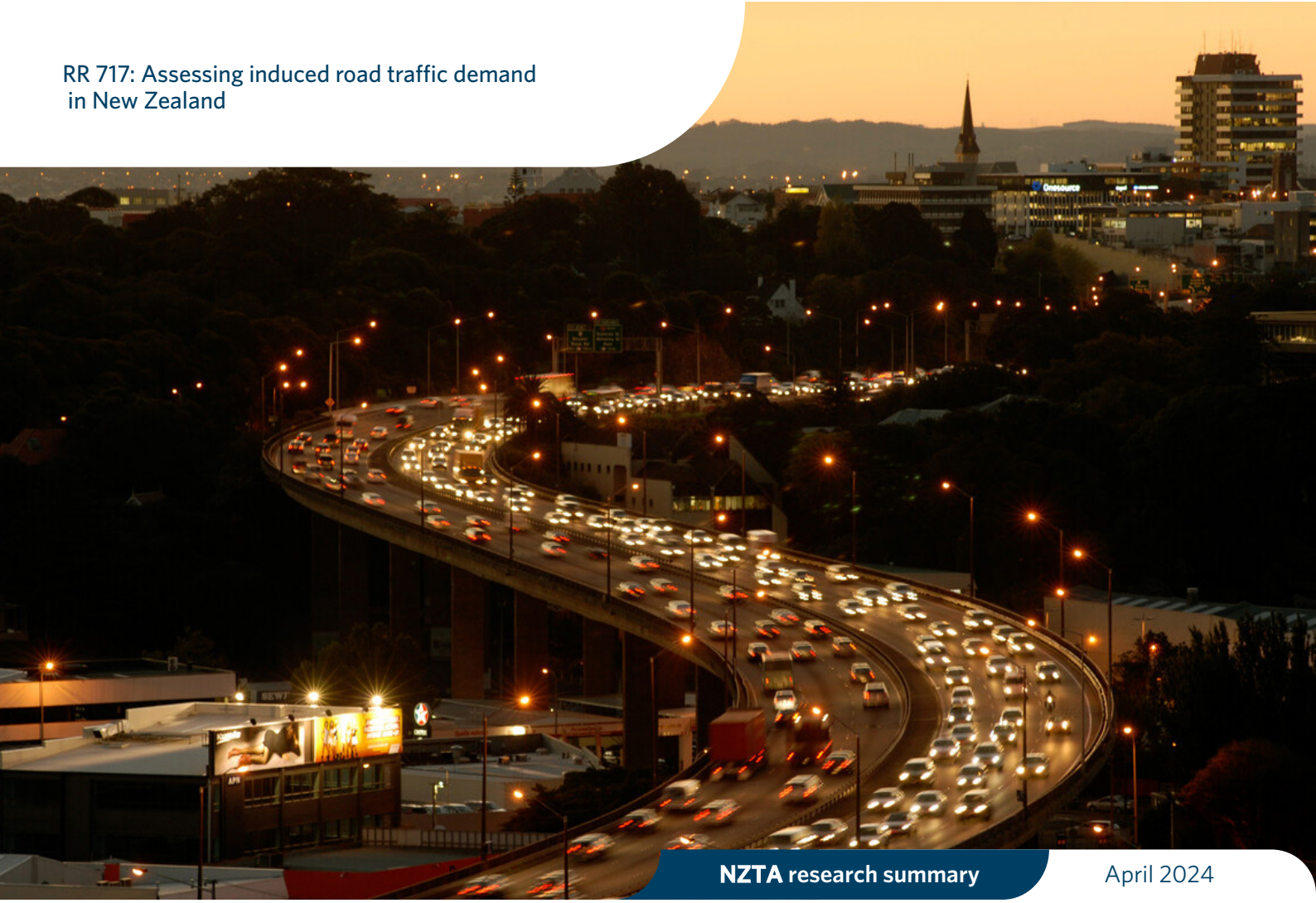

NZTA research summary April 2024

Assessing induced road traffic demand in New Zealand

A new tool to predict how much traffic new roads and lanes will create - how does it work?

It may seem counterintuitive to the average driver, but widening and extending busy roads tends to make them busier. This is a major issue when it comes to combating climate change. But some lane extensions create more new traffic than others, making the problem even more complex. That's why we commissioned a tool to help planners and policymakers predict increases in traffic on New Zealand roads after major new road projects.

What is induced traffic?

Have you ever noticed that the more we extend and widen congested roads to ease traffic, the more they continue to fill up with additional traffic? That's what economists call 'induced demand'. In the transport industry, 'induced traffic' is a paradox that planners have been trying to understand since at least the 1930s in the United States.

Induced traffic is becoming an increasingly serious issue. Why? Because adding even more cars on our roads will continue adding to societal costs. A balance needs to be struck. Being able to travel more on roads does increase choices for individuals - choices such as where to work, where to shop and where to be entertained.

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But having more cars also imposes costs on other people - costs such as noise, pollution, accidents, congestion and, significantly, more greenhouse gas emissions. If we want New Zealand's strategies for road development to be sustainable and align with our commitment to combating climate change, we need to be able to predict induced traffic and consider potential mitigations.

When we commissioned research on this issue, the research team reviewed dozens of international studies on induced traffic. They also examined the limited number of New Zealand studies and evidence. Then they searched for tools that predict induced traffic at the early stages of planning a road project. The tools they found either lacked important variables or restricted the types of roads that could be used in the calculations.

So we decided they would develop a tool that was specifically tailored to the New Zealand context.

What creates induced traffic?

The researchers started by re-examining the influential research by Gilles Duranton and Matthew Turner which posits a 'fundamental law of congestion'. They examined a number of new roads in various US cities and found the extra lane-kilometres created by the new roads merely led to more vehicle-kilometres travelled (VKT). The new roads did not relieve congestion, hence the 'law' that new roads simply induce more traffic. The way they calculated such induced demand was by estimating a lane-kilometre elasticity. In mathematical terms, a lane-kilometre elasticity of 1.0 would mean that for every percentage increase in the kilometres of lanes on a road, the VKT would increase by an equal percentage. While the new roads in the study eventually became as congested as the existing motorways, they were, however, busy major roads. On other roads, the causal factors differ, and in many cases the elasticity will be less than 1.0. When the researchers looked in detail at what creates induced traffic, they found three other factors that they thought should also be considered.

The first factor is simply road volume: get away from the very busy major roads and traffic is usually less responsive to additional lanes. The international research, and the limited New Zealand information, suggests elasticities for New Zealand mostly ranging from near zero (eg, minor rural roads) to 0.5 (eg, Auckland motorways), with lane-km elasticities for other roads in between. But existing volume alone does not determine the traffic response (eg, the elasticity for a new bridge could even be greater than 1.0).

The second factor is more difficult to measure, although it is also intuitive: we tend to travel more if the cost of travel declines. Travel cost is a generalised cost that combines travel time and vehicle costs. A travel-cost elasticity is the percentage change in VKT as a ratio of the percentage change in travel-cost. The immediate effect is that the new or improved lanes lower travel costs, which, in turn, generates traffic. In the long term, more people might then be willing to move further away from urban centres, essentially swapping a potential travel-cost saving for a lower housing cost, or for a preferred city fringe or country lifestyle (in transport modelling speak, this is 'land-use change' occurring over the longer term).

The third factor is the potential for people to divert to the new or improved road. Areas with extensive networks of interconnected roads tend to experience greater induced traffic compared to regions with limited alternatives. Greater induced demand is also often experienced in areas where public transport is available, but users are dissatisfied with it. A large proportion of induced travel is often a diversion of travel from other roads or other modes. We need to think of induced demand in gross, or local, terms (the extra VKT on or near the road project) and in net or national terms (the extra VKT nationally), as it is the latter net effect that will determine New Zealand's emission impact.

Understanding the causes of induced traffic also provides the potential mitigations, such as providing modal options with comparable travel costs and managing land use change.

How does this tool work?

Having considered all this, the researchers decided that the best way to predict induced traffic on New Zealand's roads was by creating a tool that could combine the lane-kilometre elasticity approach (how much more will people drive if road lanes increase?) with the cost-elasticity approach (how much more will people drive if travel costs decrease?). The tool gives the user a likely range of VKT that researchers think will be created each day by adding new lanes to a specific road, or by creating a new road.

The tool is designed to be user-friendly. It has five steps.

1. The user adds information about their road project, such as the class of road, the region the road is in, and the length of road lanes they plan to add. The tool then gathers data about New Zealand's regional roads and applies international lane-kilometre elasticities to it, giving the user an initial 'VKT effect'. This initial result tells a planner straight away if their road project is unlikely to induce more traffic.

2. The user can then decide if they want the tool to further develop the result based on travel-cost changes – how much time and money the project might save drivers. The tool provides the user with a guide to help determine the expected travel-cost savings.
3. The tool can then refine the calculation further after asking the user to input information about any nearby public transport or any factors that might affect land-use.
4. Next, the tool adjusts the result for diverted traffic: whether the newly induced traffic created by the road project will be offset by traffic it reduces elsewhere.
5. The tool then presents the results. It does this by showing an estimate of how many additional VKT per day will be induced by the project, both in the locality and at the national level. The user is also given an induced demand rating: rather than rating the results as high/medium/low risk (which can be misleading), the tool rates them as 'top of range' (taken to be comparable to an Auckland motorway project), 'mid-range' (comparable to a Canterbury motorway project), or 'bottom of range' (comparable to lower-class roads).

However, the tool's results are not precise forecasts. Traffic for an individual road is difficult to predict with confidence at the early planning stages, and fuller traffic modelling is still needed if induced demand is expected to be an issue.

What does this tool hope to achieve?

The tool's main goal is to show policymakers and planners the effects of their potential road projects and enable them to easily explore mitigation impacts. With a clearer idea about the amount of additional traffic their project might create, planners will be better informed about their project before they start the lengthy process of business-case development and transport modelling.

Ultimately, this tool will help us find ways to quickly assess a range of transport proposals and potential mitigations addressing induced travel. We think it will be valuable for managing our traffic and creating a better transportation system for New Zealand.

RR 717: Assessing induced road traffic demand in New Zealand.
NZ Transport Agency Waka Kotahi research report.
Available at **www.nzta.govt.nz/resources/research/reports/717**