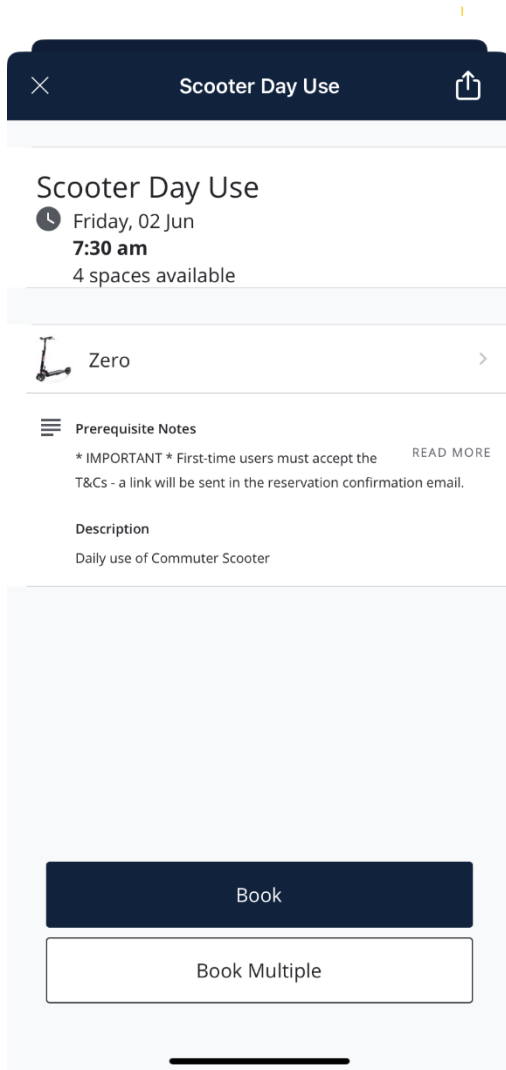
Commute Tab showing commuter coach availability:



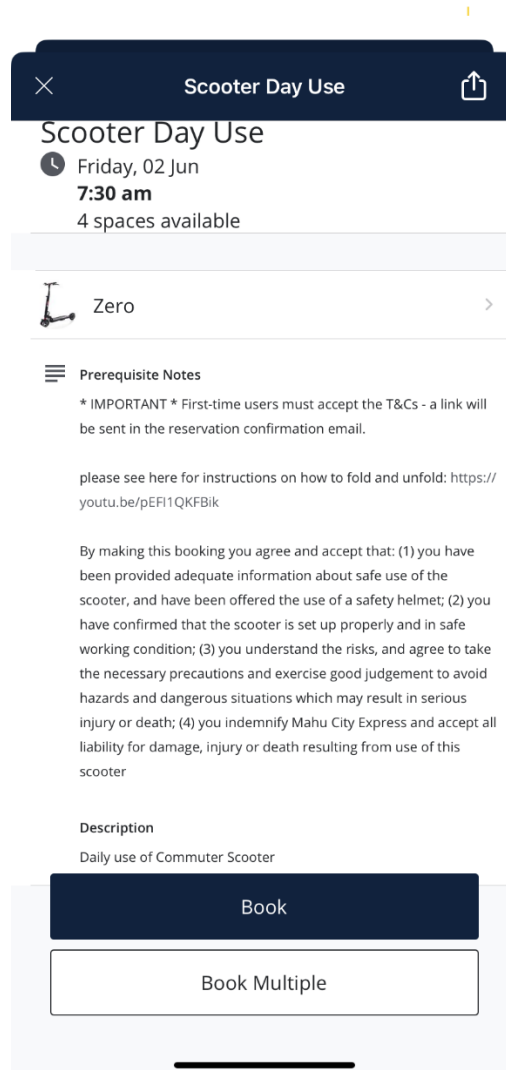
Scoot Tab showing scooter availability:



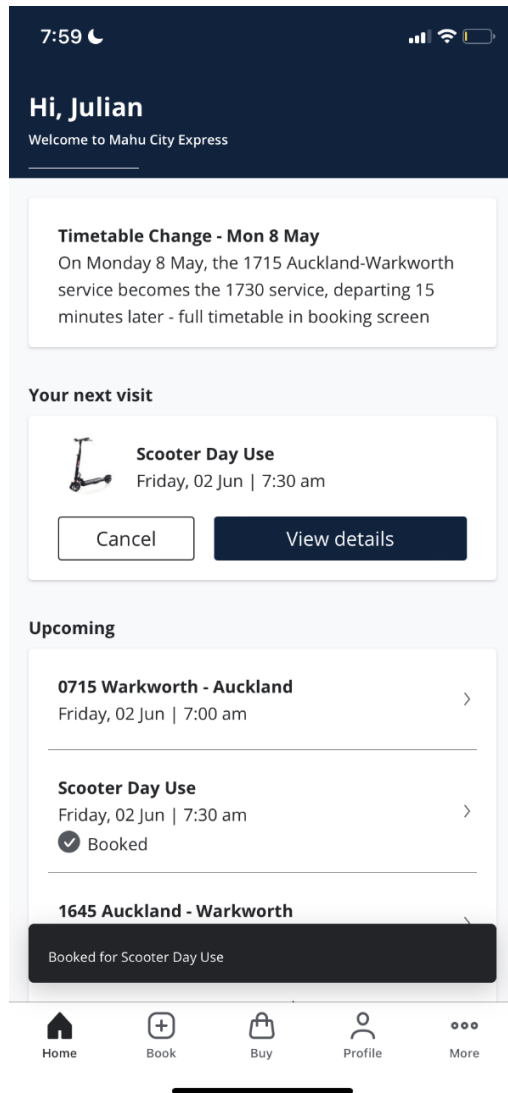
Scooter Booking Screen



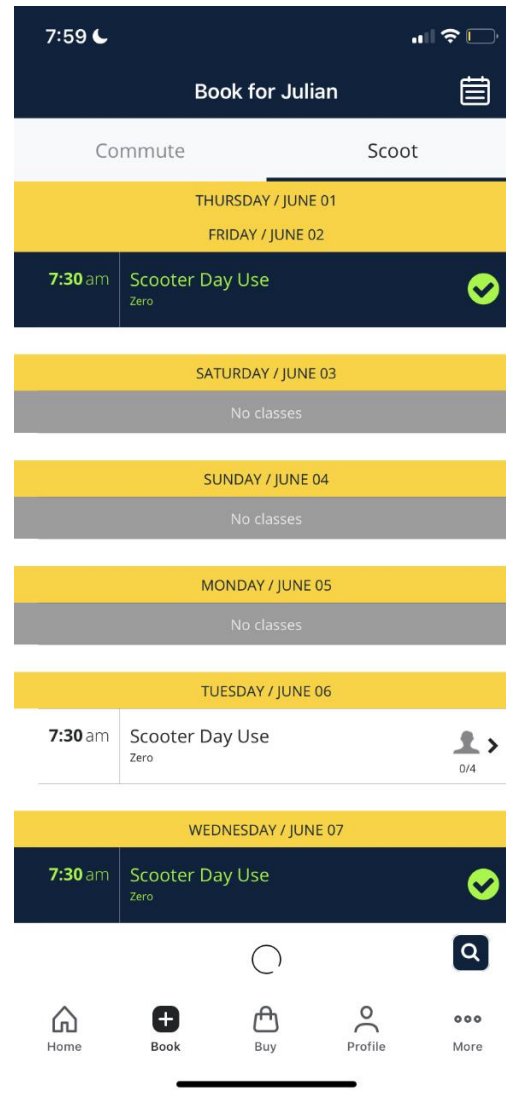
Scooter Booking Screen showing more details including disclaimer and instruction video



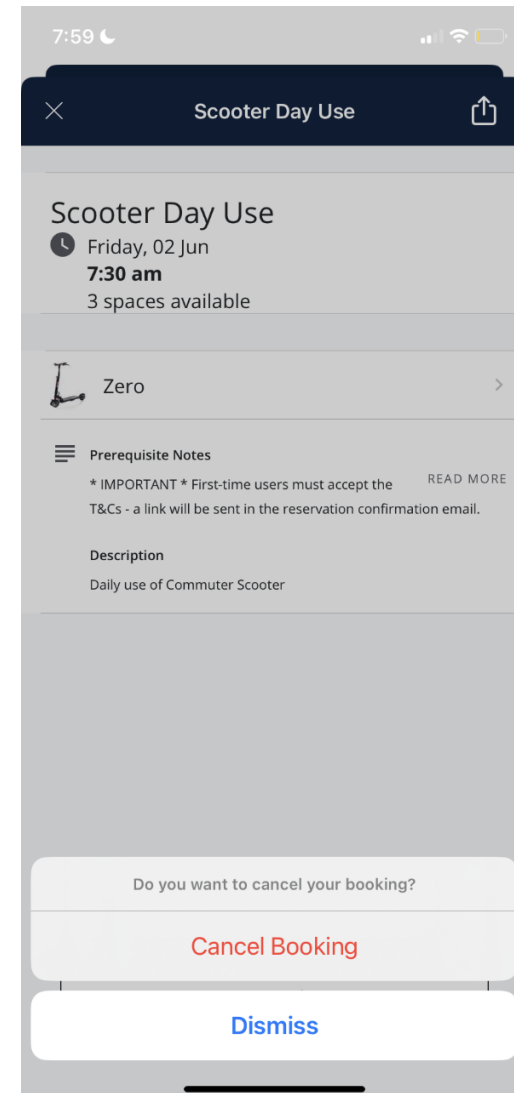
Home Screen showing booked scooter session:



Scoot Tab showing booked scooter session:



Cancel Booking screen:



Appendix 5 – publicity

The table below lists the activities to publicise the initiative. We also had several informal conversations with customers while onboard during commutes.

Channel	Date	Description
LinkedIn	19 Dec 2022	Announcement on eCoach LinkedIn page
LinkedIn	19 Dec 2022	Announcement on Mahu City Express LinkedIn page
Event	20 Dec 2022	Waka Kotahi / Minister of Transport Site Visit (publicised on Waka Kotahi LinkedIn page)
Facebook / Instagram	20 Dec 2022	Announcement on Mahu City Express Facebook/Instagram pages
Press Release	20 Dec 2022	Press release prepared by Amanda Wilson (Agency: These Guys I Know) collaborating with Waka Kotahi
Stuff.co.nz	20 Dec 2022	Stuff Article on Scooter Initiative
NZ Entrepreneur	21 Dec 2022	Included in article in NZ Entrepreneur
Event	23 Dec 2022	Scooters on demo at Mahu City Express end of year event
Facebook / Instagram	28 Mar 2023	Facebook advert - countdown to launch
Facebook / Instagram	02 Apr 2023	Facebook Post - Countdown to launch
Newsletter	02 Apr 2023	Pre-launch newsletter
Booking App & Website	March & April 2022	Pre-launch and post-launch alerts (banner messages) displayed on Mahu City Express website and booking app leading up to and following launch on 03 April 2023

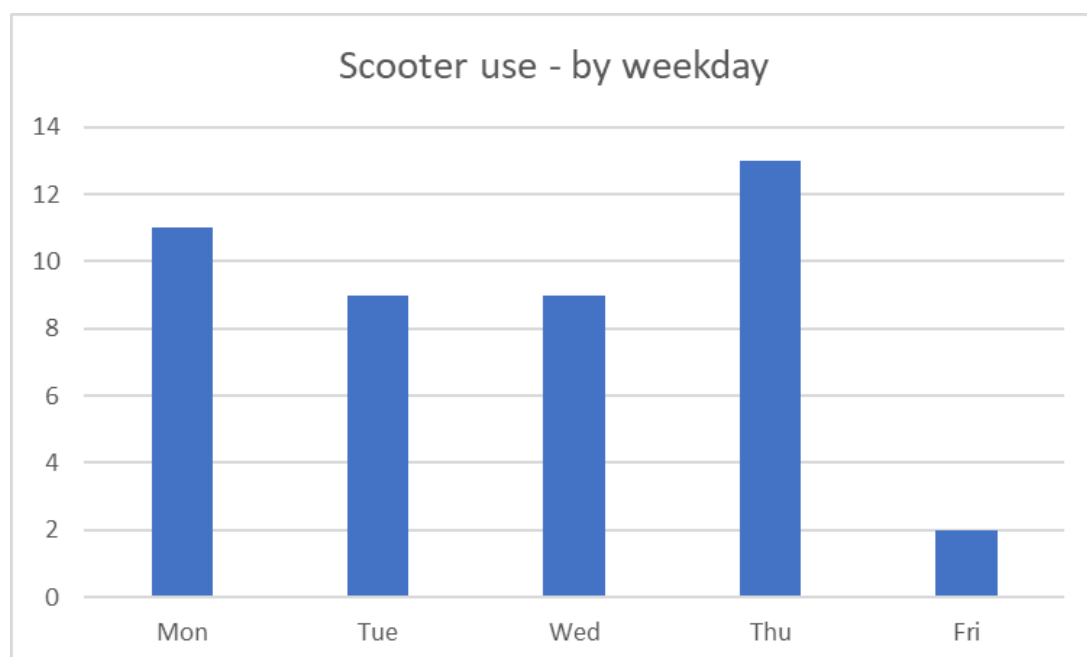
Appendix 6 – Usage and survey data

Usage data from booking system

In the following graphs, 'use' is defined as a single booking in the booking system: scooter taken from coach in morning and returned to coach in afternoon.

Wk.		User 1	User 2	User 3	User 4	User 5	User 6	User 7	User 8	User 9	User 10	User 11	Total	% cap
1	03 Apr			2		1					1		4	25%
2	10 Apr		1		1					1			3	21%
3	17 Apr	1	2									1	4	20%
4	24 Apr		1	2							1	1	5	31%
5	01 May		2						1				3	15%
6	08 May												0	-
7	15 May		1					2					3	15%
8	22 May												0	-
9	29 May		1										1	5%
10	05 Jun		1										1	6%
11	12 Jun		1					1					2	13%
12	19 Jun		1				1						2	10%
13	26 Jun		2										2	10%
14	03 Jul		3					2					5	25%
15	10 Jul		2										2	13%
16	17 Jul		4					3					7	35%
	Total	1	22	4	1	1	1	8	1	1	2	2	44	15%
	%	2	50	9	2	2	2	18	2	2	5	5		

* % capacity is based on 4 scooters per day being available to book through booking system



19 July Scooter Survey data

(58 responses from 1,035 recipients - 6% response)

Question 1		
Do you commute with the Mahu City Express?		
<i>Yes, occasionally</i>	<i>Yes, regularly</i>	<i>Rarely/never</i>
30	25	3

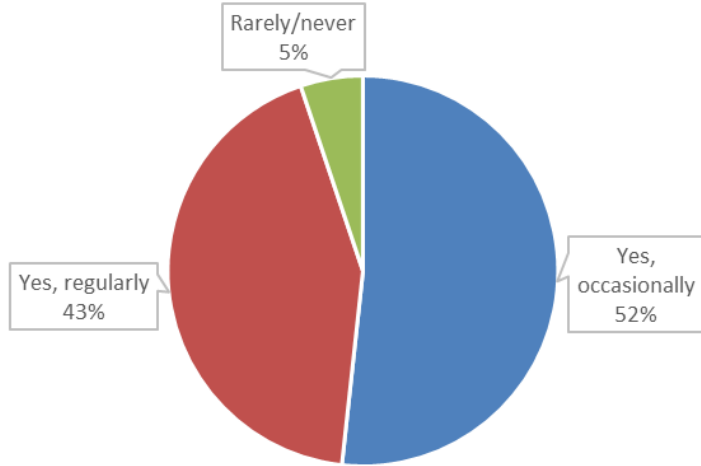
Question 2			
Are you aware we provide eScooters to complete your journey? (tick all that apply)			
<i>I'm aware I could use an eScooter for the day to get from the bus to my workplace and back again</i>	<i>I'm aware I could use an eScooter to get home in the evening and back to the bus next time</i>	<i>Vaguely aware of the eScooter option but not the exact details</i>	<i>I'm not aware of the eScooter option</i>
43	13	14	1

Question 3					
If you haven't used our eScooter option, we'd love to understand why (please tick any that apply):					
<i>It's unnecessary - I can easily walk from the bus to my workplace or home</i>	<i>I'm not convinced it's safe. seems difficult, and too risky</i>	<i>It just doesn't suit me: I have stuff to carry, prefer to drive, worried it might rain etc</i>	<i>It seems too complicated (booking, pulling out and setting up scooter etc)</i>	<i>I have nowhere to store it at work during the day</i>	<i>Other (please specify)</i>
32	8	9	4	4	9

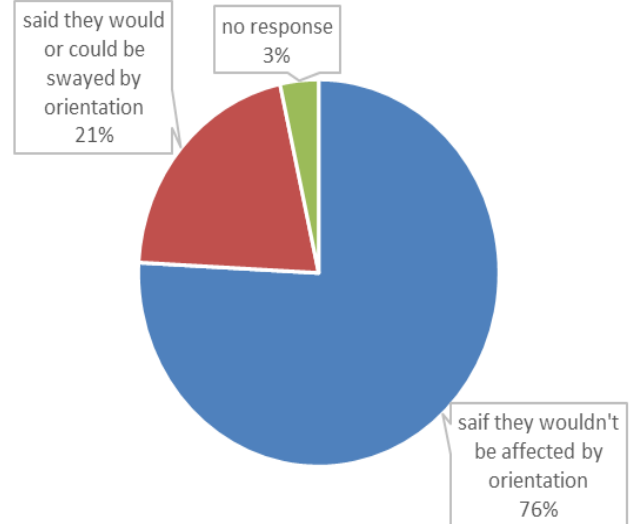
Question 4			
Would it make a difference if we ran some orientation sessions to show you how to use the scooters before you try one for your commute?			
<i>Yes</i>	<i>No</i>	<i>Maybe</i>	<i>(blank)</i>
9	44	3	2

Question 5		
We're especially interested to know how this 'first/last mile' option might affect your commuting choices (please tick any that apply)		
<i>Has made me more aware of the Mahu City Express as a commuting option</i>	<i>Has made me more likely to try commuting with the Mahu City Express</i>	<i>Won't change my commuting behaviour at all</i>
17	9	35

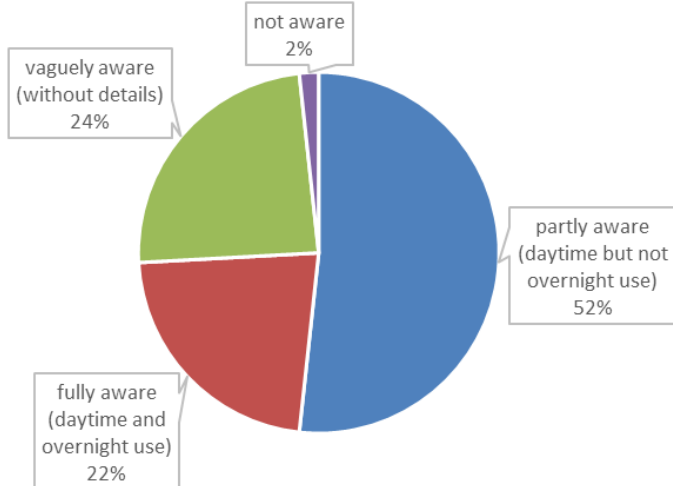
Commuting with the Mahu City Express?



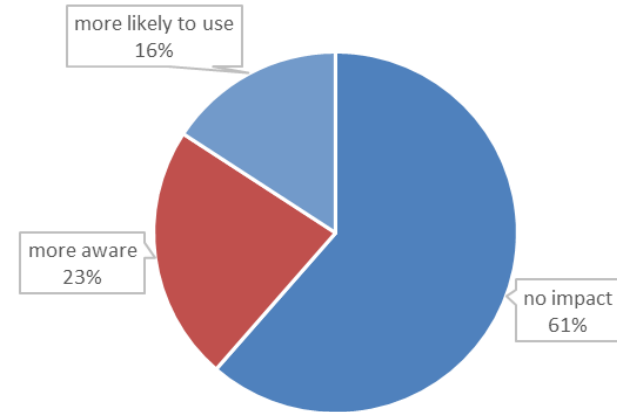
would orientation sessions impact usage?



Q1 - Awareness of eScooter options



Impact of scooters on use or awareness of commuter service



21 June Warkworth Park & Ride Survey data

(92 responses from 1,029 recipients - 9% response)

Would you be interested in using an eScooter to get between your home and the bus?			
<i>Yes, regularly</i>	<i>Yes occasionally</i>	<i>Maybe</i>	<i>No</i>
1	5	6	80
1%	5%	7%	87%

