

Te Manatū Waka Ministry of Transport Long-Term Insights Briefing

The impact of autonomous vehicles operating on New Zealand roads
consultation document

27 August 2021

This consultation document outlines the topic selected by Te Manatū Waka Ministry of Transport to explore in its Long-Term Insights Briefing (LTIB) to Government. It is designed to provide you with information around what topic has been selected and why, the scope of the LTIB in relation to this topic, and a high-level outline of the content that will be included in the LTIB. You are welcome to provide feedback on any, and all sections in this document.

Introduction | Our role

Te Manatū Waka Ministry of Transport (the Ministry) is the government's system lead on transport.

We provide advice about how the transport system can better support the New Zealand economy and the evolving transport needs of New Zealanders.

We take a long-term and integrated approach to transport, considering how the transport system impacts people and products, health, economic prosperity, global connectivity, how easy it is to live in our towns and cities, and the quality of our environment.

We work with other transport agencies to develop and administer the regulatory framework for the transport sector that supports these outcomes, including Waka Kotahi NZ Transport Agency, Maritime New Zealand (MNZ) and the Civil Aviation Authority (CAA).

Section One | Long-Term Insights Briefings (LTIB)

The *Public Service Act 2020* ([Schedule 6, clauses 8 and 9](#)) requires agencies to develop a Long-term Insights Briefing (LTIB) at least once every three years. These briefings form part of the stewardship role of public service agencies.

The Briefings are intended to provide greater visibility of future challenges and opportunities that may affect New Zealand and New Zealand society. They are intended to promote public debate on issues that are important to the future wellbeing of the people of New Zealand.

Briefings are developed independently of Ministers. This means the subject matter for the LTIB is at the discretion of the Chief Executive. Ministers should be made aware of the content of briefings, and the consultation and select committee process, but this must be informative in nature only.

Briefings project at least 10 years into the future to explore issues that are known but have not received adequate consideration to date. This allows the Briefings to be distanced from current Government policy and the day-to-day work programmes of government agencies.

For the Ministry, the LTIB provides another opportunity to elevate areas we believe will have a major impact on the transport system, allowing us to better prepare to proactively respond to them.

You will have two opportunities to provide feedback: firstly, on the content and scope of the topic chosen by the Ministry (this document), and secondly to provide feedback on the final LTIB in early 2022. The final LTIB will be tabled in the House of Representatives by the Minister of Transport and will be subject to a select committee review. The deadline for tabling the final LTIB is 30 June 2022.

Section Two | The topic we have chosen

What topics could the Ministry have considered?

The Ministry wants to ensure that the focus of its first LTIB is significant, meaningful, and achieves the intent and purpose of Long-Term Insights Briefings. There are a number of projects underway across the Ministry that could have been selected that would deliver this value.

The Ministry Recently published the Government Policy Statement on land transport (GPS). This document sets out how money from the National Land Transport Fund is allocated towards achieving the Government's transport priorities. Each GPS sets out the priorities for the following 10 years. It is reviewed and updated every 3 years. The focus for the next 10 years includes addressing four big challenges: preventing deaths and serious injuries on our roads, decarbonisation, better transport choices for New Zealanders, and improving freight connections. Some of the work underway in each of the four areas is outlined below:

- In December 2019 the Government published *Road to Zero - New Zealand's Road Safety Strategy 2020-2030*, along with an initial 3-year action plan. The strategy outlines a plan to stop people being killed or injured on our roads. It includes five areas of focus for the next decade and targets a 40% reduction in death and serious injuries (from 2018 levels) by 2030.
- The Ministry has recently completed targeted consultation on its discussion document *Hīkina te Kohupara – Kia mauri ora ai te iwi - Transport Emissions: Pathways to Net Zero by 2050*. This document sets out potential pathways and policies to phase out emissions across the transport system. All members of the public will be given the opportunity to provide feedback on Government initiatives to reduce transport emissions when the Government releases a draft *Emissions Reduction Plan (ERP)* for consultation in the second half of 2021.
- The Ministry has work underway to provide people with better travel options to access places for earning, learning, and participating in society. This includes

implementing priorities identified in the New Zealand Rail Plan, support for the *Disability Action Plan* (to increase the accessibility of transport), the *Auckland Transport Alignment Project 2021 – 2031*, and the review of the *Public Transport Operating Model (PTOM)*.

- The Ministry has initiated work on a national freight and supply chain strategy. Supply chain congestion issues have serious economic impacts. The purpose of this strategy is to identify challenges and opportunities over the next 15-30 years facing New Zealand's supply chain and freight systems. The strategy will centre on resilience and sustainability as well as ensuring we have sufficient labour and skills for growth and adapting to new technologies.

As the above are already significant projects across the Ministry, and the wider transport sector, additional work in these areas is not being considered for the Ministry's first LTIB.

What topic has the Ministry chosen to explore?

In late 2020 the Ministry provided the incoming Minister of Transport a briefing outlining (among other things) the key challenges for the transport system. The Briefing to the Incoming Minister (BIM) reinforced the importance of the four priorities above and also outlined the key considerations for developing a transport system that supports the wellbeing of New Zealanders.

Among these considerations is a transport system that enables economic and social opportunities, supports inclusive economic growth and provides sustainable and safe networks for people, businesses, and freight. The system must also provide safety and security for New Zealanders, help meet New Zealand's emissions goals and take a long-term view of transport investment decisions.

In line with these considerations, the Ministry has decided to focus on *the impact of autonomous vehicles operating on New Zealand roads*. This includes their potential impact on New Zealand's transport system and the wellbeing of New Zealanders. Autonomous vehicles (AVs) meet the requirements of a LTIB as they have not received adequate consideration to date and are likely to affect the wellbeing of New Zealanders at least 10 years into the future.

AVs are predicted to fundamentally change the transport sector. There is, however, a high degree of uncertainty in understanding their potential impact. On the one hand, AVs could significantly improve road safety outcomes and contribute to a more integrated, accessible and cost-effective transport system for New Zealand. However, they could also introduce

new road safety risks (such as hardware and software failures and malicious hacking), and make new demands on transport services, infrastructure and regulations.

While AVs are still an emerging technology, over the next 5-10 years (and beyond) they are likely to have a major impact on regulatory systems, equity, congestion, the use of public spaces, economic development, labour markets, the health of New Zealanders and the way we connect with each other. Not all of these impacts will be positive.

The Ministry's role is to ensure our regulatory settings are fit-for-purpose, including making sure regulations are focussed on keeping road users and the wider public safe. By understanding the impact of autonomous vehicles operating on New Zealand roads, the Ministry will be able to put appropriate regulations in place to ensure AVs support Government's broader transport objectives. In addition, the impact of AVs is likely to affect other sectors across Government - particularly the energy, infrastructure, and labour market sectors. Building our understanding of the potential impact of AVs will help inform future decision-making in these sectors and more cohesively shape Government's longer-term investment priorities.

Why does New Zealand need to focus on this topic now?

Over the last decade, we have seen increasing levels of driving automation in land transport vehicles arriving in New Zealand. On-board vehicle technology has progressed beyond single-task on-board computers or providing warning lights in times of emergency or when systems are not operating as designed. We now see systems that provide sophisticated support for the driver, such as lane-keep assist, electronic stability control, and adaptive cruise control, known as Advanced Driver-Assistance Systems (ADAS).

There are some clear safety benefits in having ADAS in our vehicle fleet. In recent years New Zealand has mandated Electronic Stability Control (ESC) for all vehicles entering New Zealand and Anti-lock Braking Systems (ABS) for motorcycles. A number of ADAS systems also allow vehicles on our roads to operate for extended periods of time without human intervention.

The current challenge is that we do not know how many vehicles are operating on New Zealand roads with these systems, what their specific capabilities are, or whether the general public have the information they need for their safe use. Contributing to this challenge is that some of these vehicles can have their capabilities upgraded through over-the-air software updates, without any direct knowledge of the regulator.

New Zealand can expect to see exponential growth in autonomous vehicle features, as global companies and manufacturers compete to test, trial and deploy different levels of autonomous vehicles on public roads. There is some urgency for New Zealand to understand the impact of autonomous vehicles operating on our roads if we are to address the potential risks and capitalise on the benefits of AVs. There are two key drivers underlying the need to develop this understanding now.

New Zealand is a taker of technology

New Zealand is a taker of technology. On the one hand, this allows us to observe and evaluate the success of other jurisdictions' approaches to the deployment of AVs before committing to a course of action ourselves. On the other hand, it means we need to deliberately and consciously follow international developments, so we are prepared for the arrival of new vehicle technologies on our roads.

New Zealand also does not have its own vehicle manufacturing industry and subsequently sources its vehicles from four different international markets. This requires us to remain current with technology developments and monitor and evaluate the vehicle technologies entering New Zealand. While some work has been undertaken across the Ministry and Waka Kotahi New Zealand Transport Agency around AVs since 2013, it is only now that technology has developed enough to see AVs as a real eventuality on New Zealand roads over the next 10 years. New Zealand needs to have a renewed focus on the benefits and risks of AVs now to ensure we can proactively respond to developments in the international market.

We have already seen significant investment in Electric Vehicle (EV) technology over the past ten years. This is now being paralleled by significant investment in the development of AV technology internationally. Global tech giants like Facebook, Amazon, Google, Microsoft and Apple are acquiring their own capabilities in the AV space and collaborating with traditional automotive companies, and vehicle manufacturing start-ups alike. This is similar for companies like Alibaba and Baidu in China. These companies are striving to be the first to commercially deploy higher levels of AVs to market. Some of these vehicles are a progression of existing technology, but others are being designed with the intention of never having a "driver" (or even a steering wheel in many cases). Once the technology has been proven, and regulatory settings are conducive, we should expect the rapid deployment of higher levels of AVs on a global scale. New Zealand needs to be prepared for this.

New Zealand needs a regulatory approach that is specific to the New Zealand context

Regardless of whether the Government chooses to encourage the uptake of AVs, we will need a considered response to them as they do not fit neatly into our existing regulatory frameworks.

There are no specific policies currently under development that directly relate to the on-road deployment and operation of AVs in New Zealand. While the international community has been developing their thinking in the regulatory space for some time, New Zealand has been taking a “wait and see” approach to regulation. While it will be complementary, this international thinking is not directly transferable to the New Zealand context.

Modifying or amending regulation and legislation is also a time-consuming and resource intensive process. By proactively understanding the regulatory challenges and opportunities AVs present, New Zealand can better get the balance right between minimising the risks, while not stifling innovation that could provide significant benefits.

New Zealand’s current regulatory settings are based around the driver always being in full control of the vehicle. The deployment of AVs on public roads is subsequently bound by existing rules and regulations on the operation of motor vehicles under the Land Transport Act 1998, and other legislation that addresses the safe operation of motor vehicles. We are already seeing more sophisticated vehicle technologies entering New Zealand. While our current regulatory settings are adequate for the vehicles on our roads now; they are not fit-for-purpose for higher levels of automation. With increasing levels of autonomy on the horizon, there is a need to understand how regulations might need to change.

New Zealand has an old vehicle fleet, so we are likely to experience a transitional period where we will have a mixed fleet of vehicles across various levels of automation. Some of the greatest challenges will arise as we see the incremental growth in automation on New Zealand roads. While this will allow Government to adapt and prepare for greater numbers of AVs, it will require consideration of what regulations might need to change to support this transition period.

How will the Ministry approach this topic?

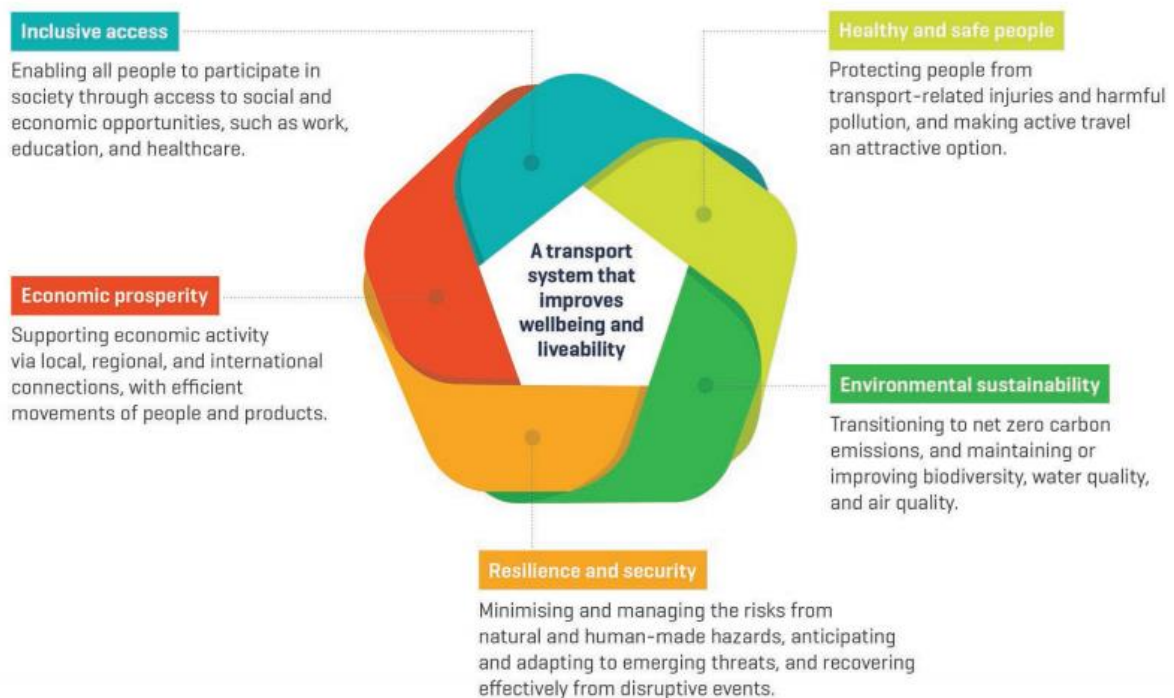
We are using the Transport Outcomes Framework as our lens for assessing the impact of AVs operating on New Zealand roads. The framework provides an enduring lens for assessing policies and investments against the outcomes the transport system is trying to

deliver. The LTIB will evaluate the potential risks and benefits of AVs for New Zealand and New Zealanders against the five outcomes identified in the framework.

At the heart of the framework is improving the wellbeing of New Zealanders and the liveability of the places they live in and visit. This encourages officials to take a holistic view of the transport system, with people at its centre (rather than roads and the vehicles that travel on them). Consideration is given to the health and safety of people, and their ability to participate in society and access opportunities, as well as how the transport system supports economic development, resilience, and environmental sustainability.

Evidence shows that Māori experience disproportionate inequities in the transport system. We will be engaging with Māori specifically throughout the development of this work to understand how AVs might impact positively or negatively on their outcomes. This will help us to identify ways to mitigate potential further inequities.

When looking at the impact of AVs, and any new or emerging technology, we take a human-led, rather than technology driven approach. The outcomes we seek are subsequently viewed through a lens where people are the focal point, and the technology must fit around their needs. This will help us to ask better questions that are focussed on the wellbeing of New Zealanders. A copy of the framework is below, but you can find more information in the Ministry’s website at: [Transport Outcomes Framework | Ministry of Transport](https://www.transport.govt.nz/transport-outcomes-framework/).



Section Three | The scope of the Ministry's LTIB

In line with the requirements for a LTIB, the Ministry has scoped the above topic to ensure that it is manageable, closely connected to the department's function, and contributes to public value by considering the future wellbeing of the people of New Zealand. The three elements identified below help us to achieve this.

A focus on land-based transport

Land-based transport impacts more New Zealanders than any other mode of travel. The Ministry has deliberately chosen to focus on autonomous vehicles operating on New Zealand roads as these represent the greatest level of potential risk and benefit to the transport system and New Zealanders' wellbeing over the next 10-20 years. The impact of change from AVs will be felt by more people, with wider-reaching impacts (both directly and indirectly) on the wellbeing of New Zealanders and liveability of our country. While we intend to focus on land-based transport, many of the insights in the LTIB will be applicable to other modes of transport.

Challenges and opportunities in the maritime and aviation environments were considered, but not progressed as the focus of this LTIB. There is also work underway in both of these areas across the Ministry. In the area of aviation, work on the potential benefits of drones for the transport system and the regulatory changes required to support their integration into the transport network has been underway since 2019. In the maritime environment, the recent release of *The Maritime Security Strategy 2020 Te Kaitiakitanga o Tangaroa*, provides an enduring operational approach to respond to changes in the maritime security environment. This strategy builds on our strengths, addresses weaknesses and helps us to prepare for new technology and approaches.

Transportation of people and goods

The transport system covers the transportation of both people and goods. It includes privately owned vehicles for personal use, public transport services and transport options offered by commercial entities. Across the system, there are a variety of different vehicle options available to provide different benefits for their owners and users. This is no different in the AVs space.

The LTIB will cover the breadth of potential uses for different types of AVs that could eventually end up operating on New Zealand roads. These are known as use cases and include AVs that replace existing transport options or provide entirely new transport

solutions. These use cases will be assessed against our transport outcomes, as well as commercial and regulatory constraints.

We know from previous work at the Ministry that the freight sector will grow significantly over the next 30 years, in line with population growth and an increase in e-commerce. We also know that to achieve a reduction in transport emissions we need to shift our vehicles to lower emissions and make better use of our public transport system. Bus and truck driver shortages and New Zealand’s high levels of car dependency are creating challenges to achieve these goals. We will need to understand how AVs can help mitigate these challenges for both people and goods transport.

Vehicles with automated driving features

There have been rapid advances in vehicle technology, with an increased use of sensors and faster computer processing in vehicles. These developments have enabled ever-increasing levels of functions to be controlled by the vehicle, rather than the driver.

The LTIB will focus on vehicles that sit at level 3 automation and above. The current level of vehicle technology on New Zealand roads is level 2. To understand the levels of driving automation, New Zealand has adopted the International Standard J3016 as developed by the Society of Automotive Engineers (SAE). This framework describes vehicles from SAE level zero (no automation) to SAE level 5 (full automation). The SAE framework is shown below.

SAE J3016™ LEVELS OF DRIVING AUTOMATION™
 Learn more here: [sae.org/standards/content/j3016_202104](https://www.sae.org/standards/content/j3016_202104)

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	SAE LEVEL 0™	SAE LEVEL 1™	SAE LEVEL 2™	SAE LEVEL 3™	SAE LEVEL 4™	SAE LEVEL 5™
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged – even if you are seated in “the driver’s seat”		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	
	These are driver support features			These are automated driving features		
What do these features do?	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met		This feature can drive the vehicle under all conditions
Example Features	<ul style="list-style-type: none"> • automatic emergency braking • blind spot warning • lane departure warning 	<ul style="list-style-type: none"> • lane centering OR • adaptive cruise control 	<ul style="list-style-type: none"> • lane centering AND • adaptive cruise control at the same time 	<ul style="list-style-type: none"> • traffic jam chauffeur 	<ul style="list-style-type: none"> • local driverless taxi • pedals/steering wheel may or may not be installed 	<ul style="list-style-type: none"> • same as level 4, but feature can drive everywhere in all conditions

SOCIETY OF AUTOMOTIVE ENGINEERS

At the furthest end of the spectrum (depicted on the right), fully autonomous vehicles do not require a human driver to be involved in the driving task. The human driver will effectively be replaced by artificially intelligent self-driving software. This is known as level 4 and 5 automation.

Level 4 fully driverless “robotaxi” services are already operating under various trials in cities in the United States and China. These services have fare-paying customers, with no safety drivers in the vehicle. Similarly, autonomous trucking companies are trialing the autonomous movement of goods up to distances of 1000 miles with a safety driver only in the vehicle to monitor vehicle performance.

Level 4 and 5 vehicles represent a paradigm shift for road transport, away from the driver being responsible for any part of the driving task, towards the automated driving system taking over this role. Up until Level 4 and 5 automation the driver will continue to have a role, even if only as a back-up if the driving system fails or is unable to manage the driving task (maybe due to extreme weather). This is level 3 automation.

At level 3 there will be a transition back-and-forth between the driver and the automated driving system. When requested to re-take control of the vehicle, the driver must be ready, willing and able to undertake the driving task. Understanding the risks associated with Level 3 automation is important, not only for the potential safety challenges it creates, but also because it will challenge our current liability settings in the case of an accident.

Internationally we are already beginning to see level 3 AVs on public roads. In March 2021, Honda released the first production vehicle with a Level 3 autonomous system. Its *Traffic Jam Pilot* function can drive the car in certain conditions without requiring the driver to pay attention. The fundamental difference between level 2 and level 3 automation is the ability to no longer pay attention when the automated driving features are engaged.

The Ministry would like your feedback on the proposed scope of the LTIB outlined above

- *Do the elements identified adequately cover the topic?*
- *Are there any additional elements that are missing?*
- *Should some elements receive greater emphasis than others within the briefing?*
- *Is there anything else that should be included in the scope to effectively explore the topic?*

Section Four | The content of the Ministry's LTIB

The content of the Ministry's LTIB is centred on understanding the potential risks and benefits of AVs for New Zealand and New Zealanders. There are benefits for New Zealand by allowing AVs to operate on our roads, but only once we understand the potential risks, particularly in the early stages of AV deployment. The LTIB will look at the international evidence, evaluate and assess how risks and benefits could play out in the New Zealand context, and recommend what responses should be considered, and who is best place to deliver these (Government or industry).

The Ministry has already started thinking about the risks and benefits of AVs. We have run several workshops with subject matter experts from the private sector, academia, and other Government agencies to better understand the potential impact of AVs in New Zealand.

We have developed several background papers looking at the possible use cases for AVs in New Zealand, global trends influencing AV development and deployment, and the approaches of different countries and companies to AV deployment.

The Ministry has ongoing engagement with our overseas counterparts, particularly Australia and Canada, who both have substantial AV work programmes. We have learnt a lot from Australia about the regulatory challenges, and from Canada around the social and cultural challenges.

The Ministry is part of the UN Working parties that are developing standardised regulations for AVs, and recently we have been invited to join a newly established UN Working party responsible for drafting a legal instrument on the use of automated vehicles in traffic.

All of our work to date has helped inform the key areas we believe need to be considered in the LTIB to understand the potential risks and benefits of AVs specifically in the New Zealand context. These have been highlighted below and grouped under seven key headings. These areas will form the basis of the Ministry's LTIB.

Ensuring that safety is the key driver behind AV deployment

Road safety could be significantly improved by level 4 and 5 AVs.

If managed effectively, AVs could eliminate some of the most significant causes of road accidents in New Zealand. New Zealand has a high road toll with 318 deaths on NZ roads in 2020. As well as the lives lost, the total social cost of road crashes and injuries was estimated at \$4.6 billion for 2019. We know that 90% of deaths and serious injuries on our

road are a result of human error. Alcohol and drugs, excessive speed, fatigue, and driver distraction are amongst the primary contributors to this. Fully autonomous vehicles would theoretically eliminate these contributors.

However, if consideration is not given to their introduction to the transport system, AVs could introduce new safety risks, particularly in the early stages of technology development. For example, how do regulators get visibility of automatic software upgrades to higher levels of automation, and what does this mean for other road users' safety, driver responsibility and traffic enforcement? New Zealand will need to understand where the risks lie, how its current safety compliance processes and approaches need to evolve to manage these, and what level of assurance the public will demand before there is endorsement of fully autonomous vehicles on New Zealand's public roads.

There are several factors to explore to understand the real impact AVs could have on road safety. Improving road safety is heavily dependent on where AVs are deployed in relation to where crashes currently occur, the types of vehicles that are involved in crashes most often (cars or trucks?), and the characteristics of those drivers most frequently involved in crashes (younger or older?). We will also be living in a world of mixed traffic for the foreseeable future, limiting the impact AVs could have in the medium-term. In addition, it takes on average around five to six years for the latest vehicle technologies to filter through to the New Zealand car market, so a real improvement in road safety as a result of AVs may be a way off.

Understanding the impact on social outcomes across different populations

AVs could have a significant impact on social outcomes, particularly for certain groups.

AVs could prolong independent travel later in life, providing freedom and independence for the elderly and people who can no longer drive. AVs could also improve accessibility for differently abled populations. This could help to reduce isolation, improve access to services and improve social connectivity.

AVs could also shift the way we think about car ownership and how we move people and goods in the future. Under the right conditions AVs could incentivise the use of car and ride-sharing services, taking vehicles off the road and improving connectivity to public transport hubs. They could provide people more free time during their commute, or even allow office workers to count that time towards their workday. Current developments suggest AVs will be electric, so are likely to support New Zealand's greenhouse gas emissions targets.

Equally, AVs could lead to unintended outcomes like exacerbating urban sprawl, reinforcing car dependency, contributing to lower levels of physical activity, and taking people away from public transport. All of these issues could make congestion in our cities worse and have a negative impact on our health and wellbeing. There are also a number of roles that drivers play at the moment that may be lost such as helping people get into vehicles, with their luggage, and loading and unloading freight and cargo. AVs could reduce social connectedness as well, if we are underestimating the value people place on having a human driver to engage with when taking a taxi or ride-hailing service.

Most importantly, social outcomes from AVs are not likely to be equitably distributed across all populations in New Zealand society. For example, some populations may be priced out of the market for AVs and therefore miss out on potential benefits altogether. We need to better understand how the benefits and risks might be distributed across different population groups, and the role Government might need to play to ensure a more equitable distribution of benefits.

Highlighting the possible implications for jobs and the training industry

Automation has long been a feature in the transport system.

Technology and automation in the transport sector can have many effects on the labour market, with implications for current jobs that revolve around driving, including logistics and staff management roles as well as drivers. This will include job displacement and job creation, with new roles being created, and new skills needed, to support the increasing complexity of on-board software systems. Understanding the potential size and scale of labour market movement as a result of AVs will assist Government and industry to better prepare for job transition in the future.

As New Zealand shifts towards a fully autonomous fleet, there will also be implications for our current compliance processes. There will be implications for driver training and licencing, offence provisions and the role of enforcement agencies, and the warrant of fitness and certificate of fitness processes. All of these will require a transition to new skills to mirror changing processes. While not viewed as catastrophic for the industry, job and role transition will need to be considered across a number of areas in the transport system sooner rather than later.

Understanding the demands AVs could put on our physical and digital infrastructure

Supporting infrastructure will be key to New Zealand getting the benefits AVs promise.

There is a lot of uncertainty around the extent to which commercially produced AVs will be reliant on external digital networks to operate safely on public roads. What these requirements might be is equally uncertain, as is the level of connectivity required between vehicles, physical infrastructure and compatible systems to get the benefits AVs could deliver. This will have implications for investment decisions for New Zealand as a technology taker.

Physical infrastructure will need to support a mixed fleet for an extended period of time. We need to understand if this requires dedicated infrastructure – like separate lanes for AVs (at least during the early days of AV deployment). The question is how and when to invest in infrastructure, the appropriate levels of investment, and how to account for this in all future infrastructure decisions.

Understanding the impact of consumer preferences on AV deployment

AV uptake will be influenced by consumer preferences.

Consumer preferences are shaped by culture, the options available to people, and the perceived value of each of those options. The market will respond accordingly. However, the market may need to be incentivised to provide options that best contribute to transport outcomes. Understanding consumer preferences will be essential for effective policy and regulatory development to support these outcomes.

Understanding the importance of Artificial Intelligence and the Human-Machine Interface

Artificial Intelligence (AI) and machine learning will play an increasingly important role in progressing to level 4 and 5 AVs.

The realisation that higher levels of automation will require more complex computer software is pushing developers more and more down the path of AI and machine learning. Exactly what this might look like is still unknown, and we are unsure about how comfortable people will be in knowing our vehicles are learning from our every move.

The transition period from where we are now, to fully autonomous vehicles, creates complexity and high uncertainty for drivers and regulators alike. Understanding the development pathway for artificial intelligence and machine learning in AVs, and how human

“drivers” will interface with the machine, will be pivotal in building consumer trust and supporting the safe deployment and use of AV technologies.

Highlighting the implications of data privacy and cybersecurity

AVs will increasingly collect and analyse vast amounts of data.

This will include personal information, location data, route history, owner preferences, and other sensitive information about individuals. This creates new risks around data privacy and software security. It also provides new opportunities to access transport network data to significantly improve transport network efficiencies. Systems will be needed to keep personal data secure, with consideration given to how anonymised data could benefit the efficiency of the transport network and all road users.

AV users will need assurance that their data is secure and not being used for purposes other than what they have consented to. There may also be concerns around mass surveillance through the data collected by AVs and how data might be used or sold by companies. Equally, the systems that collect data and operate the vehicle systems need to be safe from malicious hacking.

To gain public acceptance and buy-in there will need to be trust that the vehicle and broader data systems will operate as designed, and an awareness by users of the safeguards in place. Government will have a role in understanding and regulating data challenges, while also helping inform the public and road users about the risks and benefits of sharing their data.

The Ministry would like your feedback on the proposed content of the Briefing outlined above

- *Are these seven areas the most important ones to focus on?*
- *Are there elements that should be emphasized under any of them?*
- *Will addressing these areas be sufficient to understand the potential impact of autonomous vehicles operating on New Zealand roads?*