**LOS-LESS PLANNING: VKT for EQUITABLE OUTCOMES**

**(This paper has been peer reviewed)**

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**ABSTRACT**

Environmental assessments in Los Angeles will undergo a dramatic change this July. New legislation requires that the evaluation criteria for environmental reviews for new developments will shift from focussing on general traffic Level of Service (LoS) to overall Vehicle-Kilometres Travelled (VKT). Increasing road capacity to mitigate traffic LoS impacts generally leads to more driving and reduced access to alternative transport choices. This disproportionately benefits existing and wealthier drivers, whereas the negative impacts of increased driving and car-dependence tend to disproportionately impact lower-income people. By changing the metric of environmental impacts from the delay experienced by drivers to the act of driving itself, regulators are communicating that demand for driving is not an immutable force of nature, but is dynamic depending on land use typology and network capacity. Rather than attempting to meet some perceived static demand for driving by increasing roadway capacity, mitigation measures under the new regulations will focus more on reducing the need to drive by providing more and higher-quality alternatives that provide people with more choices about how they get around. This change has the potential to benefit denser, more walkable developments and projects in more central locations over car-dependent typologies in exurban greenfield locations, further improving the viability of active transport for residents’ daily activities and reducing driving distances when people do choose to use the car. This paper is intended to discuss the potential ramifications of assessing development and infrastructure projects based on their impacts to vehicle-kilometres travelled (VKT) as the primary metric of transport-related environmental impacts rather than delay experienced by motor vehicle drivers and how this would better align with current New Zealand policy objectives to deliver more equitable and environmentally beneficial outcomes.

**INTRODUCTION**

The way we assess transport and land use projects has major impacts on the structure of our cities and regions and on how we get around them. The metrics we use to evaluate the impacts of projects influences the types of infrastructure and developments that get built and how they are integrated into our wider transport network.

Governments around the world have been increasingly adopting goals to expand transport choice to reduce greenhouse gas emissions and improve equitable access to the community. Multiple councils across New Zealand and worldwide have declared a climate emergency. Yet stated goals and strategy require clear action to translate into outcomes. In the transport sector, one of the clearest ways to meet these goals is through the reduction in private automobile use in urban areas. This requires land use and infrastructure that makes it easy for people to choose to get around without driving.

Here in New Zealand the Government Policy Statement (GPS) 2018/19—2027/28 states four priorities for transport investment:

1. A safer transport network free of death and injury;
2. Accessible and affordable transport;
3. Reduced emissions; and
4. Value for money.

The first three of these are clearly and directly delivered through reduced driving. However, depending on the way in which transport benefits are measured, the fourth could favour projects that lead to increased driving, and are therefore in conflict with the first three priorities.

On a local level, the Auckland Plan 2050 lays out the directives to “better connect people, places, goods and services”; “increase genuine travel choices for a healthy, vibrant and equitable Auckland”; and “maximise safety and environmental protection”. The Auckland Unitary Plan (2019) aims to effectuate these directives by “reduce[ing] the rate of growth in vehicle use”. The Greater Wellington Regional Land Transport Plan (2015) states that “the goal is to have more people using public transport, walking and cycling-particularly at peak times when the transport network is in high demand.”

The metrics by which we evaluate project impacts reveal much about what we value. Although there are growing efforts to provide viable alternatives to the private car, these types of projects are often disadvantaged compared to road expansion projects because of the way that benefits and negative impacts are calculated.

This paper will show that using traffic LoS (delay to drivers) as an assessment metric leads to mitigations that increase traffic capacity, which:

* Disproportionately benefits people driving versus people using more economical travel options (wealthier people tend to drive more often, and lower-income people are less likely to have access to a car. Therefore, benefits accrue disproportionately to the wealthy.);
* Tend to detract from walking, cycling and public transport (this disproportionately disbenefits lower-income people and vulnerable populations who cannot drive);
* Leads to more sprawling, disconnected communities (more space required for expanded roadways and incentivising driving encourages choosing a lifestyle that requires longer trips); and
* Encourages more driving via the well-documented induced demand phenomenon, which increases the negative externalities of driving (pollution, traffic deaths and serious injuries, community severance, network-wide congestion). Many of these externalities tend to disproportionately impact lower-income people.

**VKT vs LoS as ENVIRONMENTAL IMPACT**

**Induced demand**

Road capacity expansion projects are often touted as providing environmental benefits by reducing emissions from traffic congestion. Although emissions may be reduced in the short run, these gains are quickly lost through induced demand. It has been well established that expanding roadway capacity will lead to more driving through induced demand (Downs 1962, 1992; Cervero & Hansen 2002; Litman 2019). Duranton & Turner (2011) confirmed Downs’ (1962, 1992) “fundamental law of highway congestion” by showing that increases in urban motorway capacity led to one-to-one increases in VKT across the urban area. Induced demand, or generated traffic, on a newly improved roadway can be split into two parts, diverted traffic and induced travel.

**Diverted traffic** is made up of drivers:

* Shifting travel time to the peak period from the shoulder or interpeak;
* Changing their route to take advantage of the new capacity; and
* Changing their destination (e.g., shopping at a grocery store that is as close or closer, but used to take longer due to roadway capacity or connectivity constraints)

**Induced travel** is new travel (additional VKT) in the form of:

* Trips taken by car that were previously taken by public transport, walking or cycling;
* Changing destination to someplace that is further away, but is now at least as fast as the previous destination (e.g., shopping at a grocery store that is further away, but is faster to get to because of a new high-speed roadway, or moving to a home further from work[[1]](#footnote-1));
* Taking a longer route that is faster due to the new roadway alignment (e.g., faster speed limit, fewer traffic signals, etc.); and
* New vehicle trips that otherwise were previously not made at all (either in type or frequency of trip).

Furthermore, many roadway capacity projects place new or greater barriers to using non-car modes of travel, by making it unsafe, unpleasant or impossible to walk, cycle or access public transport, leading to even greater mode shift to driving. Some examples include:

* Wider streets become more difficult to cross, requiring long detours;
* Motorway construction severs formerly direct walking routes;
* Higher traffic speeds make road crossings dangerous and walking unpleasant;
* Expanded intersection turning bays push bus stops further from the intersection, decreasing the stop’s walking catchment and requiring longer walking distance to make transfers to intersecting routes;
* Roundabouts or slip lanes lead to more continuously flowing traffic in mid-block sections, reducing or eliminating traffic gaps suitable for crossing;
* Roadway widening reduces or removes footpaths.

Not only does induced traffic quickly erode most, if not all congestion reduction benefits initially experienced, but much of the estimated emissions reduction benefits will be lost during the project works: Noland & Hanson (2015) found GHG emissions of the works accounted for about 20% of emissions from 50 years of traffic using the highway. In busy urban areas, the additional congestion caused by the works could increase this figure substantially.

**Vehicle-kilometres travelled (VKT)**

Is VKT an environmental impact?

From a public health and fiscal wellbeing standpoint, increased VKT has been shown to have many negative impacts. Currey, et al. (2015) reviewed a wide range of literature showing increasing VKT leading to:

* Increased traffic deaths and serious injuries;
* Increased GHG and other pollutant emissions;
* Reduced physical activity; and
* Poorer mental health incomes.

As VKT increases, so too do the number of cars and therefore, the space occupied by cars and vehicle infrastructure. Space dedicated to car usage could have otherwise been used for more productive purposes. This represents an inefficient use of resources.

Higher levels of VKT are also associated with land use and infrastructure that negatively impacts open space, water runoff and habitat loss. Although VKT may not be the cause of these undesirable outcomes, it is correlated with them, and therefore provides a good *indicator* of environmental impacts of a project that are not captured elsewhere.

Given the negative direct impacts of increased driving—health-wise, environmentally and fiscally—increased driving can safely be identified as an activity that causes adverse effects on the environment and it would be reasonable to make a goal of reducing VKT, both on a per capita level and overall. However, does it make sense to use VKT as a metric for project assessment?

It has been shown that the built environment has a strong impact on VKT. Reid & Cervero (2010) found that VKT is strongly related to accessibility to destinations, with public transport usage impacted by network design and proximity to stops/stations, and greater levels of walking resulting from a greater number and type of destinations in close proximity and greater intersection density. In fact, these land use factors had a greater impact than overall population or employment density. Litman & Steele (2019) show that land use impacts VKT in cumulative and synergistic ways and that “Integrated Smart Growth programs … can reduce vehicle ownership and travel 20-40%” before even taking into account any wider transport policy or network changes.

The strong connection between land use characteristics and vehicle travel, coupled with the negative impacts and correlations of driving suggests that developments and infrastructure projects should be assessed based on their impacts to VKT. If projects are expected to increase VKT, then mitigations to consequential environmental impacts should be required. Most existing assessments use traffic level of service (LoS), which is based on average delay to motor vehicle traffic. Mitigations to LoS impacts tend to include traffic capacity increases, which as shown above, lead to increased driving through induced demand. LoS mitigations also raise concerns about equity. The benefits of traffic capacity improvements mostly accrue to people driving. This tends to disproportionately benefit a wealthier segment of the population because of higher levels of car ownership and driving among the wealthy. People who do not have access to a car—typically people with lower incomes (Atkinson, Salmond & Crampton, 2014), or those who are unable to drive because of age or ability—will benefit very little, if at all. As previously discussed, traffic capacity improvements often detract from walking, cycling and public transport, which makes these more economical methods of travel more difficult and disproportionately disbenefits lower-income and vulnerable populations who cannot drive. Negative externalities of driving such as pollution, neighbourhood severance, traffic deaths and serious injuries, and noise tend also to fall more heavily on poorer neighbourhoods. Furthermore, the LoS metric incentivises developers to build in low-density areas on the urban fringe where impacts to the surrounding traffic network will be low enough to not trigger mitigations and disincentivises more efficient infill development in dense urban areas.

If VKT is used as the metric to assess projects instead of LoS, driving itself will be considered as the activity to be regulated because it results in significant adverse effects on others in the community and therefore must be mitigated, and that activity will be directly associated with the land use development or roadway project under review. This will favour development typologies that minimise driving such as higher-density, mixed use developments orientated to public transport with low or no parking provision. These developments provide additional benefits in that they:

* Are more affordable on a per unit basis;
* Can reduce the cost of travel for residents, workers and shoppers; and
* Provide a wider range of housing choice.

Mitigations to VKT would more typically be those that provide better access to public transport/walking/cycling, manage parking, and manage travel demand. If used in the assessment of transport projects, public transport, walking and cycling projects will be more likely to be shown to be environmentally positive while roadway capacity increases will be shown to be more environmentally impactful projects (through induced demand). This does not imply that road capacity projects would not be allowed, but that they would require more robust justifications and mitigations than currently.

**CALIFORNIA**

The State of California in the United States passed Senate Bill 743 in 2013 as a measure to align environmental review, via the California Environmental Quality Act (CEQA), with the State’s environmental goals of reducing greenhouse gas emissions. The bill requires California to eliminate LoS as an environmental impact under CEQA. In January 2019 the State formally adopted the CEQA rules to replace LoS with VKT that will go into effect in July 2020.

The SB 743 technical advisory has developed thresholds for what constitutes “significant impacts” under the VKT measure. The thresholds for excusing a development from environmental review include:

* **Project size:** less than 100 vehicle trips per day
* **Near transit stations:** less than ½ mile (0.8km) from train station, ferry terminal or the intersection of two frequent bus routes, defined as 15min or lower headways during peaks
* **“Low-VMT” area:** based on census transportation analysis zone (TAZ) per capita VMT for housing and average commute VMT for employment less than 85% of city figures; or “locally serving” retail

Lee & Handy (2018) reviewed three developments in Davis, California that had been assessed using general traffic LoS and compared what an assessment using VKT would produce. Their research found that the LoS metric resulted in requiring developers to build large amounts of costly roadway capacity mitigations. The price of these mitigations could cause developers to change their plans to reduce the number of housing units or commercial floor area or to abandon the project altogether. If built, mitigations would further encourage driving in Davis and create more barriers to walking and cycling. The VKT method greatly reduced the amount of mitigations required, making it easier to build the types of developments that reduce the need for car travel.

One of the projects reviewed in the study, Nishi Gateway, provides some interesting insights and shows that some additional considerations may be needed when determining what constitutes impacts and required mitigation under the VKT model. Nishi Gateway was a dense, mixed use development near the city centre. The LoS analysis required significant and expensive intersection mitigations that would have also likely led to an increase in driving into the city centre. This could have made the development unfeasible in this location within the urban boundary, which is where it is most suited. The VKT assessment would have provided a better outcome because the development’s proximity to a train station automatically excluded it from environmental impact review under the “near transit station” criterion. However, one of the required mitigations via the LoS analysis was a bicycle bridge across the motorway to connect to the city centre. This would not have been built if the VKT criteria had been used.

This highlights a gap in California’s use of the VKT criteria. The project may be within a half mile of a major public transport station, but if the motorway causes significant severance, then many people may still choose to drive. Furthermore, using the criteria above, a low-density, residential development with large amounts of car parking proposed for this location would have been excused because of the proximity to the train station, even if the development was orientated in such a way as to discourage access to the station. Such a development would likely lead to large increases in VKT but would not be required to mitigate them. The same could be true when determining VKT impacts based on TAZ characteristics. If a development is built that is fundamentally different than the surrounding land uses, then it is likely to have different VKT outcomes. To capture these outcomes, it will be important to also consider the development’s land use characteristics when determining significance of impacts. Therefore, a development should be required to meet additional criteria to be found to have no impact under a VKT metric, or the limits of “no impact” should be more stringent.

**ASSESSMENTS IN NEW ZEALAND**

**Transport projects**

The New Zealand Transport Agency’s (NZTA) Economic Evaluation Manual (EEM) provides a framework for assessing the economic viability of transport infrastructure projects. The primary benefits estimated for most transport projects evaluated using the EEM are based on travel time savings to motorists. The EEM provides some provision for reducing the overall benefits due to induced demand in already congested corridors, but for the most part assumes that travel time savings produced by the project will be persistent over the lifetime of the project. The EEM also assumes relatively inelastic demand, meaning that demand will increase at the same rate irrespective of built environment, land use and transport network capacity. This implies a need to accommodate this future demand to avoid suffering severe congestion outcomes.

The EEM provides methods for addressing unrealistic congestion shown in the do minimum model by either artificially increasing the capacity of the do minimum scenario or capping the modelled demand matrix for the activity[[2]](#footnote-2) option. In reference to induced demand, this is a workaround to reduce the calculated benefits as it suppresses demand in the do-minimum scenario, but then holds that demand constant in the build scenario, which results in fewer drivers experiencing the “benefit” of the travel time savings and reduces the magnitude of those savings (less congestion in the do-min). These methods will reduce the overall calculated benefits, but if, as this paper suggests, we use VKT as a project impact, then these methods would result in no estimated impact.

Appendix 11 of the EEM presents various methods for restricting the growth of traffic for the do-min scenario in congested networks, recognising that travel will not increase in a constrained environment. The resulting traffic volumes are then used in the activity scenario. This results in lower calculated travel time benefits due to fewer vehicles being shown to benefit from the travel time improvements. Most of these methods do not include increased car travel resulting from increased capacity and would therefore not be applicable for using the VKT metric. A11.11 (Applying project demand models) provides an option for including low levels of scheme-induced traffic, but this method only increases the benefits by attributing travel time benefits enjoyed by the induced traffic. This method is used when there will be high levels of congestion in both do-min and activity. A11.12 (Conducting cost-benefit analyses using variable matrix methods) provides for significant levels of induced traffic. It also includes calculations for external social costs caused by driving to offset the benefits, but it appears that the net benefits are typically still estimated as positive.

The key is that the EEM is a tool within the broader planning assessment process, which does not consider the very act of driving in itself to be a disbenefit. The EEM is concerned with assigning dollar value costs to some (but not all) specific deleterious outcomes of driving within the existing network and land use context. This mostly ignores the fact that enhancing driving begets more driving in a variety of flow-on effects that are not currently measured, such as:

* Barriers to walking/cycling in the activity location and elsewhere (induced traffic impacts on other parts of the network beyond the activity area);
* Psychological impacts (‘I’m driving for this trip, so I might as well drive for other things too’);
* Increased car ownership (marginal cost of travel is reduced, which could be the tipping point for increased car ownership, which is one of the top determinants for how much people drive);
* Long-term decisions (one portion of someone’s commute is now faster, so they can now move further from work to have the same travel time and become “locked in” to that location by the time induced demand has increased congestion back to its former level, which results in a longer travel time than they had before);
* Space taken by road capacity projects could have otherwise been used by other uses that would have reduced distances between origins and destinations thereby reducing driving distances and/or eliminating some driving trips altogether.

Although these impacts are typically small, when taken on an individual project level, the impacts of many projects taken together across time and space have a reinforcing, positive feedback effect that may result in multiplicative combined impacts that are greater than the sum of their parts. At the least, small impacts added across a large number of projects over time can result in large total impacts, but when they are small enough to be ignored at each project level, then the sum of impacts estimated in the long run will be far less than the true impact of those projects taken as a whole, which could represent a large gap in mitigation efforts.

Furthermore, the EEM does not allow that the activity could itself be the cause of the desire to drive, but rather assumes that induced demand occurs when the activity reduces the perceived cost to drive to such an extent that *existing* latent demand is unlocked because the cost has fallen below the perceived benefit to the driver. This assumes that there is a fixed set of trips of *fixed distance* that consumers want to make and that the only limit is the cost of making them.

Even so, that increased car travel would not be seen as a disbenefit because the EEM does not consider VKT itself as a negative impact. In fact, increased car travel could translate to *larger* benefits because the EEM calculates benefits based on travel time changes over fixed travel distances.

**Property developments**

The **Resource Management Act 1991 (RMA)** legislation provides a framework for the appropriate management of our environment across New Zealand. The RMA covers a wide range of activities, including regulating “land use and the provision of infrastructure which are integral components of New Zealand’s planning system.” The RMA focuses on managing the effects of activities on the environment rather than regulating the activities themselves. Section 7(b) of the RMA requires decision makers to have regard to ‘the efficient use and development of natural and physical resources’, which includes the transportation network. These transportation impacts are assessed using an Integrated Transport Assessment (ITA), which is submitted as part of a resource consent application. Though the RMA legislation applies across New Zealand, local councils make key decisions on how to manage their environment within the RMA framework through the resource consent process, including the review of ITAs.

NZTA’s Research Report 422 (RR422) provides guidance to local councils on how to evaluate impacts on the transport network through the ITA, while maintaining a ‘thin’ framework so as to retain the independence of councils to engineering and planning judgement, tailored to their own specific local circumstances. This document provides a good framework for developing ITAs under the RMA. It also includes recommendations for improving public transport, walking and cycling that could be leveraged to a greater extent under a VKT-based assessment methodology. The RR422 does not conflict with the proposition of this report, which is to provide greater legal standing to the use of VKT as the primary metric of environmental impacts. In fact, RR422 could be adapted relatively easily to the VKT scenario. The primary drawback of RR422 is a heavy focus on trip generation in numbers of trips, which would need to be converted to VKT via origin-destination modelling to determine the lengths of the trips that are generated. However, this could be overcome through additional Practice Notes that would describe methods for simplifying the process. Additional research will also be required to determine how VKT generation is affected by different forms of similar land uses.

Some local councils provide additional guidelines for ITAs. For example, **Auckland Transport’s Integrated Transport Assessment (ITA) Guidelines** (2015) voice an overarching regional goal of reducing driving and shifting to public transport, walking and cycling. The guidelines consistently state mode shift as the goal, with only brief discussion of traffic and delay. The guidelines also recommend capacity increases for addressing traffic impacts as the last solution:

*‘Consideration of the traffic impacts of a proposal is still an important part of an ITA [Integrated Transport Assessment] assessment; however the response to those effects is expected to be different. Rather than proposing the provision of more roading capacity as an automatic solution, an applicant and their advisors, through the preparation of an ITA would be expected to look first at measures to reduce travel demand, followed by measures to utilise existing transport networks more efficiently, encouragement of other modes, and finally adding more road capacity if no other alternatives exist.’*

However, using the delay to vehicle traffic as a metric vis-à-vis LoS places some constraints on the level of development that will be able to be constructed in dense, infill sites, even where most trips are likely to use non-drive modes of travel. Delay metrics also limit the potential infrastructure that can be used as a mitigation measure because adding public transport, walking or cycling infrastructure may reduce capacity for general traffic, thereby increasing average delay. If VKT were used as a metric, then some additional delay may be considered acceptable in order to provide improved alternatives that would reduce driving. Furthermore, existing methods of assessing transport impacts treat the land use development as an invasive activity that needs to be addressed, when in reality it is driving that is the activity causing adverse effects on the environment. When developing essential land uses such as housing, schools and retail, it should be assumed that these uses will need to be accommodated somewhere in the region and if not allowed at one location, will be built elsewhere. Therefore, these should be assessed against the amount of VKT they would produce under a worst-case scenario of 100% driving for all trips, which would make infill developments more favourable.

**RECOMMENDATIONS**

Much of recent policy documentation, including the GPS, RMA and local Council policies, voice overarching goals of reducing reliance on driving and expanding opportunities for other modes of transport and there has been significant literature published over the past three decades to substantiate the ‘Law of Induced Demand’, or ‘Universal Law of Congestion’, which states that expanding capacity for driving results in additional driving, i.e., demand for driving is not fixed. Yet the impacts to the transport network from developments and transport projects continue to primarily be evaluated on the impact to general traffic LoS, which results in mitigations that encourage more driving. Therefore, it is recommended that general traffic LoS should be replaced as the primary metric of assessment for transport and land development projects. In its place, VKT should be adopted as the primary metric of evaluation. As a corollary, the reduction of VKT would be considered a beneficial environmental impact.

In order to adequately incorporate VKT into project planning assessments, it would be necessary to develop a standard set of impact measures for development assessments. Lee & Handy (2018) reviewed several models for calculating VKT based on the nuances of different locations and project types and generally found them deficient. Rather than attempting to develop and apply complex models, I would suggest that a simpler method be developed, similar to the Trip Generation Manual, but based on data-driven analyses of the level of vehicle travel by people living in or accessing different types of developments.These metrics could be tabulated in a form of “VKT-generation manual” that would provide generalised calculations for how much VKT would be expected to be generated by a given type of development. The baseline VKT generation values could be based on status quo land use typologies with various adjustment factors to increase or decrease baseline VKT depending on specific internal and external network and land use features, such as:

* Proximity to public transport (and type of transport)
* Access to cycling network
* Access to the motorway network
* Future plans for each of these networks
* Walkability scores
* Proximity to complementary land uses (such as retail and employment near housing and vice-versa)
* Existing travel behaviour in the same mesh block
* Mesh block density
* Availability of parking (trips generated per carpark)

Litman & Steele (2019) provide an excellent starting point for measuring land use impacts.

Developing an agreed set of measures/impacts to use in assessments, similar to existing trip generation/parking generation tables, will allow developers and reviewers to systematically compare different development types and locations, and mitigation measures based on their impact on VKT. **These need to be codified into standards of practice** to be useful and to gain buy in from stakeholders. Providing a standard method of VKT estimation will ensure that different developments are compared in a fair manner and will reduce the burden of compliance for developers and evaluation for practitioners. Such a manual will help with buy-in from stakeholders because it will provide a relatively transparent evaluation process that can be systematically amended in parts as new evidence emerges and planning objectives evolve. This process will also avoid the potential for poorly-fitting land uses to be excused from assessment by meeting “no impact” minimums, such as proximity to transit.

VKT impacts could be mitigated through measures that provide better alternatives to driving or by implementing plans or development styles that discourage driving. Some options could include:

* Completing gaps in walking/cycling network
* Traffic calming measures
* Discounts for reduced parking (e.g., replacing a large carpark with housing)
* Implementing infrastructure pricing plans

It is important to note that this paper is specifically focussed on LoS for general traffic but that LoS would remain a valuable tool for assessing impacts on other public transport, walking and cycling. In fact, general traffic LoS would still have a place in the transport planning and engineering disciplines but would not be the primary metric by which projects are evaluated. For example, LoS would continue to be a useful method of measuring traffic signal design.

**POTENTIAL CONCERNS**

Although the focus on VKT as an assessment metric has the potential to better align with government policy and provide more equitable, environmental and efficient outcomes, there are a number of concerns that should be addressed.

**Economic development**

There could be concerns that the shift from delay to motor vehicles as the assessment metric would lead to more congestion as a result of less expansion of motor vehicle capacity and that this would stymie economic growth through:

* Increased costs of freight, trades, tourism and other activities that are reliant on the road network;
* Reduced attractiveness of the region; and
* Increased travel times for general traffic.

However, the literature review reveals that peak hour demand and traffic congestion are actually correlated with motor vehicle capacity supply. Therefore, foregoing the expansion of the supply would be unlikely to have much, if any, impact on congestion. The types of mitigations that would be required under the VKT assessment method would expand options for people to travel by modes other than driving, thereby allowing more people to escape the impact of congestion.

If there is an increase in congestion, this could have an adverse impact on activities that rely on the road network. However, many of these activities occur outside of peak periods where congestion is greatest and therefore should not be impacted significantly beyond existing levels. If the shift to VKT leads to a more compact development patterns compared to using traffic LoS, as anticipated, while the intensity of congestions is unchanged, as suggested by the literature, then intercity freight and tourist traffic would experience *less* congestion than if no change had been made.

Sweet (2013) found that increased congestion tends not to negatively impact regional economic growth, until the region reaches a highly congested state and that the costs of alleviating congestion can exceed congestion costs. It would be prudent to monitor the effects of congestion on the region with the understanding that the VKT assessment method would not prevent traffic congestion reduction measures from being implemented, if the benefits are found to exceed any increase in VKT that might result.

Although the goal would be to reduce the amount of driving that occurs, this does not necessarily translate an economic cost due to driving less. Driving is an expensive activity, both directly to the driver and indirectly via externalities on everyone. The more compact urban form and improved alternative transport options that are intended to result would imply that the same amount of economic activity could occur with less driving, which would result in a more economically efficient region.

**Rural considerations**

There is a risk that this could pose an undue burden on rural developments, which by nature of their location would necessarily increase VKT with little opportunity to mitigate with other modes. To address this, the VKT measure could be applied only to developments within urbanized areas. For rural areas and sites near the urban fringe, it would still be necessary to apply the VKT metric for larger projects so as to prevent ‘leapfrogging’ of development attempting to avoid environmental mitigations and prevent developments that are out of scale with their rural context. Determining the details of how rural developments would be included or exempted is beyond the scope of this report.

**CONCLUSION**

Using general traffic LoS to assess projects implies that delay to vehicles in the peak hour is the environmental impact to correct. Therefore, mitigation methods include increasing roadway and intersection capacities, which makes cities more sprawling, less walkable, less bikeable and less able to be served by public transport. Added capacity has also been shown to lead to additional driving through induced demand, meaning that there is the perverse outcome that instead of reducing congestion, roadway capacity increases are soon filled to the same level of congestion, which simply means that more people are experiencing congestion than before. This additional driving also increases negative externalities. The benefits of traffic capacity increases tend to accrue disproportionately to wealthier people with the disbenefits of increased driving often accruing disproportionately to lower-income people and vulnerable populations who cannot drive.

Therefore, it is recommended that VKT, as opposed to general traffic LoS, is adopted as the primary metric for evaluating the environmental impacts of projects. VKT is a good proxy for the level of adverse effects a project creates and using it as the primary metric of assessment would better address impacts to the efficient use of the transportation network. LoS would, however, remain a useful tool in transport planning and engineering, particularly when applied to public transport, walking and cycling modes.

Using VKT to assess projects implies that driving itself is the environmental impact to be mitigated.

The Government Policy Statement (GPS) 2018/19—2027/28 states four priorities for transport investment:

1. A safer transport network free of death and injury;
2. Accessible and affordable transport;
3. Reduced emissions; and
4. Value for money.

Switching assessment metrics from LoS to VKT will provide a more equitable city and help deliver on the four priorities of the GPS by:

* Favouring developments that:
	+ Increase housing choice
	+ Allow lower-cost housing (including purchase/rental price and transport-related living expenses) typologies to be built
	+ Reduce per capita public infrastructure expenditures, freeing up more funds to be used on social services or reduced rates
* Favouring mitigation measures that:
	+ Improve public transport access and service
	+ Create a safer walking/cycling environment
	+ Discourage driving
	+ Reduce transport-related pollution and noise
	+ Improve transport mode choice

This shift would not preclude projects that expand roadway capacity, if it is decided that it makes economic sense, but the benefits of these projects would need to be assessed against the impacts of the increased traffic that would be induced.

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**ACKNOWLEDGMENTS**

I would like to convey my deepest gratitude to the many colleagues who helped me with ideas, fact checking and review as I developed this paper.

The views expressed in this paper are those of the author alone, as are any errors or omissions.

1. Unfortunately, the travel time savings that initially motivated the move are usually deteriorated back to baseline levels through induced demand, so a person who changes housing or employment location to take advantage of initial travel time gains often ends up with a longer commute than they started with. [↑](#footnote-ref-1)
2. The infrastructure expansion option being assessed. [↑](#footnote-ref-2)