

The Greater Wellington Regional Land Transport Strategy Health Impact Assessment

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ACKNOWLEDGEMENTS	6
EXECUTIVE SUMMARY	7
INTRODUCTION.....	9
WHAT IS HIA AND HOW DOES IT RELATE TO REGIONAL GOVERNMENT?	9
THE HIA PROCESS USED	11
SCOPING.....	11
<i>Aim</i>	<i>11</i>
<i>The wider determinants of health to be assessed:</i>	<i>11</i>
<i>Populations affected.....</i>	<i>11</i>
<i>Packages of the plan to be assessed</i>	<i>12</i>
CARRYING OUT THE APPRAISAL	12
STUDY LIMITATIONS	13
COMMUNITY PROFILE	14
ENVIRONMENT	14
DEMOGRAPHICS	14
SOCIO-ECONOMIC INDICATORS.....	15
HEALTH STATUS	15
TRANSPORT.....	15
THE POTENTIAL EFFECTS OF THE RLTS	17
PUBLIC TRANSPORT.....	19
<i>What the draft RLTS aims to do for public transport</i>	<i>19</i>
<i>The link between public transport and health.....</i>	<i>19</i>
<i>New and additional trolley buses and rolling stock.....</i>	<i>20</i>
<i>New shelters for bus stops.....</i>	<i>21</i>
<i>Integrated ticketing and zoning</i>	<i>22</i>
<i>Real time information</i>	<i>23</i>
<i>Expansion of the Total Mobility access scheme</i>	<i>23</i>
TRAVEL DEMAND MANAGEMENT (TDM) AND WALKING AND CYCLING STRATEGIES	24
<i>What the draft RLTS aims to do for TDM, walking and cycling.....</i>	<i>24</i>
<i>The link between TDM, walking, cycling and health.....</i>	<i>24</i>
<i>Travel Plans.....</i>	<i>25</i>
<i>Walking</i>	<i>26</i>
<i>Cycling</i>	<i>27</i>
<i>Bus priority measures</i>	<i>27</i>
<i>Pricing strategies.....</i>	<i>27</i>
ROADING – GRENADA TO GRACEFIELD LINK	29
<i>What the RLTS aims to do for roading</i>	<i>29</i>
<i>The link between roading and health.....</i>	<i>29</i>
ASSESSMENT OF THE RLTS OBJECTIVES	33
<i>Consideration of other RLTS objectives</i>	<i>36</i>
SUMMARY TABLE OF INDIVIDUAL PACKAGES AND THEIR IMPACT ON PUBLIC HEALTH	38

SUMMARY TABLE OF THE DRAFT RLTS AS A WHOLE AND ITS IMPACT ON PUBLIC HEALTH FOR SPECIFIC POPULATION GROUPS.....	39
CONCLUSIONS AND RECOMMENDATIONS.....	41
<i>Major conclusions.....</i>	<i>42</i>
<i>Public Transport recommendations.....</i>	<i>45</i>
<i>TDM recommendations.....</i>	<i>49</i>
<i>Roading recommendations.....</i>	<i>51</i>
APPENDIX 1 - TRANSPORT AND HEALTH EVIDENCE REVIEW	53
<i>What is health?</i>	<i>53</i>
<i>What determines health?.....</i>	<i>53</i>
<i>What do we mean by inequalities in health and why are they important?</i>	<i>53</i>
<i>Why reduce inequalities?</i>	<i>54</i>
<i>What can be done to reduce inequalities?</i>	<i>54</i>
REVIEW METHODS	55
PHYSICAL ACTIVITY	56
<i>How does physical activity affect health?.....</i>	<i>56</i>
Premature death	56
Cardiovascular disease.....	56
Diabetes mellitus.....	56
Cancer	56
Osteoporosis.....	57
Mental health	57
Obesity	57
Physical activity and health in New Zealand.....	57
<i>How does transport affect physical activity?.....</i>	<i>57</i>
Using active modes of transport	57
Public transport	58
Accessing recreation facilities	58
Car travel.....	58
<i>Groups affected.....</i>	<i>59</i>
<i>What works in terms of transport policy to increase physical activity?</i>	<i>59</i>
Building cycleways and walkways	59
Urban design	59
Targeted behaviour change	60
Commuter subsidies.....	60
Providing alternative services	60
Walking school buses	60
Making combining modes easier	60
ACCESS TO SERVICES	61
<i>What is the evidence that access to services impacts on health?</i>	<i>61</i>
Access to health care services.....	61
Access to workplaces.....	61
Educational institutions.....	61
Food outlets.....	61
Facilities for social, cultural and sporting activities	62
<i>How does transport impact on access to services?</i>	<i>62</i>
Availability and physical accessibility of transport.....	62
Cost of transport.....	63

Safety and security of roads, walkways, public transport.....	63
Acceptable services.....	63
<i>Who is most affected?</i>	64
<i>What transport interventions help to improve access?</i>	65
HOW DO ACCIDENTS AFFECT HEALTH?.....	65
HOW DO ACCIDENTS AFFECT HEALTH?.....	66
<i>How does transport affect accidents?</i>	66
Mode of transport.....	66
Alcohol.....	67
Speed.....	67
<i>Who is affected by transport accidents?</i>	67
<i>What transport interventions work to reduce accidents?</i>	67
Safer Roads	67
Measures to reduce the severity of accident injuries:	68
Policies that promote public transport and reduce vehicle use	68
SOCIAL CONNECTEDNESS AND COMMUNITY SEVERANCE	69
<i>How do connectedness and severance affect health?</i>	69
<i>How does transport promote or disrupt connectedness?</i>	70
<i>Who is affected?</i>	70
<i>What works to prevent community severance and promote community networks?</i>	70
STRESS.....	72
<i>What are the health effects of stress?</i>	72
<i>How does transport cause stress?</i>	72
Congestion	72
Noise	72
Public transport and stress	72
<i>What transport interventions work to reduce stress?</i>	73
Strategies to reduce congestion.....	73
Strategies to reduce noise.....	73
Strategies to reduce public transport stress.....	73
APPENDIX 2 – HEALTH IMPACT ASSESSMENT WORKSHOP FINDINGS	74
PUBLIC TRANSPORT - EASE OF USE PACKAGE	74
PUBLIC TRANSPORT – TRAVEL DEMAND MANAGEMENT, WALKING AND CYCLING PACKAGE.....	80
ROADING PACKAGE – GRANADA TO GRACEFIELD	90
PUBLIC TRANSPORT – INFRASTRUCTURE IMPROVEMENTS	95
APPENDIX 3 – RLTS PACKAGES USED IN THE ASSESSMENT WORKSHOP.....	104
<i>Package one: Public transport (scheduled train and bus services) infrastructure improvements.....</i>	<i>104</i>
<i>Package two: Public transport (scheduled train and bus services) ease of use improvements.....</i>	<i>106</i>
<i>Package three: Travel Demand Management that promotes modal shift, and improvements to walking and cycling.....</i>	<i>108</i>
<i>Package four: Grenada to Gracefield Roading Package.....</i>	<i>110</i>

REFERENCES.....112

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Executive summary

This Health Impact Assessment (HIA) aims to check that the draft Greater Wellington Regional Land Transport Strategy (RLTS) delivers on its objective of 'promoting and protecting public health' (draft objective four) by assessing the impact of the RLTS against the determinants of the health and well-being.

This is a rapid HIA, due to time and human resource constraints, incorporating input from readily available sources including relevant literature and stakeholders. Ideally the HIA process would have been undertaken earlier in the process of drafting the RLTS. However this is the first time an HIA has been undertaken on an RLTS in New Zealand and demonstrates the Greater Wellington Regional Council's efforts for following international best practice.

This HIA focussed on five determinants of health identified as important at the scoping meeting, namely physical activity, accessibility to services and the community, accident rates and changes in injuries and fatalities, community effects and severance as a result of traffic, and stress and anxiety.

Because of the size of the RLTS document, and the lack of tangible outcomes from many of the objectives and policies of the strategy, the HIA focussed on representative packages derived from Section 11 – the Regional Transport Programme. These were:

- Public transport (scheduled train and bus services) infrastructure improvements
- Public transport (scheduled train and bus services) ease of use improvements
- Travel demand management, walking and cycling
- Roding, the Grenada to Gracefield link

A brief assessment of the objectives of the Regional Land Transport Strategy was also undertaken.

The main conclusions of the HIA approach are:

- The draft RLTS objectives have the potential to positively impact on public health and are supported.
- Overall the draft RLTS is unlikely to protect and promote public health for the region's population.
- The draft RLTS is likely to increase inequalities in health, particularly between socio-economic groups.
- Increasing modal share for public transport use and walking and cycling, and reducing private motor vehicle modal share are the best ways for transport to promote health, and the draft RLTS is not predicted to achieve these changes. If the RLTS is to meet its objective of protecting and promoting public health it must shift its focus to increasing public transport and TDM use.
- Individual investments in the RLTS that promote public transport infrastructure and services, and access for people with disabilities are applauded. However, on balance their positive public health impact is likely to be overshadowed by the impact of the new roading.
- An increased focus on equity is recommended in the RLTS objectives, policies, and packages.
- The draft RLTS displays a mis-match between the public health protecting and aspirational objectives and policies at the front of the Strategy, with the

public health damaging 'advanced roading' funding allocation in the rear of the Strategy.

- Assumptions that increased allocation of funds to public transport are likely to increase congestion and negatively impact on economic and regional development must be strongly challenged.

The major recommendations of the HIA approach are:

- Incorporate social equity and affordability into the RLTS objectives and outcomes
- Investigate changes in fare pricing structures and fare boundaries to improve equity and affordability
- Increase the proportion of funding for public transport, walking and cycling, and reduce the proportion of funding for new roading, as new roading is not likely to promote health, while other modes of transport are.
- Make trade-offs explicit with regard to the mis-match between objectives and policies in the front of the strategy and funding allocations in the back.
- Initiate HIA in projects that flow out of this RLTS, and initiate HIA earlier in future RLTS planning processes.
- Strengthen the aims of the RLTS towards increased mode share for public transport and active modes and reduced dependence on private motor vehicles.

Introduction

Quigley and Watts Ltd were commissioned to undertake a Health Impact Assessment (HIA) of the Draft Wellington Regional Land Transport Strategy (RLTS). This was undertaken in parallel with a Strategic Environmental Assessment undertaken by Environmental Management Services Ltd.

The GWRC RLTS health impact assessment has been undertaken because:

- the Greater Wellington Regional Council want to strengthen their work across sectors to promote health and wellbeing.
- Regional Public Health also want to strengthen their work across sectors.
- Greater Wellington Regional Council has a willingness to try innovative approaches to meet the requirements of the Land Transport Management Act
- Greater Wellington Regional Council understand that transport is a key determinant of the health and wellbeing of the region
- The timing was right for informing the pre-public consultation strategy
- The RLTS affects a large number of people, and impacts on many determinants of health and wellbeing.

The draft Wellington Regional Land Transport Strategy (RLTS) document sets out the vision, objectives, policies and plans for land transport in the Wellington region for the next ten years. The draft Wellington RLTS sits within a politically charged environment that includes a number of relevant planning documents, some of which are complete, others of which are ongoing.

The draft strategy became available on 12 July 2006 and the draft HIA report was available for the GWEC five and a half weeks later on 21 August 2006. Following review by stakeholders, the final report was submitted on 4 September 2006.

What is HIA and how does it relate to regional government?

HIA has been defined as 'a practical approach that determines how a proposal might affect people's health and wellbeing'. The proposal under assessment may range from a project (for instance, a housing development or a leisure centre) to programmes (such as an urban regeneration or a public safety programme) to policies (like an integrated transport strategy, or the introduction of water metering).

HIA builds on the now generally accepted understanding that a community's health and wellbeing is not only determined by its health services, but also by a wide range of economic, social, psychological, and environmental influences. People develop their illnesses and injuries while living in the community – so for example, homes, workplaces, schools, streets and open spaces are some of the places where health is determined. This gives rise to the term 'health determinant', sometimes referred to as the 'wider determinants of health and wellbeing'.

HIA draws on accepted broad definitions of health and wellbeing from the World Health Organization and from Maori models of health. Once acknowledged, it is clearly important to attempt to estimate the effects of non-health sector projects and policies on health and wellbeing in order to inform any decisions taken; this is the aim of HIA.

HIA can be carried out as an individual study, but is commonly addressed as part of an integrated assessment with either environmental and/or social assessments. An HIA is best undertaken before a strategy is implemented so that measures that might help increase the positive aspects of the project and minimise or avoid any negative impacts can be recommended. Evidence gathered is both quantitative and qualitative and may include literature, expert advice and community participation. Whereas, environmental assessments do not typically identify positive effects of a strategy, an HIA does. This is particularly helpful when trying to justify the adoption of strategies, or to seek funding.

HIA systematically works through relevant questions and issues, providing a rigorous base for any recommendations provided to decision makers. It is particularly good at seeing how policies affect people with disabilities, ethnic groups and socio-economically disadvantaged groups.

The New Zealand Government is committed to the principle of HIA. The New Zealand Health Strategy refers to the requirement for the health effects of national and local policies and projects to be assessed, and the Public Health Advisory Committee (PHAC) is training people in this approach and encouraging its uptake. This is further supported by the introduction of a new duty on local authorities to promote the economic, social and environmental wellbeing of their areas, in partnership with all relevant local interests.

Of particular relevance to this work, the Land Transport Management Act 2003 (LTMA) states that when an approved organisation is preparing a land transport programme it must take into account how each activity or activity class:

- (a) assists economic development
- (b) assists safety and personal security
- (c) improves access and mobility
- (d) protects and promotes public health
- (e) ensures environmental sustainability.

Four of these (a, b, c and e) are determinants of health and wellbeing, while the fifth (d) is a direct public health outcome.

Because of this requirement in the LTMA, there is an increasing expectation that transport policy decisions and project developments should undergo an assessment of more than just their economic and environmental impacts. To provide more balance, HIA provides one way of informing such decisions about the direct and indirect consequences on public health that are likely to arise from transport strategies, policies, programmes or projects.

The HIA process used

Scoping

The scope of the project needed to clarify key requirements:

- timeframes
- budgets and other resources available
- the determinants of health to focus on
- the populations affected to focus on
- the parts of the strategy to focus on.

The timeframes and budgets for the HIA were set by the Greater Wellington Regional Council. The aims, objectives and other boundaries for the HIA were set by a steering group on 23 November 2005 (listed in the acknowledgements).

Aim

The brief for the HIA is to “check that the draft RLTS contributes to objective 4 (protect and promote public health). If found deficient, appropriate changes are to be recommended, taking account of the other RLTS objectives.”

The wider determinants of health to be assessed:

The steering group acknowledged the budget and timeframe constraints of this process and were able to recommend a priority list of determinants. They were:

- physical activity
- accessibility to services and the community
- accident rates and changes in injuries and fatalities
- community effects and severance as a result of traffic
- stress and anxiety.

The strategic environmental assessment also covered:

- natural environment and land
- air pollution
- open spaces and loss of land
- waterways and water quality
- infrastructure
- natural disasters
- noise and vibration

Populations affected

Whilst recognising the time and resource constraints on the HIA process, the stakeholders favoured an inclusive approach rather than a tight focus on a small number of narrow population groups. For manageability, and because there are significant overlaps between some of the populations most likely to experience health impacts, grouping of the populations based on the common issues they face in relation to transport was suggested. For example access (both access to transport and access to services and community) and affordability were expected to be issues faced by a number of groups. Other groups might be affected due to their geographical location - communities close to busy or dusty roads, near proposed new routes, or far from public transport for example. Finally, there are culturally-specific behaviours and attributes that lead to particular transport issues for ethnic minorities. It must also be noted that ethnicity is a determinant of health independent of other factors, and Maori are a priority population for public health action.

The following populations were identified as important to the stakeholders:

1. Those with access issues:
 - Households without cars
 - Schoolchildren
 - People with disabilities
2. Those with affordability issues:
 - Low socio-economic groups (NZ Deprivation Index 9 and 10 in particular)
3. Those affected by geographical location:
 - Rural people
 - Communities close to existing routes
 - Communities close to proposed routes
4. Maori.

Packages of the plan to be assessed

At the scoping meeting it was agreed that the most tangible components for assessment within this strategy document were the policies, however this did not turn out to be the case on subsequent drafts of the plan. The policies in the draft RLTS were noted to be numerous (45 in total) and not linked to specific actions within the strategy. The policies included many goals that the strategy was unlikely to meet, including reducing greenhouse gas emissions and improving the safety of cycling. Therefore a decision was taken to focus on the Regional Transport Programme (RTP), which sets out the specific outputs from the strategy over the next ten years, and the funding allocated to these.

The HIA focused on representative packages derived from Section 11 – the Regional Transport Programme. These are shown in detail in Appendix 3, but in summary, they are:

- Public transport (scheduled train and bus services) infrastructure improvements
- Public transport (scheduled train and bus services) ease of use improvements
- Travel demand management, walking and cycling
- Roding, the Grenada to Gracefield link

A brief assessment of the objectives of the Regional Land Transport Strategy was also undertaken.

Carrying out the appraisal

A half-day stakeholder workshop was hosted by Greater Wellington Regional Council on Friday 11 August 2006 at the Duxton Hotel, Wellington to provide input into that assessment (see acknowledgements for attendees).

In preparation for the workshop a considerable amount of data was collected and summarised for presentation to, and use by workshop participants. This included a description of the draft RLTS; evidence about the link between relevant interventions and health impacts (Appendix 1); and a profile of the community.

Following presentation of background information, the workshop split participants into four groups, and assessed each package for its potential impact on public health. These four working groups were facilitated by four of the authors.

The following set of questions was provided as a guide for each group's discussion. Examine the package of proposed measures from the draft RLTS and answer:

1. How might the implementation of this package affect health and wellbeing directly, or indirectly (by affecting other factors in a causal pathway)?

And for each determinant affected:

2. What is the causal pathway for this impact on health?
3. Who is likely to be affected? Are some groups likely to be affected more than others? (in particular the population groups of interest)?
4. What evidence do you have to support the answers above, e.g., past experience, facts, research & existing data sources?
5. What key factors might encourage, prevent or mitigate the health impact?
6. What possible actions could be taken to enhance positive or diminish negative impacts? Who are these recommendations directed at?

Following the workshop, the results were organised into a matrix by the workshop facilitators to elaborate on points that were not fully described and to further integrate and explore concepts and impacts.

Study limitations

Due to practical limitations of funding, staffing and timing this was a rapid HIA. Data collected and used in the HIA came from existing evidence bases, a literature review, experience of the authors, a stakeholder workshop and suggested documents from stakeholders. The assessment could not be undertaken on the entire strategy as the document was far too large to accommodate a stakeholder-involved approach such as HIA, and so packages were created that reflected key features of the strategy.

Community profile

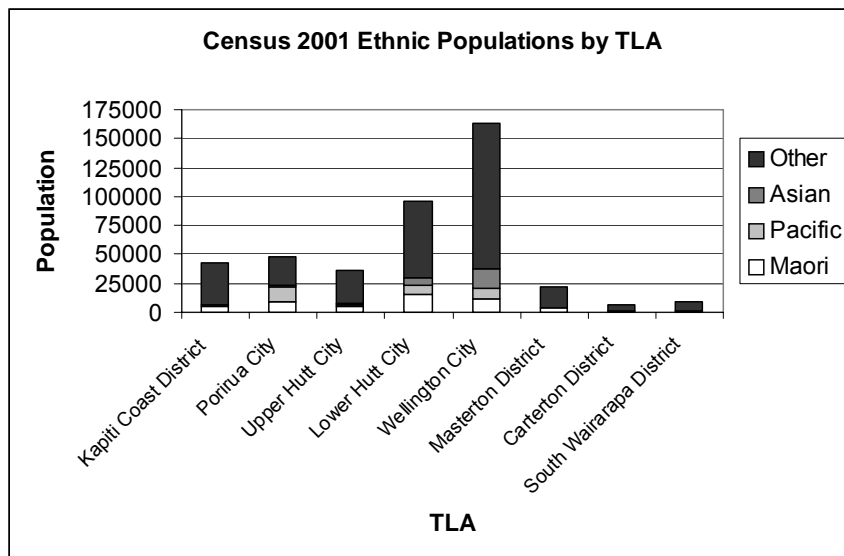
As part of the HIA process, a profile of the community that is likely to be affected by the Regional Land Transport Strategy was synthesised from existing reports. This allowed workshop participants and the authors to be able to make a more informed assessment of how the draft RLTS might potentially impact on the target populations.

Environment

The greater Wellington region comprises eight Territorial Local Authorities covering the areas of Wellington, Porirua, Kapiti, Lower Hutt, Upper Hutt, Masterton, Carterton and South Wairarapa. This covers 8,130kilometres² of land and 497 kilometres of coast line (GWRC 2005). Natural threats include flooding, erosion, wildfires, earthquakes and tsunami (WRLTC 2006).

Demographics

The greater Wellington region's projected population for 2006 is around 453,600 people. An extra 40,000 people are expected to live here by 2016 (StatsNZ 2005). Future population growth is expected to be concentrated within Wellington City and the Kapiti Coast. While Porirua has a younger age structure than other parts of the region, Kapiti has an older population (WRLTC 2006).



Ethnic Population Percentages 2001 Census

Area	Maori	Pacific	Asian	Other
Lower Hutt City	16%	8%	7%	69%
Upper Hutt City	13%	3%	3%	81%
Carterton District	10%	1%	1%	88%
Masterton District	16%	2%	1%	81%
South Wairarapa District	12%	1%	1%	86%
Kapiti Coast District	9%	1%	2%	88%
Porirua City	20%	23%	4%	53%
Wellington City	7%	5%	10%	78%
New Zealand	14%	5%	6%	75%

Source: Statistics NZ

Socio-Economic Indicators

Unemployment in the region, while dropping in 2004 and 2005, has recently increased to around 5.8% (StatsNZ 2006). Approximately 16% of the region's population level live in New Zealand Deprivation Index areas 9 and 10 (equivalent to high need populations), this includes 30% of all Maori and 55% of all Pacific peoples within the region (Salmond and Crampton 2002).

Health Status

The greater Wellington region comprises the Capital and Coast, Hutt Valley and Wairarapa District Health Boards. Leading causes of death and disability are similar to the rest of New Zealand and include cardiovascular disease (heart disease and strokes), diabetes, cancer, depression, respiratory disease and suicide and self-harm (MOH 1999). All of these health outcomes are affected by transport. Road traffic injuries are important causes of hospitalisation and death for children, youth and middle aged people. Around 20% of central region people live with some type of disability, with the most common types being mobility, agility and hearing (MOH 2004).

Transport

Regional Transport activities are associated with the following areas (GWRC 2005):

- Air: to promote reduced vehicle emissions
- Energy: to encourage use of public transport, cycling and walking
- Safety and Hazards: to promote safety within our transport systems
- Transport: to fund public transport services to achieve a balance between public and private transport use, to encourage active modes of transport and to maintain access to key facilities.

There are 4,105 kilometres of road in the region and nearly half are urban roads. Between 2000 and 2005, car ownership in the region increased by 11% (WRLTC 2006). Average congestion over the road network increased 8% during 2004/05, to an average of 25 seconds per kilometre travelled (GWRC 2005). Increasing numbers of commuters travelling between Kapiti and Wellington are expected, as well as increased forestry transportation from the Wairarapa. The movement of people and freight through the Wellington central business district is important as around a third of the region's jobs are located there and most trips to Wellington airport and hospital go through it (WRLTC 2006).

Transport issues include access and mobility, traffic congestion, safety and environment impacts. Many disabled people have difficulties using public transport services (HRC 2005). Public transport is relatively well patronised in the Greater Wellington region compared with the New Zealand average. In 2001, 4.3% of total trips made in the region were by public transport. This compared with around 76% of all trips made by car and 17% by active modes (walking and cycling). Public transport use in 2001 was split between 37.3% using train and 62.7% bus. Train trips are approximately evenly split between the Western and Hutt Corridors. There were a greater number of short bus trips taken compared with a smaller number of long train journeys, consistent with the region's strategy of train-based trunk services and bus feeders.

In 2004/05 32.4 million passenger trips were made on the region's public transport system, an increase of 2.5% from 2003/04 (GWRC 2005). While bus patronage continues to grow (particularly within the Hutt Valley), the region has an aging rail network requiring significant investment in rolling stock to cater for increasing patronage (WRLTC 2006).

In the 2001 Census, households without access to motor vehicles varied by area and at a suburb level ranged from 0% to 38%. Areas with lower access to motor vehicles include city centers, parts of Porirua, Newtown, Naenae and parts of Upper Hutt (StatsNZ 2001).

Households without Motor Vehicles	
Area	Percentage
Kapiti Coast District	9%
Porirua City	14%
Upper Hutt City	11%
Lower Hutt City	13%
Wellington City	14%
Masterton District	11%
Carterton District	8%
South Wairarapa District	7%

Source: Statistics New Zealand.

The potential effects of the RLTS

Full details of the workshop findings are presented in Appendix 2, and of the evidence review in Appendix 1. This section provides a narrative summary of workshop findings and evidence for these findings, focusing on the five determinants of health identified by the steering group.

The draft RLTS sets out the strategic direction for transport policy in the region over the next ten years, including funding allocations for spending on infrastructure and services. As such it has significant potential to impact on the determinants of health.

Transport is a fundamental requirement for access to services. Access to health services, workplaces, food outlets and educational institutions is important for attaining adequate income, enhancing social status and connection, improving self-esteem, gaining an education, accessing fresh fruit and vegetables and providing an opportunity to participate in community life, all of which improve population health status (NHC, 1998; Starfield et al, 2005; MoH 2003; Kawachi and Berkman, 2000).

Transport systems have considerable impact on the amount of physical activity achieved by the population. For example, transport policies that encourage and facilitate active modes of transport such as walking and cycling encourage physical activity, and active journeys are an opportunity to achieve the recommended 30 minutes of moderate intensity exercise per day (MOH 2006). Transport policies that encourage use of public transport also impact on physical activity levels, as each journey by public transport typically requires walking or cycling at each end (Gorman, Douglas et al. 2000). The health benefits of regular physical activity include reduced risk of premature death, cardiovascular disease, diabetes, breast and colon cancers, osteoporosis, and improved mental health (Warburton, Nicol et al. 2006). Overall each additional 30 minutes spent in a car per day is associated with a 3% increase in the likelihood of obesity, while each additional kilometre walked per day is associated with a 4.8% reduction in the likelihood of obesity (Frank, Andresen et al. 2004).

Transport policy also impacts on the rate of transport-related injuries. Bus and rail travel are comparatively safer per km travelled, while car fatality rates are higher, with cyclists, pedestrians and motorcyclists at the highest risk (Anonymous 1997). Policies that promote public transport use are therefore likely to reduce injury rates. However policies that promote walking and cycling may increase injury rates, as people using these modes are more vulnerable to accidental injury, unless parallel improvements are made in the environment to ensure that walkers and cyclists are as safe as possible (such as segregated walking and cycle paths, and measures to reduce traffic volume and speed) (Ameratunga, Hajar et al. 2006). Improvements to roading infrastructure may reduce injury rates among car users on the new and improved sections of roading, but may also increase injury rates among vulnerable road users as more cars are encouraged onto the road. It may increase injury rates among car users overall as indirect traffic leaves and enters other communities.

Transportation systems are important for maintaining social connections. Walking and public transport provide opportunities for social contact during journeys, while journeys by any mode can allow access to social support networks. A strong social network can reduce the risk of depression and susceptibility to infection (Wilkinson, Kawachi et al. 1998), and low social contact has been linked to an increase in all-cause mortality (Berkman and Syme 1991). Transportation systems, particularly large and busy roads, have the potential to disrupt social networks by creating barriers to accessing social networks (PHAC 2003). The design of public spaces,

including walkways, cycleways, footpaths and roads can promote or inhibit social connectedness (Appleyard and Lintell 1972).

Stress caused by congestion, transport noise, and unreliable public transport, has the potential to decrease work performance, maintain anxiety, and promote insecurity, low self-esteem, social isolation and a lack of control over home or work life. These can manifest in many health problems, such as high blood pressure, headache, impaired immune function (which may precipitate cancer, infection, and disease), stomach ulcers, stroke, diabetes, depression and asthma (Read and Cramphorn 2001) (JRF 1999).

Transport policy also impacts on inequalities in health. In New Zealand, as in other countries, certain groups are consistently disadvantaged with respect to health. Poverty is associated with health, and all people in poverty are likely to experience worse health than those who are better off than them by any socio-economic measure (MOH 2002). Maori and Pacific peoples also have consistently worse health than Pakeha New Zealanders, and the gaps are widening (Ajwani, Blakely et al. 2003). Moreover, at all educational, occupational and income levels Maori and Pacific have worse health status than other New Zealanders (Howden-Chapman and Tobias 2000).

Inequalities in health result from unequal access to the determinants of health, and social and economic policies, including transport policy, impact on this access. Interventions in sectors beyond health have the greatest potential to affect the broader determinants of population health, and thus reduce inequalities (Woodward and Kawachi 2000). Transport policy is one such area. It is therefore important to consider the potential impacts on inequalities of the RLTS. For example, policies that make public transport less affordable will have a disproportionate impact on those on low incomes, who are more likely to be dependent on public transport for accessing essential services.

Public transport

What the draft RLTS aims to do for public transport

The draft RLTS aims to 'protect and promote public health' and one of the ways in which it hopes to do this is by investing within public transport, taking approximately \$1387 million of the public transport spend over the next ten years (out of the total \$3107 million ten year RLTS spend) for both infrastructure and ease of use improvements. This is a significant focus of the draft RLTS and is supported by a detailed passenger transport plan.

Such investment has a strong potential to protect and promote public health if implemented equitably. The draft RLTS hopes to improve public transport ease of use¹ by:

1. Improved/ replaced rail stock/trains and buses, station improvements and station integration between bus and rail, providing more bus stop shelters
2. Increased frequency and speed of rail and bus services, for peak and off-peak services
3. Integrated ticketing between bus and rail and use of zone fares
4. Real time information systems for the bus and rail network
5. Expansion of the 'Total Mobility access scheme' that provides half price taxi fares for people with a permanent disability who cannot use public transport.

The link between public transport and health

Public transport plays a role in encouraging physical activity. UK estimates suggest that on average a journey by public transport requires 10 minutes walking (to and from the bus stop or station) (Gorman, Douglas et al. 2000). A large United States study found that public transport users spent an average of 19 minutes per day walking to and from transport, with 29% achieving the recommended 30 minutes per day of exercise in this way (Besser and Dannenberg 2005). Thus policies that facilitate public transport use can also increase physical activity.

The availability and appropriateness of public transport services are important for facilitating access to essential services, particularly for people on low incomes, who are much more likely than those on higher incomes to use public transport for the majority of their journeys (SEU 2003). Inadequate public transport is the main transport problem mentioned by people with difficulties accessing services (ibid). Accessible and affordable transport has been identified as a key service gap for people with disabilities in New Zealand (PHAC 2003), and getting on and off public transport is the principle barrier to using public transport for adults with disability (MOH 2004).

Public transport journeys are safer than car journeys, and so promoting public transport can reduce injury rates. Data from Britain in 1992 shows that bus and rail travel are comparatively safe at 0.04 and 0.1 fatalities per hundred million passengers per km travelled respectively, while car fatality rates are higher at 0.4 per hundred million passengers per kilometre (Anonymous 1997).

Public transport use can also have potentially harmful impacts through 'commuter stress', with slow, unreliable and crowded services being most likely to cause stress (Wener, Evans et al. 2003). However in areas where congestion occurs, public transport is often faster than a car journey, and for a given speed and duration public

¹ A summary of this package is in Appendix 3

transport journeys tend to be less stressful than car journeys (Zimmerman 2005). Improvements to public transport services can also mitigate stress.

New and additional trolley buses and rolling stock

The major RLTS investment in public transport is for new and additional trolley buses and rolling stock. These might lead to an increase in the frequency of services and the speed of travel, make travelling a more pleasant experience, and make travelling easier for people with mobility issues due to wider doors and improved design features. The most significant impact of this investment is the potential to shift significant numbers of people into public transport usage from vehicles, for both Wellington CBD and rural Wellingtonians. Modal shift is known to have positive impacts on health and wellbeing via increased physical activity, social connectedness, reduced stress (if services are well run), reduced accidents and greater access to services. Demand for public transport within the GWR continues to increase, and is further predicted to increase, and so this investment might help meet that need.

A second significant impact of the new and additional trolley buses and rolling stock is the potential improvement in access for those people with mobility issues, such as people with disabilities, older people, children and caregivers with children. This has the potential to provide safer travel, improved access to services and increased social connectedness for these people. Continued purchases of disabled-friendly trolley buses and rolling stock is crucial to ensure that the benefits to the whole population from these investments are available to all people in the community, and not just those with excellent mobility. Such an investment has the potential to reduce inequalities in health and wellbeing and is to be congratulated. Any further investment in rolling stock and buses is supported due to the direct positive impacts on protecting and promoting public health.

Access for those with physical disabilities requires not only accessible public transport vehicles (such as buses that can 'kneel'), but also accessible street and bus stop/ train station infrastructure, including safe pedestrian crossings adjacent to bus stops and train stations, and accessible platforms, and shelters designed to accommodate those with disabilities. Public transport can also provide access problems for those with sensory and intellectual disabilities, for example through complicated timetables written in small print. Much of this is also considered within the draft RLTS and so access should greatly increase when these measures are all in place.

Improved access to the community and increased social connectedness for households without cars is a further benefit of public transport investments. Amongst these households, Maori and Pacific people, older people, and people living in urban centres are over-represented. Investments in public transport also benefit households with cars, as many households only have one vehicle, driven by the 'male in the house', leaving women, children and older people reliant on other modes, including public transport, for much of their travel.

A third significant impact of the new and additional trolley buses and rolling stock is the safe, efficient and timely delivery of the workforce into the CBD and other hubs for the region. Local data shows 37% of all work trips to the CBD use buses and trains. The economic benefit of providing a suitable means of travel for this workforce on the Wellington regional economy and the national economy must surely be enormous. We were unable to find any NZ data to support the benefit of public transport to regional economies, but US data exists. This is a significant gap in the

information available for decision makers. Such an impact from public transport on economic growth might for example be used to argue for additional funding to support the regional economy. Investments in rolling stock and trolley buses may have the potential to achieve both economic growth and protection and promotion of public health.

“The analytical techniques used in the current study [...] have been applied in several major metropolitan areas across the country [...] to gauge both regional and state-wide economic benefits of investment in public transit. In each of these cases, the economic return to both the regions and to the states was many times greater than the initial investment. The analyses also showed that the long-term negative economic impacts of under-investing were severe” (American Public Transit Association, 1999).

A fourth potential impact is that modal shift may reduce roading congestion, speed up freight and support regional economic growth. Data on the impact of modal shift from the Wellington Transport Model implies investments in public transport make congestion worse. This is counter-intuitive and is not supported by recent vehicle congestion and increased public transport patronage following the recent rises in petrol prices.

A caution for the above investment is that it benefits those who already use public transport, or those about to make the switch from a vehicle to a car, that is, those who already travel for work or leisure. For example, it is unlikely to encourage low income or fixed income users who do not travel because of cost issues, to take advantage of the improved buses and rolling stock. Maori and Pacific families are over-represented amongst low income households, and so may be affected disproportionately. A final interesting issue was that improved rolling stock on trains and increased frequency on existing train routes, might further encourage additional people to live long distances from work, thereby spending long periods of time away from family, export their skills out of their own local economy to a central hub and promote non-sustainable energy use for travel. While such impacts have been noted for road building in the past, we were unsure of examples where increasing service frequency and comfort of public transport might have similar negative impacts. Possible examples could be commuter traffic into central London from far-flung destinations. This appears to be an unintended negative impact from what would typically be an overall positive effect. Working with local government to promote local jobs and linking land use planning more directly to the draft RLTS may mitigate this potential impact.

New shelters for bus stops

New shelters for bus stops, where the proportion of stops sheltered will increase to 35% of all stops, is another component of the draft RLTS. This investment has the potential to have direct impacts on protection of people from the sun (reducing skin cancer risk) and the elements (reducing the risk of respiratory infections). To gain the benefits of sun protection, appropriate polycarbonate or glass would be required, and it is understood that this is not the current case. The Cancer Society are highly interested in working with the GWRC to assist them in developing a standard for SunSafe shelters as off-peak travellers are at risk of sunburn (often less than 15 minutes burn time) during the hours of 11am-4pm.

Furthermore additional bus shelters may also assist modal shift as people will be protected from the elements while waiting for buses. The people most likely to benefit

from this are people who currently travel for work or leisure, but particularly those who wouldn't take public transport when exposure to the cold might compromise their wellbeing, such as children, older people, and people who are immune-compromised. Rural people are less likely to benefit from such investments compared with urban people and this needs to be acknowledged. An investigation on the proportion of shelters in low income areas would be useful to ensure that there is no inequality in distribution of these resources. The current provision is low (about 31%) and the target is high (80%) and on current rate of increase, the 80% target will be reached in 70 years time. Given the likely benefits to public health, and the current low proportion of shelters compared with total bus stops, any additional funding allocated to this area would be supported.

Integrated ticketing and zoning

Integrated ticketing between bus and rail, and integrated zoning of public transport travel are major investments in the draft RLTS designed to improve public transport. Integrated ticketing is expected to increase the speed of services via smaller queues. Integrated ticketing typically makes services easier to use, especially for those with disabilities and the elderly, however it is important that any ticket barrier facilities that might be required at stations are well designed to maintain this likely benefit. Integrated ticketing and zoning also has the potential to make the system easier to use for people with English as a second language as there is only a single ticket to purchase for whole system use. This has the potential to reduce stress and anxiety for all users, and to improve social connectedness for people who might otherwise find it more difficult to travel. Integrated ticketing and zoning are also likely to support modal shift from vehicle travel to public transport. To achieve the full public health benefits of these investments, and to potentially reduce inequalities, it is important that major ticket purchase areas can cater for people with communication difficulties and that staff are fully trained in their ability to assist with these travellers needs.

Most importantly, integrated ticketing and zoning may increase the affordability of public transport, by supporting use of multiple bus/train journeys without needing to pay for additional fares when changing services. It may also provide a certainty of price of travel that will be useful for budgeting and be safer for children travelling by themselves (single up-front payment with no chance of losing or spending the fare on other items on the journey). Increased affordability could allow more household money to be used on other items of importance such as education, food and heating with subsequent health benefits. This possible gain in affordability from integrated ticketing and zoning is highly dependent on fare prices, and while the draft RLTS has little discussion on prices, they continue to rise (next increase due on 4 September 2006), negating the positive impact on affordability provided by integrated ticketing and zoning. Fare increases are highly likely to increase inequalities in access to transport services, particularly for those people with issues of cost. Reduced access to services, social disconnection and increased stress/ anxiety from an inability to participate fully in society are highly likely outcomes that are particularly damaging to public health. Low income people are currently not catered for, or discussed within the RLTS. Maori and Pacific families are over-represented amongst low-income households, and so may be affected disproportionately.

Possible remedies to this include a greater emphasis on disadvantaged groups within the objectives of the RLTS and throughout the document. Practical measures would include investigating changes to zone boundaries near to low income areas (characterised by the NZ Deprivation Index) for possible movement, thereby making it more affordable for people from these low income areas to travel to key local

destinations. A further option that requires investigation is the reinstatement of low-income concession fares.

Affordable public transport is important in enabling access for those on limited incomes. Many countries provide subsidies for those with disabilities, the elderly and young people. In the United Kingdom over 60s and those with disabilities pay at most half price fares, and in some areas travel for free. Subsidies have also been used successfully to aid people getting to work or study in certain areas. Public transport provided to all users at a highly subsidised rate improves access for the most disadvantaged groups.

Real time information

The first step towards real time information at bus and train stops is currently providing scheduled timetable information only, rather than actual time/ position of the next service due. Actual GPS based services are scheduled to be complete by 2010. This package has significant potential for public health gain from reduced stress, modal shift and increased patronage of public transport services. Text based services are unlikely to be used by people on a low income and so real time station- and bus stop-based services are preferable to provide benefits to all users rather than those with available income. Conversely, text based services have the potential to assist people with sight difficulties through the use of text reading/talking cell phones, though these cell phones are understood to be prohibitively expensive at the moment for many users, but cost is likely to decrease over time. Equity of application of real time information is important and we encourage the consideration of low-income areas when deciding what services get real time information, and what services get real time information first.

Expansion of the Total Mobility access scheme

The expansion of the Total Mobility access scheme has significant potential to improve public health through improved access to services and the community, increased social connectedness and safer travel for people who can otherwise not use public transport due to a permanent disability. It has the potential to make such travel more affordable for the large number of people who are currently eligible but who currently do not access the scheme. It is worth acknowledging that despite the generous funding in this scheme, for some low income people half-price taxi fares may still be out of reach. A major issue with this scheme is the long term sustainability of funding given significant growth due to an ageing population and the impacts of the diabetes epidemic (amputations and blindness are common complications). The scheme has expanded by 75% in the last six years. Tying the scheme into travel planning initiatives is worth investigation to assist the scheme in using the funding as efficiently as possible, making it as widely available to as many people as possible, rather than making the scheme criteria more restrictive.

Travel Demand Management (TDM) and Walking and Cycling Strategies

What the draft RLTS aims to do for TDM, walking and cycling

The draft RLTS focuses on three areas of TDM: travel plans, bus priority measures, and traffic management solutions such as Advanced Traffic Management Systems (ATMS), and High Occupancy Vehicle (HOV) lanes². The Regional TDM strategy (GWRC 2005) spells out these measures in more detail, and also discusses the possibility of road pricing measures, although points out that a law change will be required before charges can be applied to the use of existing roads, and that further investigation of a road pricing scheme appropriate and acceptable to Wellington residents is also required. The Regional Walking and Cycling Strategies are an important adjunct to TDM, aiming to ensure that walking and cycling are viable and desirable transport options (MOT 2005).

Travel Demand Management aims to increase the efficiency of transportation systems, helping individuals and communities to meet their transportation needs in the most efficient way. TDM emphasises the movement of people and goods, as opposed to motor vehicles. TDM recognises that most transportation problems arise from market distortions that result in excessive motor car use, and therefore solving these problems requires planning reforms that increase transport options and market reforms that give consumers suitable incentives to choose the best option for each trip (VTPI 2006). TDM is most effective in addressing problems such as road and parking congestion, inadequate mobility for non-drivers, and external costs from traffic such as pollution and road accidents (ibid). Experience with TDM internationally has found that it can provide cost-effective solutions to travel problems, but that the full range of possible TDM strategies have not been implemented anywhere, meaning that no community has seen the full potential benefit of TDM (ibid). TDM aims to promote equity by making transportation prices more accurately reflect costs, improving affordable transport choices, and reducing external costs of motor vehicle travel (pollution and crashes).

TDM is a very popular strategy internationally, and there is large amount of information available about effective strategies. Several large online databases exist, including Australia's Travel Smart website (www.travelsmart.gov.au), Canada's Online TDM encyclopaedia (www.vtpi.org/tdm/) and national TDM database (www.tc.gc.ca/programs/environment/UTSP/tdm.htm), and the European Platform on Mobility Management (www.epommweb.org).

The link between TDM, walking, cycling and health

The RLTS TDM strategies aim to promote accessibility, which has positive impacts on health. Transportation is important for access to health services and places of education and employment, all of which are important determinants of health status (NHC 1998; McKee 1999). Travel plans focusing on healthcare institutions, schools and workplaces have the potential to improve access to all these places and thus impact on health. Improvements to traffic flows and reduced congestion also increase access for car users and freight, while bus priority measures increase access for bus users, by increasing the speed and reliability of journeys.

² A summary of this package is in Appendix 3

Most TDM strategies, particularly measures to encourage public transport and active transport use (such as travel plans and bus priority measures proposed in the RLTS), aim to reduce car use, which has considerable health benefits. Mode shift to active transport (walking and cycling) increases physical activity, and active journeys are an opportunity to achieve the recommended 30 minutes of moderate intensity activity on most days (MOH 2006). The health benefits of regular physical activity include reduced risk of premature death, cardiovascular disease, diabetes, breast and colon cancers, osteoporosis, and improved mental health (Warburton, Nicol et al. 2006). Overall each additional 30 minutes spent in a car per day is associated with a 3% increase in the likelihood of obesity, while each additional kilometre walked per day is associated with a 4.8% reduction in the likelihood of obesity (Frank, Andresen et al. 2004). Using public transport instead of a car is also associated with increased physical activity, as walking or cycling is usually required at each end of the journey (Gorman, Douglas et al. 2000). Shifting car journeys to public transport or walking and cycling also increases social connections as these journey types provide increased opportunity for social interaction. Public transport journeys are also lower risk in terms of accidents than car journeys (although foot and cycle journeys are higher risk) (Anonymous 1997). Finally, since such measures have the potential to benefit all members of society, particularly those on low incomes, households without cars, children and elderly, such measures have strong potential to reduce inequalities in health. Also, Maori and Pacific families are over-represented amongst low-income households, and so are particularly likely to benefit.

However the draft RLTS also includes TDM strategies such as advanced traffic management systems (ATMS), which aim to improve the flow of existing traffic volumes. By reducing congestion such strategies may reduce the “cost” (in terms of time spent) of car travel thus potentially increasing car travel (induced demand), with resulting negative health effects (Cairns, Sloman et al. 2004; Frank 2004). And so while reducing congestion has health benefits in terms of reducing stress for drivers (Hennessy and Wiesenthal 1997), and increasing accessibility for car users, these benefits are likely to be outweighed by the negative health impacts of increased car use (reduced physical activity, reduced social interaction). ATMS strategies also aim to reduce vehicle accidents by improving vehicle flow (VTPI 2005), but by speeding up traffic have the potential to increase the severity of accidents, particularly those involving pedestrians and cyclists. Thus such strategies may benefit car drivers, but may have a negative impact on other road users. Increased traffic flow can also increase the severance effects of large roads for surrounding communities. A focus on TDM measures designed primarily to discourage car use is more likely to promote health.

Travel Plans

Travel plans are a major part of TDM in the RLTS, with 10.2 million dollars set aside for designing and implementing a travel plan programme to encourage the uptake of travel plans by schools, workplaces, communities and individuals. There a large body of international evidence regarding the efficacy of travel plans (Cairns, Sloman et al. 2004).

School travel plans typically involve a mixture of awareness raising, incentive schemes, and engineering measures to improve safety. School travel plans have been found to reduce the proportion of children being driven to school (with consequent health benefits from physical activity as part of alternative mode), to reduce injuries to child pedestrians, to increase road safety skills, and to increase children’s independence and the connectedness of children and parents with their local community (Cairns, Sloman et al. 2004). There is also evidence that cycling

becomes safer as it becomes more popular (Jacobsen 2003), and an international study of 10-14 year olds found that higher levels of cycling is linked with fewer accidents per kilometre cycled (Christie, Towner et al. 2004), thus promoting cycling is not likely to lead to increased injuries as might be feared. However, separate cycle paths are likely to also be important in increasing parents' perceptions of the safety of their children cycling.

Work travel plans have been successful in reducing car journeys to work. In Britain a study of 20 organisations with travel plans found that on average the proportion of staff commuting by public transport and active modes had doubled following implementation of travel plans, while car sharing was also popular (Cairns, Davis et al. 2002). Other studies have found that travel plans combining incentives (such as cheaper public transport) and disincentives for car use (such as parking charges) are more effective than plans which used only 'softer' measures such as car sharing and awareness raising (Cairns, Sloman et al. 2004). Increasing public transport and active transport has health benefits via physical activity, connectedness, and reducing accidents.

Travel plans aimed at specific organisations have potential benefits for individuals within those organisations as noted above, and may also have some flow on community benefits through reduced traffic flow increasing accessibility and reducing exposure to pollution. However travel plans have the potential to increase inequalities. Wealthy employers may be more able to afford to employ a travel coordinator and provide incentives to employees. Similarly high decile schools may be more likely to have the budget for travel planning and to have parents who can volunteer their time. Maori and Pacific children are over-represented in schools that are deprived, and so may be affected disproportionately. Moreover, Maori children have higher rates of transport-related injury and so have more potential to benefit from travel planning initiatives to improve road safety. For this reason generic travel plans and council-employed advisors, such as are suggested in the RLTS, may help to provide broader benefit providing advisors work closely with low decile schools.

Also, travel plans involving subsidies or other incentives have the potential to benefit those already using public transport and active modes, and can increase the affordability of public transport for those on low incomes, thus reducing inequalities. Workplace travel plans do not meet the needs of people without employment, although travel plans run by employment services have been successful in encouraging employment (Haider 2003). Travel plans aimed at communities and individuals, particularly those already disadvantaged, are likely to provide important benefits to other sections of the community such as the elderly and parents of young children. A community development approach to travel planning can increase community cohesion, but requires adequate resources. Supporting other initiatives such as DHB travel plans also has the potential to reduce inequalities by benefiting users of medical care with access problems.

Walking

Promoting pedestrian access supports TDM strategies and promotes active transport. The Greater Wellington Regional Walking Strategy focuses on improving pedestrian access to transport nodes and in new developments. Universal accessibility of public transport nodes and vehicles is important for improving access to services for those with disabilities (HRC 2005). Pedestrian accessibility promotes health through encouraging physical activity, and improving access for those without cars (TRB 2005). However in order to reach those living in deprived areas and those unable to afford alternative means of transport, it is important that pedestrian access

is also improved in existing neighbourhoods as outlined in the Pedestrian Strategy by local authorities, and not just in new developments where residents are likely to be among the more advantaged members of society. With the increased numbers of cars on the roads from the new roading initiatives there is increased potential for conflict between pedestrians and vehicles, and decreases in safety. We acknowledge that the infrastructure available for walking is good within much of the Wellington region, and that the RLTS does not cover the maintenance of this, of which local authorities carry out. However pedestrians have to get from one piece of pavement to another, many times on a single journey, crossing roads as they go. This is where conflict has the potential to increase. Again, this may be mitigated by Safe Routes to Schools Programmes and other projects, but structural changes, such as more cars, are likely to be the dominant determinant of outcomes. Therefore, the RLTS is at best going to maintain the safety of pedestrians, and may even reduce safety for pedestrians, and so is unlikely to protect and promote public health for this area.

Cycling

The Greater Wellington Regional Cycling Strategy sets out measures including education for child and adult cyclists and for drivers, improving local and regional cycle networks, and cycle information and advocacy measures including employing a cycling coordinator. While these are important initiatives, some concern was voiced by stakeholders about the speed of implementation of the strategy, in particular the linking of the regional network. Safe and continuous cycle routes are important determinants of the choice to cycle (Pikora, Giles-Corti et al. 2003). In particular, the need for a safe route between the Hutt Valley and central Wellington was raised as a priority. Safety of cyclists at intersections was also raised as a particular concern.

Research evidence suggests that provision of cycle facilities such as dedicated lanes and paths increases cycle travel (Sustrans 2005; Barnes, Thompson et al. 2006), and reduces accidents (Ameratunga, Hajar et al. 2006), although may not increase cycle mode share (Ogilvie, Egan et al. 2004). Concern was voiced as to the lack of funding for the construction of these facilities on existing roads. Cycling has health benefits in terms of increased physical activity, and these have been found to far outweigh the increased risk of accidents (Hillman 1992). However, the RLTS is unlikely to improve the overall lot for cyclists due to the increased numbers of cars on the road.

Bus priority measures

The RLTS also includes bus priority measures (such as bus lanes and bus signals at traffic lights), which are important for increasing the speed and efficiency of bus travel, thereby reducing the stress associated with its use and making it a more attractive option (Wener, Evans et al. 2003). Public transport use brings many health benefits as noted above, including physical activity at each end of most journeys, increased social cohesion, reduced accidents, and increased access (if services are affordable and on appropriate routes). The priority measures proposed are likely to bring most benefits to those using services within and accessing the Wellington CBD, and less benefit to those outside this area. However buses outside the CBD are more likely to keep to timetable anyway.

Pricing strategies

'Hard' TDM measures (such as road pricing) have been shown internationally to be particularly effective in reducing car travel. Parking pricing for example has been shown to be one of the most important predictors of mode choice (Frank 2004). The importance of transparency, public participation and trust is however emphasised as key to the success of road pricing strategies (VTPI 2006). The potential health

benefits of these measures are large, and they should be given serious consideration, but parallel improvements in the affordability of public transport will be important to ensure that pricing measures do not result in increased inequalities of access to essential services. Central government legislation is required to allow local government to implement road pricing interventions, and local governments would benefit from being able to use this solution where they deem it appropriate in their regions.

Roading – Grenada to Gracefield link

What the RLTS aims to do for roading

While the draft RLTS aims to 'protect and promote public health', one of the ways in which this will be challenging is through its significant investments in new roading, taking approximately \$1773 million of the roading spend over the next ten years (out of the total \$3107 million ten year RLTS spend). This money is complemented by a further \$1020 million for highway maintenance and local roading. Roothing is a significant focus of the draft RLTS, with new roading representing 42% of all funding, and all roading projects combined representing 67% of all funding.

To represent this roading focus in the assessment, a single package that was considered to be representative of many of the likely issues was chosen for assessment. The road assessed was the Grenada to Gracefield link, proposed to provide new network capacity and a more direct route for traffic from Wellington's northern suburbs and from areas north of Tawa across to the Hutt Valley. This has the potential to speed access between these two centres for both vehicle users and freight.

The Grenada to Gracefield link is in two parts:

Stage I, within the ten year planning period of the draft RLTS, is a new road across the hills to Petone which would significantly reduce congestion in the Ngauranga Gorge and the intersection with State Highway 2 at the bottom of the gorge.

Stage II is referred to as the Cross Valley Link and does not yet have funding. It would follow the railway alignment across the valley from the Dowse interchange on State Highway 2, to Gracefield. There are two alternative routes:

- Alternative 1. is along existing suburban streets on both sides of the Hutt River, widening and upgrading them.
- Alternative 2. starts along the existing streets then deviates onto a new alignment beside the railway line.

In both cases the new road is expected to be the preferred route for northbound heavy traffic from Wellington and southbound Wainuiomata and eastern valley commuters, diverting them away from the Petone Esplanade.

Whichever Stage II route alternative is chosen, traffic calming measures are to be put along the Esplanade to make it less attractive for use by heavy vehicles and commuting traffic.

Further details of the Grenada to Gracefield Roothing Package are provided in Appendix 3.

The link between roading and health

Roothing infrastructure has historically been a large component of transport provision, and taken up a large proportion of transport budgets. As noted above, roading is an important component of the draft RLTS. The recent controversy around the decision between transmission gully and the coastal route upgrade gives an indication of the depth of public feeling aroused by roading decisions.

Roads in New Zealand are principally designed for use by private motor vehicles, although they are shared by freight vehicles, passenger-transport vehicles, and cyclists and pedestrians. Road construction and road improvements generally have

the effect of increasing car use (Frank 2004). Car travel, as an alternative to public transport, walking or cycling, generally has a negative impact on public health. Car travel is a missed opportunity for physical activity, and more car travel has been associated with an increased risk of obesity (Frank, Andresen et al. 2004). Alternative modes also provide greater opportunities for social interaction. Car travel is more risky than public transport, although less risky than walking and cycling. And car travel is not available to the entire population, with 14.1% of Wellington households not having access to a motor vehicle (2001 census).

Car travel also has some potential benefits for health, as it is important for access to services and social supports in areas where alternative transport is not available and for people who are unable to use alternative transport (such as some people with disabilities).

The health impacts of roads are not limited to road users. Those living near large roads are subjected to the air and noise pollution generated by the road, and can be cut off from their social contacts, with the volume and speed of traffic creating a physical and psychological barrier (known as the 'severance' effect) (PHAC 2003).

Physical Activity

The Stage I development has the potential to improve access for recreational use of the Belmont Regional Park by walkers and mountain bikers although this may be a new destination rather than new exercise. It would need safe and secure off-road parking areas to achieve this.

Depending on the alignment selected for this road, the walking tracks and picnic areas in the vicinity of the Korokoro Stream may be lost or have their peaceful character diminished. Recreational users of such 'local' tracks may include young families and the transport disadvantaged who may not easily find other places to go.

It is possible that this new road would be used by sufficient people traveling to work that public transport services would be warranted. The public health benefits of public transport use are described elsewhere and would be shared by users of these services if they eventuated. It is likely however that some users of any new services would already be public transport users.

The reduced congestion on State Highway south from Grenada that is expected in the early years as a result of the new road may encourage some public transport users to move back to their cars. Improvements to public transport such as upgrading the railway rolling stock, stations and services, as is proposed, has the potential to mitigate against that.

In Petone the changes to Wakefield Street (widening and increased traffic flow) has the potential to accentuate the barrier imposed by the rail line between Alicetown and the parks and sport grounds immediately to the south. This has the potential to reduce spontaneous physical activity by older children and youth, and project level mitigations are likely to be required.

The new roading development offers the opportunity to increase the number of pedestrian connections between Ava and Alicetown with new ones under or over the railway line (and the newly widened road) for walking access to schools and the Te Kura Kaupapa Maori.

The heavy vehicles and the increased traffic on the feeder roads is expected to reduce pedestrian and cyclists' safety and walking pleasantness for school children

in particular, and the elderly. This would be a particular issue in Woburn if Alternative Route 1 was selected, as it would significantly alter the character of the suburban area south of Whites Line West.

Accessibility to Services and the Community

The Stage I road between Grenada and Petone has the potential to provide much more direct access for communities with family and cultural connections shared between the lower Hutt Valley and the Porirua Basin. These include several iwi whose access to Marae and choice of Te Kura Kaupapa Maori may be improved. Bus services have further potential to assist.

Access to local services by residents within the Hutt Valley have the potential to be made more difficult due to the severance effect of the new road, both its greater width but more particularly heavier traffic flow which would reduce pedestrian and cycle safety and enjoyment. This is particularly the case for Woburn if Alternative Route 1 is selected, but also for Waiwhetu irrespective of the route, as Wainuiomata traffic is expected to use the Cross Valley Link when traffic-calming measures are installed on the Petone Esplanade. These issues arise again in the following section.

Community Effects and Severance

There were no severance effects identified by the workshop group for the Stage I road nor community effects for the immediate catchment communities in the vicinity of Grenada.

In the Cross Valley Link, the severance effects of the new roadway vary according to the route chosen. This is true also for community effects although they are expected to be more widespread as traffic flows increase over time.

Severance effects were identified as severe for the small Woburn community in the south of White Lines East if Alternative Route 1 was chosen.

Heavier traffic flows on Randwick Road with more freight vehicles heading toward Gracefield have the potential to amplify community effects and severance in Moera – measures to moderate these effects are not obvious.

Heavier commuter traffic from Wainuiomata using the lower section of Wainui Road and White Lines East also amplify community effects in Moera and in Waiwhetu as well. Measures to moderate this effect include improved commuter bus services between Wainuiomata and the railway services and perhaps direct to Wellington.

Improving park and ride facilities at Woburn Station could reduce some of severance effects on the new road west of Randwick Road.

Accident Rates and Change to Injuries and Fatalities

Accident statistics indicate that while nose to tail accidents may decrease due to less congestion in the short term on the Stage I road, accidents are likely to be more severe than on the more congested and slower moving existing routes. This applies to pedestrians and cyclists using the road verge as well as motorists.

On Wakefield Street, Whites Line East and Randwick Street more pedestrian and cyclist accidents are predicted, especially amongst children and the elderly.

Traffic calming measures on the Petone Esplanade should reduce accidents notwithstanding expected higher pedestrian and cyclist use.

Stress

Proposed new roading developments are a source of anxiety and stress for communities that would be potentially or actually affected by them. In some cases this uncertainty hangs over some communities for years.

Decisions on possible or proposed roading projects should be taken as soon as possible to reduce the uncertainty and anxiety of affected landowners and to allow local authorities to embark on planning to reduce or mitigate any adverse effects

General

A number of health and wellbeing issues noted above are sensitive to the timing of both construction activities and the introduction of mitigating measures.

For instance the traffic calming measures on the Esplanade need to be in place more or less when the new Cross Valley Link is opened otherwise the safety benefits and reduced community effects are less likely to be realised.

Similarly measures to reduce private motor vehicle commuter use of the new link such as Express Bus service from Wainuiomata to Wellington and perhaps elsewhere, improved park and ride facilities at Woburn, and passenger transport services between Porirua and Petone / Gracefield need to be investigated and planned in advance of road completion.

The HIA stakeholder workshop did not address the effects on Petone, and in particular the use of the Esplanade, that might arise from changed commuter travel behaviour as a result of the improved access via the completed new Stage I link from Grenada.

Assessment of the RLTS objectives

The six objectives of the draft RLTS provide an optimistic and aspirational view of the potential transport outcomes for the Wellington region. In their totality they were considered to be a good set of objectives for their potential to protect and promote public health and are supported. The objectives reinforced the linkages between public health and transport, with four of the six objectives relating to public health directly, or to a determinant of health.

The one major aspect that is believed to be missing from the objectives is the lack of focus on low socio-economic groups. The Ministry of Transport's (2002) New Zealand Transport Strategy (NZTS) states that 'We must ensure that transport supports social interaction and wellbeing, especially for those who are most vulnerable in society or for those who are mobility impaired'. The draft RLTS has a strong focus on people with mobility impairments, but nothing on other vulnerable groups, particularly low income. The only time the word 'affordable' is mentioned in the draft RLTS is in the policy context, '*The NZTS was released in December 2002. The strategy is about creating a sustainable transport system that is also affordable, integrated, safe and responsive to our needs.*' While some proponents suggest that affordability perhaps only refers to whether the community can afford the transport solution, the Hon Paul Swain (Minister of Transport) clearly sets out his understanding of affordability in the Foreword of the NZTS '*Accordingly, this document recognises the importance of efficiency to achieving our vision, the need for people to have access to affordable and effective transport choices and local services, and considers more fully the needs of children and the aged*'. Any suggestion that affordability does not mean 'affordability regarding the use of services' undermines the intention of the NZTS.

Affordability to the individual or disadvantaged groups is identified in the intent of the NZTS, and we would expect that there would be a number of programme components in place within the RLTS to address this. This is not the case, and as it stands the draft RLTS is likely to reduce affordability and thus widen inequalities in health. Given that Maori and Pacific families are over-represented in low income households, they may be disproportionately affected.

It is clear that fare structures and zoning are two places where affordability could be addressed, and these require investigation and action. Currently, affordability issues are only considered in the concession fare structures for Wellington public transport that are available to:

- Children 5-15 years
- Secondary school students aged 16-19 years
- Wellington City pensioner, beneficiary and blind permit holders on Stagecoach Wellington services only. Not available before 9.00am or between 4.00pm and 6.00pm weekdays
- Senior Citizens using a Go Rider smartcard on Cityline Hutt Valley services. Not available for travel to and from Wellington or before 9.00am weekdays.

Children under five years travel free.

A more broadly based and effective approach to addressing inequalities in access to public transport would focus on high deprivation areas (using for example the NZ Deprivation Index as a guide) to assist any targeting using a geographical focus.

To ensure this occurs, affordability needs to be written into the overarching objectives of the draft RLTS in an explicit manner, and then represented throughout the document in policies and projects.

Equitable economic development is important to ensure that socio-economic inequalities are not further widened. The Wellington Regional Strategy supports closing 'prosperity gaps' and such a focus throughout the RLTS will better achieve that.

A final overarching comment from the stakeholder workshop was that one of the biggest stresses for communities regarding transport is the time taken and processes used to make decisions. Residents in Paremata for example have had to live with many different transport options being suggested, multiple reassurances and commitments, all of which have changed markedly over the years. It was acknowledged that this process is far from ideal for promoting or protecting public health and wellbeing.

Linking the draft RLTS objectives to the Regional Transport Programme

The optimistic front-end of the draft RLTS (vision, objectives and policies) includes a laudable set of goals, and is supported. However, it is important to note that up until page 100 in the draft document, the strategy aims to deliver all things to all stakeholders, and is therefore unrealistic. For example, freight increases, traffic congestion declines and pedestrians and cyclists become safer. The trade-offs that must be made for this to actually occur are not discussed and it is assumed that the draft RLTS really will deliver everything for everybody. This is not a criticism of the Regional Transport Programme, as it would be highly unlikely that any programme would be able to deliver fully on such diverse goals. Instead, the objectives, policies and plans need to explicitly describe what is likely to be delivered by each. With the information from the environmental and health impact assessments, it should be possible for the trade-offs for public health and environment to be clearly set out in a future draft throughout the RLTS.

The proposed public transport spend has great potential to protect and promote public health, as do the TDM initiatives. This is a great advance from previous RLTS's in Wellington and is to be heartily congratulated. However, in the face of the new roading proposed in the Regional Transport Programme component of the Draft RLTS, and with small investments in walking and cycling, the impact on public health of health promoting modes is greatly diminished and likely overshadowed. Public health and wellbeing outcomes have the potential to be reduced. Only by shifting further proportions of funding to public transport, walking, cycling and TDM, as requested by the people of Wellington in the strategic options consultation, would it be likely to maintain public health for the people in the Wellington region. If issues of inequalities could be addressed in any new shift of funding, public health may actually be protected and promoted.

The disconnect between the front-end of the RLTS and Programme is largely due to the ten year plans allocation of a substantial proportion of funding to roading initiatives (particularly new roading) at the expense of public transport, walking, cycling and TDM initiatives. In the 10-20 year scenarios, this funding remains skewed towards roading until approximately 2020. The proportion of funding allocated to walking, cycling and TDM are small in the face of increased road building, and the strategic options paper agrees that cycling is likely to become less safe under the current draft RLTS. It needs to be acknowledged in the early part of the strategy that the draft RLTS is not going to deliver overall benefits for cyclists and pedestrians, and that the goals around walking and cycling have been traded off against the need for improved movement of motor vehicle traffic. While we support the notion of aspirational goals, it should be clear to the reader that they are aspirations and unlikely to be met within this 10 year time period.

A large proportion of the public transport funding is spent on bringing rolling stock and buses up to standard, for which the GWRC is to be congratulated. However, it is unclear if the current or projected growth in public transport use can be accommodated within this improved and expanded fleet. Public opinion in the Strategic Options consultation clearly recommended a higher ratio of funding be allocated to public transport, yet this has not happened. This is partly due to the large funding base for the Transmission Gully Motorway, which when considered as part of the Western Corridor plan (as separate from the overall strategic direction) was also strongly supported by public submissions. Transmission Gully therefore has been decided and is not up for discussion, but if the draft RLTS is to meet its other objectives, other roading projects will require their funds to be reallocated to other

modes or their investment delayed. This acknowledges that the generally negative impacts of new roading on public health should not be traded-off when new roading decisions are made, and instead, the roading allocation needs to decide on trade-offs within roading. The proportions spent on each mode are important, as the more the proportion moves towards new roading, the less promoting of public health the draft RLTS is likely to be.

Our analysis of the roading package shows that those who benefit from new roading are not the most vulnerable in our communities. NZ Deprivation Index data show that households without access to motor vehicles at a suburb level ranged from 0% to 38%. Areas with lower access to motor vehicles include city centers, parts of Porirua, Newtown, Naenae and parts of Upper Hutt. New roading is likely to further increase inequalities, and make Wellington 'better for the majority and worse for the minority'. Shifting the balance more towards other modes would make the draft RLTS 'better for all'.

Consideration of other RLTS objectives

When considering the other objectives of the draft RLTS, the same argument applies. Not only will the draft RLTS be less likely to promote public health for vulnerable groups, but it is less likely (overall) with the current balance, to assist safety and security of both vehicle and non-vehicle users; improve access, mobility and reliability for non-vehicle owners; or even assist economic development given that nearly half of all CBD work trips do not use cars.

Regarding economic and regional development, ingrained assumptions that re-allocating public transport expenditure may in some way stifle the economic and regional development (as outlined in the Strategic Options modelling and analysis) must be challenged. As described by a USA report (American Public Transit Association 1999),

“The analytical techniques used in the current study [...] have been applied in several major metropolitan areas across the country [...] to gauge both regional and state-wide economic benefits of investment in public transit. In each of these cases, the economic return to both the regions and to the states was many times greater than the initial investment. The analyses also showed that the long-term negative economic impacts of under-investing were severe”.

Similarly regarding congestion, new data from the Greater Wellington Regional Council shows that that modal shift to public transport (due to petrol price increases in this instance) have resulted in a similar reduction in congestion. This would support freight movement and contribute positively to economic growth for the region. The Strategic Options modelling and analysis that suggests additional investment in public transport increases congestion, appears flawed given the recent data. The authors acknowledge that interventions that encourage people to stop driving their cars (petrol price increases, congestion charging) may have different impacts from interventions that promote public transport (bus lanes, new rolling stock and buses, real time information), but the authors would be surprised if the impacts are polar opposites, as suggested in the Strategic Options modelling and analysis. Such ingrained assumptions need to be strongly challenged:

“Figures released this week by Greater Wellington show a healthy increase in the number of people using the Metlink network of bus, train and harbour ferry services. Total patronage of these services

for the year July 2005 to June 2006 was 35 million passenger trips, an increase of 2.6 million (or 8.1%) over the previous year.

Along with the significant increase in public transport usage, the all-day average congestion over the region's key roads and motorways decreased by 17% in March 2006 compared with the previous March." (Greater Wellington Regional Council 2006)

Similarly, data from the London Congestion Charging shows that with modal shift to public transport, congestion can drop dramatically

"...during the first six months of the charge the average number of cars entering the central zone was 60,000 fewer than the previous year, representing a drop in non-exempt vehicles of 30%. Around 50–60% of this reduction was attributed to transfers to public transport" (Transport for London 2003).

While the authors acknowledge the Congestion Charge Zone is an intervention not available for use in this draft RLTS, it demonstrates in a single example how interventions that promotes people to get out of their cars and into public transport can have significant positive impacts on congestion, not negative impacts as suggested by the Strategic Options modelling and analysis.

Finally an example from Auckland, where 400 cars have been removed from the motorway each day due to investment in public transport infrastructure (the first stage of the new Northern Express bus service) (Auckland Regional Transport Authority 2005). Further exploration of the basic assumptions in the Wellington Transport Model is warranted and beyond the scope of this HIA.

Summary table of individual packages and their impact on public health

Individual packages	Potential impact on protecting and promoting public health ³	Those who may miss out
New and additional trolley buses and rolling stock	√√	Low income
New shelters for bus stops	√	Rural
Integrated ticketing and zoning	√√	Low income
Accessible bus and train stations, both new stations and upgrades to existing stations	√√√	Low income
Real time information	√√	Low income
Expansion of the Total Mobility access scheme	√√√	
Travel plans	√	Low decile schools, less wealthy employers
Walking initiatives	√	Low income
Cycling initiatives	√	Those without bicycles
Bus priority measures	√	Low income
New roading	XXX	Pedestrians, cyclists, children, elderly, households without cars
Proportion of funding for Public transport, cycling, walking and TDM	XXX	Pedestrians, cyclists, children, elderly, households without cars

Key: small positive change [√], moderate positive change [√√]; strong positive change [√√√]; Neutral [-]; Strong negative change [XXX]

When considering the objectives as a whole set, the following summary was drawn.

Proposal	Potential impact on protecting and promoting public health	Those who may miss out
RLTS objectives	√	Low income

³ When the proposal is considered in isolation of the broader RLTS.

Summary table of the draft RLTS as a whole and its impact on public health for specific population groups

Determinant of health	Drivers	Public transport users	People who cycle or walk	People on low incomes	People with disabilities
Physical activity	X	-	X	-	√
Social connectedness	√	-	X	X	√
Access to community and services	√	-	X	X	√
Accidents	X	√	X	X	√
Stress	√	√	X	X	√

Key: positive change [√]; maintained [-]; negative change [X].

For drivers, physical activity has the potential to be negatively affected due to the impact of a significant increase in the absolute number of car drivers in cars; social connectedness has the potential to improve for those who currently drive as they can access more of the community and services, outweighing the negative social connectedness aspects of typical solitary car use. Severity and number of accidents have the potential to increase for car drivers due to the absolute increase in the numbers of vehicles on the roads. Stress has the potential to be reduced in the short term, until congestion builds again from the induced traffic.

Public transport users have a number of potential benefits to look forward to under the draft RLTS, but the over-riding impact is that of maintained modal share at best, not increased modal share. So for the people using the service, while improvements will be warmly greeted, the overall impact on the determinants of health is likely to be maintained. For the small absolute increase in public transport journeys if mode share is maintained, and the people who make up this minority, they have the potential for improvements in all of the determinants of health.

People who cycle or walk for their main form of transportation have the potential to have negative impacts on all determinants of health due to the absolute increase in numbers of vehicles on the road. This has the potential to decrease physical activity, social connectedness and access, while increasing the risk of stress and accidents. Furthermore it reduces the impetus of all Wellingtonians to walk and cycle and mitigates against efforts to support modal shift.

The group most likely to be adversely affected by the draft RLTS are those on low incomes. This includes Maori and Pacific peoples who are more likely to be over represented in this group. For low income people, the potential negative impact from increased numbers of vehicles will be partnered with rising public transport fares, so the only transport option left may be walking or cycling, despite the environment being more dangerous – for this perverse reason, physical activity levels may be maintained for this group. Stress levels due to increased transport costs have the potential to increase. Related to this, social connectedness and access to services and the community have the potential to suffer. Accidents for this group have the potential to remain the same or increase given the increase in vehicles utilising the new roading coupled with an increased need for low income people to walk or cycle.

People with disabilities are generally well catered for under the draft RLTS. Improved roading with benefits for those who have to use special mobility cars and

those who can drive themselves will result in enhanced social connectedness. Those who choose to use the improved access and increased service of the public transport options have the potential to also benefit in terms enhanced social connectedness and from safe forms of travel. Improved physical activity from potential increases in the frequency of getting out more, and improved access to recreational facilities are possible, as is a reduction in stress due to services more in tune with needs of people with disabilities. Many of these benefits are dependent on adequate disposable income, and it is acknowledged that people with disabilities are over-represented in high deprivation areas and have lower average incomes.

Conclusions and recommendations

The draft RLTS objectives have the potential to positively impact on public health.

Overall the draft RLTS is unlikely to protect and promote public health for the region's population.

The draft RLTS is likely to increase inequalities in health, particularly between socio-economic groups.

Increasing modal share for public transport use and walking and cycling, and reducing private motor vehicle modal share are the best ways for transport to promote health, and the draft RLTS is not predicted to achieve these changes. If the RLTS is to meet its objective of protecting and promoting public health it must shift its focus to increasing public transport and TDM use.

Individual investments in the RLTS that promote public transport infrastructure and services, and access for people with disabilities are applauded. However, on balance their positive public health impact is likely to be overshadowed by the impact of the new roading.

An increased focus on equity is recommended in the RLTS objectives, policies, and packages.

The draft RLTS displays a mis-match between the public health protecting and aspirational objectives and policies at the front of the Strategy, with the public health damaging 'advanced roading' funding allocation in the rear of the Strategy.

The draft RLTS has a number of individual components that have the potential to protect and promote public health, but overall, the draft RLTS is unlikely to protect and promote public health.

The six objectives of the draft RLTS set a positive framework from which to develop a transport system. We applaud the wide nature and scope of these objectives and note that the objectives reinforced the linkages between public health and transport. Five of the six objectives relate to public health directly, or to a determinant of health, so in all situations where these objectives are being met, on each occasion there is the potential also for a small gain in public health.

However, consideration of public health issues via the HIA has come at a late stage in the development of the Strategy and accordingly a number of ways in which the strategy might be altered to further protect and promote public health have not been able to be realised. Ideally public health considerations would be built into the Strategy development so that suggested alterations have more chance of being able to be implemented.

Major conclusions

The application of HIA to the draft RLTS leads us to the following conclusions:

1. Affordability⁴ and social equity are not adequately addressed in the objectives of the strategy, despite being included within the New Zealand Transport Strategy. These issues are fundamental to public health and wellbeing. A population health perspective recognises that inequalities in access to determinants of wellbeing, such as transport, lead to inequalities in health. Therefore the draft RLTS should prioritise the needs of disadvantaged groups in order to ensure equitable health gains

‘Assisting economic and regional development’ for the total population does not necessarily address inequalities. In New Zealand there is evidence that socio-economic inequalities are widening. Equitable economic development is important to ensure that socio-economic inequalities are not further widened. The Wellington Regional Strategy supports the notion of closing ‘prosperity gaps’ and such a focus throughout the RLTS will better achieve that.

As well as not being adequately represented in the objectives, equity and affordability are also only minimally discussed within the draft RLTS (with the exception of policy 6.1). We have suggested a number of recommendations to address this as there is a high likelihood that without intervention, the RLTS may widen inequalities in the determinants of health and health itself, in turn having significant potential to harm public health and wellbeing. Given that Maori and Pacific families are over-represented in low income households, they may be disproportionately affected.

2. The sections at the beginning of the draft RLTS (vision, objectives and policies) present an optimistic and aspirational platform for the Strategy. Each of these sections reads very positively. For example, the objectives, outcomes and policies describe a situation where cycling is valued, will be supported and will be safer. Unfortunately there is a mismatch between these aspirations and the reality of what is likely to happen when the draft RLTS is implemented via the Regional Transport Programme (RTP). Other examples include a front-end that describes more freight, less vehicle congestion, maintained vehicle travel times, reduced traffic demand and improved pedestrian safety. Readers should be made aware of this mismatch.

The mismatch between front- and back-ends of the draft RLTS requires a discussion of the trade-offs that have happened in the shaping of the RTP, between one investment decision and another to help the reader understand that the draft RLTS is unlikely to deliver the objectives that the Regional Land Transport Committee established for the RLTS.

3. The final major conclusion of the HIA is that the relative proportions of funding used within the draft RLTS should be altered to protect and promote public health. Funding spent on public transport, cycling, walking and certain TDM packages is highly likely to protect and promote public health, in multiple ways and for all sectors of society. Funding spent on new roading (as separate from maintenance of roading) is highly likely to induce traffic, traffic that comes from communities and flows to other communities. Apart from increasing access to the

⁴ Affordability of users to use the system, rather than affordability of the community to fund new transport investments.

community and services for those people with access to vehicles⁵, new roading is largely damaging to public health and wellbeing. Not only that, but every dollar spent on new roading undermines the other packages, as it slows modal shift and makes it harder to put in place effective programmes that protect public health such as Safe Routes to Schools.

We believe that the current funding proportions, while considered generous towards public transport in comparison to other parts of the country, do not go far enough to ensure that public health is protected and promoted by this strategy. The potential negative effects of the new roading that is proposed in the draft RLTS are likely to outweigh the positive public health benefits that might accrue from the planned investments in public transport, walking, cycling and TDM. This is because the new roading is likely to create an environment that will promote additional vehicle use within the region for the foreseeable future⁶. While some of the public transport initiatives are also long term, such as new rolling stock and buses, many are short-term education based initiatives that attempt to mitigate against a vehicle-based environment, for example travel plans. While useful and fully supported, these are less effective than environmental changes for promoting behaviour change.

Furthermore, in the modelling and analysis of the Regional Transport Programme Strategic Options prepared for public consultation, three options were presented to the public – advanced roading (66% of funding allocated to roading); planned investment (60% roading); and advanced passenger transport (54% roading). The analysis noted a number of negative impacts from the advanced roading option, and the draft RLTS therefore stated it would take a middle path of 'planned investment' to best meet the objectives of the RLTS, and this wording is used throughout the draft RLTS. However, the ratio of funding in the draft RLTS is 67% roading, higher even than the advanced roading option. When analysed by total dollars allocated, passenger transport and TDM is \$22 million lower in the draft RLTS than the planned investment option presented in Strategic Options. So not only is the ratio misleading, so is the absolute amount. The strategic options paper noted that advanced roading option *'does not perform as well as the planned investment scenario. It results in significant degradation of passenger transport services and mode share without making any overall decongestion improvement'*. We agree with this assessment.

Finally, we believe the modelling data and assumptions that reallocation of funding to public transport would damage economic and regional development, and/or increase congestion require challenging. These assumptions do not appear to stand up to scrutiny when considering recent interventions in cities around the world, nor even to recent data from Wellington. We believe the reverse may be true, that increased allocation to public transport may assist economic and regional development, and reduce congestion. Investigation of these assumptions is critical for informing future transport decisions in the Wellington region.

⁵ Another possible positive impact is increased opportunities for movement of freight, which may or may not contribute to equitable economic development. This will be heavily mitigated by increasing vehicle congestion.

⁶ While mode share is predicted to be maintained between vehicles and public transport over the next ten years, because vehicles make up 75% of all region wide trips per day, the absolute increase in vehicle movements far outstrips absolute increases in trips by other modes.

For these reasons, it is probable that the draft RLTS may not protect and promote public health, and in its current form it has the potential to be damaging to public health and to increase inequalities.

Public Transport recommendations

Public Health and wellbeing issue	Recommend changes for current draft RLTS preparation
<p>Social equity and affordability are inadequately addressed within the draft RLTS, despite being important within the Wellington Regional Strategy consultation document and the New Zealand Transport Strategy. This has the potential to increase inequalities in the determinants of health and wellbeing.</p>	<p>Develop an affordable concession-fare in consultation with the community to assist people on low-income and benefits.</p> <p>Investigate fare zone boundaries by mapping geographical socio-economic data (use NZ Deprivation Index) against the fare zone boundaries. Move zone boundaries to make it less expensive for those communities to travel to major local destinations.</p> <p>Alter objective one to read ‘Assist <i>equitable</i> economic and regional development’ Alter objective three to read ‘Improve access, mobility, reliability <i>and affordability</i>’</p> <p>Alter <i>Land Transport Outcome 6.3.6</i> to read ‘Improved accessibility for all, including disabled people <i>and low income people</i>’.</p> <p>Alter <i>Network and service improvement and responsiveness policy 8.1.15</i> and develop action plans that acknowledge low income people within the policy ‘Provide public transport services and concessions that recognise the needs of transport disadvantaged to enhance equity, <i>for example low income users and people with disabilities</i>’.</p> <p><i>Support Passenger Transport Plan fares and ticketing objectives 6.12</i> ‘requiring a review of fares to maintain equity [...]’.</p>
<p>Mis-match between the aspirations of the front sections of the draft RLTS and the reality of what is likely to happen when the RLTS is implemented via the Regional Transport Programme (RTP).</p>	<p>Rename the ‘planned investment’ approach wording in the draft RLTS to ‘advanced roading’ (less desirable, but honest), or actually reallocate the funding in the Regional Transport Programme towards public transport, cycling, walking and TDM packages to support the 60:40 split of the planned investment option rather than the current 67:33 advanced roading option.</p> <p>Reduce the aspirations at the front (less desirable, but honest), or reallocate the funding in the Regional Transport Programme towards public transport, cycling, walking and TDM packages.</p> <p>Produce a linking section in the draft RLTS that details the mismatches between the draft</p>

	RLTS front sections and the Regional Transport Programme, and explicitly outlines the trade-offs that have happened in the shaping of the Regional Transport Programme.
Funding for new roading is damaging to public health whereas funding for public transport, walking, cycling and TDM is largely protective of public health. Under the draft RLTS walking and cycling is likely to be less safe, and while public transport and vehicle mode shares remain equal, absolute numbers of vehicle movements increase substantially. The proportions of funding are likely to lead to a net loss to public health and increase inequalities in health.	Reallocate the funding in the Regional Transport Programme towards public transport, cycling, walking and TDM packages.
Consideration of public health issues has come at a late stage in the development of the Strategy and accordingly a number of ways in which the strategy might be altered to further protect and promote public health have not been able to be realised.	<p>Specific HIAs should be considered for packages that are being developed from this strategy.</p> <p>Consideration of public health issues should be built into the development of the draft RLTS from an early point.</p>
Universal-accessible design principles when used in station designs increase social connectedness and access to the community for people with mobility issues, such as people with disabilities, older people, children and people with prams. The draft RLTS is commendable in supporting this.	<p>Support the inclusion and specific mentioning of disability in <i>Objective 3 Improve access, mobility and reliability</i>.</p> <p>Support <i>Land Transport Outcome 6.3.6, Improved accessibility for all, including disabled people</i>.</p> <p>Support for pedestrian audits that consider 'mobility impaired and disability needs'.</p> <p>Support the <i>Accessibility objective, 'Complete the transition to a level access bus fleet and introduce level access trains'</i>.</p> <p>Support the <i>train accessibility aim, 'top five busiest train stations to have level access by 2010, and 80% by 2025'</i>.</p> <p>Support the <i>elements of the accessible public transport project, for example GWRC will work with representatives of disability communities</i>.</p>
New and additional trolley buses and rolling stock will benefit all who use public transport on the routes and lines affected. The draft RLTS is commendable in this aspect.	Support <i>Network and service improvement and responsiveness 8.1.2, Effect a high passenger rail level of service with regard to rolling stock and line conditions</i> .

<p>Integrated ticketing and zone boundaries will benefit those who use public transport and in particular the elderly and those with disabilities.</p>	<p>Support <i>Network and service improvement and responsiveness outcome 8.1.15, Provide public transport services and concessions that recognise the needs of transport disadvantaged to enhance equity.</i></p>
<p>The planned purchasing of universal-accessible transport stock, such as super low floor buses and new rolling stock with better access may increase social connectedness and access to the community for people with mobility issues. The RLTS is commendable in supporting this.</p>	<p>Support the continued purchase of universal-accessible transport stock.</p> <p>Support <i>Network and service improvement and responsiveness outcome 8.1.15, Provide public transport services and concessions that recognise the needs of transport disadvantaged to enhance equity.</i></p>
<p>Expansion to the Total Mobility access scheme improves access to the community and social connectedness for people not able to use buses or trains due to a physical disability. The RLTS is commendable in supporting this.</p>	<p>Support <i>service procurement objective 'Increase availability of Total Mobility subject to sufficient additional Government funding'.</i></p> <p>Support <i>Accessibility objective, Maintain GWRC's contribution to Total Mobility funding in real terms.</i></p>
<p>Substantial growth in users (75% increase in 6 years) means that to ensure the Total Mobility access scheme is sustainable, and the benefits go to as many people as possible, innovative plans are required, rather than just making the scheme criteria more restrictive in the future.</p>	<p>Support <i>Accessibility objective, Investigate alternative transport solutions for people who meet the Total Mobility eligibility criteria.</i></p> <p>Consider integrating travel planning into the Total Mobility scheme to help keep costs as low as possible.</p>
<p>GPS-based real time information systems would encourage modal shift as in most cases travellers are happier to wait for a service providing they know that it is coming. Modal shift to public transport has multiple health benefits. This draft RLTS is commendable in supporting this.</p>	<p>Support <i>Information Standards 6.13, Introduce widely accessible real-time passenger information.</i></p> <p>Ensure that the roll-out of this is carried out in an equitable fashion, with bus routes to low income areas also getting the service, and receiving the service first.</p>
<p>Sheltered bus stops encourage uptake of public transport and reduces the risk of respiratory infections for travellers. The current provision is low (about 31%) and the target is high (80%) and on current rate of increase, the 80% target will be reached in 70 years time.</p>	<p>Support <i>Bus Stop standard '[...]to significantly increase the percentage of sheltered boarding stops to 80%'.</i></p> <p>Revisit the 2010 target for sheltered bus stops of 35% of bus stops (approximately 115 extra shelters) and consider increasing.</p> <p>When undertaking the 'review of spacing and location of bus stops' (Bus stop standard, 6.11.2) also ensure that the placement of shelters is equitable when analysed by geographical deprivation (using the NZ Deprivation Index)</p>

<p>At off-peak times during the day public transport users may wait for 15 minutes or longer. Burn time in Wellington is shorter than this during peak UV hours (11am-4.00pm) for 5 months of the year. The Cancer Society is very interested in assisting the GWRC with their expertise.</p>	<p>Change <i>Bus Stop standard</i> 'Development of a <i>bus shelter standard is required, working closely with interested agencies such as the Cancer Society</i>'</p>
<p>Availability of clear information, with large letters and at low heights assists all users to access information about the public transport system. This has the potential to increase access to the community and increase social connectedness, particularly for otherwise marginalised groups.</p>	<p>Support the <i>Service Procurement Objective, 2.5, Significantly improve infrastructure quality to achieve [...] 'low, large and loud' information at key stops and stations.</i></p>
<p>Public Health and wellbeing issue</p>	<p>Recommended changes for future RLTS preparations</p>
<p>Consideration of public health issues has come at a late stage in the development of the Strategy and accordingly a number of ways in which the strategy might be altered to further protect and promote public health have not been able to be realised.</p>	<p>Public health considerations should be built into future Strategy development at an early stage so that suggested alterations to protect and promote public health have more chance of being able to be implemented.</p>
<p>The economic impacts of public transport are not well documented, especially compared to vehicle and freight usage. This restricts our ability to make public health arguments for public transport, given that income is one of the most significant determinants of health and wellbeing.</p>	<p>Investigate information sources that detail the benefits of public transport to household and regional economies, in terms of movement of workforce, reduced pressure on congestion and enhancing the health and wellbeing of the workforce, for example.</p>
<p>Availability of clear information, with large letters and at low heights assists all users to access information about the public transport system. This has the potential to increase access to the community and increase social connectedness, particularly for otherwise marginalised groups.</p>	<p>Confirm via community discussion whether or not languages are an issue for using bus and train timetables.</p>

TDM recommendations

Public Health and wellbeing issue	Recommend changes for current RLTS preparation
Some TDM strategies have the potential to increase reliance on private motor vehicles	<ul style="list-style-type: none"> • Support 8.2.1 'Reduce reliance on private motor vehicles' • Suggest more proactive objectives for TDM strategy (9.5) including: Alter obj 1 to '<i>Reduce car traffic, particularly at peak times...</i>' Alter obj 2 to '<i>Increase journey to work mode share for passenger transport and active modes</i>' Alter obj 10 to '<i>minimise adverse impact on economic development</i>' • Monitor effects of TDM strategies on car use, and be prepared to alter strategies if reductions are not found
Differential uptake of TDM likely, with low-income areas potentially missing out, despite having the greatest potential to benefit	<ul style="list-style-type: none"> • Prioritise deprived areas (as measured using NZ Deprivation Index) when rolling out TDM interventions including travel plans • Monitor effects of TDM strategies on different communities, in order that impacts on inequalities can be understood and addressed • Consider increased resources for high need communities (for example funding a paid walking school bus 'driver') • Targets for numbers of travel plans in operation should differentiate by level of need of group involved
Need to maximise safety and connectivity of walking and cycling routes to encourage active transport	<ul style="list-style-type: none"> • Alter 6.3.24 from 'Reduced relative risk of cycling as a transport mode' to '<i>Increased safety for cyclists</i>' (in line with 6.3.19), also repeated in 9.3 • Alter 6.2.25 to 'Improve regional road safety for <i>all road users</i>' to ensure that cyclists and pedestrians are not overlooked • Support 8.1.7 and 8.1.8 'Continuous development of pedestrian and cycling network accessibility and integration' • Suggest developing indicators and targets for cyclist and pedestrian injury and including with overall targets in 9.2 • Alter 9.3 objective 2 to read 'Enhance cycling safety throughout the region via education initiatives <i>and improved infrastructure</i>', recognising that educational initiatives alone are unlikely to have a significant impact on the safety of cyclists, and that infrastructure

	<p>such as separate cycleways are more likely to be of benefit. Therefore include infrastructure plans in next update of cycling action programme.</p> <ul style="list-style-type: none"> • Prioritise completion of regional cycling network, particularly safe route linking Wellington City and the Hutt Valley
Funding for TDM likely to be insufficient	Increase funding allocated to TDM, as well as funding to support behaviour change such as improving the safety and attractiveness of cycling and walking and integrated land use development
Road pricing	Support advocacy to central government for road pricing, and subsequent investigations. But suggest that parallel improvements in the quality and affordability of public transport systems will need to be implemented so that these measures do not adversely affect access for people on low incomes.
Monitoring and evaluation	Develop indicators for TDM which include impacts on different communities and on access to services (as well as existing indicators of car use, fuel consumption, congestion and the like)
Public Health and wellbeing issue	Recommend changes for future RLTS preparation
Car dependence	<p>Long term aim should be reduction in dependence on private motor vehicles – this needs to be made explicit.</p> <p>Prioritise environmental measures such as land use policies encouraging short commutes and active journeys.</p> <p>Develop walking and cycling infrastructure in existing communities (currently majority of funding is for new developments and as part of new road construction)</p>
Perceived risks of walking and cycling	<p>Publicise health benefits of walking and cycling (and that they outweigh risks)</p> <p>Investigate developing indicators of health benefits of active transport, perhaps could be included in travel survey</p>

Roading recommendations

Public Health and wellbeing issue	Recommended change for the current draft RLTS
Private vehicle users engage in less physical exercise than walkers, cyclists and users of public transport	<p>To encourage walking and cycling, the design of the new Stage I road between Grenada and Petone should include one or two access points to the Belmont Regional Park with adequate parking. There may need to be some track development in the Park to connect to the new parking areas.</p> <p>And in particular, bus route planning be undertaken as Grenada to Gracefield Stage I nears completion to identify routes and possible loadings for connections between the Porirua/Johnsonville and Tawa areas and the two destinations across the hills, Wainuiomata and Petone / Gracefield</p>
New roading developments and heavier traffic flows and longer peaks lead to physical and social severance	Where alternatives are present, alignments should be avoided that involve a greater loss of community connection through severance and diminished community effects, accessibility to services and the community
Increased motor vehicle use induced by the construction of new roads leads to increased accidents involving pedestrians and cyclists	<p>Segregated cycle ways be provided on all new roads and progressively added to existing networks</p> <p>Bus route planning be undertaken in conjunction with new roading projects so public transport services can be introduced immediately after their opening</p>

<p>Proposed new roading developments are a source of anxiety and stress for communities that would be potentially or actually affected by them</p>	<p>The route alignment of Stage II, the Cross Valley Link, should be decided as soon as possible – alternative 1 for the Cross Valley Link is not recommended</p> <p>Stress and anxiety in the community may be reduced by giving people opportunities to participate in decisions about their future.</p> <p>Accordingly a community design process should be used to involve people affected and potentially affected by roading development, including:</p> <ul style="list-style-type: none"> a. decisions around the location of new intersections and access points, over and under passes, etc b. noise barriers, surfacing and other amenity related aspects of road design and operation
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Public Health and wellbeing issue	Recommend change in RLTS preparation in future
<p>Private vehicle users engage in less physical exercise than walkers, cyclists and users of public transport</p>	<p>Significant investments in TDM and public transport is required to achieve the modal shift to address these issues on a long term basis</p>
<p>New roading developments and heavier traffic flows and longer peaks on existing roads lead to physical and social severance</p>	<p>Where alternatives are present, alignments should be avoided that involve a greater loss of community connection through severance and diminished community effects, accessibility to services and the community</p>
<p>Proposed new roading developments are a source of anxiety and stress for communities that would be potentially or actually affected by them</p>	<p>Decisions on possible or proposed roading projects should be taken as soon as possible to reduce the uncertainty and anxiety of affected landowners and to allow local authorities to embark on planning to reduce or mitigate any adverse effects</p>
<p>Increase motor vehicle use induced by the construction of new roads leads to increased accidents involving pedestrians and cyclists</p>	<p>Significant investments in TDM and public transport is required to achieve the modal shift to address these issues on a long term basis</p>

Appendix 1 - Transport and health evidence review

'The primary function of transport is in enabling access to people, employment, goods and services. In doing so it also promotes health indirectly through the achievement and maintenance of social networks. Some forms of transport, such as cycling and walking, promote health directly by increasing physical activity and reduction of obesity. Lack of transport may damage health by denying access to people, goods and services and by diverting resources from other necessities. Furthermore, transport may damage health directly, most notably by accidental injury and pollution'. (Acheson 1998)

What is health?

The World Health Organization defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease' (WHO 1946). In New Zealand the Whare Tapa Wha model similarly recognises the physical, mental, social and spiritual elements of health (Durie 1998).

What determines health?

There is now increasing recognition that health is determined by more than individual genetics and behaviour, and that 'upstream' factors in the social and physical environment have an important influence on health status (NHC 1998). Social, cultural, economic and environmental influences have the greatest impact on population health, and so policies in these areas have great potential to promote or harm population health. The HIA approach seeks to investigate the potential for policies to promote or harm health, and to make recommendations to enhance the health promoting effects and mitigate the harmful effects.

This health impact assessment considers how transport policy can affect the following determinants of health:

- physical activity
- access
- accidents
- community connectedness
- stress

Other determinants affected by transport such as air pollution and noise are not covered in this HIA, but are covered in the environmental impact assessment.

What do we mean by inequalities in health and why are they important?

Significant inequalities exist among groups of New Zealanders. For example, Maori and Pacific peoples and people from lower socio-economic groups have worse health and die younger than other New Zealanders. The reasons for inequalities are complex and generally beyond the control of the groups most affected (MOH 2002).

Good health is not evenly shared. In New Zealand, as in other countries, certain groups are consistently disadvantaged with respect to health. Inequalities in health exist between socio-economic groups, ethnic groups, people living in different geographic areas, and males and females.

The association between poverty and health is well recognised in New Zealand and internationally, with researchers consistently finding that people of lower socio-economic status have worse health across a range of measures than better off people (Acheson 1998).

Certain ethnic groups in New Zealand society are also disadvantaged with respect to health. Maori and Pacific peoples in particular have consistently worse health than Pakeha New Zealanders (MOH 2002). The recent Decades of Disparity report found that there has been little change in life expectancy for Maori and Pacific people over the past twenty years, while life expectancy for other New Zealanders has increased significantly (Ajwani, Blakely et al. 2003). This means that the gap in life expectancy has increased over the past twenty years – that ethnic inequalities in health in New Zealand are increasing. Recent estimates suggest a difference in life expectancy of nearly ten years between Maori and non-Maori men (Ajwani, Blakely et al. 2003). Moreover, at all educational, occupational and income levels Maori and Pacific have worse health status than other New Zealanders (Howden-Chapman and Tobias 2000).

Why reduce inequalities?

Inequalities in health are undesirable to the extent that they result from unjust distribution of the underlying determinants of health, such as opportunities in employment and education (Woodward and Kawachi 2000). Inequalities in health are thus avoidable, because they result from social and economic policies and practices that can be altered, as is shown by variations in inequalities over time and between countries which can be linked to differences in social and economic policies (ibid). Increased inequalities in New Zealand following radical changes in social policy in the 1980s and 90s are one example (Ajwani, Blakely et al. 2003).

And so reducing inequalities is desirable and possible. It would also have benefits for the population as a whole, in terms of a fairer, more inclusive society, in terms of the economic benefits of a healthy society, and in terms of improved health overall (MOH 2002). Reducing inequalities in health is a government priority in New Zealand (MOH 2002).

The Treaty of Waitangi is the founding document of New Zealand, and was signed to protect the interests of Maori. Inequalities in health and in access to the determinants of health are not in the interests of Maori and thus the Crown and all Crown agents (including GWRC) have a responsibility to address the causes of inequalities (MOH 2002).

What can be done to reduce inequalities?

There is evidence that some public health interventions can increase inequalities. Health education interventions tend to be taken up disproportionately by better off groups, while structural and environmental interventions (such as taxation of cigarettes or fluoridation of water) tend to affect the population more evenly and have the greatest benefit for those worst off (Woodward and Kawachi 2000). Interventions in sectors beyond health have the greatest potential to affect the broader determinants of population health, and thus reduce inequalities (Woodward and Kawachi 2000). Transport policy is one such area.

Review Methods

This is a brief review of available evidence on the relationship between transport and the chosen determinants of health. Because of the time limitations and the extensive literature on the topic, it was not possible to complete a full systematic review of published and grey literature. This review focuses on the results of recent reviews of relevant literature, published in peer reviewed journals or on the websites of major national and international organisations (eg, World Health Organization, Centres for Disease Control and Prevention (CDC), Public Health Advisory Committee (New Zealand)), as well as literature reviews performed for similar health impact assessments internationally.

Medline, Google and Google scholar were used to locate material, as well as the reference lists of relevant documents and advice from colleagues.

The lack of what is generally regarded as high quality evidence for population health interventions is well recognised, partly due to the difficulties inherent conducting controlled trials of environmental interventions (Egan, Petticrew et al. 2003). The clinical focus of medical database indexing also makes it difficult to find information on public health interventions (Mays, Roberts et al. 2001), and the indexing of transport databases (which I did not have access to in this case) have been noted to be poorly suited to answering health questions (Egan, Petticrew et al. 2003). Given these factors, together with the short timeframe, it is not surprising that it was not possible to find a large body of evidence relating to the effectiveness of transport interventions to improve health.

Physical Activity

'Because mechanisation has reduced the exercise involved in jobs and housework and added to the growing epidemic of obesity, people need to find new ways of building exercise into their lives'.

(Wilkinson and Marmot 2003)

'Physical activity is not just exercise and sport. It includes taking the stairs instead of the lift, hanging out the washing, walking to the shops or to work and school, gardening, vacuuming and sweeping, and carrying objects'.

(MOH 2006)

How does physical activity affect health?

'Physical activity is now considered a major modifiable factor for preventing and reducing the mortality from cardiovascular disease, diabetes and some cancers, as well as improving musculoskeletal and mental health. Increasing epidemiological evidence confirms the health benefits of moderate regular physical activity' (Bauman and Owen 1999).

There is now very convincing evidence that physical activity has a wide range of health benefits.

Premature death

Being physically fit or active (variously defined) is associated with a reduction in the relative risk of dying from all causes of between 20 and 50% compared to being inactive for men and women (Macera, Hootman et al. 2003; Warburton, Nicol et al. 2006). An increase in physical fitness reduces the risk of premature death, with even a small increase in fitness leading to a significant reduction in risk (Erikssen, Liestol et al. 1998).

Cardiovascular disease

Regular physical activity is associated with a reduction in the risk of death from cardiovascular disease (heart attack and stroke) in the general population and in those with known cardiovascular disease (Taylor, Brown et al. 2004; Warburton, Nicol et al. 2006). Regular physical activity can halve the risk of coronary heart disease and halve the risk of dying from a heart attack, with the level of risk reduction depending on the amount of activity (Pitches 2003).

Diabetes mellitus

Regular physical activity reduces the risk of developing type 2 diabetes (also known as 'adult onset' diabetes, although it is now worryingly occurring in younger people), with those at increased risk of diabetes benefiting the most from small amounts of exercise (Helmrich, Ragland et al. 1991).

Cancer

Regular physical activity is associated with a reduced risk of certain cancers, specifically colon and breast cancers, with physically active men exhibiting a 30-40% reduction in the risk of bowel cancer, and physically active women exhibiting a 20-30% reduction in the risk of breast cancer, compared to their inactive counterparts (Lee 2003).

Osteoporosis

Weight bearing exercise (such as walking or running) increases bone mineral density and prevents bone density loss associated with aging (Wolff, van Croonenborg et al. 1999). Regular exercise is also associated with fewer falls in older people, thus further reducing the risk of fracture (Sherrington, Lord et al. 2004).

Mental health

Regular physical activity has been found to promote a sense of wellbeing, enhanced self-esteem and cognitive function, and reduce the symptoms of depression and anxiety (BMA 1997; Wilkinson and Marmot 2003). However more research is needed to clarify the amount and type of activity that provides mental health benefits, and the biological mechanisms involved (Bauman 2004).

Obesity

Obesity is a growing problem in New Zealand as it is in much of the developed world. Obesity is a risk factor for type 2 diabetes, cardiovascular disease, high blood pressure, gout, osteoarthritis, gallstones, obstructive sleep apnoea, and certain cancers. Lack of physical activity increases the risk of obesity (along with excessive energy intake). The past fifty years have seen considerable reduction in average weekly energy expenditure in most westernised countries, due among other factors to increasing automation and an increased dependence on car travel (Pitches 2003). In New Zealand in 2002/3 one in three adults was overweight, and one in five was obese, with higher rates of obesity in Maori adults (approximately one in four) and in Pacific men (one in three) and Pacific women (nearly one in two)(MOH 2004).

Physical activity and health in New Zealand

It has been estimated using 1996/7 data that 9% of all deaths in New Zealand (2,600 per year) can be attributed to physical inactivity, and that given demographic trends, the prevalence of physical inactivity is likely to increase (Tobias and Roberts 2001). Inadequate physical activity is thus a significant public health problem in New Zealand. According to the 2000/1 Hillary Commission Physical Activity Survey nearly one third of New Zealanders are inactive, doing less than 2.5 hours of leisure time physical activity per week (SPARC 2002). Unfortunately the survey only included leisure time physical activity, and not daily life activity.

The more physical activity done, and the more intense, the greater the health benefit (Warburton, Nicol et al. 2006). In New Zealand the Ministry of Health recommends at least 30 minutes of moderate intensity activity on most days for adults, with a higher level of activity recommended for children (MOH 2006), and this in keeping with international guidelines.

How does transport affect physical activity?

'Transport policy can play a key role in combating sedentary lifestyles by reducing reliance on cars, increasing walking and cycling' (Wilkinson and Marmot 2003)

Using active modes of transport

Short to medium length journeys are opportunities to use active modes of transport (such as walking and cycling) and incorporate physical activity into daily journeys.

Given that 46% of motor vehicle trips that begin and end at home are less than 10 km long, and 19% are less than 4 km, there is considerable opportunity for increased active journeys (Turner, Roozenburg et al. 2006).

The built environment, including the quality, safety, and width of roads, footpaths and cycle ways, affects the ease with which people can undertake active transport (TRB 2005). In SPARC's Obstacles to Action report, a number of barriers to active transport are identified, including heavy traffic, not enough cycle lanes or paths, footpaths not being well maintained, and there not being enough footpaths (Sullivan, Oakden et al. 2003). Less mobile people such as the elderly and those with physical disabilities are particularly affected by the quality of footpaths. Those using mobility aids such as walking sticks or wheelchairs require sufficiently wide and even footpaths, as do those with young children in pushchairs.

In order to increase the use of active modes of transport, it will be important to also address other factors that discourage their use, such as air pollution (which makes walking and cycling unpleasant, and has health risks particularly for the young and old and those with respiratory problems), and road safety.

Encouraging physical activity in daily routines, such as the journey to work, school or the shops, is consistent with the evidence of the health benefits of small amounts of moderate intensity daily exercise, which has led to a "[policy] shift from promoting participation in structured exercise programmes and vigorous sports, to incorporation of a wide range of physical activities into everyday life" (Tobias and Roberts 2001).

Public transport

Public transport can also play a role in encouraging physical activity. UK estimates suggest that on average a journey by public transport requires 10 minutes walking (to and from the bus stop or station) (Gorman, Douglas et al. 2000). A large United States study found that public transport users spent an average of 19 minutes per day walking to and from transport, with 29% achieving the recommended 30 minutes per day of exercise in this way (Besser and Dannenberg 2005). Thus policies that facilitate public transport use can also increase physical activity.

Accessing recreation facilities

Transport policy also has a role to play in facilitating access to places such as parks, gymnasiums and swimming pools where people can undertake recreational physical activity. Major roads were identified as a barrier to accessing community facilities (including recreational facilities) in a recent New Zealand report (PHAC 2003).

Car travel

There is evidence that New Zealanders are relying increasingly on private motor vehicles for transport (MOT 2005). Journeys made by car, particularly short journeys, are missed opportunities for active travel and hence physical activity. The 2003/4 travel survey showed an increase in the mean number of vehicles per household since the 1997/8 survey from 1.6 to 1.8 (a ten percent increase), with a decrease in the number of households with no car normally parked overnight from 9% to 2% (MOT 2005). A recent study found a 3% increase in the risk of obesity for every extra 30 minutes spent in a car per day (Frank, Andresen et al. 2004).

Groups affected

Children in developed countries, including New Zealand, are becoming more sedentary, with a resulting increase in childhood obesity (BMA 1997). In New Zealand fewer children are undertaking active journeys to school (walking or cycling) than was the case ten years ago (MOT 2005).

There is some evidence that people who are financially disadvantaged are less physically active, but how this relates to transport related activity is unclear (Dora and Phillips 2000). People with lower incomes are also less likely to own cars, but little research has been done on how this influences levels of activity (PHAC 2003). In NZ an association between low income and physical inactivity is not apparent, but low income is commonly identified as a barrier to physical activity (MOH 1999). The 1996/7 NZ health survey found that lower levels of vigorous activity were associated with household income, educational level, and deprivation group (ibid).

Maori and European New Zealanders have similar levels of physical activity, and are on average more active than Pacific and other ethnic groups. Among young people, Maori are the most active group (SPARC 2002).

What works in terms of transport policy to increase physical activity?

The Guide to Community Preventive Services, produced by the Centre for Disease Control in the US, summarises evidence relating to programmes and policies to promote population health. At the present time the Community Guide task force has found insufficient evidence to recommend for or against particular transportation policies or practices to promote physical activity (CDC 2006) (<http://www.thecommunityguide.org/pa/>).

Building cycleways and walkways

Creation of, and enhanced access to, places for physical activity, including interventions such as creating walking trails and providing access to nearby exercise facilities, have been found to promote increased physical activity (Kahn, Ramsey et al. 2002). In the United Kingdom the establishment of a National Cycle Network has helped to promote active transport, with two thirds of users reporting that local cycle routes had encouraged them to become more physically active (Sustrans 2005).

A recent US study found increased bicycle commute mode share associated with the creation of new bicycle facilities (cycle lanes and paths) (Barnes, Thompson et al. 2006). However a recent review of studies of engineering measures designed to promote active transport (mostly building cycle ways) did not find consistent mode shift away from car travel (Ogilvie, Egan et al. 2004).

Urban design

Sufficient evidence was found by the Community Guide Taskforce to recommend street-scale and community-scale urban design and land use policies and practices for increasing physical activity (CDC 2006). Another review found that high residential density, mixed land use developments with walkable distances between residential, commercial, and educational sites, and connected streets rather than cul-de-sacs, promote active transport (Saelens, Sallis et al. 2002).

Targeted behaviour change

A recent systematic review (Ogilvie, Egan et al. 2004) found that behavioural interventions such as education, resources, and subsidies, given to motivated groups of volunteers or tailored to a group's particular requirements, resulted in a significant shift towards active transport (5% of all household journeys shifted from car to walking or cycling). Short-term health benefits were demonstrated after taking up active commuting. Workplace travel plan evaluations were included in this group of studies.

Commuter subsidies

The Ogilvie review found a single study which showed a positive shift of 1% away from car travel resulting from a scheme which provided cash subsidies to workers choosing alternative modes of transport over driving (in effect "cashing out" the cost of providing workplace parking).

Providing alternative services

One study in the Netherlands has found a significant shift away from car travel after a new train station was opened in a small town. Other studies considering car-sharing schemes and telecommuting (working from home using electronic communication systems) did not produce a significant mode shift away from car travel, although may have reduced single occupant car travel (Ogilvie, Egan et al. 2004).

Walking school buses

Research evidence suggests that walking to and from school can contribute an increase of five to ten percent in overall physical activity levels for primary school children (Neuwelt 2005). The Walking School Bus is an initiative involving parent volunteer "drivers" walking with groups of children through and from school along organised routes. Evaluations of walking school bus initiatives, including a recent pilot study in Auckland, suggest that walking school buses create opportunities for children to become more physically active, but also encourage children to think of walking as a normal transport mode, and may have broader health benefits such as encouraging physical activity at other times and helping to make neighbourhoods safer for children (Neuwelt 2005).

Making combining modes easier

Other interventions to encourage cycling by making it easier to combine cycling with other modes include bicycle storage at railway/bus stations and bicycle carriage on trains. However the authors not able to find any information regarding the effectiveness of these interventions in encouraging mode shift to active transport.

Access To Services

Accessibility depends on:

- Existence of transport between home and services
- People's knowledge of and trust in transport services
- Affordability of transport
- Physical accessibility of transport (SEU 2003)

What is the evidence that access to services impacts on health?

The impact on health to some extent depends on the service being accessed.

Access to health care services

While increasing attention is now being paid to the environmental determinants of health, advances in medical technology in recent decades mean that medical treatment and secondary prevention provided by health care services also contribute significantly to health status (McKee 1999).

There is evidence that primary health care services in particular have an impact on population health status, and have the potential to mediate the influence of other determinants of health (Starfield, Shi et al. 2005). Health services in New Zealand include community services such as primary medical care provided in general practice, primary health care provided by other providers such as physiotherapists, health promoters and Maori and Pacific providers, and specialist services such as community mental health, as well as secondary and tertiary hospital services.

Access to workplaces

There is considerable evidence regarding the importance of employment to health. Many studies have found evidence of a link between unemployment and poor mental and physical health, and this link is felt to be at least partly a causal one (i.e. unemployment causing poor health) (Kasl and Jones 2000). Participation in paid employment is important for attaining adequate income, and also enhances social status, improves self-esteem, and provides an opportunity to participate in community life, all of which enhance health (NHC 1998).

Educational institutions

Educational attainment is important in determining social and economic position later in life, and there is good evidence that poor educational attainment is associated with worse health outcomes (NHC 1998).

Food outlets

Nutrition is a key determinant of health, and poor nutrition is a major risk factor for heart disease, stroke, diabetes, some cancers, and other health conditions (MOH 2003). Ready access to food shops is essential given that very few New Zealanders grow their own food. It is also important that healthy food such as fresh fruit and vegetables is available, as most of the nutrition related burden of disease in New Zealand is related to high intake of foods rich in fats and sugars (MOH 2003).

Facilities for social, cultural and sporting activities

Access to social services and community facilities such as churches, cultural centres, libraries, community halls, parks, playgrounds, youth centres, sports clubs and other meeting places is important for social participation and community functioning.

Access to these services develops social cohesion and social capital (“those features of social structures ... which act as resources for individuals and facilitate collective action” (Kawachi and Berkman 2000)). Indicators used to measure social capital include the number of people in a community who are members of voluntary organisations (which requires access to these organisations). High levels of social capital have been linked to higher population health status with lower all cause mortality and better self-rated health (Kawachi and Berkman 2000).

Access to sporting facilities also promotes physical activity, and the evidence for the relationship between physical activity and health is discussed separately.

How does transport impact on access to services?

The UK Social Exclusion Unit identified five key barriers to access:

- Availability and physical accessibility of transport
- Cost of transport
- Services and activities located in inaccessible places
- Safety and security of roads, walkways and public transport
- Travel horizons (people being unwilling to travel long distances or unfamiliar with or distrustful of available services) (SEU 2003).

Of these, four relate directly to transport policy and services, and the fifth relates to urban design, which is closely linked in with transport planning.

Lack of transport is a significant barrier to gaining employment, attending education, accessing health services, accessing supermarkets, and seeing friends and family (SEU 2003).

Availability and physical accessibility of transport

Public transport is particularly important for people on low incomes, who are much more likely than those on higher incomes to use public transport for the majority of their journeys, including accessing essential services (such as the chemist and local hospital) (SEU 2003). Inadequate public transport is the main transport problem mentioned by people with difficulties accessing services (ibid).

Public transport services tend to run into the centre of town from peripheral areas (radial routes), making access to peripheral services such as employment destinations and primary health care centres difficult (SEU 2003). Services also tend to be concentrated around peak commuting times, with infrequent services at other times, when people might be accessing services such health care or shopping for food. Increasing peripheral development designed around motor vehicles exacerbates transport problems for those on low incomes or without cars.

Access for those with physical disabilities requires not only accessible public transport vehicles (such as buses that can “kneel”), but also accessible street and bus stop/ train station infrastructure, including safe pedestrian crossings adjacent to bus stops and train stations, and accessible platforms, and shelters designed to accommodate those with disabilities. Public transport can also present access problems for those with sensory and intellectual disabilities, for example through complicated timetables written in small print.

The availability of walkways and cycleways along useful routes linking services, workplaces and residential areas is particularly important for accessibility for those without access to motor vehicles, and also helps promote the choice of active transport over car use for others.

Lack of access to a car has been found to be associated with reduced use of health care services among people living in rural areas (Arcury, Preisser et al. 2005). Difficulty with getting transportation to health care services was reported as a barrier to access by one third of respondents in a US study of non-elderly urban poor (Ahmed, Lemkau et al. 2001), and as a significant barrier to accessing GP services in New Zealand (MOH 2004).

Cost of transport

The average New Zealand household spends around 14.7% of weekly expenditure on transport (although this figure is based on 2005 data, and with the increasing cost of petrol since that time it is likely to have increased) (StatsNZ 2006). Local figures for Wellington are not available (GWRC 2005). International statistics suggest that those on lower incomes spend a higher proportion of income on transport (Kohler, Luhmann et al. 1999).

For those on low incomes who do not have cars or cannot afford to use their cars regularly, the cost of public transport can pose a barrier to accessing services. The costs associated with car use, such as petrol, road user charges, parking, and congestion charging, may also pose a barrier to accessing services where no alternative means of transport is available. This is a particular issue for people in rural areas where regular public transport is less viable.

Within the Wellington region, public transport fares do not cover the cost of providing the service, and the balance is met by the Regional Council (from rates and road user charges). In Wellington fares cover about 75% of the cost of providing services, a higher proportion than in many other cities in New Zealand and overseas (GWRC 2005). Subsidies are available to those under 19 and over 65 years of age (ibid). A subsidised fare for beneficiaries was available in Wellington city in the past but is no longer available (ibid).

Safety and security of roads, walkways, public transport

Freedom of walkways and public transport from vulnerability to harassment or attack by other users is an important factor in determining people's willingness to use these modes of transport to access services, especially for women and the elderly, and especially at night (BMA 1997). Safety is also an issue in determining parents' willingness to allow their children to walk to school, with the reduction in children walking to school in recent years though to be largely due to concerns about traffic and "stranger danger" (PHAC 2003).

Acceptable services

The reliability and frequency of services is particularly important to women, who are more likely to combine several tasks in one trip, such as journeys to work, school, childcare and shopping (SEU 2003). People accessing peripherally located services

are more likely to have to make several changes in their journey, and so are also more affected by the reliability and frequency of services.

The proximity, reliability and frequency of public transport are also important in determining mode choice (Murray, Davis et al. 1998).

Who is most affected?

People without cars must rely on public transport and active modes to make essential journeys, and are therefore dependent on the public transport service being affordable and appropriate to make longer journeys such as travelling to the base hospitals for outpatient appointments. They also have reduced access to services that are designed assuming car use, such as supermarkets and suburban malls. Carlessness has been found to be associated with reduced access to social support services (Bostock 2001).

According to the New Zealand Transport Survey, car usage is lower in women, in Maori and Pacific peoples, and in people with low incomes (LTSA 1999).

In the 2002/3 New Zealand Health Survey, lack of transport was identified as one of the top six barriers to accessing general practice services by Maori and non-Maori men and women, but particularly among Maori women who were significantly more likely than non-Maori women to report lack of transport as a barrier (MOH 2006).

Accessible and affordable transport has been identified as a key service gap for people with disabilities in New Zealand (PHAC 2003). A survey of people with disabilities in Auckland found that people from five specific disability groups (physical disability, sight impairment, intellectual disability, age, and parents of young children with disabilities) regarded transport as their highest priority need (ahead of areas such as employment or education) (Associates 1999). Eleven percent of adults with a disability and seven percent of children with a disability live in households without access to a private motor vehicle, while 24 percent of adults with a disability cannot easily get from their home to a bus stop or railway station (MOH 2004). Getting on and off public transport is the principle barrier to using public transport for adults with disability (MOH 2004).

People living in relatively deprived areas often have fewer services within easy access, including fewer walkable green spaces and fewer health service providers (Galea and Vlahov 2005). There is now also New Zealand evidence of substantial differences in the accessibility of local services between urban neighbourhoods, with people living in some areas having considerably further to travel to reach services (Pearce, Witten et al. 2006).

The elderly make a higher proportion of their journeys by walking than younger New Zealanders (those over 80 make one quarter of their journeys on foot), and thus access is more affected by the quality of footpaths and walking tracks (Davey and Nimmo 2003).

Rural people are more likely to be dependent on car travel to access services, which are likely to be further away. Those on low incomes and/or without cars living in rural areas are thus likely to be doubly disadvantaged, because of the high cost of car travel and the lack of alternatives (PHAC 2003).

What transport interventions help to improve access?

Measures to improve the availability and acceptability of services, such as more frequent and faster services with fewer changes, have been successful in improving access, particularly to employment in the UK (SEU 2003).

Integrated ticketing, where a single ticket can be used across different modes of transport, and integrated timetabling, where services are coordinated to allow for easy transition between modes, are used extensively in the UK and elsewhere, and make services easier to use especially for elderly and disabled users.

Affordable public transport is important in enabling access for those on limited incomes. Many countries provide subsidies for those with disabilities, the elderly and young people. Subsidies are also used in some places to aid people getting to work (SEU 2003). While targeted subsidies can improve access for those who are aware of and utilise them, it is probable that universal low cost public transport would improve access for a wider group.

Services designed to meet the needs of people with disabilities, including accessible mainstream public transport, and publicly or community provided alternative services (such as door-to-door and demand-responsive services), have been effective in many countries in improving access for this group (SEU 2003). Bus and taxi driver training to increase awareness of the needs of those with disabilities has also been effective (ibid.).

Locally, Maori health provider Ora Toa has improved access to health services for its clients by making home visits and providing transport for clients attending GP and specialist appointments (personal communication, August 2006)

How do accidents affect health?

Physical injury from accidents ranges from minor cuts and bruises to broken bones, head injuries, and fatal injuries. By the year 2020 road accidents are predicted to be the 3rd leading cause of disability adjusted life years lost internationally (WHO 2003). In New Zealand unintentional injury is the leading cause of death for children and young adults, and motor vehicle accidents make up a large proportion of injury deaths (NZHIS 2006). New Zealand has a high rate of road fatalities compared to other countries in the OECD (Kjellstrom and Hill 2002).

The total social cost of motor vehicle injury in New Zealand for 2005 was estimated at 3 billion dollars, of which 2.5% (75 million dollars) was health care costs (MOT 2006). This cost removes money from the rest of the health system and reduces funding that could be made available to other departments. It is estimated that 80% of the total cost of motor vehicle crashes is attributable to non-fatal events, with lost productivity and disability costs contributing to this figure (Ameratunga, Hajar et al. 2006).

In addition to physical problems many people involved in accidents suffer, psychological health effects including posttraumatic stress disorder (PTSD). Recent evidence has shown that up to 14% of survivors have diagnosable PTSD and 25% have psychiatric problems one year post accident (Dora and Phillips 2000). In addition to this, motor accidents have been linked to acute stress disorder in children (thought to progress to PTSD in some cases) (Meiser-Stedman, Yule et al. 2005).

The perceived risk of accidents is also an issue in determining parents' willingness to allow their children to walk to school, with reduction in children walking to school in recent years resulting in lost opportunities for physical activity (PHAC 2003).

How does transport affect accidents?

Road traffic injury is recognised as a major global health problem, and was the focus of World Health Day 2004. According to the 2003 World Health Report, over 20 million people are killed or severely injured on the world's roads every year, at a cost to society 416 billion euros (WHO 2003). The World Health Organisation and the United Nations have identified road traffic injuries as a priority; with those in low and middle-income countries and children most at risk (Ameratunga, Hajar et al. 2006).

Between 1998 and 2001 motor vehicle traffic was the most common mechanism of death by injury in New Zealand (IPRU 2006). 363 people have been killed on New Zealand roads in the past 12 months (as at 24/7/06) (LTNZ 2006). The road toll in New Zealand has steadily declined over the past decade, but traffic injury remains a significant cause of injury and distress (PHAC 2003). Approximately seven people are injured on the roads for every death, and only a proportion (approximately 66%) of crashes are reported (Kjellstrom and Hill 2002).

Mode of transport

Pedestrians and those using bicycles or motorbikes are most vulnerable to road traffic injury. They are vastly over-represented internationally among crash victims, and are at higher risk of subsequent disability (Ameratunga, Hajar et al. 2006). However car-occupants make up the large majority of fatally injured road users in New Zealand (80% in 2000) and in other high-income countries, because of the high proportion of journeys made by car and the size of the vehicle fleet (Ameratunga, Hajar et al. 2006).

Data from Britain in 1992 shows that bus and rail travel are comparatively safe at 0.04 and 0.1 fatalities per hundred million passengers per km travelled respectively, while car fatality rates are higher at 0.4 per hundred million passengers per km, with cyclists (4.3), pedestrians (5.3) and motorcyclists (9.7) at the highest risk (Anonymous 1997).

Alcohol

In 2004 alcohol contributed to 31% of road deaths in New Zealand (LTNZ 2006). Alcohol is also a major contributor to pedestrian injury (Kjellstrom and Hill 2002).

Speed

Faster speed is associated with greater stopping distances and an increased likelihood of death if a pedestrian is hit. WHO research suggests a 1km/ph reduction in speed could reduce accidents by 3% (Dora and Phillips 2000).

Who is affected by transport accidents?

People of low socio-economic status bear the main burden of accidents. A recent British study found that while child injury death rates have fallen 63% in Wales and England in the twenty years to 2001, there has been almost no change in rates for children from the poorest families, and for deaths among child pedestrians and cyclists. Children from the lowest socio-economic group were found to have a cause specific mortality rate more than twenty times that of the highest group (Edwards, Grenn et al. 2006). New Zealand research has found similar disparities in child injury rates, and has highlighted differences in exposure to risk and environmental risk factors (such as the speed and density of traffic, access to safe play areas, and fenced driveways) as underlying the socio-economic differentials (Roberts, Norton et al. 1996).

Drink driving in New Zealand has been shown to be much higher in rural areas where most fatal or serious injury alcohol-related crashes occur (MOT 2006). The lack of alternative transport is often cited as a reason for drink driving in rural areas (Hamilton 1996).

Drivers of Maori or Pacific ethnicity face higher risk of injury per distance driven than other drivers, with the hospitalisation risk for Maori and Pacific peoples approximately three times that for other ethnicities. Maori youth have high rates of road traffic mortality when compared to other groups (32.0 per 100,000 compared to just 19.6 per 100,000 for Europeans and an overall rate of 21.3 per 100000) (MOH 2004).

Traffic related injuries are among the most common causes of death among children and young people, in New Zealand and internationally (PHAC 2003). In New Zealand road traffic injuries are the major cause of death for young people aged 15-24, and young men are at higher risk than young women (MOH 1999). Pedestrians at either end of the age spectrum are most at risk of injury and the majority of pedestrian injuries occur in significant urban areas (PHAC 2003).

What transport interventions work to reduce accidents?

Safer Roads

The construction of separate cycle lanes alongside urban roads has been shown to be effective in reducing cyclist casualties (Ameratunga, Hajar et al. 2006). Footpaths

are also important for reducing the risk of pedestrian injury (Ameratunga, Hajar et al. 2006).

Traffic calming measures to reduce traffic speed have also been found to reduce deaths and injuries by 11% by a recent systematic review (Bunn, Collier et al. 2003). UK 20 mile/hour (about 30 km/hr) speed limits, supported by physical measures such as speed humps and traffic islands, have been shown to reduce road accidents by 67% and child pedestrian injuries by 70 % (SEU 2003).

Measures to reduce the severity of accident injuries:

Measures such as seatbelts, child restraints, and cycle helmets have been shown to reduce the severity of accident injuries (Morrison, Petticrew et al. 2003).

Policies that promote public transport and reduce vehicle use

Policies that facilitate reductions in motor vehicle traffic and promote the use of safer modes of transport such as public transport are likely to reduce road crashes and the risk of injury to vulnerable road users (Ameratunga, Hajar et al. 2006).

Social connectedness and community severance

The influence of transport on social cohesion is complex. Transport provides an important means of contact between family members, friends, and members of voluntary organisations and communities. At the same time, roadways and traffic act as physical and psychological barriers to contact. (Kjellstrom and Hill 2002)

Social connectedness can be defined as “the relationships people have with others” and “joining together to achieve shared goals which benefit each other and society as a whole”(MSD 2005).

In the context of transport policy, community severance can be defined as “the sum of the divisive effects a road has on those in the locality”(Dora and Phillips 2000).

How do connectedness and severance affect health?

The level of cohesion or connectedness in a society is related to the health of individuals and communities (NHC 1998). High levels of social support are thought to promote health directly and to buffer the adverse effect of stressors, and good social support networks are particularly important for vulnerable groups such as older people and children (PHAC 2003). A strong social network can reduce the risk of depression and susceptibility to infection (Wilkinson, Kawachi et al. 1998). Conversely, low social contact has been linked to an increase in all-cause mortality, with those with few social contacts being at more than twice the risk of those with many contacts (Berkman and Syme 1991).

Friendship, good social relations and strong supportive networks improve health at home, at work and in the community. Belonging to a social network of communication and mutual obligation makes people feel cared for and valued. This has a powerful protective effect on health. When these are disrupted, negative health impacts occur. Intervention studies have shown that providing social support can improve patient recovery rates from several different conditions, and improve pregnancy outcome in vulnerable groups of women (World Health Organization 2004).

Experiments suggest that good social relations can reduce the physiological response to stress (World Health Organization 2004) and several studies have demonstrated links between social connectedness and the performance of the economy as well as positive outcomes for individual health and wellbeing (Ministry of Social Development 2006).

In contrast, social isolation and exclusion are associated with increased rates of premature death and poorer chances of survival after heart attack (World Health Organization 2004). Both social isolation and non supportive social interactions can result in lower immune function and higher neuroendocrine and cardiovascular activity while socially supportive interactions have the opposite effects (Seeman 1996). Many studies have shown that people without social support have higher death rates (Hawe and Shiell 2000).

Social exclusion can also result in reduced physical activity and since those without private transport are more predominantly vulnerable groups, further inequalities arise.

Community severance involves disruption of social support networks, and reduces access to facilities and services, especially for those with restricted mobility. Thus it can impact on health by removing the protection of social support, and by preventing easy access to essential services such as health care and education. Large roads passing through communities can also cause stress, which can result in depression and anxiety (PHAC 2003).

How does transport promote or disrupt connectedness?

Appleyard and Lintell (Appleyard and Lintell 1972) conducted a study in San Francisco in the 1970s that considered the impact of traffic flow on community connectedness. Three similar streets with different volumes of traffic were compared, and it was found that the number of social contacts residents had, and the perceived 'liveability' of the street, was inversely proportional to the traffic flow. Large volumes of motorised traffic can also reduce access to facilities for walking and cycling (PHAC 2003). The construction of large roads through residential areas thus has the potential to cause community severance, reducing the health promoting social networks of residents and the likelihood that residents will choose active transport.

The situation of roads in relation to residential areas, traffic volumes, and the design and layout of the road and footpath system, can affect the social impact of the road and the degree to which it disrupts or prevents social connections (Read and Cramphorn 2001). Finally, inequality is corrosive of good social relations, and that includes unequal access to transport (WHO, 2004)

Transport systems can also promote social connectedness. For example, good access to local amenities such as shops, cafes, sports and social facilities has been found to promote social interactions (JRF 1999). The design of public spaces, including walkways, cycleways, footpaths and roads, also contributes to the degree to which people feel comfortable in and a sense of ownership over these spaces (Frumkin, Frank et al. 2004). Transport can facilitate social support, such as enabling better access to friends and family (PHAC 2003).

Who is affected?

Those without cars are more vulnerable to community severance, as they are more likely to make local journeys on foot and to have social contacts in their immediate neighbourhood. Those who spend more time at home, such as older people and those with young children, are also particularly vulnerable to community severance, as they are also likely to rely more on social contacts in their immediate neighbourhood (PHAC 2003).

What works to prevent community severance and promote community networks?

There is a move internationally to promote sustainable urban growth through initiatives such as the "urban villages" movement in the UK and the US, and other "smart growth" programmes. These initiatives seek to reduce urban sprawl and design communities to facilitate short and easy local journeys by means other than car (Eley 2003). The "walkability" of communities has the potential to impact on the social networking of residents, particularly those without cars or with limited mobility.

A recent systematic review found that new major urban roads increase noise disturbance and severance effects in local communities (Egan, Petticrew et al. 2003).

Stress

The term stress can be used to refer to both a set of circumstances which are perceived as threatening, and to the resulting state of physiological and psychological disturbance or distress (VanItallie 2002). The body has its own mechanisms for adapting to stressful stimuli, which can be protective (such as the 'fight or flight response), but can also cause illness.

What are the health effects of stress?

It is generally accepted that stress has a significant effect on health. Excess stress can lead to continuing anxiety, low self-esteem, social isolation and a lack of control over home or work life, and can result in significant health problems (Wilkinson and Marmot 2003). These health problems commonly result from the sympathetic response to stress and are wide ranging including hypertension, headache, impaired immune function (which may precipitate cancer, infection, and disease), stomach ulcers, stroke, diabetes, and depression (VanItallie 2002).

How does transport cause stress?

Congestion

Road congestion is an increasing problem worldwide, particularly in urban areas, and Wellington is no exception. Road congestion leads to frustration due to a driver's inability to drive at a speed consistent with his or her own wishes (TAG 2003), with a feeling of not having control being a major factor in determining the level of stress (Hennessy and Wiesenthal 1997). Stress due to congestion has been shown to affect work performance (Wener, Evans et al. 2003).

Noise

Noise is known to have an adverse effect on health, causing annoyance and sleep disturbance (both of which contribute to stress) (Kjellstrom and Hill 2002). Studies have found that stop/start traffic, and vibration or low frequency noise, are most annoying, particularly early in the morning and late at night (Kjellstrom and Hill 2002). Socio-economic status is reported to influence exposure to noise, with those who can afford to, living away from busy roads resulting in less exposure to traffic noise (therefore widening inequalities) (FPHM 2000).

Public transport and stress

International research suggests that a degree of "commuter stress" is associated with public transport use. The quicker and more reliable a service, and the less crowded, the less stress it causes (Wener, Evans et al. 2003). However in areas where congestion occurs, public transport is often faster than a car journey, and for a given speed and duration public transport journeys tend to be less stressful than car journeys (Zimmerman 2005).

What transport interventions work to reduce stress?

Strategies to reduce congestion

Effective strategies for reducing congestion include road pricing (particularly congestion charging), programmes encouraging the use of alternative modes for commuting, flexitime and telework, improvements to public transport systems, High Occupant Vehicle (HOV) priority, access management (coordinating road design and land use, to minimise intersections, pedestrian crossings etc.), parking pricing, and “smart growth (VTPI 2005 (last updated)).

On the other hand, increasing road capacity was found to reduce congestion in the short term, but have only a modest effect in the medium to long term, because of extra capacity being filled by induced peak period traffic (the rebound effect, where reduced congestion means more people choose to drive) (VTPI 2005 (last updated)).

Strategies to reduce noise

Some road surfaces produce less noise than others. A recent New Zealand report found that chip seal surfaces are significantly louder than bitumen surfaces, even at 50km/hour (Dravitzki, Walton et al. 2006). Noise insulation in new houses or houses in vulnerable areas (i.e. near new or high traffic roads) can reduce exposure to noise inside houses.

Strategies to reduce public transport stress

There is evidence that more predictable transport systems induce less stress in those who use them (Wener, Evans et al. 2003). Reliability and good information (such as real time information systems at bus stops and train stations) are both important factors in making public transport more predictable.

The GWRC perception survey 2003 and 2004 asked about the perceived reliability of public transport services in the region. Of note, around 60% of those asked rated the regional transport networks as reliable in 2004 across all modes (buses, roads and trains). Between 2003 and 2004 bus network reliability perception fell significantly from 70% to 61%, road network reliability perception fell slightly from 60% to 58%, and train reliability perception increased from 59% to 62% (GWRC 2005).

Appendix 2 – Health impact assessment workshop findings

The potential impacts of the RLTS, the populations affected and comments from workshop participants are presented in the matrix below. The matrix covers the four main components of the RLTS to be assessed for each of the population groups covered. This summarises the main findings of the HIA workshop, and has informed the recommendations.

Public transport - ease of use package

How might the implementation of this package affect health and wellbeing directly, or indirectly, (by affecting other factors in a causal pathway)?	What is the causal pathway for this impact on health?	Who is likely to be affected? Are some groups likely to be affected more than others? (In particular the population groups of interest)?	What evidence do you have to support the answers above, eg, past experience, facts, research & existing data sources?	What key factors might encourage, prevent or mitigate the health impact?	What possible actions could be taken to enhance positive or diminish negative impacts? Who are these recommendations directed at?
New trolley buses and rolling stock increasing service frequency	Increase in frequency may increase uptake of public transport, with subsequent increases in physical and mental health and social connectedness. Reduction in road traffic accidents from possible modal shift from cars.	Current users of public transport have the potential to have their use supported. Vehicle users may switch modes. People most likely to benefit are people who currently travel for work and leisure. Those not already travelling due to cost, for example, are unlikely to see	Transport modelling supports maintained modal share with increased public transport availability. Public health evidence base supports health outcomes. Local knowledge also suggests a tipping point where people just turn up		Investigate at what point the increase in rolling stock and trolley buses cease to increase customer uptake (GWRC). Since the public health gains are significant, any additional funding in this area is likely to be beneficial, providing customer uptake continues to

		improvement. Rolling stock assists people from outside the Wellington CBD, whereas trolley buses support Wellington city commuters.	to use a service and not consult a timetable.		increase (GWRC).
New trolley buses and rolling stock have wider doors.	Increased ease of use making public transport more accessible. Improved social connectedness.	People with disabilities, parents and children, younger children, older people.	Public health evidence base supports health outcomes.	Marketing of the new trolley buses and rolling stock to appropriate sectors of the community.	Continue purchasing disabled-friendly transport stock. Further highlight accessibility for people with disabilities in the RLTS at appropriate points. (GWRC)
New rolling stock encourages more people into long-distance train travel to the CBD.	Allows additional people to live long distances from workplace. Increases urban sprawl, decreases family and community time. Discourages local workplace initiatives.	People who currently travel for work and leisure. Families.	Concept only at this point. Unsure of evidence base to support public transports role in urban sprawl and public transports effects. Current study has been limited to roading.	Cost of travel, speed, frequency.	Campaigns to encourage people to live and work near to where they live (Local authorities, GWRC).
New rolling stock and trolley buses deliver workforce	Promotes increased wealth for Wellington CBD	People who currently travel for work and leisure.	15% of all work trips to CBD currently via rail, and a further	National and regional economy.	Investigate the contribution of public transport to

into the CBD.	and regional economy as workforce delivered to main economic area.		22% by bus.		economic wellbeing of the region and use information to support further public transport spending (GWRC).
Shelter provided to 35% of bus stops.	Reduced respiratory infections. Reduced sun exposure. Increase likelihood of people using public transport with subsequent increases in physical and mental health and social connectedness. Reduction in road traffic accidents from possible modal shift from cars.	People who currently travel for work and leisure. Older and younger people, and people who are immune compromised.	Public health evidence base supports health outcomes.	Quality of shelters, placement in rural versus city areas, versus low socio-economic areas. Visual pollution and safety/security is an issue for local residents from shelters.	Investigate placement of shelters based on distribution in low socio-economic areas. Promote a significantly higher proportion of covered shelters than 35%. Consider future requirements of shelters such as real time information. Develop a standard for bus shelters that includes UV protected glass as standard (GWRC).
Integrated ticketing may increase speed of service, smaller queues.	Less stress and anxiety; Increase likelihood of people using public transport with subsequent increases in	People who currently travel for work and leisure.	Public health evidence base supports health outcomes.	Simple system used; Training of staff. Fare prices	Staff provided with appropriate training in the full benefits of the system.

	physical and mental health and social connectedness. Assists with modal shift.				
	Easier use of total system for people with English as a second language and other communication difficulties as ticket purchasing occurs once only. Increase likelihood of people using public transport with subsequent increases in social connectedness.	People with English as a second language. People who are deaf or blind.	Workshop discussion. Public health evidence base supports health outcomes.	Availability of information in multiple languages and formats at key stations. Training of staff. Assisted by good travel planning information.	Basic information available in multiple languages and formats at key stations (GWRC and transport providers).
	Increased affordability of system use from multiple rides within zone – allowing integrated travelling. Increased money for other activities, greater connectedness. Assists with modal shift.	People who travel for work and leisure already. Low income people. People travelling on multiple routes, eg Porirua to Hutt Valley, rail users, suburb-suburb bus users needing to change buses.	Workshop discussion.	Fare prices. Training of staff. Assisted by good travel planning information.	Support for this initiative (GWRC).

Integrated ticketing may mean ticket barriers are erected at stations.	Reduced ease of use for certain populations with subsequent decreases in physical and mental health and social connectedness.	People with disabilities, parents and children, younger children, older people.	Workshop discussion. Public health evidence base supports health outcomes.	Design of barriers.	Ensure disable-friendly design principles are used. Further highlight accessibility for people with disabilities in the RLTS at appropriate points.
Zoning of public transport travel.	Certainty of price for travel making it easy to budget, single payment option at the start of the trip. Safer travel for children as whole trip pre-paid. More affordable travel allows more money for other activities, greater connectedness. Assists with modal shift.	People who travel for work and leisure already. Low income people. Children. People travelling on multiple routes.	Workshop discussion. Public health evidence base supports health outcomes.	Fare prices; zone boundaries. Assisted by good travel planning information.	Zone boundaries should be investigated based on NZ Dep boundaries to decrease inequalities of access based on cost. Affordability of fares is important for this to achieve public health gains, particularly for low income groups. Investigate need for low-income fares.
Increase in fares.	Less affordable travel reduces money available for other activities. Less travel, less social	Low income and fixed income people.	Workshop discussion. Public health evidence base supports health outcomes.	Low income fare structures, zone boundaries.	Ensure high-need low income users are considered at all levels in the RLTS, and specific measures are

	connectedness.				included to ensure they are not priced out of services.
Real time information at major stations/ stops increases certainty of travel and increased knowledge of cancelled services. Txt bus options available also at 20 cents per use.	Reduced stress, increased use of public transport and subsequent physical and mental health improvements and social connectedness. Assists with modal shift.	People who travel for work and leisure already. People who travel from major stations/ stops only, so less likely to directly assist rural people. Cell phone users. Less likely to assist low income users. People with vision impairment less likely to benefit.	Workshop discussion. Use of complex and pay-information systems by low income people is typically lower than general population. Public health evidence base supports health outcomes.	Usefulness of system if all it does is provide schedule information rather than actual time of arrival. Assisted by good travel planning information.	Provide GPS-based, real time system rather than a system based on scheduled information. Investigate ways to ensure low income people benefit from such interventions. Further highlight low income people's issues in the RLTS. Ensure legibility is high.
Total Mobility access scheme expanded	Greater access to work, education and the community for people with disabilities. Increased social connectedness. Safe form of travel and more affordable.	People with disabilities and their families.	Workshop discussion. Public health evidence base supports health outcomes.	Low income people still pay ½ price, which may still be out of reach. Long term sustainability of the funding is required.	Investigate travel planning for people to help keep costs as low as possible. Align the service with other providers, eg doctors who remove licences from older drivers should be alerted to the scheme if eligible.

Public transport – travel demand management, walking and cycling package

How might the implementation of this package affect health and wellbeing directly or indirectly?	What is the causal pathway for this impact on health?	Who is likely to be affected? Are some groups likely to be affected more than others? (In particular the population groups of interest)	What evidence do you have to support the answers above, eg, past experience, facts, research & existing data sources?	What key factors might encourage, prevent or mitigate the health impact?	What possible actions could be taken to enhance positive or diminish negative impacts? Who are these recommendations directed at?
TDM measures in general, leading to reduced car travel at peak times	Reduced need for construction of large roads, resulting in reduced severance effects; Reduced stress for commuters still travelling by car at peak times;	People living near large roads; People who have to travel by car, including parents, people with disabilities, rural people	Evaluations of TDM measures in other places; Experience of severance;	Other measures to discourage car use eg road pricing, petrol prices, parking pricing; Some TDM measures might encourage car use eg ATMS;	Focus on TDM measures which discourage car use (GWRC); Aim for reduced car mode share and spend less on roading infrastructure (GWRC, central govt)
Travel plans encouraging public transport use, leading to increased public transport use (mode shift from car use)	Increased physical activity at either end of public transport journeys has positive impact on health; Modal shift to public transport leading to reduced	Those for whom travel plans are created, likely to be mainly workers commuting to work. Those with difficulty affording public transport are unlikely to see any impact,	Research evidence that travel plans work to promote mode shift; Research evidence that public transport use is associated with physical activity;	Good information about public transport services; Improved quality of public transport including direct routes, frequency, accessibility; Uptake of travel	Travel plans for non-commute journeys (community travel plans)(GWRC, local councils, community groups); Marketing of travel plans and public

	<p>accidents; Improved mental health (reduced stress) from reduced congestion and reduced car travel (unless public transport unreliable); Increased social connectedness from public transport use; reduced emissions resulting in nicer walking enviro increasing physical activity and connectedness; Improved access to employment; Improved access to health care services (hospital) via improved information re transport options.</p>	<p>unless financial incentives to use public transport are provided as part of travel plans. However information provision eg with hospital appointments) may benefit those without cars. Those who have to use a car (rural people, parents) may benefit from reduced congestion. People with disabilities, esp. frequent users of health services, have the potential to benefit from hospital travel plans</p>	<p>Research evidence that public transport is associated with lower accident rates; Personal experience of travel journeys; Experience as CCDHB travel planner. Evaluations of Australian Travel Smart projects (www.travelsmart.govt.au)</p>	<p>plans – buy-in by workplaces and communities; Affordability of public transport</p>	<p>transport use (GWRC); Funding for travel plans, including to provide financial and other incentives for PT use (eg competitions) (GWRC, employers); Road pricing to further discourage car travel (GWRC); Parking pricing as part of travel plans (employers, local councils); Investment in public transport (rather than roads) (GWRC, central govt); Provision of functional items such as transport tickets, maps and timetables to travel plan participants (GWRC); Demand responsive bus</p>
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					services
Travel plans encouraging walking and cycling, including walking school buses	Increased physical activity through active transport; Potentially increased accidents as walking and cycling higher risk than car travel, but improved road safety awareness for children taking part in walking school bus programmes, and reduced risk of accidents for cyclists when a larger number of people cycle; Increased connectedness with community and workmates/classmates through walking and cycling journeys; Increased community	As above – mainly commuters; Also school children have the potential to benefit from school travel plans (especially if parents able to participate in eg WSBs, and live walkable distance from school – children of working parents may miss out); Maori children and children from poor areas are at higher risk of accidents and so have potential to benefit more from school travel plans; Community travel plans could benefit a wider range of people	Evaluations of walking school buses; Other evaluations of travel plans; Personal experience of planning and implementing travel plans, particularly for DHB; Evidence about risk of accidents using different travel modes; Success of other community-based social marketing initiatives (eg weedbusters) in encouraging community connectedness	Good information on walking and cycling routes - maps; Good infrastructure for walking and cycling (walkways, cycleways); Way media presents risk of walking to school; Community buy-in to community travel plans – whole of community involvement is better, including local leaders (from TravelSmart Australia); Land use policies promoting dense urban development and mixed land use	Increased spending on walking and cycling infrastructure (local and regional councils); Travel plans for communities – adequate funding for these, including reimbursement of organisers (GWRC and local councils and ?community organisations). Develop innovative methods to reach less well off communities – danger of increasing inequalities (GWRC). Infrastructure changes to support travel plans (eg slow speed limit around schools, no

	connectedness through community travel planning meetings; Evidence gathered to produce travel plans could be used to advocate for infrastructure to make walking and cycling safer and easier (therefore increase p.a. and reduce accidents)				parking around schools) (GWRC, local councils, central government)
Travel plans promoting shared transport (car-pooling, special services)	Reduced congestion and therefore reduced stress. Improved social connectedness with colleagues. Improved access to workplace. Improved access to other services (eg hospital) through special transport services such as mini-buses.	Mainly commuters travelling at same time as colleagues (i.e. not flexi-time or shift workers). Those who live in isolated areas or away from colleagues may not benefit. Those with affordability issues have the potential to benefit – although may need to have a car for car-pooling.	Personal experience of transport journeys, Research evidence about effectiveness of ride-sharing	Ease of ride sharing;	HOV lanes to make shared transport faster than non-shared (GWRC); Incentives for shared transport as part of travel plans (GWRC, employers); Ride-share matching in workplace (employers); Facilities for safe ride-share matching in the community (local councils)

<p>Improving pedestrian access to public transport nodes</p>	<p>Make public transport more accessible, therefore improve access to services; May increase public transport mode share, an increase physical activity; Could also decrease physical activity if transport nodes easier to get to (require less walking); Reduced accidents from safety measures such as pedestrian crossings</p>	<p>People who rely on public transport (without cars, cannot afford to run cars); people with physical disabilities;</p>	<p>Personal experiences regarding ease of use; The Accessible Journey report</p>	<p>Degree of accessibility for those with mobility restrictions; Quality of public transport services;</p>	<p>Accessibility modifications taking into account those who use mobility aids (GWRC, local councils)</p>
<p>Encouraging pedestrian accessibility in new developments</p>	<p>Increased walkability of neighbourhoods leading to increased physical activity and increased social connectedness</p>	<p>Those living in or using services in new developments, mostly likely to be wealthy; Those without cars and with disabilities living in these areas; Children living in these areas – more</p>	<p>Urban design research (US and UK), e.g. New Urbanism, evidence of harmful effects of sprawl</p>	<p>Proximity of residential areas and essential services within new developments;</p>	<p>Urban design principles for walkability and sustainability applied more broadly to existing neighbourhoods and to siting of new developments as well internal</p>

		able to walk to school			structure (eg don't build walkable developments a long way from workplaces of most of intended inhabitants) (local and regional councils, central government); Prioritise disadvantaged neighbourhoods (all government)
Regional cycling strategy including: Cycling education for children and possibly adults; Cycle awareness education for drivers; Improving local and regional cycle networks; Providing maps; Cycling advocacy.	Promotion of safe cycling and cycle awareness among drivers leading to reduced accidents and reduced severity of accidents (eg through cycle helmet use); Improved route connections may make cycling less stressful and safer; All strategies designed to encourage cycling, therefore increase	Current cyclists are likely to benefit from increased safety due to driver education, improving cycle network and advocacy; Those encouraged into cycling by advocacy and education and information have the potential to benefit from increased exercise, but may be at increased risk from accidents (benefits outweigh risks);	Knowledge of experience and concerns of local cyclists; Experience and evidence of the effectiveness of education and social marketing programmes	Public perception of safety of cycling; Land use and urban design policies;	Safe cycle way between Wellington city and Hutt required (GWRC); Prioritisation and faster implementation of regional cycling strategy (GWRC and local councils); Lower speed limit in CBD – along cycle routes (WCC); Prioritise walking and cycling in LTCCPs (local councils)

	physical activity, increase accidents, increase social connectedness (with other cyclists and community); Driver education may encourage car drivers to cycle, therefore increase physical activity, reduce congestion;	Those with affordability and access issues, including people without cars, may benefit from improvements in regional network			
ATMS – to increase efficiency of traffic flow, and therefore reduce congestion and reduce journey time	Makes car travel more attractive, so potentially increased car travel leading to reduced journeys by other modes, therefore reduced physical activity; Reduced stress due to reduced congestion and increased predictability; Reduced accidents due to smoother flow of traffic; Increased severance effect from faster traffic	Car drivers and passengers; Public transport passengers (lesser degree as measures mainly on motorways, arterial routes) Those living near large roads affected by severance	International evidence regarding success of ATMS in improving traffic flows;	Improved quality of public transport service would mitigate effect of increasing ease of car travel; Other measures to reduce congestion which provide disincentives to car travel such as road pricing might mitigate increase in car travel, as reducing stress for remaining car drivers;	Traffic signally to promote ease of pedestrian journeys within town centres (rather than being structured around ease of car journeys) (regional and local councils)

	flow;				
Bus priority measures making bus journeys faster and more reliable (mainly in Wellington CBD)	Increased use of public transport leading to increased physical activity; more reliable, faster bus travel leading to reduced stress; Bus travel provides increased opportunity for making social connections; Improved access to health services, employment, and other services which require predictable arrival times	People using CBD bus routes, especially at peak times (commuters to CBD)	Research evidence regarding use of public transport and commuter stress; Experience of reliability of public transport;	Quality of bus services,	Extend bus priority measures to cover areas outside CBD, and off-peak times, to reach priority groups (GWRC)
High occupancy vehicle lanes	Improving access for those who can share transport; Reducing congestion leading to reduced stress;	People making journeys at same time as family, colleagues etc; People living near main roads	Evaluations of HOV lanes overseas	Ridesharing programmes have the potential to promote use of HIV lanes; Continuity of HOV	Ensure continuity of HOV routes and routes serving areas other than CBD;

	Reduced car use leading to reduced emissions, leading to reduced respiratory effects and making walking and cycling more attractive encouraging physical activity			routes have the potential to make them more useful	
Cycle carriage on trains	Promoting physical activity by making cycle use easier, May increase accidents by promoting cycle use	Those who can combine modes			
Road pricing	Reduced congestion leading to reduced stress; Disincentive to care travel leading to mode shift to PT and active transport, increasing physical activity; Reduced	People who can afford to pay charges have the potential to benefit from reduced congestion; People who shift mode from car travel (especially commuters); People who can travel off-peak, have flexible jobs, can telecommute, have the potential to be less affected;	International evidence regarding effectiveness of road pricing	Likely to be unpopular if regarded as revenue gathering	Reinvest revenue in public transport and walking and cycling infrastructure (GWRC, central govt)

	accessibility for those unable to afford charges and without alternatives	People with low incomes; People who have to use cars e.g. people living in isolated areas, parents of small children, people with disabilities (some)			
Flexible working hours and teleworking	Reduced social connectedness/ social isolation resulting from reduced contact with colleagues; Flexible working hours may increase car dependence and reduce active or PT journeys	People with flexible jobs	Experience of working from home	Urban design with services in walkable distance of homes would reduce social isolation;	Community/ household travel plans to encourage sustainable journeys by those working from home (local and regional councils)

Roading Package – Granada to Gracefield

Grenada to Gracefield Roading Package. Determinant : Physical Activity

How might the implementation of this package affect health and wellbeing directly, or indirectly?	What is the causal pathway for this impact on health and wellbeing?	Who is likely to be affected?	What evidence do you have to support your answers?	What factors might encourage, prevent or mitigate the health impact?	What possible actions could be taken to enhance or mitigate impacts?
Increase in local public transport routes.	Indirect - increase in physical activity from increased local patronage of public transport and better access to Belmont Regional Park.	People who take public transport.	Evidence base and data from the transport model.	Quality of service frequency accessibility, routes, cycle carriage on buses, etc.	Bus only route, bus priority lanes, safe and secure cycle storage at bus stops, etc.
Reduction in congestion south on State Highway 1 improves access and available time for recreation.	Direct increase in physical activity where this option is exercised.	People who drive to work.	None, is supposition, but testable by survey for instance. Is there evidence for more leisure = more exercise?		
Reduced congestion lessens people's incentive / pressure to take public transport.	Less exercise would result.	People who drive to work.			
Increase number of people walking in Belmont Regional Park.	Provide better access to the park.	Road users and their families.	None.	Good road access to the park.	Build secure parking areas, signage, tracks

Reduce walking and picnicking in the Korokoro Stream (depending on alignment chosen).	Direct loss of walking and picnicking areas. Reduction in pleasure using what remains.	Local and nearby residents. Iwi.	None.	Select an alignment that avoids the Korokoro Stream.	None if wrong alignment is chosen.
Alicetown residents exercise less.	Direct if Wakefield Street widening impacts access to riverside walk and Sladden Park etc.	Children, youth and people without access to private car.	Severance studies.		
	Walking to school / kura less safe and/or pleasant with wider road, increased traffic.	Children and their principal care giver.	Severance studies.	Alternative accessible parks and playgrounds.	Build underpass and overbridges.
Reduced congestion from Johnsonville/Tawa/Porirua to Moera, Woburn and Wainuiomata, reduces PT use.	Indirect reduction in physical activity	Commuting families with motor vehicles.	?	Make public transport more attractive.	Improve park and ride facilities at Woburn.

Grenada to Gracefield Roding Package. Determinant : Accessibility to Services

How might the implementation of this package affect health and wellbeing directly, or indirectly?	What is the causal pathway for this impact on health and wellbeing?	Who is likely to be affected?	What evidence do you have to support your answers?	What factors might encourage, prevent or mitigate the health impact?	What possible actions could be taken to enhance or mitigate impacts?
Improved access to Te Kura Kaupapa Maori from Wainuiomata and Porirua / Titahi Bay area.	Quicker / cheaper car (and car pooling) and public transport opportunity.	Maori in particular (but not only).	Measured travel distances between suburbs and Kura.	Improved dedicated travel schemes. "Bus route planning."	Mini bus, car pooling schemes.

Improved access to Marae from Wainuiomata and Porirua / Titahi Bay. Severance effects from increased traffic flows on feeder roads.	Quicker / cheaper car (and car pooling) and public transport opportunity. Direct barrier and lost amenity plus increased risk of injury for pedestrians in Ava, Alicetown, Woburn and Moera.	All Maori. Children and primary caregiver, the elderly.	Measured travel distances between suburbs and Kura and Marae. Severance studies.	Improved dedicated travel schemes. "Bus route planning." Safe pedestrian crossings and traffic controls.	Mini bus, car pooling schemes. Pedestrian crossings with traffic lights. Reverse severance by rail corridor with underpasses etc. Involve locals in community design process. No additional measures needed.
Improved motor vehicle access to community services.	Less congestion in the short term on new / improved roads.	Families / individuals with motor vehicles.	Travel times from modelling.	No additional measures needed.	No additional measures needed.

Grenada to Gracefield Roding Package. Determinant : Accident Rates and Changes in Injuries and Fatalities

Speeding on open road sections likely to lead to more fatal and severe accidents.	Direct car to car, car to cycle impacts plus vehicle only incidents.	Motor vehicle occupants, cyclists, recreational walkers.	Accident statistics.	Design of road, cycle ways, section, also surfacing selection.	Design Stage 1 for pedestrian use is due to proximity to Belmont Regional Park.
More, and more serious pedestrian and cyclist accidents on Wakefield / Whites Line East.	Direct impact of motor vehicle and pedestrian or cyclist from heavier flows and more trucks.	Children and older people.	Accident statistics.		

Fewer and less serious accidents on The Esplanade.	Lower flows and fewer trucks (but probably more pedestrians).	Children and older people.	Accident statistics.	Will not eventuate until Stage 2 of this project is completed. Traffic calming essential to keep speeds down and controlled.	Commence Stage 2 as soon as possible.
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Grenada to Gracefield Roading Package. Determinant : Community Effects and Severance, Physical and Social Severance

Significant differences arise from Stage 2 Alternatives 1 and 2					
How might the implementation of this package affect health and wellbeing directly, or indirectly?	What is the causal pathway for this impact on health and wellbeing?	Who is likely to be affected?	What evidence do you have to support your answers?	What factors might encourage, prevent or mitigate the health impact?	What possible actions could be taken to enhance or mitigate impacts?
Physical and social severance. This is greater with Alternative 1.	Increase in road width and traffic flows.	Immediate population, especially Woburn, Alicetown and Ava. Woburn in particular for Alternative 1.	Severance studies construction drawings.	Pedestrian crossings, encourage PT use especially Wainuiomata sourced traffic.	Improved (? Express) bus services from Wainuiomata. Improved park and ride at Woburn. Pedestrian underpasses / overbridges.

Physical disruption and displacement of community and ongoing amenity issues.	Increase in road width and traffic flows.	Immediate population, especially Woburn, Alicetown and Ava.	Severance studies construction drawings.	Pedestrian crossings, encourage PT use especially Wainuiomata sources traffic.	Improved (? Express) bus services from Wainuiomata. Improved park and ride at Woburn. Pedestrian underpasses / overbridges.
This is greater with Alternative 1.		Woburn in particular for Alternative 1.		Noise barriers.	
Physical and social severance.	Significant increase in traffic flows on Lower Wainuiomata Road and Whites Line East as Wainuiomata traffic accesses new connection.	Waiwhetu, particularly west of Wainuiomata Road.	Severance studies construction drawings.	Encourage PT use form Wainuiomata.	Noise barriers. Improved (? Express) bus service from Wainuiomata.

Public transport – infrastructure improvements

How might the implementation of this package affect health and wellbeing directly, or indirectly, (by affecting other factors in a causal pathway)?	What is the causal pathway for this impact on health?	Who is likely to be affected? Are some groups likely to be affected more than others? (In particular the population groups of interest)?	What evidence do you have to support the answers above, eg, past experience, facts, research & existing data sources?	What key factors might encourage, prevent or mitigate the health impact?	What possible actions could be taken to enhance positive or diminish negative impacts? Who are these recommendations directed at?
PHYSICAL ACTIVITY					
New railway stations, bus shelters, park & ride facilities. Approximately 90% of the population have/will have service within 300-500 metres of their house.	Improved physical activity on average, walk/drive to stations for park & ride, less stress for commuters	Those commuters and others who already use rail and bus services, those who take up the services due to improved quality of service. Bus users region wide. Focus on Western Corridor reflecting concentration of work places - workers commuting into Wellington City. Kapiti and Johnsonville rail	Public health evidence base supports health outcomes.	Ability to place bus shelters at appropriate sites. Numbers of parking spaces at park & ride facilities.	Ensure appropriate levels of parking at park & ride facilities as well as accessibility. Educate people on the negative impacts on physical activity, cost and environment etc of car trips vs public transport. Include public transport benefits in a campaign to get people out of cars.

		users.			
Increased rail services	Improved physical activity including cycling and walking.	Those who cycle already, school children, new users of improved services.	Public health evidence supports health outcomes related to increased public transport use.	Ability to incorporate cycle into journey securely.	Secure cycle parking to be incorporated at railway stations. Ability to take cycles on trains to be improved. Good pedestrian access required.
Improved bus services and shelters (33%?). More accessible.	Increase public transport use and physical activity	People who already use bus services, elderly, school children and those on low income.		Quality of shelters. Consistency of shelters across different areas.	Increase to 80% covered bus shelters Regional Councils and T.A. to consider this.
More information about physical activity benefits.	Improved uptake of public transport and physical activity.	People who already use bus services, elderly, school children and those on low income.	Social marketing strategies?	Increased numbers of bus shelters	Use of advertising income on shelters to offset cost? Could incorporate health promotion messages. Regional Councils and TAs
Bus access for those with disabilities	Improved access. Better physical independence & activity. Improved mental health and social connectedness.	Those with disabilities.		Cost of transport	Continue scheme and possibly increase subsidies for those with disabilities.

Half-price taxi scheme (mobility scheme)	Improved access for those who can't access public transport. Access to necessary appointments.	Those with disabilities. Those with disabilities also on low incomes are likely to be less able to afford the cost of the taxi		Cost of taxi service still prohibitive, especially for those on low income.	Increased funding for those on low incomes.
School bus services, fill in any gaps in existing services (no extra services planned)	Allow school children better access to schools. Physical activity increase walking to school bus.	Young people/ school children.		Parents driving school children to school buses. School closures may affect access issues in future?	
Increased fares for bus and train services	Indirectly limit physical activity	Those on low incomes. Maori and Pacific peoples on low incomes.		Cost of private vs public transport.	Look at the possibility of a means tested transport subsidy system.
Improved roading	Decreased physical activity because of increased car use.	Those who choose to use private transport. Those who can afford private car use costs.		Active encouragement to use public transport.	
Wairarapa & Kapiti rail and bus improvements	Increased local trip use. Improved lines into and out of Wellington City	Locally the elderly will benefit from greater access. Local families increased access to work / education /			

		social connectedness. Ease of access and improved environment for workers coming into the CBD in Lower Hutt and Wellington City.			
ACCESSIBILITY TO SERVICES & THE COMMUNITY					
Increased use of buses (Aiming for 20% increase in patronage)	Meet more people when using the bus and waiting at bus stops	Those with accessibility issues benefit. Those with affordability issues situations will not change.		Those on low incomes will not improve overall use of public transport, including buses.	Look at the possibility of a means tested transport subsidy system.
Bus and rail improvements.	Increased access and therefore access to services and community	Those close to bus stops / railway stations.			
Frequency and accessibility improvements to public transport	Positive effect on communities. Increased access to services and the community.	Those with accessibility issues		Marketing of improvements to specific sectors of the community.	
Road network improvements	Less community connectedness. Shifts balance away from public transport benefits /				

	decreases public transport uptake.				
Improved public transport		Rural access will not improve. If time is not an issue or for those that have no choice then accessibility will improve.		Options for transport in rural areas should be considered.	
Increased fares	Reduced access to public transport.	Low income and Maori and Pacific peoples access to health services. Does not necessarily improve the logistics of travel to health services.	Discussion at Aratahi re transport to health appoints for Maori	Cost of transport and access prevent uptake of services. Also centralisation of health services is an issue.	
ACCIDENTS AND INJURIES					
Increased use of public transport decreases risk of accident or injury overall.	Public transport much safer	Those who use public transport. – cycle and ride. Risks to pedestrians and at rail crossings is lower than private cars.	LTNZ exposure graph (ROB has this)	Need to keep transport stock, rail etc up to date to prevent rail accidents.	
Increased rail use	Increased risk of rail crossing accidents	People taking public transport		Level crossings need to be safe.	

				Suicides on tracks could be an issue.	
Increased rail use				Length of trains at any short stations, eg, Wairarapa, should not be longer than 8 cars max to prevent difficulties at crossings	Put on extra services rather than increasing the length of trains.
New rail stock	Should increase safety overall due to age related accidents not happening	All using rail services		Continued budget for ongoing maintenance after upgrades.	
Increased bike and ride and bicycle use in general	Increased cycle accidents	Those using cycles to get to public transport. Those using cycles as an alternative to public transport perhaps due to cost		Improved cycleways, cycle safety at crossings,	
COMMUNITY EFFECTS AND SEVERANCE					
Public transport reinforcing the existing corridor	Severance limited but affecting those near main rail and road routes.	Those on main transport routes.			
Rail frequency – at	Severance at times	Those most		Crossings to	Funding to be

crossings increased from 20 mins to 15 mins (eg, Tawa basin)	of trains crossing. Affects pedestrians and those in cars	affected are those living close to rail lines – noise etc. Pedestrians affected especially if have to go underground to get over lines – safety issue Private car users may have increased stress due to additional waiting time.		facilitate access to public transport and improve access to community facilities. Overbridges for pedestrians. Overbridges / interchanges for cars (eg, Mungavin interchange; Plimmerton underground access.)	directed at improving crossings and other access options.
Reduce private transport therefore increase positive community effects					
STRESS AND ANXIETY					
New buses and rolling stock	Reduced stress	Those who use public transport and those who may take up the use of public transport due to improved an environment			Public education regarding new and improved buses and trains.
Increased reliability and frequency	Reduced stress	Those who use public transport		Decreased use and overcrowding due to more choice.	Public education regarding new timetable options.

		No change for school children			
New kneeling buses	Better public transport access therefore less stress and anxiety	Those with access issues / disabilities			Public education regarding options for those with access issues or disabilities
Time taken to kneel bus to allow access	Impatience at time taken	Increased stress to other bus users.		Education of public	Driver management of the time taken to kneel a bus. Perception that it is being dealt with efficiently will assist
Increased fares	Increased stress for people who can't afford the fares.	Those on low income Maori and Pacific peoples			Look at the possibility of a means tested transport subsidy system.
	No change in stress and anxiety to those not affected	Rural people will not alter stress levels as not covered by public transport already. This may already be a source of stress?			
Transport proposals specific to particular communities, eg, Paremata / Mana Esplanade	Stress, grief and anger of communities	Communities affected by transport proposals	Past experience, discussion within community	Not being informed, kept in the loop, having previous assurances overturned by authorities. Crown	Crown systems should not be inconsistent with and take into account previous decisions or

				systems responses	assurances.
	Stress	Cultural issues, Maori and Pacific peoples less likely to complain if there are problems or they don't like any part of a plan, eg, proximity to housing			

Appendix 3 – RLTS packages used in the assessment workshop

Package one: Public transport (scheduled train and bus services) infrastructure improvements

General Wellington Transport Information

Greater Wellington's public transport services operate in five key transport corridors. The network consists of rail-based, long distance main trunk services with bus feeder routes in the northern corridors and, south and west of the CBD, trolleybuses on the busiest routes and diesel buses on secondary routes.

Operational funding for public transport in Greater Wellington comes from three main sources:

1. Fares cover approximately 75% of total system operating costs (farebox recovery ratio).
2. Regional rates account for 60% of the remaining net costs
3. Land Transport New Zealand funding meets 40% of the remaining net costs.

Public transport is relatively well patronised in the Greater Wellington region compared with the New Zealand average. In 2001, 4.3% of total trips made in the region were by public transport. This compared with around 76% of all trips made by car and 17% by active modes (walking and cycling). Public transport use in 2001 was split between 37.3% using train and 62.7% bus. Train trips are approximately evenly split between the Western and Hutt Corridors. There were a greater number of short bus trips taken compared with a smaller number of long train journeys, consistent with the region's strategy of train-based trunk services and bus feeders.

Public Transport infrastructure improvement package in the RLTS

Public transport infrastructure improvements in the RLTS take \$1334 million out of the total \$3107 million ten year RLTS spend. Plans to improve public transport infrastructure include the following:

Rail infrastructure

1. New double tracking and new stations
2. Increasing the distance able to be covered by the (new) electrified units
3. Improved rolling stock / trains
4. Track and station improvements, including accessibility

The outcomes of these are increased speed of trains and improved timetable frequency.

Bus infrastructure

5. New trolleybuses (unbudgeted)
6. New bus stop shelters and at least 35% of stops being covered.

The outcomes of these are expected to be increased reliability and speed of trolley buses (if budget becomes available), and improved conditions for waiting for buses.

Please note that there are also plans to improve ease of use of rail and buses, such as integrated ticketing and real-time travel information. These are being assessed in a separate package.

The infrastructure package of options more specifically includes elements such as:

- New rail stations on the coast – Lindale and Raumati. These areas have a mix of populations living in them, with a significant proportion of low-middle income households, with smaller proportions of high income ‘lifestyle’ residents. The nearest rail link is currently several kilometers away. Pedestrian access, bus interchange, security and park and ride facility will be provided.
- Coastal rail lines will have a 1.3 times improvement in the frequency of train services. Trains will also run faster between destinations. This will affect all stops from Wellington rail station to the ends of the line. The stations service many different communities, largely bringing workers into the Wellington CBD and Porirua, but also feeding all of the other community facilities in the area. Improvements include double tracking between MacKays and Lindale.
- Improvements the Wairarapa rail services – increased frequency of train services and shorter journey times.

Package two: Public transport (scheduled train and bus services) ease of use improvements.

General Wellington Transport Information

Greater Wellington's public transport services operate in five key transport corridors. The network consists of rail-based, long distance main trunk services with bus feeder routes in the northern corridors and, south and west of the CBD, trolleybuses on the busiest routes and diesel buses on secondary routes.

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4. Fares cover approximately 75% of total system operating costs (farebox recovery ratio).
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Public Transport ease of use improvements package in the RLTS

Public transport ease of use improvements in the RLTS will take approximately \$53 million of the public transport spend over the next ten years (out of the total \$3107 million ten year RLTS spend). This is complemented by public transport infrastructure improvements of \$1334 million over ten years. Improvements to ease of use include making services more accessible for people with disabilities, providing more information for travellers and making use of different modes within a single trip easy. The RLTS hopes to improve public transport ease of use by:

Rail services

7. Improved rolling stock / trains
8. Track and station improvements, including accessibility
9. Integrated rail and bus stations, including pedestrian access, security improvements and park and ride facilities.
10. Integrated ticketing between bus and rail and use of 'zone fares'.
11. Real time information systems for the bus and rail network.

The outcomes of these are higher quality traveling environments, more information for travellers and facilities that allow integrated travel.

Bus services

12. New trolleybuses
13. New bus stop shelters and at least 35% of stops being covered.
14. Timetable improvements on bus routes including increased speed of service and improved timetable frequency
15. Increased evening, after midnight and weekend/public holiday bus services
16. Integrated rail and bus stations, including pedestrian access, security improvements and park and ride facilities.

17. Integrated ticketing between bus and rail and use of 'zone fares'.

18. Real time information systems for the bus and rail network

The outcomes of these are expected to be increased reliability and speed of buses (and trolley buses if budget becomes available), more regular services off-peak, improved conditions for waiting for buses, more information for travellers and facilities that allow integrated travel.

Total Mobility Access scheme

Ongoing support for half-price taxi scheme for people with a permanent disability and maintenance of the 29 hoists. Significant expansion of the scheme for more people and better information made available to them. Twenty percent of the population has some form of disability, with the most common being mobility, agility and/or hearing.

Package three: Travel Demand Management that promotes modal shift, and improvements to walking and cycling

Travel Demand Management (TDM) attempts to influence travel demand by using measures that increase transportation efficiency, improve and influence travel choices, and reduce the need to travel (see glossary for examples of TDM measures). TDM, walking and cycling components are expected to take \$44 million⁷ of the \$3107 million ten year spend. It is important to note that the strategy does not account for \$130 million⁸ walking and cycling monies spent by city councils, though such budgets are largely for footpath renewal/ resurfacing (\$128 million) so will not change the relative spend considerably. In 2001, 4.3% of total trips made in the region were by public transport. This compared with around 74% of all trips made by car and 17% by active modes (walking and cycling).

The Greater Wellington Regional Council Transport Strategy Programme includes a number of TDM programmes:

- **Travel plans (\$10 million)** – ways in which a community, business or institution (including schools and hospitals) can reduce the impact of journeys made by people to and from their base location. Travel plans provide options to encourage the use of sustainable transport such as walking, cycling, public transport, and car-sharing. Travel plans can include a mixture of supportive measures (such as appointing a travel coordinator, rideshare matching, and providing shower facilities) and incentives (such as subsidised public transport). Walking school buses are an example of school travel planning.
- **Bus priority measures (\$20 million)** - particularly in Wellington CBD. These include bus lanes, priority space for buses at intersections, and bus phases at traffic lights, to allow buses to move ahead of general traffic. The intended bus priority measures for the CBD are not spelled out in the strategy. (PT26)
- **Funding to implement regional walking and cycling strategies (\$6 million).**
 - Advocate for cycling and funding, hold a regional cycling forum, employ a cycling coordinator
 - Run education initiatives to enhance cycling safety with drivers
 - implement the Kiwi Cycling/Bikewise programme in schools and investigate the need for an adult cycle skills programme
 - Improve inadequate sections of the regional cycling network and improve local networks
 - facilitate cycle carriage on trains with a small charge for peak carriage and free off peak carriage
 - produce regional cycling maps
 - review pedestrian access to public transport nodes and implement improvements (road crossings, lighting, shelter, surface quality, disability needs)
 - Encourage high levels of pedestrian accessibility in land development (review plan changes, development proposals etc.) (SR2)
- **Advanced traffic management systems (ATMS) and High Occupancy Vehicle (HOV) lanes (\$8 million).** A variety of measures are proposed to increase the efficiency of the existing infrastructure of which ATMS and HOV are examples. HOV lanes can only be used cars and other vehicles with

⁷ An agglomeration of Passenger Transport references 18 and 26, \$1 million from reference 19. And Strategic Roding references 2, 3 and 21.

⁸ July 2004 analysis of published LTCCP's

more than one occupant, making the journey time shorter for high occupancy vehicles and thus creating an incentive for ride-sharing. Advanced traffic management system (ATMS) sets out to monitor, control and manage traffic on streets and highways by providing highway incident management and real time information to assist in route selection and travel planning. An example of ATMS includes the electronic signage coming down Ngauranga Gorge (SR3, SR21)

The Strategy recognises that road pricing (which includes toll roads, high occupancy toll (HOT) lanes, cordon charges, congestion pricing, area charges, distance pricing, and parking charges) has the potential to provide significant benefits, but that there are still significant issues to be resolved before any road pricing strategy could be implemented. Therefore the strategy sets out the steps for investigation of road pricing options, rather than pricing proposals, which will need to be developed at a later date.

Glossary

Examples of TDM strategies include:

- Measures which seek to promote modal shift to sustainable transportation (away from single occupant car use) such as improving public transport services, providing safe cycle-ways, and road pricing.
- Measures which seek to reduce peak-time travel, such as tele-working and flexi-time, and peak-time congestion charges, car pooling
- Measures which seek to reduce unnecessary travel, such as mixed use development, and education campaigns to increase awareness of the “costs” of travel choices; parking charges and supply;
- Measures which seek to improve the efficiency of the existing transport network, such as real time traffic monitoring; advanced traveller information systems; road freight by rail.

Package four: Grenada to Gracefield Roding Package

The proposal is to construct a road across the hills from Grenada to Petone continuing partly on existing roads and partly alongside the railway across the Hutt Valley to Gracefield. The project would be undertaken in two parts. The Grenada to Petone section is written into the initial 10 year period of the RLTS. The section across the Hutt Valley is shown in the 11 to 20 year timeframe. Communities adjacent to the new road include Grenada, Petone, Moera, Ava, Woburn, Alicetown, Gracefield and Seaview. Communities near the beginning and the end points of the route include Southgate, Sundale, Redwood, Glenside and Tawa. These communities are a mix of high and low income, but it is safe to assume that a number of residents within these communities have lower than the national averages for income, employment, education and access to private transport and other resources. This project is expected to take \$180 million of the \$3107 million ten year spend.

Stage 1 would involve the construction of a new four-lane road connecting with the Grenada off-ramp on the Johnsonville to Porirua section of the Motorway (SH1). The road commences at the top of Westchester East Drive adjacent to the northern landfill, cutting across the hills in the vicinity of some lifestyle blocks to the Petone end of the Hutt Road (SH2) near the mouth of the Korokoro Stream. The 'lifestyle blocks' area is generally known as Lincolnshire Farm and is identified for mixed use commercial and residential development in Wellington City's Northern Growth Management Plan.

By allowing vehicles traveling between the Hutt Valley and immediately south of, and to the north of Grenada, to avoid the Ngauranga Gorge and the Hutt Road it would have the effect of:

- reducing traveling time for those using the route
- reducing congestion and travel time on the alternative routes
- increasing traffic at the entry and exit points of the new roads and the communities from where these vehicles come from and go to
- reducing fuel use and emissions
- providing a new private and public transport link promoting localised increase in public transport mode share but a region wide decrease in public transport use
- providing access to a development area
- having a four lane road traversing the southern margin of the Belmont Regional Park.

Stage 2 the Petone to Gracefield section, referred to as the Cross Valley Link (Valley Floor Connector), is proposed to be a four-lane road and there are two route alternatives, the first along existing neighborhood streets and the second alongside the railway line. The route leaves Hutt Road at the new Dowse Interchange, and runs in an easterly direction:

- alternative 1 would entail the widening of Wakefield Street (which runs beside the rail line) and the western end of White Line East with a new road bridge over the Hutt River with ramps etc connecting to local streets
- alternative 2 also widens Wakefield Street but then deviates along the rail line to share a new road and rail bridge across the river, then beside the rail line to join Whites Line East at the existing Whites Line/ LudlamCres/ Randwick Road roundabout.

Both alternatives would be accompanied by traffic calming measures along the Petone Esplanade to reduce its attractiveness to heavy traffic as a route to Gracefield, having an overall the effect of:

- diverting traffic coming from the south, especially trucks, from The Esplanade onto the four lane road.
- diverting south bound traffic, especially trucks, from High Street and Cambridge Terrace onto the four land road.
- enabling better community use of the valuable Petone foreshore precinct.

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