



# Mobile phone and seatbelt detection trial

## Report

24 July 2023

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# Mobile phone and seatbelt detection trial

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## Executive summary

### An overview of the trial

Distracted drivers are a known road safety risk. Distraction is a contributing factor in nearly 8% of all fatal and serious injury crashes in Aotearoa New Zealand. Distractions can affect drivers in different ways and while there are many causes and factors that can lead to a driver being distracted, the use of a mobile phone appears to be a significant source of distraction, with a continuing upward trend in offences prosecuted by New Zealand Police annually.

Accurately quantifying the rates of mobile phone use and seatbelt wearing while driving is currently difficult, as much of the evidence is historical.

Undertaking a trial presented an opportunity to better understand the scale of the problem. It also demonstrated the role safety camera technology can play in the detection and enforcement of mobile phone and seatbelt use to bring about road safety gains through driver behaviour change.

The trial commenced on 24 May 2022 in Tāmaki Makaurau Auckland and finished on 24 November 2022. During the trial, no enforcement action was taken. Drivers did not receive infringement notices, warnings or any other communication from Waka Kotahi. All images taken were deleted within 48 hours, with a small number of anonymised images kept for use in this report.

### What did the trial data show?

Across three trial sites over the six month period, one in 42 drivers (2.4%) were shown using mobile phones and one in 95 (1%) of vehicles had occupants (driver or front seat passenger) not wearing seatbelts. The total number of detections recorded over the full trial period were 242,959. The data recorded from the trial is available here: [Technology trial – Waka Kotahi website](#)

### Summary and next steps

The findings of the trial present the first steps to providing better evidence of the scale of these safety issues. This could be used in the future to help to shape new initiatives that encourage people to make safer choices, including not using their phones while driving. Wearing a seatbelt can also increase the chances of survival in a crash by 40%.

Automated detection technology systems could be used to support Aotearoa New Zealand's road safety strategy Road to Zero, by reducing the number of deaths and serious injuries on our roads. However, legislative changes are required to use this technology to enforce mobile phone and seatbelt offences. Further investigation is needed to support the successful introduction of this technology.

## Introduction

Road to Zero is Aotearoa New Zealand's road safety strategy that aims to reduce road trauma by 40% by 2030. This is based on an ethical approach that is evidence-led and aims to strengthen all parts of the transport system. This includes influencing road user behaviour and recognising that everyone has a shared responsibility when it comes to shaping our transport system to support good choices.

Seatbelt use is one of the key behavioural measures targeted by Waka Kotahi and the New Zealand Police. Crash statistics show that a third of drivers and passengers who die on Aotearoa New Zealand roads were found to not be wearing seatbelts<sup>1</sup>. Evidence suggests that being properly restrained reduces the chance of death or serious injury in a crash by 60% in the front seat and 44% in the back seat. Seatbelt and child restraints surveys were undertaken regularly by the Ministry of Transport. However, they have not been completed since 2016, when the seatbelt wearing rate for drivers and adult front seat passengers was 96.5%. In the survey, around 95,000 drivers and adult front seat passengers were observed at 274 sites around the country. As in previous years, each site was surveyed between 10 am and 12 pm on normal working weekdays during the school term.

Distractions can affect drivers in different ways and can be categorised by a driver taking their eyes off the road, taking their hands off the wheel, noises that are distracting or a driver thinking about something other than driving. In 2020 there were 24 fatal crashes and 111 serious injury crashes where distraction was identified as a contributing factor. The Waka Kotahi Crash Analysis System (CAS) data for 2018 identified that 456 crashes involved attention being diverted by a mobile phone (9% of 4,945 distraction-related crashes).

Various surveys detecting mobile phone use have been attempted over the years with varying levels of success, including roadside observation surveys and the use of roadside signal technology.

Due to the lack of recent data to confirm the prevalence of these issues, Waka Kotahi sought to undertake a safety camera technology trial of an automated detection system. This would help us to better understand the prevalence of people driving while using their mobile phones and drivers and front seat passengers not wearing their seatbelts.

## Trial and scope objectives

The first trial of its kind in Aotearoa New Zealand presented an opportunity to better understand the scale of the problem, and the role that safety camera technology can play in increasing the detection and enforcement of mobile phone and seatbelt use.

While the trial initially proposed mobile phone detection only, the camera technology had the capability to detect seatbelt wearing. This was included in the scope of the trial following the completion of the Privacy Impact Assessment (PIA) specific to seatbelt detection.

### Scope

The trial had a limited scope, as it focused on the technology and systems needed to detect mobile phone use and not wearing a seatbelt while driving. This included:

- keeping the trial to a limited term (six months) and a single vendor for the supply of equipment and the automated detection system
- keeping the trial to an area of at least three operationally appropriate test sites across central Tāmaki Makaurau Auckland
- evaluating the operational suitability, reliability and robustness of the automated detection system to identify the number of people driving while using hand-held mobile phones, exploring the possibility of identifying the number of people not wearing a seatbelt and
- investigating what evidence is needed from an automated detection system to meet the requirements of the Aotearoa New Zealand justice system.

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<sup>1</sup> [Being safe on the road – rules and reasons | New Zealand Police](#)

The trial did not include the enforcement (or sending of warning letters) of any offences detected by the system during the trial period.

## Objectives

The primary objectives of the trial were to:

- capture real and accurate data to better understand the number of distracted driver incidents detected on Aotearoa New Zealand roads
- determine the reliability of the automated detection system
- ensure that data packages collected by the automated detection system met the evidential standards and requirements in the Aotearoa New Zealand justice system (this included the infringement processing for potential enforcement action, which at the time of writing would need legislative changes to introduce), and
- ensure that the safety cameras and automated detection system can be correctly installed (both at the roadside and in overhead infrastructures) and operate correctly in all typical weather conditions.

Secondary objectives were to:

- identify any other detection and enforcement capability this type of equipment could provide and if appropriate, test and validate that capability, and
- prepare and publish deployment reports and monthly data statistics to the Waka Kotahi website and produce a final report.

## Technology overview

### How does the technology work?

The safety cameras take a photo of the cockpit of an approaching vehicle and focus the image on the driver's hands. The automated detection system uses Artificial Intelligence (AI) to determine whether the driver is holding a mobile phone or wearing a seatbelt. This happens at the roadside. Should the AI return a positive result, the encrypted image is sent through to the vendor back office for human verification. Images that don't appear to show distracted driving or a driver not wearing a seatbelt are deleted instantly by the camera. All data is fully encrypted throughout the capture, AI scan, transfer and subsequent back-office activity.

### Human verification

Human verification consists of people being presented with randomised, cropped images that were flagged by the automated detection system as possibly containing an offence. This takes place on secure devices that only display these images and are monitored by the device's webcam. The cropped images do not have any identifying or location information visible and focus on a driver's hands and across the chest. The people checking the images simply click 'yes' or 'no' on the device to confirm if an offence has taken place or not.

### Privacy and data security controls

During the trial no personal or identifying data was captured or used. Vehicle registration numbers were included in the images, but no Motor Vehicle Register (MVR) database checks were performed, so no personal identifying information was seen. A sample of four images have been retained to evaluate if the images meet the evidence requirements of the Aotearoa New Zealand justice system. They have also been included in this report with identifying information fully anonymised to show what the system captures and how it works.

A comprehensive PIA process was completed prior to the installation and activation of the safety cameras and automated detection systems. This involved working closely with the Office of the Privacy Commissioner, where an open and frank relationship was fostered to ensure any potential privacy issues

were managed across the duration of the project. The PIA was proactively published and made available to privacy and civil liberties advocacy groups: [Safety cameras relevant documents Mobile phone and seatbelt detection trial - Waka Kotahi website](#)

## The plan for the trial

Waka Kotahi produced a full implementation plan, which included the installation dates for the safety cameras and automated detection system.

The original delivery timeframes were not met due to the significant work involved in the PIA and the Waka Kotahi Security Development Life Cycle for the trial, along with COVID-19 induced restrictions. The project started in May 2020, with a planned delivery window from October 2021 through April 2022.

Due to delays, the safety cameras and automated detection systems were activated on 24 May 2022 with the trial ending on 24 November 2022.

### Safety camera and automated detection system deployment

Systems (safety camera with the automated detection system) were installed at three locations - State Highway 1 Newmarket, State Highway 16 causeway and Fanshawe Street in the Auckland central business district (CBD).

The State Highway 1 Newmarket system covered the left most northbound lanes. The State Highway 16 covered the left two city bound lanes. The Fanshawe Street system covered the two left hand lanes.

The State Highway 1 system ran for the full six months of the trial, with the State Highway 16 and Fanshawe Street systems being split across the trial period.

## Results

The objectives and deliverables of the trial are summarised as follows:

[The trial delivered on its objective to capture real and accurate data to better understand the number of distracted driver incidents detected on Aotearoa New Zealand roads.](#)

The vendor provided data in weekly reports that showed the number of offences recorded by the automated detection system. This included the total number of:

- vehicles detected
- mobile phone offences detected and verified
- heavy motor vehicle offences as part of a limited seven-day test capture period.

The vendor and Waka Kotahi performed additional audits to evaluate the effectiveness of the automated detection system.

### Offence counts

The detection duration totalled 183 days across all three sites (seatbelt detection was active for 125 days).

During that time, 12,774,978 individual vehicles were detected and checked for offences.

At the three test sites, 1 in 42 drivers were detected using mobile phones and 1 in 95 vehicles had occupants not wearing seatbelts.

## Operational Data




**12,774,978  
Detections**

**201,788 Phone Offences** 

**43,710 Seat Belt Offences** 

## Operational Data by Month

Month	Vehicle Detections	Phone Offences	Seatbelt Offences	Phone Offence Rate (%)	Seatbelt Offence Rate (%)	Drivers per Phone Offence	Vehicles per Seatbelt Offence
May	498,598	8,964	-	1.80	-	55.6	-
June	2,250,324	19,951	-	0.89	-	112.8	-
July	2,183,042	30,515	1,033	1.40	0.05*	71.5	2,113*
August	2,759,574	50,008	9,910	1.81	0.36	55.2	278.5
September	2,738,684	40,840	9,401	1.49	0.34	67.1	291.3
October	1,205,168	24,516	11,388	2.03	0.98	49.2	105.8
November	1,139,586	26,994	11,978	<b>2.37</b>	<b>1.05</b>	<b>42.2</b>	<b>95.1</b>
TOTALS	12,774,976	201,788	43,710	1.58	0.54**	63.3	183.8**

\*Seatbelt AI was enabled July 22, 2022.

\*\*Overall seatbelt offence rates are given for the last four months (August - November).



# Operational Data by Site

Site	Site Name	No. of Lanes	Start Date Distracted	Start Date Seatbelt	End Date	Days of Operation	Detections	Phone Offences	Seatbelt Offences	Drivers per Phone Offence
1200	SH16 Causeway	2	24/5	22/7	24/11	185	6,961,194	103,332	31,508	67.4
1201	SH1 New Market	2*	28/5	22/7	30/9	127	5,623,197	93,518	9,964	60.1
1202	Fanshawe St	2	30/10	30/10	24/11	26	190,585	4,938	2,238	38.6
<b>TOTAL</b>		<b>6*</b>	<b>24/5</b>	<b>22/7</b>	<b>24/11</b>	<b>338</b>	<b>12,774,976</b>	<b>201,788</b>	<b>43,710</b>	<b>63.3</b>

\*Site 1201 operated with one lane only from 18/6 to 19/7:  
 • Lane 2 from 18/6 to 7/7,  
 • Lane 1 from 8/7 to 19/7.

A limited seven-day test period examined heavy motor vehicles to capture data on the extent of seatbelt non-compliance. Approximately 6.5% of all seatbelt offences captured were by heavy motor vehicle drivers at one of the site locations.

[The trial delivered on its objective to determine the reliability of the automated detection system.](#)

During a typical audit, a random sample of 200 images from each site is collected. There were six collections during the period of the trial, which would have totalled 1200 images. However, due to a configuration issue, an external audit was only completed on 487 images. Of these, the automated detection system found that 14 drivers were offending in the sample. An auditor found that 17 drivers were offending in the sample.

The automated detection system effectively detected over 82% of offences based on the sample size of 487 images in this audit. The vendor confirmed this result is similar to other external audits of the automated detection system. However, data from the Queensland Mobile Phone Detection Camera Program run in 2019 reported the automated detection system detected 35.1% of mobile phone offences during their trial. The vendor advised that the discrepancy is due to improvements to the technology during the time between the two trials.

[The trial delivered on its objective to ensure that data packages collected by the automated detection system met the evidential standards and requirements in the Aotearoa New Zealand justice system.](#)

This would include infringement processing for potential enforcement action, which would need legislative changes to introduce.

The images evaluated were very clear and would allow offence processing in line with the current practices followed in Aotearoa New Zealand for speed and red-light offences. For image-based offence detection, the current legal requirements are that the image shows a motor vehicle on a road and captures the offence (the offence description may be supported by data included in the header on an evidential image). The images evaluated met these criteria.

### Anonymised sample of offence images:



The trial ensured the safety cameras and automated detection system could be correctly installed (both at the roadside and in overhead infrastructures) and operated correctly in all typical weather conditions.

As the trial progressed, we detected issues with moisture ingress to the safety cameras. This caused fogging of the camera lenses and at times caused poor image quality. The trial also underestimated traffic volumes on State Highway 1, which meant the system could only process the volumes of traffic on one lane. The vendor visited the State Highway 1 site post COVID-19 restrictions to remedy the water ingress issues and install a second processor.

## Project deliverables

Another deliverable for the trial was the preparation and release of this final report, outlining its outcomes and the lessons learned. This includes the information provided on the installation, system performance, quality and reliability of the automated detection system, and a full description of distracted driver and seatbelt offence rates during the trial period. The findings in this report will be used to inform future activities to better understand the road safety implications around mobile phone use while driving and seatbelt non-compliance.

### Lessons learned

Computer processing capability for the system is driven by traffic going past the installed equipment. Future installation of these (or similar) systems must accurately reflect daily traffic volumes to meet the required processing capability to effectively detect offences.

The water ingress issue would be remedied by using the vendor's preferred coupling and seals, rather than locally sourced alternatives.

Early and regular engagement with the road maintenance contractors was critical to ensure smooth and planned access to sites when required to remedy issues identified on site.

## Conclusion and next steps

The trial data showed compliance rates of approximately 99% for restraints and 97.5% for focused driving on the three corridors assessed within Tāmaki Makaurau Auckland. These are high volume roads that allowed Waka Kotahi to review larger volumes during the trial period but are not necessarily typical of the wider Aotearoa New Zealand road network.

The images captured by the automated detection system were clear and would meet evidential standards and requirements in the Aotearoa New Zealand justice system. The automated detection system suffered from image processing and water ingress issues, which were resolved during the trial and could be addressed ahead of another trial. The automated detection system identified over 82% of offences based on the sample of images in the audit.

Further work is required to understand the problems at a national level and determine the appropriate system-based approach to achieve the best balance of road safety interventions. Waka Kotahi will continue to work with national and international experts to ensure we take a best practice approach. This could involve a second phase of the trial looking at a range of different road environments and locations throughout Aotearoa New Zealand, alongside different technologies such as trailer-based camera deployment that can increase flexibility of where such technologies can be used.