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**Paper title** New Zealand without Travel Demand Management?

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**ABSTRACT**

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| Can New Zealand afford to continue to expand urban centres without embracing TDM?  This paper defines Travel Demand Management (TDM) in the New Zealand context and explains why is it so important when planning robust, resilient, safe and accessible transport networks. TDM optimises network capacity to increase people movements and not just vehicle movements. TDM also encompasses behaviour change to remode, retime, re-route and reduce or remove trips. TDM is not a modern concept and if historical lessons learned are applied to urban growth areas TDM can align planning for all modes across all regions in New Zealand.  When TDM is implemented consistently across multi-dimensional planning disciplines, it delivers change and provides equity in transport. Successful TDM interventions seamlessly blend land use planning, transport planning and new technologies resulting in a mode shift from single occupant vehicle trips, to more sustainable modes such as walking, cycling, micro-mobility, public transport, and shared transport (carpooling).  The resulting equity improves safety, the health of our people, our standard of living, accessibility and the economy and delivers on the Governments key strategic priorities published in the Government Policy Statement on Land Transport (2018).  Auckland TDM interventions demonstrate the benefits associated with applying the TDM lens to a range of transport projects ranging in scale from macro to micro projects including at a macro level: creating capacity and optimising capacity and at a micro level managing capacity through a rolling TDM programme and the application of travel plans.  A much-needed New Zealand TDM Policy with supporting training and resources will aid the delivery of TDM across the country. |

**Introduction**

New Zealand can’t afford to continue rapid urban growth across the country without embracing Travel Demand Management interventions to mitigate trip generation and the associated degradation of both the environment and people’s quality of life.

Travel Demand Management (TDM), managing people’s demand to travel, could be the solution for some of the major social and environmental challenges that are facing urban growth and threatening the economic prosperity of New Zealand. For example, congestion and transport poverty which exacerbates social exclusion and isolation; climate change and increasing greenhouse gas emissions which contribute to decreasing air quality and livability in some of our urban areas, obesity and associated increases in diabetes and heart disease caused by lack of exercise. New Zealand without TDM will experience increases in these challenges which will affect moving people and goods and could slow-down in economic development and increase social isolation and exclusion. Historic examples of aligning land use planning and transport planning can be applied to modern planning in order to maintain sustainable economic development, and provide equitable access for all. The government has provided a clear directive for the implementation of TDM interventions through the Government Policy Statement on Land Transport (Ministry of Transport 2018). This has provided the foundation for the development of a New Zealand TDM policy and associated initiatives that could be rolled out across the country.

**What is Travel Demand Management**

The recent Waka Kotahi the New Zealand Transport Agency (NZTA) TDM Programme defined Travel Demand Management (TDM) as “the application of strategies, policies and initiatives to reduce or manage travel demand more enduringly by redistributing trips across travel modes, reducing the need to travel and retiming and rerouting trips. This redistribution will increase the potential for social and economic opportunities, reduce greenhouse gas emissions, improve safety and public health outcomes, and enhance the liveability and productivity of New Zealanders and their communities.” (Philbin 2019 a)

Every person in NZ should have equal access to goods, services, employment, education and recreational opportunities. An equitable transport system will provide that access. Effective TDM is the result of the alignment of land use planning, transport planning (at a macro level) and behaviour change interventions (at a micro level – working with schools, businesses and communities) which create livable communities supported by transport networks. TDM provides people and freight with reliable, cost efficient transport and travel choice regardless of socio-economic status or geographical location.

New Zealand can’t keep growing demand within the transport sector at the same rate as now, without harming our transport systems, polluting our environment and increasing social exclusion through barriers to accessibility (Philbin 2019b). Congestion affects every aspect of our daily lives and the facts demonstrate the unsustainable growth in demand to travel:

* 48.2 billion kilometres were driven on our roads over 2017 – a 17% rise over a decade
* the economic cost of Auckland’s congestion is between $0.9bn and $1.3bn, and growing (1% - 1.4% of Auckland’s GDP)
* emissions due to road transport in years 1990-2015 increased by 78%
* there is evidence of global warming with the best estimate showing that New Zealand will be 1℃ warmer in 2040 than it was in 1990

TDM comprises four levels of interventions, three of which strongly align with macro level interventions and include land use planning, transport planning, and at the micro level, behaviour change initiatives. These include:

1. [macro] **increasing capacity** within transport networks (e.g. widening existing roads, completing rail infrastructure projects)
2. [macro] **managing existing capacity** (e.g. aligning land use planning so that employment and residential development makes best use of existing transport networks, providing interventions that move more people with less vehicles such as high occupancy vehicle lanes)
3. [macro] **creates capacity** (e.g. upgrading infrastructure, providing new roads, rail networks, and public transport services)
4. [micro] **manages demand to travel** through behaviour change interventions (or not travel in the case of teleworking and skype meetings).

In terms of micro-scale interventions these can be grouped into four categories often referred to as the four Rs:

* re-mode, change to a different mode
* re-time, travel at a different time of day
* re route, take a different route to avoid congestion, and
* remove the need to travel or don’t travel at all.

These interventions in effect, change peoples’ travel behaviour from being entrenched in single occupant vehicle (SOV) travel. However, the necessity to change peoples’ travel behaviour would be greatly reduced if the ‘need’ to travel was mitigated through the alignment of land use planning and transport planning at the macro level i.e. providing employment and services in or adjacent to residential areas and creating complete communities.

**Why is TDM so important to the development of New Zealand?**

New Zealand’s population is expanding. Growth projections show that the major centres of Auckland, Hamilton, Tauranga, Wellington, Christchurch and Queenstown are set to expand their populations with New Zealand’s total population forecast to rise by 19% to 5.9 million by 2042/43.

Population growth will in turn create growth in trip generation, predominantly car base trips. Statistics show that:

* 83% of all trip legs made by a car or van
* 92% of households have access to a car and 56% have two or more cars
* 55% increase in New Zealand’s vehicle fleet between 2000 and 2017 (Philbin 2019b)

Can New Zealand continue to grow at forecasted rates without embracing TDM? Without TDM interventions at the macro and micro level, unitary and district plans will continue to permit development in inappropriate locations (e.g. Kingseat in South Auckland) that cannot be serviced by public transport, congestion will continue to choke urban areas, pollution from vehicles will degrade air quality and the sedentary populous will experience increases in obesity related diseases which will, in turn put pressure on an already stretched health system. TDM needs to be embraced at a policy level with government support for TDM education, training and funding to implement TDM initiatives across the country (not just in urban growth areas).

The forecast trip generation and growth in car-based travel will need to be managed through TDM if economic development and access to jobs, services and basic needs are to be provided equally for all and peoples’ quality of life is protected.

**The historic context of managing demand to travel**

We should not forget the lessons learned from historic land use patterns. When applied to modern urban form they enable sustainable development, connectivity and transport equity.

TDM is not a new concept although it is a newly coined phrase from the 1990s. Planning for transport and urban development in medieval England and the Victorian era demonstrated TDM in the most basic form: providing ease of access for all to everyday facilities and services. The medieval transport routes and location of villages across the English countryside placed every village or town within a day’s walk of the next village or town. The countryside was connected with a comprehensive network of footpaths, drovers’ tracks and roads. These networks connected the rural hinterland with the market towns. The transport system enabled the movement of people and goods to access their destination with the most convenient transport mode that was available to them.

With the onset of industrialisation in the Victorian times, transport networks were built to connect resources to manufacturing sites and market towns. In the northwest of England woolen mills were built in rural areas where the sheep were farmed and the weather was conducive to the spinning of yarn. Industries requiring high levels of energy were build adjacent to coal fields. These initiatives reduced the need to transport raw materials over great distances. The Victorians also substantially invested infrastructure building canals, railways and roads. The transport systems were developed first, in order to facilitate economic development and population growth, rather than expanding the towns and then superimposing the transport systems on the pre-existing development pattern.

Some Victorian towns were built next to factories. The classic example is the village of Bournville. The Cadbury family moved their chocolate factory from the slums in the centre of Birmingham and created a model village in a rural area for factory workers and those on low incomes. They named the village Bournville. “Although rural, Bournville was also already serviced by a new railway station, right next to the canal….. The designs in Bournville became a blueprint for many other model villages in Britain and many have credited the village with laying the foundations for the development of garden cities and introducing the benefits of open space into modern town planning. The Cadburys were particularly concerned about the health and fitness of workers and incorporated parks and recreation areas into Bournville, encouraging swimming, walking and sport.” (bvt.org.uk)

At the turn of the 20th Century it was still common for urban neighbourhoods to be serviced with corner shops, doctor’s surgeries, banks, post offices and community facilities. However, economic pressures resulted in the onset of centralisation for services and businesses. Many were relocated to town centres leaving rural areas and urban fringes denuded of basic facilities and job opportunities. The effect on modern transport patterns is that people living in these areas are forced to travel to access work and basic amenities. The Government recognises the need to redress the balance and to provide equal access for all and is providing guidance through the Government Policy Statement on Land Transport (GPS) (2018).

Lessons learned from the historic context of TDM and the Bournville example that should be applied at every level of land use planning and transport planning include:

* planning communities with good transport links for all modes of transport
* building multi-modal transport infrastructure before allowing housing development to take place (thereby giving new residents travel choices)
* creating an urban form that supports walking, cycling and micro mobility
* planning development so that people can live adjacent to where they work and not have to travel to access employment and essential services – self containment
* create supportive communities with an emphasis on health and served with basic amenities
* provide leadership, be bold and where necessary revoke planning consents where development is inappropriate

**How is the Government promoting TDM?**

Providing equity in transport is at the heart of the Government’s focus in developing New Zealand’s transport system and is outlined in the GPS. The GPS identifies two *key* strategic priorities of access and safety with *supporting* strategic priorities of environment and value for money.

The outcomes associated with providing equitable access include: providing increased access to economic and social opportunities, enabling transport choice and a transport system that is resilient. It could be argued that the model village of Bourneville met these objectives.

There is a clear directive within the GPS to promote road safety and *demand management* as an activity class for funding through “investment to support behavioural changes to increase road safety and promote mode shift and use of travel planning to optimise the transport system – including work and school travel management plans, cycle safety training, ride sharing, promotion of public transport and active modes……” (Ministry of Transport 2018)

It should be noted that mode shift is listed as an ‘outcome’ in the GPS, not as a tool to manage TDM. Mode shift occurs when TDM is implemented effectively and is listed as one of the four R’s that are used to engender behaviour change.

It has often been stated in transport planning circles, “we can’t build our way out of congestion.” This is not true. If we look at how the Victorians developed road, rail and canal systems in England we can see that building to accommodate growth is quite feasible. However, it may not be economically viable or socially acceptable (people want transport infrastructure, but not in their back yard!). Therefore, TDM provides a value for money approach to accommodating growth by delivering the right infrastructure and services to the right level at the best cost – a supporting strategic requirement of the GPS.

**Example of TDM interventions Auckland**

The Auckland TDM Programme demonstrates that TDM techniques both at the macro and micro level creates behaviour change and can be effective in reducing congestion. The Programme aligned increasing, managing and creating capacity within transport networks with the behaviour change programme. Examples of supporting infrastructure (macro interventions) include:

* the reassignment of some road capacity to high occupancy vehicle lanes (T2 and T3 lanes) to enable the movement of more people more efficiently
* a dedicated bus corridor to the North of Auckland (the Northern Expressway)
* double decker buses introduced to areas of increased demand
* the electrification of the commuter rail network optimised the efficiency of train services, and
* the introduction of an electronic pre-paid transport card which is viable across all modes and facilitates the uptake of public transport in Auckland.

In tandem with improvements in transport infrastructure and networks, Auckland created a rolling programme of annual TDM behaviour change activities and promotions (micro interventions). The TDM programme included the following promotions:

* cycling in February
* walking in March
* car pool in June
* tertiary (university and college) campaigns in March and August
* car free day in September
* personalised journey planning campaigns in October
* tower block travel plan expos in November
* ‘Give it a Go’ discounted travel passes to encourage people to ‘try’ public transport for 2 weeks, and
* on-going support for organisations and Business Associations developing travel demand management plans.

In the year 2016/17 the Auckland TDM programme reduced Auckland’s morning peak traffic by an estimated 7,364 vehicles per day between 7am and 9am (Auckland Transport 2017). The catalyst for the development and promotion of the TDM programme was the unprecedented re-development of Auckland’s city centre, the City Rail Link project and the associated disruption to road-based transport. Through traffic modelling it was apparent that unless effective action was taken to reduce traffic entering the city, the streets would be unnavigable in the morning peak hour. It was estimated that a trip reduction target of 7,000 single occupant trips was required in order to keep the city moving in the morning peak. The actual reduction of 7,364 vehicles was measured from travel to work surveys that were undertaken by organisations that participated in the Travelwise Choices TDM programme.

To put the trip reduction into context of CO2 emissions savings, the removal of 7,364 vehicles from the morning peak amounts to approximately 14.6 tonnes of CO2 saved daily. Over the course of a year this amounts to over 5,300 tonnes of CO2 saved. This was calculated using Ministry of Transport (MoT) statistics which estimate that Auckland drivers drive an average of 8.7km per trip (trip purpose not stated). Petrol consumption was estimated using the MoT rate pf 9.9L/100km for the average New Zealand light petrol fleet with CO2 emissions calculated using the rate of L/100km x 22.961grams/km using the Rightcar CO2 emission rates.

The Auckland TDM programme demonstrates that influencing peoples travel through micro-level interventions (travel plans and non-infrastructure interventions) can be effective in reducing CO2 emissions and congestion. The Travelwise Choices programme, although primarily a behaviour change programme was supported by the provision of infrastructure that supports alternative modes of transport and the combination of micro and macro interventions contributed to the trip reduction.

It should be noted that the comprehensive TDM programme of macro and micro interventions implemented in Auckland is not commonly replicated in other urban areas of New Zealand. The regions need a policy directive and funding to enable, and unlock the level of TDM activity and mode shift experienced in Auckland.

**What does New Zealand need in the future to effectively implement TDM across the country?**

There is no quick fix to the transport challenges that face the rapid increase of New Zealand’s population. The GPS provides a clear directive to deliver TDM in NZ but councils and agencies requires further support in education, training and funding. Supporting initiatives could include:

1. a comprehensive TDM Policy to guide TDM activity across the country
2. a national TDM Action Plan (directed by the TDM Policy) to enable the regions to benefit from national resources in delivering national campaigns with supporting marketing resources (e.g. a rolling programme of TDM promotions such as walking, cycling, public transport and carpooling)
3. ease of access to Government funding for TDM interventions (the current funding model is complicated and not always well understood by participating approved organisations)
4. the provision of national guidance and training information for TDM practitioners in agencies, councils, and organisations implementing travel demand management plans
5. financial support and training for regional/local authority TDM teams
6. a review of existing planning consents such that where development has been approved in unsustainable locations, it could be revoked
7. a review of planning consent process to include travel demand management plans as a requirement for every development over a certain size so that infrastructure to support multiple transport modes are ‘built’ into developments and SOV trips are mitigated
8. the formation of a unifying body, organisation or association to provide a vehicle for dissemination of information, training, networking and rewarding TDM achievers.

**Summary**

When TDM is implemented effectively it reduces congestion, invigorates the economy, improves the environment and public health, and improves access to areas that may be suffering social exclusion due to lack of transport services and alternatives to car travel.

New Zealand’s population is projected to grow to 5.9 million by 2042/43 with an associated increase in the demand to travel which will put pressure on existing transport infrastructure and services. TDM interventions can help to mitigate projected trip generation and provide for future demand. Without TDM interventions New Zealand will experience increase development in inappropriate locations that cannot be serviced by public transport; congestion will to choke urban areas; pollution from vehicles will degrade air quality and the sedentary populous will experience increases in obesity, cardiovascular disease and related diseases.

Lessons learned from historical land use and transport planning patterns should be revisited and applied to modern urban development to mitigate travel demand and accommodate growth whilst creating livable communities.

The GPS provided a clear directive for TDM interventions, but a comprehensive TDM Policy and supporting training, resources and funding are required to coordinate the implementation of TDM across the country for the benefit the regions not just the major growth areas.

**AUTHOR CONTRIBUTION STATEMENT**

This paper has been prepared by Sue Philbin.

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