

The Wellington City Council's speed limit reductions

**A review of the cost benefit
analysis**

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Part one: Introduction

On 15 September 2022 the Wellington City Council made a decision to reduce the speed limits on city roads to 30km/h, and to 40 km/h for arterial routes. The state highway speed limits will remain unchanged because the Council does not have authority over those roads.

The case for the speed reductions was set out in the Planning and Environment Committee report 'Approach to speed management' dated 9 June 2022¹. The report was written by Sandra Mandic, Principal Advisor Transport Strategy, and Joe Hewitt, City Insights Manager.

The report included a summary of the Council's cost benefit analysis. The key takeout was that the benefit/cost ratio (BCR) of the preferred option was 7.7. This looks to be impressive and may have influenced some Councillor's support for the proposal. However, this estimate was misleading. A better measure of the BCR, given the Council's estimates of the relevant costs and benefits, is 1.4.

However, it appears that the Council has overstated the benefits and understated the costs. Our estimate of the present value of the benefits from the reduction in deaths and injuries was about \$250 million compared to the Council's estimate of \$529 million.

It is also possible that the costs have been understated but it is difficult to tell as the full cost benefit report was not released. It should have been made available when the policy decision was announced. How we made an adjustment additional

¹ Note there was a supplementary report dated 15 September 2020 but this did not add to the economic analysis

costs to public transport because of the lower speed limits. Our preliminary estimates are that the costs exceed the benefits by around \$200 million and that the BCR is 0.54.

Given the high degree of public interest in the speed limit decision we have decided to release this assessment which is based on the Council's summary cost benefit study and other relevant information.

This paper is organised as follows:

Part two sets out our key findings.

Part three explains why the Council's benefit cost ratio estimate of 7.7 is misleading and discusses other aspects of the cost benefit analysis. These indicate that the benefits have definitely been overstated and the costs are probably understated.

Part four reviews other arguments and analysis in the Approach to Speed Management paper.

Part five presents relevant parts of a submission we made on the Government's Road to Zero consultation in 2019. The idea that zero deaths and serious injuries is a sensible road safety target is the driver behind the desire to reduce urban road speeds so it might be useful to have our perspective on this.

Part two: Key findings

Limited impact on accident numbers

Despite the fairly draconic reduction in speed limits expected deaths and serious injuries fall by 32 percent. The number of expected deaths falls by only 0.5.

The benefits are substantially overstated

The social value of the reduction in accidents is about \$250 million, not the \$529 million claimed in the cost benefit analysis.

Costs will exceed the benefits

Our limited review shows that the costs will exceed the benefits by around \$200 million. It is also possible that other travel time costs have been understated so the

net costs could be significantly higher. The benefit cost ratio is 0.54 and could be lower again if further cost understatements are uncovered.

Buses will become less competitive

Most people will exceed the new limits but buses will be constrained to comply with the rules. They will become relatively slower and hence less competitive. There could be a material increase in operating costs.

No review of existing speed limits

The Council should have waited until it had carefully reviewed the impact of the recent reduction in speed limits in commercial areas.

Part three: Assessment of the cost benefit outputs

Figure one below presents the main outputs from the cost benefit analysis. Option 6 (40/30 km/h) is the chosen option. Figure two sets out the components of the Council's direct expenditures.

The BCR in a conventional cost benefit analysis is the ratio of all of the benefits, to all of the costs. For option 6 the road safety benefits are \$529 million; and the costs are increased travel time of \$327 million; and Council costs of \$44.8 million. The ratio is $(\$529/(\$327+ 44.8)) = 1.4$.

This is not how the Council's BCR is calculated. Instead the travel time costs are deducted from the road safety benefits providing a net benefit number. The cost are some of the Councils costs, described as construction costs. Other Council costs of \$18m million appear to have been ignored. The BCR is $(\$529-327)/26.3 = 7.7$

The effect of this approach is to generate a much higher BCR. This makes the results look more robust and gives the impression that the Council's investment is very productive.

The Council's explanation for their approach is:

In a Cost Benefit Analysis disbenefits are negative consequences that occur to the public and, therefore, are included in the numerator of the benefit cost ratio. Costs are consequences to the public sector and are included in the denominator.

The problem here is that only the costs to the public sector are counted as the 'investment' and are included in the denominator. This implicitly assumes that it is only the investments in signs and the minor traffic calming investments that are driving the accident reduction benefits, which of course is not true. It is the regulatory limits on speed that primarily generate the benefits.

Conceptually the better way to calculate the BCR would be to treat the time costs of the speed limits as investments in road safety, and include them in the denominator. A benefit cost ratio calculation should include both the private and public investments. This would have generated the 1.4 ratio we calculated above.

The problem here is that the Council has tried to implement the procedures in Waka Kotahi's Monetised Cost Benefit Manual², which allows netting, but were not set up to deal with cases where the physical inputs by the public sector are small, and most of the costs are borne privately.

Figure one: Council BCR outputs

Option	Construction cost	Crash reduction benefit	Travel time disbenefits	Annual death and serious injury crashes avoided	Benefit cost ratio
1a: Variable at schools	\$9.1 million	\$10.2 million	\$4.1 million	0.3	0.7
1b: Variable at schools (accelerated)	\$10.4 million	\$12.2 million	\$4.9 million	0.3	0.7
2a: Permanent at schools	\$6.5 million	\$172 million	\$21.3 million	6.2	23.4
2b: Permanent at schools (accelerated)	\$7.4 million	\$195 million	\$25.5 million	6.2	22.8
3: 40 km/h default	\$12.5 million	\$345 million	\$287 million	10.7	4.6
4: 30 km/h default	\$26.2 million	\$368 million	\$366 million	11.2	0.1
5a: 40 km/h default + variable at schools	\$14.6 million	\$284 million	\$237 million	10.8	3.2
5b: 40 km/h default + variable at schools (accelerated)	\$16.1 million	\$333 million	\$277 million	10.8	3.5
6: 40/30 km/h mix	\$26.2 million	\$529 million	\$327 million	16.3	7.7

² Waka Kotahi Monetised Cost Benefit Manual August 2020

It is important to understand that however a BCR is calculated this does not change the underlying social costs and benefits and the risks to those assessments. The role of the BCR is to provide a simple metric that summarises the underlying data in an intuitive way. The Council's approach does not meet that test. The average person would have thought that the benefit cost ratio of 7.7 meant just that, the benefits were 7.7 times the cost. They would not have read and understood the fine print in the footnote that explained that it meant something quite different.

Figure two: Council cost breakdown

Option	Signage	Traffic calming	Implementation costs	Maintenance costs	Total
1a: Variable at schools	\$2.6 million	\$4.9 million	\$3.4 million	\$11.1 million	\$22.0 million
1b: Variable at schools (accelerated)	\$2.6 million	\$4.9 million	\$3.4 million	\$11.5 million	\$22.0 million
2a: Permanent at schools	\$0.4 million	\$4.9 million	\$2.4 million	\$5.0 million	\$12.7 million
2b: Permanent at schools (accelerated)	\$0.4 million	\$4.9 million	\$2.4 million	\$5.3 million	\$13.0 million
3: 40 km/h default	\$0.4 million	\$9.0 million	\$3.7 million	\$7.9 million	\$21.0 million
4: 30 km/h default	\$1.1 million	\$18.5 million	\$7.7 million	\$17.4 million	\$44.8 million
5a: 40 km/h default + variable at schools	\$3.0 million	\$9.0 million	\$5.1 million	\$15.3 million	\$32.4 million
5b: 40 km/h default + variable at schools (accelerated)	\$3.0 million	\$9.0 million	\$5.1 million	\$15.7 million	\$32.7 million
6: 40/30 km/h mix	\$1.1 million	\$18.5 million	\$7.7 million	\$17.4 million	\$44.8 million

Measurement of costs and benefits

On the benefit side the only benefit is the accident reduction benefits of \$529 million. In the speed management document we are told that there were 17 fatalities and 507 serious injuries over the last 10 years. The annual rates are 1.7 and 50.1 respectively.

As the Council is not the controlling authority of the state highways only its streets are relevant to the analysis. We have, therefore, excluded the deaths and injuries on the state highways that the Council included in its presentation.

It is important to understand that serious injuries are not necessarily very serious as the word is commonly understood. The Waka Kotahi definition is:

Serious: Injury (fracture, concussion, severe cuts or other injury) requiring medical treatment or removal to and retention in hospital.

These are not life changing injuries. Of the 50 'serious' injuries there will be a continuum of severity, but perhaps just one will be life changing.³ A better way to think about the size of the problem, therefore, is that there are about three deaths and life changing injuries on Wellington city roads a year.

The effect of the speed reductions in the Councils model is to reduce the number of deaths and serious injuries by 16.3, a 32.7 percent reduction. This implies there are about 0.5 and 15.8 fewer deaths and serious injuries. The Waka Kotahi current social costs are \$4.42 million for a death and \$0.602 for a serious injury in the Wellington region urban areas⁴.

The value of the avoided accidents, therefore, is about \$10.7 million a year and the present value is around \$250 million. However, the Council's estimate is \$529 million. It is not clear how the Council could have calculated its much higher number. They say that they have used the Waka Kotahi numbers.

On the cost side the big driver is the increased travel times due to the lower speed limits. The present value of these costs is \$327 million and the annual cost is about \$15 million. In its response to the Waka Kotahi consultation on school speed limits the Council commented on the results of the modelling that would driven time cost estimates.

Furthermore traffic modeling indicates that travel time disbenefits are relatively minimal adding 5 to 6 percent to the average journey time.

At first sight this estimate appears way too low. A reduction in speed from 50 km/h to 30 km/h will increase the travel time on a straight stretch of road by 67 percent. The reduction from 50 to 40 km/h results in a 25 percent increase. However, accounting for: slower speeds due to congestion and traffic lights; a preference for slower speeds amongst some drivers; and the current speed restrictions in most

³ As Wellington is not the controlling authority of the state highways only the Wellington Council streets are relevant to the analysis.

⁴ Waka Kotahi Social cost of road crashes and injuries June 2020 update. Note that the serious injury figure is probably overstated. The numbers are blown up by a factor of nearly 2 to account for underreporting of injuries. It is likely that the most serious and costly life changing injuries are not significantly unreported and that the underreporting is mostly restricted to the less serious injuries. An across the board adjustment for under reporting will therefore overstate the average cost per reported accident. The overstatement could be higher than 50 percent.

commercial area, then current average speeds will be significantly lower than the current limits. Still an increase of only 5 to 6 percent still seems very low.

There is some evidence on this. In 2017 the NZTA⁵ conducted a test on two Wellington urban routes when the maximum speed of the vehicles were reduced from 50 to 40 km/h. The mean travel times increased by 9 and 8 percent. A 30km/h limit was not tested but the travel time impact would have been significantly higher.

What might be going on here is that the Council has assumed a significant degree of non-compliance with the lower limits, which will reduce the increase in travel times.

Whatever the Council has assumed on noncompliance, in real life it is likely to be significant and this might have implications for the bus fleet. Bus drivers will not be able to break the speed limits, which means that buses will become less attractive to commuters who will be able to drive at higher speeds. Lower speeds could also have a significant impact on the cost benefit analysis. The annual cost of Wellington's bus services is \$74⁶ million, so a 5 percent cost increase would be \$3.7 million. The present value of this is around \$85 million. This was not taken into account in the Council's analysis. Adding this estimate to the benefit reduction explained above increases the net loss to \$200 million and reduces the BCR to 0.54.

Part four Review of the decision document

The following are our responses to some of the statement and analysis in the Approach to Speed Management document

At present, accordingly to a Waka Kotahi assessment conducted in 2020, approximately 80% of Wellington City's streets currently have speed limits that do not align with the safe and appropriate speed calculated for the street, and 98% of those streets require a speed reduction.

⁵ NZTA Time and fuel effects of different travel speeds May 2017

⁶ Estimating the Costs of Wellington Bus and Rail Services WRC 2020

We have not seen the Waka Kotahi assessment but it is unlikely to be evidence based. Rather it is likely to be based on an arbitrary distinction between what is safe and not safe. Unless it is evidence based this advice should be ignored.

The risk of pedestrian death is about 4 to 5 times higher in collision between a vehicle and a pedestrian at 50 km/h compared to the same type of collision at 30 km/h.

The increase in deaths with higher speeds might be true but there is no evidence on how relevant this is. If all fatal accidents have occurred when cars were travelling at 30km/h or less, then reducing speed limits on 50km/h roads to 30 km/h will not help. It not does appear that the Council has done the detailed analysis that might shed some light on this question.

According to the international evidence, a speed of 30 km/h is a safe speed limit, especially for children, and creates an accessible environment for pedestrians, cyclists and micro-mobility users. Research consistently recommends reducing speed in urban areas.

This reference to a 'safe' speed limit is implicitly based on a arbitrary definition of what is 'safe'. There is no positive speed limit that will be completely safe. What the safe system proponents (including the the International Transport Forum cited by the Council in their report) are saying is that lower speeds are safer (which is true) and that in their opinions the costs are worth it. But they are also argue that there's is not just an opinion but is based on objective evidence of survivability. It is said that the risk of a pedestrian death when hit by a car at 30 km/h. is about 10 percent and that this is 'safe'. It could just have readily be said that the 'safe' death rate is 1 percent or 20 percent. Noth would have generated different speed limits.

They also forget that the goal is zero deaths **and** serious injuries and that a much lower speed would be required to reduce the latter accidents to a low level. So the argument is not internally coherent.

The other incoherence in the 'safe system' approach is that 30 km/h is the safe limit for low volume roads but 40km/h becomes acceptable on higher volume roads. This is an acknowledgement that costs do matter so the 'safe' speed has to bend to accommodate that reality.

Co-benefits

In addition to reducing the risk of crashes and injuries, lowering speed limits can also generate co-benefits such as a shift to active transport modes, improved traffic flow, reduced traffic speed and volume, improved perceptions of safety, and reduced noise and air pollution and contribute to mitigating road transport emissions.

It is not explained how reducing speed limits for cars and buses will increase active transport. Presumably reducing the speed difference between bikes and cars will encourage more people to cycle. We doubt whether this will be a big effect. For one there is likely to be widespread non-compliance, which will increase average speed levels.

The other 'co-benefits' are mostly unproven and will be minor at best.

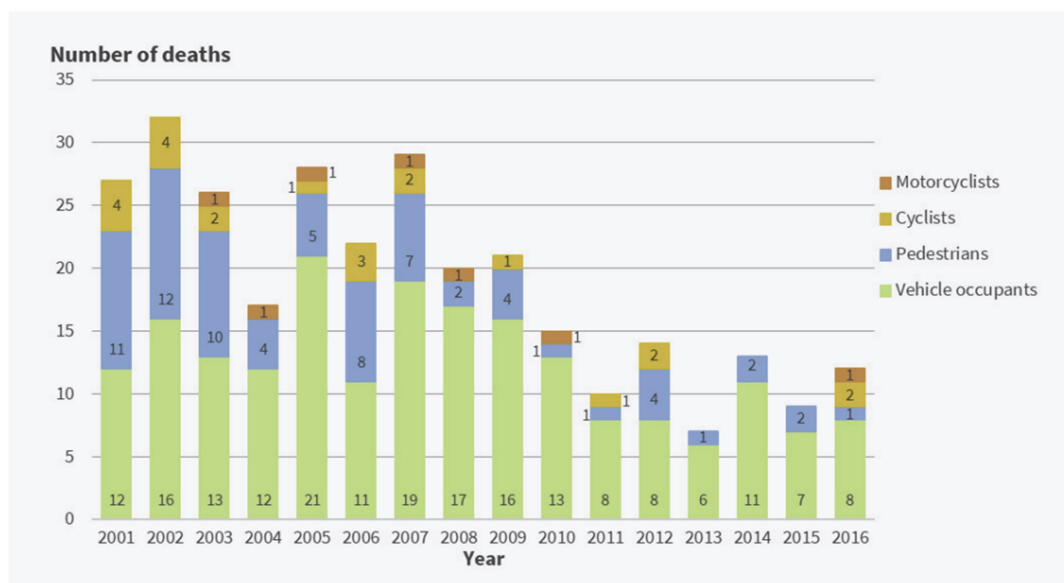
Public attitudes

Several findings from a Waka Kotahi report on public attitudes to road safety were presented. The relevant ones were:

- *Most considered New Zealand roads to be very safe (22%) or fairly safe (59%) to travel on*
- *Most understood that travelling at higher speeds increases the chance of having a crash (88%) and the severity of injuries if crash occurred (97%)*
- *82% believed that speed limits in urban areas should be left as is and only 12% believed that speed limit should be lowered*
- *58% supported and 22% opposed 30 km/h speed limit in urban centres*
- *68% supported lowering speed limits to up to 30 km/h around schools*
- *87% to 90% viewed urban areas as generally safe for walking*
- *65% to 69% viewed urban streets and town centres as safe for cycling whereas 77% perceived roads around local schools to be safe for cycling*

What these responses suggests is that the public do not consider roads to be unsafe and are aware that higher speeds result in higher accident rates. In supporting the current limits respondents are making the implicit calculation that the costs of speed reductions exceed the road safety benefits.

It is not clear why the Council thought that these findings provided support for their speed reductions. Wellington attitudes are likely to be similar to national attitudes. The exception to the support for the status quo is lower speed limits around schools. But there is no evidence that there is a serious road safety risk to school children. Figure three shows that the national pedestrian deaths for 0-14 year olds is about one per year. The Government could have, but did not, produced statistical evidence on accident rates of school children near schools when pushing its school speed limit strategy. This suggests that accident rates are very low. The Government has had a record of repressing 'unhelpful' evidence and has leveraged natural sensitivities to child safety to drive a more widespread reduction in speed limits.

Figure three: Pedestrian deaths 0-14

Source Ehinz

The high level of support for the status quo appears to be contradicted by the 58 percent support and 22 percent opposition to a 30km/h. limit in urban areas in the fourth bullet point. There is no contradiction. We checked the document. There was no question on a 30km/h limit in the survey. It appears that the Council just fabricated this information.

Supporting actions

International evidence shows that changing a speed limit without other accompanying measures (such as traffic calming, enforcement, communication and education) has a limited effect on actual speed change. For example, reducing the speed limit by 20 km/h results in the mean traffic speed reduction by 8 km/h.

The Council has budgeted just \$18.5 million for traffic calming. This won't go very far across the entire network so we can expect a limited impact on actual speeds.

Lower speeds near schools

The requirement set is to make a reasonable effort to ensure roads 'near' 40% of our schools (33 out of 81) have nominally 30km speed limits by 30 June 2024.

To define the distance to 'near' schools, international evidence shows that a reasonable walking distance to school for high school students ranges between 1 km and 3 km whereas a reasonable cycling distance ranges from 4 km to 8 km. Those distances are shorter for

primary school children (up to 1 km for walking in some studies). Area wide speed management approaches necessary to support active transport to school would also benefit a diversity of other users and destinations in neighbourhoods. Figure 1 shows Wellington City Street network with 30 km/h speed limit for walking catchment areas around schools (1 km for primary and intermediate schools and 2.25 km for secondary schools). When combined those walking catchment areas for primary, intermediate, and secondary schools cover approximately 80% of the Wellington city's urban street network.

This appears to be a dodge to argue that the requirement to ensure that the government requirement to set the speed limit 'near' schools at a nominal 30 km/h (what 'nominal' means in this context is not explained) in practice requires a 30 km/h limit because the 2.5km and 1 km catchments cover 80 percent of Wellington roads.

Obviously a high school catchment of 20 sq.km goes well beyond any reasonable interpretation of 'near' where the intent is to restrict speeds where a large number of children might be clustered.

However, the Council did not take this expansive approach in its own analysis. In its submission to the Waka Kotahi consultation on school speed limits, the Council reported that only 5-7 percent of the network would be affected by the 'near' school limit. It appears that the Council used a more plausible definition of 'near' in its modelling.

In Wellington city, less than 1 percent of serious injury crashes (3 of 399 over 5 year) occur during school times.

This data supports the national data that shows that the risk to school children is very low. The Council could have, but did not, investigate how many of the three serious injuries were school children. Possibly none.

Part five: Response to the 2019 Road to Zero consultation

This part is a shorter and updated version of our response to the 2019 Road to Zero consultation. It focuses on the zero deaths and injuries philosophy that underpins the Council's decision.

The Road to zero vision

Our proposed vision is: a New Zealand where no one is killed or seriously injured in road crashes. This means that no death or serious injury while travelling on our roads is acceptable.

We do not agree with the proposed vision. While everyone agrees that deaths and serious injuries are undesirable, nearly everyone who has thought about the issue understands that it is impossible to get to zero deaths and serious injuries, or anything close to it, without unacceptably high costs. The Road to Zero vision sets an especially high bar because it also targets zero 'serious' injuries. Most 'serious' injuries are not life changing. Serious injury is not defined or seriously discussed in the consultation document, other than a statement that there are thousands of them, and an inference that they are all very serious and 'life changing'. Mostly they are not.

A serious injury appears to be defined in New Zealand, for statistical purposes, as an injury requiring at least an overnight stay in hospital. In 2018 there were 3200 of these 'serious' injuries, with more than 1000 of these involving a hospital stay of less than three days.

The Norwegians do collect data on what they term 'life threatening' injuries, which is probably a good proxy for life changing injuries. Typically these are about 40 percent of road deaths. If this relationship is applied to New Zealand then there may be around 150 truly life changing injuries each year, not the many thousands implied by the Consultation paper discussion.

If reducing recorded serious injuries to close to zero is taken seriously, and is not just part of an unthinking mantra, then this has implications for road speed limits. They would have to set at much lower levels, especially in urban areas. Probably the Government doesn't really intend that overnight hospital stays should be reduced to zero. In which case it should remove the zero serious injury test from the slogan.

Most people accept that life has its risks and that it is a question of balancing the benefits of further improvements in life safety against the costs. This is the traditional approach to road safety that the Zero vision approach contests. In the Zero vision view, resources should be committed to reducing road deaths and injuries on roads, regardless of whether those resources could be better used elsewhere, such as by improving outcomes in the health sector.

Vision zero proponents say that theirs is a moral perspective. We don't find anything very moral about pushing your own hobby-horse to the exclusion of other peoples

interests. It is really just a case of 'expert - we know what's good for you', self-indulgence.

One response to our objection to the Road to zero vision is that it is not meant to be taken literally, or even very seriously. Rather it should just be regarded as just a nifty slogan designed to energise a new focus on road safety. So what is the harm? The harm is the risk that the 'intermediate' target of a 40 percent reduction in road deaths and injuries (which is equates to a 55 percent fall after adjusting for a 3 percent per annum increase in road travel) is unlikely to be met. The Government does not appear to be committed to the kinds of expenditures that would support the outcome; nor, probably, will it be able to get away with sharp across-the-board reductions in speed limits. But the pressure will be on to 'do something'. That pressure will tend to go on 'improvements' that have: less visible costs; make little difference; and if cost benefit analysis is applied at all, it will probably be fabricated, or the results ignored.

After all Vision zero proponents do not believe in cost benefit analysis. It is enough just to believe that the measure might reduce deaths and 'serious' injuries. The other harm is that uneconomic measures could undermine support for sensible, well selected decreases in speed limits, where the benefits do exceed the costs. However, if these reductions are seen as the start of a slippery slope to later, more drastic, across the board reductions implied by the Zero vision philosophy, promoted by elite, urban, economically illiterate, anti-car ideologues, then the sensible response by provincial and rural New Zealand might be to resist any change at all.

The 'yellow jacket' revolt in France, which was partially motivated by a reduction in rural speed limits against the preferences of the population, provides a warning. The yellow jackets took out about 70 percent of rural speed cameras that were enforcing the lower speed limits.

We think that words do matter. While slogans need to be 'catchy', they also need to be realistic and honest. If you don't really mean it, then don't say it.

It is claimed that the 40 percent reduction target is based on the modelling of a substantial programme of road safety improvements over the next ten years. As the target is the centrepiece of the Road to zero programme we would expect that this modelling to be disclosed and that the costs (road improvements, enforcement and increased travel time) would also have been calculated. But there is no sign of it. This is really unacceptable for a policy that purports to be evidence based and transparent.

Reducing speed limits

The centerpiece of Road to zero is a widespread reduction in speed limits, though this is not very explicitly spelt-out in the paper. What speed limits do you need to reduce death and injuries to zero? The discussion on this question rests just on the following.

Biomechanical research indicates that the chances of survival or avoiding serious injury decrease rapidly above certain impact speeds. (IRTAD, 2018)

For a pedestrian, cyclist or motorcyclist hit by a car, it's around 30-40 KM/H. In a side impact collision involving two cars it's around 50 KM/H. And in a head-on crash involving two, it's around 70-80 KM/H.

If these are the tests then then the benefits from speed reductions in urban areas will be limited. They will only have an affect on pedestrians, cyclists and motorcyclists who are hit by cars, but there are relative few of these events

PERCEPTION Reducing speeds in some areas won't save lives, it will just take people longer to get anywhere.

RESEARCH FINDINGS Rowland and McLeod Research has shown that reducing your speed a little generally results in a very small increase in travel time (Rowland & McLeod, 2017).

This is a misrepresentation of the Rowland and McLeod paper, which was largely about drivers' perceptions of travel time increases. They found that drivers tended to underestimate increases in travel time with reductions in speed limits in urban areas, and overestimate travel time time increases from reductions in highways speeds. This research was largely a test of respondents' mathematical skills. They tend to confuse relative and absolute changes.

When France lowered speed limits from 90 km/h to 80 km/h in some areas in 2018, the move saved 100 lives in six months, but increased average travel times by only one second per kilometer (Cerema, 2019).

The Cerema 'research' was based just on 'before and after' readings from Google maps. It was not a serious piece of research. The effect of the reduction in the speed limits was to reduce speeds by an average of 3.9km/h, as 55 percent of drivers exceeded the limit. The increase in travel time would have been about 2 seconds per kilometre.

Similarly, when the speed limit on most of Saddle Road (a 14 km stretch near Woodville, New Zealand) was reduced from 100 to 60 km/h due to an increasing number of crashes, average travel times only increased by around 50 seconds (or less than four seconds per kilometre).

The Saddle Road example is hardly illustrative. It is a temporary situation on a hilly, windy, road carrying much more traffic (it is a diversion for the blocked state highway 2) than it was designed for. The average speed before the reduction in the speed limit would have been much lower than 100km/hr.

Notably the discussion ignored the 2017 NZTA paper on the issue discussed above. It did not suit the narrative.