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**Regional Council**  
TE RAUHITANGA TAIAO

# RLTS Risk Assessment

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This document supports the development of the Auckland Regional Land Transport Strategy 2010. It is the culmination of work developed by the Technical Advisory Committee (TAC) to support the Auckland Regional Transport Committee. The TAC includes representatives from all local territorial authorities, Auckland Regional Transport Authority, Auckland District Public Health Board and other technical experts.

Reviewed by:

A handwritten signature in black ink, appearing to read 'Don Houghton', written in a cursive style.

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Date: October 2009

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# RLTS Risk Assessment

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# 1 Purpose

This report has been prepared to assist the Auckland Regional Transport Committee with preparation of the Auckland Regional Land Transport Strategy 2010.

## 2 Executive Summary

The Auckland Regional Council (ARC) commissioned McCormick Rankin Cagney (MRC) to undertake a risk assessment of the draft Regional Land Transport Strategy 2010 (RLTS). The findings of this risk assessment are summarised in the table on the next page.

This report outlines the results of this assessment, which are based on consultation with ARC officers; workshops with the Technical Advisory Committee; as well as additional research undertaken by MRC. The assessment has grouped risks into the following key categories:

- Transport
- Technical
- Political
- Land use
- External

Individual risks were then evaluated in terms of their:

- **Likelihood:** How likely it is that a risk event could impact the ARC, taking into account both the external environment and the existing systems of internal control.
- **Impact:** The impact of an event on the region, measured in terms of damage to persons or property.
- **Exposure:** The likelihood and impact together define the current exposure of the ARC to a particular risk (prior to the application of mitigation measures).

Potential mitigation measures were also identified. These are measures which reduce the chance of a risk occurring or reduces the negative impact in the event that it occurs. As a result of this risk assessment we have identified the following specific policy recommendations:

- **Sub-policy 2.1.5:** Ensure local government financial mechanisms, such as local government rates and contribution policies, support sustainable transport modes.
- **Sub-policy 2.1.6:** Investigate the development of new financial mechanisms, such as commercial parking levies, to fund local roads, internalise negative externalities generated by private vehicles, and support sustainable transport modes.
- **Sub-policy 2.1.7:** Advocate to central government to review tax treatments for employee transport benefits, such as parking, which undermine sustainable transport choices.
- **Sub-policy 6.2.11:** Encourage relevant government agencies to secure designation(s) and land required to support the strategic roading projects identified in the RLTS.

- **Sub-policy 7.4.4:** Support regional research into technical transport planning issues that support the objectives of the RLTS, particularly in relation to the links between sustainable transport modes and economic development in urban areas.
- **Sub-policy 8.1:** Investigate and develop new regional revenue streams, such as commercial parking levies and land value uplift, to fund the implementation of the RLTS and reduce reliance on external funding resources, particularly central government.
- **Policy 11.3:** Develop measures and mechanisms to manage the short-term impacts of unpredictable events, such as fuel supply constraints and catastrophic events, on the socio-economic performance and stability of the region.

In general, the measures identified in this assessment were relatively effective at mitigating transport and technical risks. Risks associated with the political, land use, and external categories, however, proved more difficult – mainly because in these areas the ARC has only limited influence. Despite these limitations, this assessment identified that a sustained focus on risk management is likely to contribute support to the objectives of the RLTS.

Risk Number	Risk					Mitigation measures	Effect of mitigation	Residual risk
	Category	Description	Likelihood	Impact	Exposure			
1	Transport	Effectiveness of road infrastructure different from expected	Medium	High	Med-High	1. Rectify transport market distortions 2. Develop robust frameworks for project evaluation. 3. Deliver user-focused transport interventions	High	Med-Low
2	Transport	Effectiveness of public transport infrastructure different from expected	Medium	High	Med-High		High	Med-Low
3	Transport	Effectiveness of travel demand management different from what is expected	Medium	High	Med-High		High	Med-Low
4	Transport	Transportation market distortions encourage inefficient travel and land use patterns	Medium	High	Med-High		High	Med-Low
5	Transport	Private bus and ferry operators do not support strategic direction	Medium	Medium	Medium		Medium	Med-Low
6	Transport	Private parking operators undermine regional transport strategy	Low	Medium	Med-Low		Medium	Low
7	Technical	Failure to protect routes of future transport corridors	Medium	High	Med-High	1. Secure designations for strategic transport routes 2. Implement performance monitoring and evaluation 3. Promote regional priorities for transport research 4. Analyze risks to estimates of construction costs	High	Med-Low
8	Technical	Ineffective performance monitoring	Medium	Medium	Medium		Medium	Med-Low
9	Technical	Inaccurate construction cost estimates	Medium	Medium	Medium		Medium	Med-Low
10	Technical	Complexity (system effects, impacts of interventions, behavioural responses)	Low	Medium	Med-Low		Medium	Low
11	Political	Supercity delays implementation (within the next 6 years)	High	Low	Medium	1. Raise central government awareness of regional transport priorities 2. Raise public awareness of the implications of regional strategies 3. Develop independent revenue streams to support transport investment	Low	Medium
12	Political	Misalignment between government agencies (e.g. strategic direction and quantum of funding)	Medium	High	Med-High		Medium	Medium
13	Political	Public resistance to the implementation of transport and land use strategies	High	Medium	Med-High		Medium	Medium
14	Political	Need for strategic regional transport and land use lacks public support	Medium	Medium	Medium		Low	Medium
15	Political	Supercity delays implementation (within the next 30 years)	Medium	Low	Med-Low		Low	Med-Low
16	Land use	Lack of enabling mechanisms to realise intended land use	High	Medium	Med-High	1. Ensure public institutions support effective land use outcomes 2. Focus on connecting land use outcomes with social values	Medium	Medium
17	Land use	Local government policies do not support intended land use	Medium	High	Med-High		Medium	Medium
18	Land use	Location of public institutions distorts land use outcomes	High	Medium	Med-High		Medium	Medium
19	Land use	Market development cycles out of sync with transport investment	Medium	Medium	Medium		Low	Medium
20	External	Economic factors, such as economic growth	Medium	Medium	Medium	1. Understand and monitor the drivers of travel demands 2. Consider adaptive strategies for transport investment 3. Develop transport contingency plans to manage catastrophic events 4. Develop policies to manage fuel supply shortages.	Low	Medium
21	External	Energy prices differ from what is expected	Medium	Medium	Medium		Low	Medium
22	External	Unexpected catastrophic event (natural disaster or terrorist act)	Low	High	Medium		Low	Medium
23	External	Social trends (changes in attitudes, population, immigration)	Medium	Low	Med-Low		Low	Med-Low
24	External	Sea level rises affects performance of regional transport network	Low	Medium	Med-Low		Low	Med-Low
25	External	Technological change (vehicle technology, personal transport)	Low	Low	Low		Low	Low

## 3 Measures to Mitigate Risks

This section outlines measures to mitigate risks to the draft RLTS. Mitigation measures are presented in terms of the five risk categories identified in this assessment:

- **Transport:** The effectiveness of investment, transportation market distortions, and interaction between the interests of the ARC and private transport operators.
- **Technical:** The ability to protect transport routes, effectiveness of performance monitoring, construction cost estimates, and understanding of system complexity.
- **Political:** Local government reform, alignment between government agencies, and public support for regional transport and land use strategies.
- **Land use:** Lack of suitable enabling mechanisms, market development cycles, and public investment that does not support land use objectives.
- **External:** Effects of volatile economic growth and energy trends, catastrophic events, unforeseen social trends, sea level rise and technological change.

### 3.1 Transport Risks

Transport risks primarily relate to the effectiveness of the transport investment prescribed in the RLTS (which includes investment in road, public transport, and travel demand management); and to the degree of alignment between RLTS objectives and the interests of commercial transport service providers, businesses, communities, households and individuals. Measures to mitigate transport risks to the RLTS are discussed in the following sections.

#### **Rectify transportation market distortions**

Transportation market distortions are a major driver of current travel and lifestyle choices and are a significant threat to the objectives of the RLTS (for more thorough discussion refer to Donovan and Genter (2008) p.57-61 and Litman (2006)).

Transportation market distortions deliver subsidies to motorised transport modes, such as passenger transport and private vehicles, and in the process contribute to what are largely undesirable and inefficient transport outcomes.

Inefficient use of private vehicles, for example, reflects:

- road charging mechanisms that fail to account for time-of-use,
- local government regulations that have created a vast over supply of under priced parking,
- the existence of large un-priced negative externalities, such as air pollution and noise,

- funding mechanisms, such as rates and development contributions, which fail to incentivise desired land use outcomes.

The existence of these distortions are partly recognised in the draft RLTS, although they are primarily addressed through reliance on regulatory measures (such as land use zoning) and/or targeted investment (such as subsidies for public transport). It is suggested that successfully rectifying the unintended consequences of transportation market distortions also requires financial instruments that incentivise individuals and businesses to make more effective travel and lifestyle choices. Such instruments might include:

- **Tailored development contributions:** Local government development contributions are usually determined by calculating the average costs of providing new infrastructure to support growth across the district or region. This approach seems to contradict the motivation for more compact urban development, which seeks to encourage development in areas with lower marginal costs of infrastructure expansion. Instead of basing calculations on coarse average charges development contributions levied by territorial authorities could incentivise desired land use outcomes. This might consider reducing contributions levied on developments which:
  - are located in town centres,
  - provide quality urban design outcomes,
  - facilitate desired land use densities and diversity
  - incorporate transportation system efficiencies, such as unbundled parking.

Alternatively, those developments that fail to deliver on intended land use and transport outcomes should face higher development contributions. In this way, contribution policies become a lever through which local territorial authorities can incentivise specific development outcomes across a broad area.

- **Commercial parking levy:** The maintenance and operation of local roads is currently funded primarily through property taxes, or rates. This is a highly indirect and ineffective funding mechanism. It also unfortunately subsidises sprawling, low-density development patterns at the expense of more centrally located, high-value properties. The costs of maintaining and operating local roads could be met more directly and equitable through a targeted financial instrument, such as a commercial parking levy. This levy would seek to charge commercial properties based on the number of parking spaces they provide. Such a levy would fund local roads in a direct and equitable way while also encouraging the redevelopment of existing parking facilities.
- **Redevelopment of parking facilities:** The recently released Regional Parking Strategy is an important initial step towards achieving a more efficient and effective

parking supply. This strategy emphasises the need for regulatory reform that moves away from minimum parking requirements, particularly in town centres. Decades of minimum parking regulations have, however, created vast oversupplies of underpriced parking. This will take considerable time to build out of the urban fabric. There is scope too for encouraging the redevelopment of existing parking facilities. Redevelopment could be encouraged, not only through the commercial parking levy discussed previously, but also by reducing development contributions for redeveloping parking facilities into other uses. Such redevelopment is likely to reduce overall vehicle travel, suggesting there is a specific case for territorial authorities to waive the transport contributions levied on such redevelopment.

- **Equitable tax treatments:** Current tax structures do not treat various transport modes equitably. This has contributed to the development of corporate employment practices that favour private vehicle based remuneration over other modes. For example, many employers provide “free” parking to employees without incurring fringe benefit tax, whereas the provision of public transport passes is taxed. It may be possible to address inequitable tax treatments and ensure decisions about transport benefits and remuneration take place in an economically neutral environment.

Finally, there is a need to internalise the external costs of using vehicles in urban areas. These external costs result from congestion to other road users as well as vehicle emissions to air, water and soil. Even without electronic road pricing mechanisms and vehicle emissions testing there may be opportunities to internalise these negative costs, albeit indirectly, to vehicle users. Given the lack of central government support for a regional fuel tax, the most obvious means through which regional and local councils can internalise external costs is through the implementation of a commercial parking levy, as proposed above. A commercial parking levy could therefore comprise of two distinct components, namely: (1) maintenance and operation of local roads and (2) internalisation of negative externalities attributable to private vehicles. Revenue from the second component could then be used to mitigate the external effects of a vehicles use, for example, by funding improvements to public transport, walking and cycling.

Ultimately, we suggest that the RLTS needs to expand its horizons to give greater consideration to innovative financial instruments. Robust regulation and increased investment are necessary but not sufficient to achieve the objectives of the RLTS – financial instruments are a more subtle and comprehensive measure to achieve desired objectives. For this reason it is recommended that the RLTS incorporate policies that:

- explicitly recognise the existence of transportation market distortions,
- seek to rectify these distortions through the development of innovative financial instruments.

## **Develop robust frameworks for project evaluation**

Effective and transparent transport investment is dependent on robust frameworks for project evaluation. Such frameworks must seek to optimise transport investment, both at the level of individual projects and across packages of projects, against broader public policy objectives – many of which are difficult to reconcile with each other.

Robust evaluation frameworks explicitly link the attributes of individual transport projects to specific policies and, ultimately, the broader objectives of the RLTS. Only in this way can the value of both, individual transport projects and combined transport packages be tracked back to specific policies articulated in the RLTS.

The draft RLTS recognises the importance of ensuring that decision-making processes and procedures are consistent with overall strategic direction. For example, Policy 7 aims to “ensure the actions of public agencies in the Auckland region contribute to the implementation of the RLTS.” Subsequent policy points include:

- 7.1 Develop specific projects and activities required to give effect to the RLTS.
- 7.2 Ensure the RLTP gives effect to the preferred strategic option.
- 7.3 Regularly monitor progress in implementing the RLTS.
- 7.4 Prepare supporting strategic and implementation plans to give effect to the RLTS.

Responsibility for developing and implementing frameworks for project evaluation lies primarily with the Auckland Regional Transport Authority (ARTA). However, it is important for ARC to collaborate with ARTA and ensure evaluation frameworks are transparent and give effect to the objectives of the RLTS, thereby mitigating the risk of ineffective transport investment.

## **Deliver user focused transport interventions**

Investment in transport infrastructure (whether in roads, public transport, or walking/cycling) is unlikely to be effective if it does not recognise and respond to user needs. These needs vary considerably between different locations and demographic groups, and also evolve in response to socio-economic trends. The need for user-focused transport interventions is particularly important for those modes where the RLTS is aiming to improve uptake, such as public transport, walking and cycling – transport modes which involve a greater degree of interaction with the urban environment. Safety and security, for example, is crucial to vulnerable transport users. In some locations, people’s concerns over safety and security, particularly at night, may undermine efforts to increase uptake of walking and public transport unless perceived safety concerns are addressed. Similarly, males tend to be less enthused with alternative transport modes and more likely to travel by private vehicle. However, males are also much more likely to make use of high-tech travel devices, such as, smart

cards and mobile technologies, suggesting that user-focused interventions can possibly be a hook into challenging transport markets.

Emerging communications technologies are creating new opportunities to better cater for user needs. Much of this technology provides public transport with a competitive advantage over private vehicle travel. Wireless internet, for example, may be used more easily on public transport. Such facilities may prove valuable on longer distance rail and bus services or in major public transport interchanges. Growth in internet capable mobile and laptop computers (especially net books) suggest demand for wireless internet facilities will increase in the future. Finally, advanced electronic ticketing systems can act not only as a payment mechanism for public transport, but also parking and road tolls, providing detailed information on people's travel decisions. Encouraging people to make different travel and lifestyle choices requires a detailed understanding of their reasons for their current choices.

## 3.2 Technical Risks

Technical risks primarily reflect our limited and/or incomplete understanding of technical aspects of transport planning and how this lack of understanding may impact on the objectives of the draft RLTS. Measures to mitigate technical risks are discussed in more detail in the following sections.

### **Secure designations for strategic transport routes**

Securing designations for major transport routes is essential to expanding transport networks in line with increasing travel demands. Designations are particularly critical to ensuring strategic projects are able to be built in a timely and cost-effective manner. Even where strategic transport routes are being tunnelled, it is necessary to ensure foundations for new development along the route accommodate the transport corridor. Securing designations is not only economically beneficial, but also avoids public opposition to expansion of the transport network and minimises the ultimate disruption to households, communities and businesses. Failing to secure designations for the Waterview Connection, for example, delayed improvements to the regional strategic road network as well as having serious implications for affected communities.

The draft RLTS contains some policies that indirectly aim to ensure that strategic transport routes are protected. For example, Policy 4.3 aims to "ensure public transport projects of high regional significance are implemented," including: Manukau and Onehunga Rail Connections and CBD Rail Link. Sub-policy 4.3.3 also requires that necessary steps are taken to develop connections for: Busway extension to Hibiscus Coast, Airport Rail Loop and Avondale-Southdown rail connection, while Sub-policy 4.3.4 identifies that further investigation is required into North Shore Rail and either Panmure-Botany-Manukau bus RTN/QTN or Henderson-Westgate-Albany bus

RTN/QTN. It may be necessary to adjust these policies to include explicit reference to the need for relevant agencies to designations for strategic public transport projects.

Similarly, RLTS policy 6.2 aims to “undertake a programme to develop the roading network to give effect to the preferred strategic option,” which includes the following improvements of regional significance: SH20 Waterview Connection, Onehunga-East Tamaki, AMETI, airport improvements and East-Tamaki connections. The draft RLTS also identifies the potential to include the additional Waitemata Harbour Crossing and SH1 Puhoi to Wellsford road improvements. Many of these projects will involve designations or land purchases of some kind. We suggest an additional sub-policy 6.11 is included worded to “encourage relevant government agencies to secure designation(s) to implement the strategic roading projects identified in the RLTS.”

In situations where the route is uncertain, there may be a need to secure multiple designations, at least initially. While seeking multiple designations is a time-consuming and expensive exercise, this is preferable to the considerable delays and community opposition incurred when infrastructure projects are foisted onto an otherwise unsuspecting community. Securing multiple designations is particularly relevant to large projects, such as the CBD rail loop.

### **Performance monitoring and evaluation**

Performance monitoring and evaluation are crucial to ensuring that progress towards RLTS objectives are able to be measured in an objective manner. Both the ARC and ARTA have developed a wide range of indicators for measuring the performance of public transport services. Moreover, the draft RLTS introduces a range of KPIs that are linked to RLTS objectives, such as commercial travel-times, road casualties, speed profiles, regional accessibility, public transport accessibility, equitable social access, selected journey times, walking rates and distances, greenhouse gas emissions, stormwater quality, mode share, travel distances, and public transport trips. Our analysis of the draft RLTS suggests performance monitoring and evaluation of the RLTS may be enhanced in the following three key areas:

- **Land use:** These indicators would quantify progress towards land use objectives, such as residential and employment densities, relative changes in land values (for example in town centres versus urban periphery), and internalisation of economic activity (as measured by census journey-to-work trends). Land use and transport integration received specific mention in the amended GPS and is of particular import to the Auckland region (New Zealand Government, 2009).
- **Urban structure:** These indicators could seek to quantify progress towards improved urban structure, such as connected/permeable street networks, block size, and space syntax. These structural components typically fall below the radar of traditional transport and land use planning, but ultimately have large impacts on the effectiveness of the transportation system, particularly its resilience and

adaptability. These indicators are particularly important to Greenfield development on the periphery.

- **Economic development:** These indicators could seek to identify how investment in the transport system was impacting on economic development, such as trends in household expenditure, overall affordability, costs of negative externalities, and trends in average and marginal costs of transport users. The distinction between average and marginal costs is important.

It may be desirable to supplement analysis of public transport trips with estimates of passenger kilometres travelled. The use of trips as the primary metric tends to understate the significance of ongoing patronage growth on the Northern Busway and Rail Network, which involve longer distances and higher speeds than the average public transport trip. This suggests recent growth in public transport patronage is likely to have resulted in more kilometres travelled than the analysis of trips would suggest. With these minor additions and amendments the monitoring and evaluation processes outlined in the draft RLTS go a long way towards mitigating the technical risks identified in this assessment.

### **Analyse risks to construction cost estimates**

Experience suggests that construction cost estimates are typically understated. Inaccurate construction costs affect the effectiveness of transport investment in the following ways:

- There is a greater likelihood that cost-items will be omitted as opposed to being unnecessarily included.
- Sociological tendencies for people to be overly optimistic about the cost and benefits for a particular transport intervention.
- Incentives for public servants and private consultants to underestimate costs to ensure large projects proceed to construction.

All of these factors skew the risk profile for construction cost estimates to the upside. Analysis of historical construction cost estimates may help shed light on areas of risk. This could be by way of a regression analysis that seeks to identify the environmental factors in which inaccurate cost estimates are most prevalent. Such analysis could, for example, highlight whether cost estimates for certain types of projects, such as tunnels, are less accurate and thereby help inform the focus of efforts to improve cost control, particularly around contingencies.

There may also be scope for developing aggregate measures on the expected range of costs for different types of transport investment. These costs could be based on actual built costs for similar projects in Auckland or New Zealand. For example, developing an average cost per kilometre of new motorway along with a low and high estimate, would allow for a quick comparison of cost estimates for new projects on the basis of

historical experience. Where cost estimates vary substantially from past experience the onus should be placed on those responsible for developing the cost estimate to identify relevant factors explaining the difference.

### **Promote regional priorities for transport research**

Mitigating the risk of transport system complexity is highly dependent on improved understanding of the interactions between transport and land use. This is best facilitated by research in areas where our understanding is incomplete. Previous discussion has hinted at the inherent complexity of the transport system. Investment in new infrastructure and services takes place against a background of dynamic network effects, micro-scale impacts, and constantly evolving socio-economic trends. The complexity of the transport system is related not only to the range of effects and trends but also the nature of the interactions between them. Many of these factors influence each other in unpredictable ways - feedback between systems may be non-linear and/or threshold based.

For example, a significant body of research has discussed the impacts of subsidised parking in encouraging excessive vehicle travel. Removing minimum parking regulations and pricing demand is, in the short run, likely to contribute to reduced vehicle travel. In the medium term, a more efficient parking supply may contribute to reduced vehicle ownership. In the long run, however, such measures may allow more compact development patterns that further reduce the need for vehicle travel. The cumulative long term impacts of parking reform on vehicle travel therefore extend beyond considerations of vehicle costs and ownership to include how it influences the underlying urban form. Little research has been undertaken into the magnitude of the inter-related but distinct effects of parking reform on travel and lifestyle choices.

These complexities raise the importance of ongoing research in transport and related fields. Transport research in New Zealand is currently funded through two primary channels, both of which are directed by central government, namely: (1) NZTA research programme which consists of approximately \$4 million in annual funding that is split 50:50 between NZTA directed projects and industry-led initiatives; and (2) FRST Building Sustainable Cities and Settlements: This fund seeks to direct approximately \$4 million annually.

We suggest that the risk posed by transport system complexity to the objectives of the RLTS is best mitigated through:

- Identifying regional priorities to guide research into transport system complexity, such as the long term impacts of parking reform.
- Actively engaging with regional research institutions, such as tertiary education providers and NIWA, to align research efforts where possible.

- Promoting regional priorities to both the agencies and applicants involved in existing research programmes, such as NZTA and FRST.
- Where necessary supplementing funding for research activities that are of direct relevance to the objectives of the RLTS.

By promoting regional priorities for transport research understanding of transport system complexity will hopefully increase over time and reduce the risks to the RLTS.

### 3.3 Political Risks

It is fair to say that central and regional government transport priorities are currently in a state of flux. This change has been driven primarily by volatile fuel prices and economic growth, the establishment of the New Zealand Transport Agency (NZTA), changes to the Government Policy Statement on Transport (GPS) and proposed reforms to local government in Auckland.

Mitigating these risks lies somewhat beyond the scope of the RLTS and instead relates more broadly to how the ARC engages and collaborates with different government agencies and the wider public. The discussion that follows deliberately avoids broader aspects of political management and instead focuses on mitigation measures of political risks that are related to the draft RLTS.

#### **Raise central government awareness of regional transport priorities**

The Auckland region is distinct in terms of its density, unliveable town centres, high population growth, high vehicle travel demands and strong international connections. This means that Auckland faces transport challenges that differ in many respects from other parts of New Zealand. These distinctive features mean that transport priorities may differ from the rest of the country. Time-of-use road pricing, for example, is likely to be of huge benefit to Auckland (and to a lesser extent Wellington) but of markedly less importance to other areas of the country.

It is important to highlight how regional transport priorities relate to the focus of the amended GPS on economic development, which has typically been assessed in terms of travel-time savings. These links between travel time savings and economic development are, however, tenuous at best (Metz, 2008b, Metz, 2008a). This presents an opportunity for the Auckland region to redefine our understanding of how transport investment relates to economic development, possibly as distinct from elsewhere in the country.

This may require the development of new indicators of transportation system efficiency. There are intuitive advantages from shifting away from measuring the benefits of transport investment in terms of travel time savings to more robust indicators, such as land values (Kim et al., 2007, Patton, 2007, Matthews and Turnbull,

2007, Rybeck, 2004, Song and Knaap, 2003, Ryan, 1999, Cohen and Morrison Paul, 2007, Debrezion et al., 2007, Tian, 2006, Brons and et al., 2003, Bateman et al., 2001, Evans and Beed, 1986).

Land values may prove to be a more reliable indicator of transportation system efficiency because they:

- account for complex externalities (both positive and negative), such as agglomeration and amenity impacts,
- incorporate urban design attributes, such as liveability, amenity and inclusive design (particularly where they contribute to tangible social outcomes, such as crime rates),
- are easily linked to innovative infrastructure funding mechanisms, such as land value uplift, which may help diversify regional funding streams.

By developing economic indicators that are more aligned with regional transport priorities, the ARC may convince central government of the benefits delivered by the projects in the RLTS. This will raise central government awareness of the somewhat unique transport needs of the Auckland region.

### **Raise public awareness of the implications of regional strategies**

Regional transport and land use strategies should not exist in a vacuum – there is a need to raise awareness of their implication amongst the wider public, private developers and even professional consultants.

Local resistance to development around the train station in Orakei, for example, illustrates how proactive community engagement may be required to help soften community opposition to the development of more integrated transport and land use solutions. Similarly, the intransigence of professional engineering and planning consultants to move away from minimum parking requirements will only slow progress towards more effective transport and land use outcomes. Raising awareness of regional transport and land strategies may not only serve to mitigate the risks of public opposition, but also increase buy-in from the private sector. For example, active promotion of regional transport priorities to real estate agents may help increase the desirability of properties that stand to benefit from future transport investment.

Policy 3 of the RLTS relates to behaviour change and aims to “manage the transport system to limit the growth in demand for private vehicle travel.” Policy 3.3 describes the need to “work with businesses, schools and communities to develop and promote more sustainable transport options.” These policies and sub-policies provide adequate scope for raising public awareness of the implications of regional transport strategies and will make an important contribution to supporting the objectives of the RLTS.

## **Develop independent revenue streams to support transport investment**

Recent uncertainty in central government attitudes to regional transport funding, as evidenced by the move to abandon the regional fuel tax, highlights the need for the Auckland region to develop independent revenue streams to support transport investment. These revenue streams must satisfy two main criteria, namely: they must be independent of central government and they must be able to be implemented under existing legislation. Previous sections have discussed how a commercial parking levy could be used to (a) fund the operation and maintenance of local roads and (b) internalise the negative costs of vehicle use. A commercial parking levy creates a revenue stream that is both independent of central government and able to be implemented under existing legislation. Donovan and Genter (2008) write that commercial parking levies “under sections 16 to 18 of the Local Government (Rating) Act 2002 can be set for the purpose of funding local roads, subject to the procedural requirement that the activities or groups of activities are identified in the local authority’s funding impact statement, created pursuant to the LGA’02.”

Similarly, “land value uplift” describes a process by which proposed transport improvements are part funded by capturing the increase in property values of adjacent properties. This process would seek to “capture” part of the increase in the value of privately owned land associated with public investment in transport solutions. Such a process allows the wider benefits of transportation improvements to be used to accelerate projects by covering later costs, such as debt servicing and operational costs. “Land value capture” mechanisms require agreement between property owners and the relevant government agency. There are overseas examples of such agreements that could be adapted to the New Zealand context. This process would deliver most benefit if the funds were captured in advance of project construction. Alternatively, the process could index the value of affected properties to a defined control for an agreed period of time, say five years. Where properties appreciated in value over this period, then a proportion of the appreciated value would then be payable to the government agency.

Land value capture mechanisms provide a mechanism for leveraging off public investment in transport infrastructure in a way that is more spatially equitable. For example, investment in rail networks is likely to deliver what are effectively “windfall gains” to private property which is adjacent to train stations, while possibly disadvantaging some properties that are adjacent to the rail line but not in close proximity to a train station. In this example, public investment in the rail network is effectively favouring some properties over others and in the process creating a transfer of economic wealth. Land value capture could seek to redistribute wealth to mitigate these effects. Land value capture also provides an alternative to “public private partnerships” (PPPs), particularly for relatively small transport projects. Whereas PPPs focus almost exclusively on large scale projects, land value capture mechanisms may

be applied over a range of financial and geographic scales, such as for example a single street. Finally, land value capture mechanisms provide an incentive to government agencies to invest in transport solutions that maximise their value delivered to wider society, while also ensuring a degree of spatial equity. The potential for hedonic regression analysis to inform the development of land value capture mechanisms, and subsequently fund transportation improvements, is potentially a worthwhile area for further research.

### 3.4 Land use Risks

Land use is a primary risk to the outcomes sought by the RLTS, but one which is hard to mitigate within a transport strategy. The following recommendations are by no means exhaustive, but are intended to present some of the key ways in which local government policies may be amended to support better land use outcomes. Previous discussion on transportation market distortions is also relevant to mitigating the risk of ineffective land use outcomes.

#### **Ensure public institutions support effective land use outcomes**

Public institutions are often relatively permanent features of the urban environment and generate consistently high travel demands, particularly by socially disadvantaged groups. There is a real need to ensure that public institutions are located where they can support efficient land use and transport outcomes.

There may be opportunities for more coordinated delivery of public services. For example primary and secondary schools (funded by central government) may be able to make use of existing community facilities, such as libraries, swimming pools and sports fields (funded by local government). This could avoid unnecessary duplication of these facilities and help raise substantial savings. This may also allow for the establishment of new public facilities, such as schools, within existing urban town centres identified for intensification and redevelopment.

The collocation of compatible public facilities requires something of a step change in collaboration between different levels of government. Central government agencies in particular need to engage more with regional transport and land use priorities. To catalyse this engagement there may be a need for the ARC to independently identify case studies where investment by separate government agencies has not contributed to intended land use outcomes and resulted in inefficient allocation of public resources.

#### **Focus on connecting land use outcomes with social values**

Land use and transport policies tend to identify where future growth in residential and employee population is best accommodated. This typically results in a process where

more compact development is zoned to occur around existing town centres, which is then supported by investment in the capacity of transport connections.

This process, however, tends to underplay the importance of social values in driving where redevelopment and intensification occur. Put simply, if the town centres identified for more compact development patterns do not deliver what people want then the intended land use outcomes are unlikely to be achieved. Understanding and responding to these values is likely to mitigate the risk of land use outcomes that do not support the objectives of the RLTS. Some features, such as the desirability of coastal properties, are immutable and unable to be changed irrespective of land use strategies. Other features, such as crime rates and proximity to schools, are more easily influenced.

U.K. experience suggests, for example, that high-quality street lighting can reduce rates of incidental crime by approximately 20 per cent (Farrington and Welsh, 2002). This means that improved street lighting may be an essential component of overcoming perceived security issues in town centres. Similarly, certain types of transport solutions, moreover, can actually undermine land use intensification. For example, research from the U.S. found that residential properties fronting onto busy streets sell for 3.3 per cent less on average. This is relevant in town centres located on arterial roads, such as New Lynn, where traffic intensity is likely to undermine the potential for residential intensification and/or diversification.

Policy 1.4 of the draft RLTS aims to “ensure that design for streets and transport infrastructure contributes to quality liveable environments and takes account of the different roles and character of particular locations.” We support the intent of this policy to connect land use outcomes and social values.

### 3.5 External Risks

There are a number of external risks that may affect progress towards the objectives of the RLTS. These risks relate to the potential impacts of factors over which central, regional and local government authorities have little control. By definition, this means that there are somewhat less opportunities for the ARC to affect the likelihood of the risk occurring. The following sections discuss external risks to the RLTS.

#### **Understand and monitor the drivers of travel demands**

Changes in travel demands are driven by a number of socio-economic factors, such as economic growth, fuel prices, workforce participation (which incorporated trends in both unemployment and age), vehicle ownership and income. Perhaps more important to the objectives of the RLTS is the impacts of socio-economic factors on the relative demands for different transport modes. While such factors are considered in transportation and land use models, this typically relies on mathematical models that

base their forecasts on past experience. Where future conditions are outside previous experience, the accuracy of these forecasts may be compromised.

For example, future fuel prices may exceed the levels from which current elasticities are derived. There is a need to ensure that ongoing monitoring and research is used to refine these forecasts as relevant information comes to light. There is evidence that part of the travel demand response to higher fuel prices is 'locked in,' even when fuel prices subsequently fall. This means that changes in travel and lifestyle patterns caused by spikes in fuel prices are not completely reversed when prices revert to lower levels. This asymmetric response may mean that transport modelling based on smooth average fuel price trajectories presents a conservative picture of the actual travel demand response.

Similarly, it is important to better understand how transportation system improvements influence travel demand in specific contexts. The use of transport models in Auckland have been the focus of specific criticism in some quarters, with Mees and Dodson (2006) noting how:

*"One feature of the ARC's model is a 'fixed trip matrix', which essentially amounts to an assumption that travel between different parts of Auckland is determined solely by demographic factors such as population and employment levels, and is not influenced either by traffic congestion or by provision of additional infrastructure. Thus, the model 'assumes' (and therefore 'predicts') that congestion will not reduce the number or length of trips, and that building or extending high-speed motorways will not encourage people to travel further. These assumptions have not been accepted by transport experts for more than a decade (e.g. Luk and Chung (1997)) and result in the model being biased in favour of motorways.*

*Not only is the ARC's model biased in favour of motorways, it is also biased against rail, due to the large 'transfer penalties' incorporated in the 'mode split' part of the model. This basically involves an assumption that people are extremely hostile to transferring from buses to trains to complete their journey, and would prefer to travel all the way by bus. Since in Auckland, as in other medium-density cities, buses have to be used to feed passengers to rail, the model's bias causes it to 'predict' that none of the rail improvements evaluated would significantly improve public transport usage. Even the 'extreme' scenario performed 'surprisingly poorly' (ARC 2005d, p. 5).*

*Significantly, given the extent to which current plans for rail in Auckland are based on experience in Perth, this modelling replicates the modelling errors made by Perth transport officials in 1988 that 'proved' the proposed Northern Suburbs rail line would be a failure. We now know that the modelling was based on false assumptions, because the officials' advice was rejected and the line was in fact constructed and carried many more passengers than anticipated. The Western*

*Australian government commissioned a review of the modelling which concluded that:*

*Many assumptions of [the] model... are in direct conflict with extensive experiences in similar cities... These assumptions heavily distort the calculations... (Newman et al. 1988, pp.16-7).*

*The Perth review argued that real-world experience demonstrated that passengers' resistance to transferring could be largely overcome by well-designed interchanges, integrated rail-bus timetables and free transfers. The Northern Suburbs line was built in accordance with these recommendations (Newman 1992; see also Newman 1999, p. 233-237), and currently carries around 14 million passengers a year, some four times the patronage of Auckland's entire rail system. The Perth case demonstrates the success of a policy process in which public communicative rationality prevailed over a biased technical rationality that could not perceive potential transport options beyond the limits of its own assumptions. When tested through a genuine public process, the technical reality of the transport model was found to be false."*

Our understanding of future travel demands is therefore hugely reliant on the accuracy of transport models, particularly in relation to passenger willingness to transfer between public transport modes. The upcoming opening of significantly upgraded train stations at Newmarket and New Lynn may provide an opportunity to test the accuracy of transport models at predicting the effects of this investment on patronage.

Other social and technological trends are also a risk to the RLTS insofar as they might impact on preferences for certain travel and lifestyle patterns, such as changes in attitude, population trends, and rates of emigration/immigration. Many of these impacts are complicated and inter-related. For example, numbers of foreign English language students impacts on demand for public transport, particularly in the CBD. These numbers fluctuate considerably from year to year, mainly in response to the value of the New Zealand Dollar (NZD). A sustained devaluation of the NZD would not only increase the numbers of foreign English language students but also increase the price of vehicles and transport fuels. The double-whammy of higher transport costs and increased student numbers associated with a lower NZD may subsequently drive substantially higher demand for public transport.

Ongoing monitoring, evaluation, and calibration of regional transport models are likely to be the best way of mitigating the risks posed by changes in the key drivers of travel demands.

### **Consider adaptive strategies for transport investment**

Transport investment requires long term planning horizons. For this reason, the RLTS focuses on identifying the big pieces of the transport puzzle that will be required over

the next few decades. This long term planning has tended to flow through into an optimal portfolio of projects that are then implemented over many decades.

Long term planning, however, is necessary but not sufficient to realise an optimal transport investment strategy. It is also important to consider how the projects identified in the RLTS might be adapted to conditions encountered on the ground. These conditions may mean that actual travel demands differ markedly from what was expected when the transport project was first envisaged.

An adaptive transport strategy would, in this situation, respond to the different travel demands by seeking to accelerate or defer certain projects. Situations that may catalyse such a response could be:

- The spatial distribution of economic and population growth around the region differs markedly from what was anticipated;
- Travel demands for a particular transport mode are considerably different from expected; or
- Step-changes in technology or cultural attitudes catalyse new travel and lifestyle choices.

It is important to strike a balance between certainty and adaptability – where the latter is needed only in the rare event that external effects contrive to influence travel demands to a degree that the long term investment strategy requires revision within the 6 year RLTS reviews. Adaptive investment strategies may also help to mitigate the effects of changing central government priorities and/or unforeseen natural events, such as sea level rise.

### **Develop transport contingency plans to manage catastrophic events**

Catastrophic events, such as tsunamis, earthquakes, and terrorist attacks, are extremely unlikely to occur. However, when they do their impact is significant and often wide-spread. The effectiveness of the central, regional, and local government response to these events is likely to be a matter of life and death for those affected. Catastrophic events are likely to have three distinct, but inter-related, effects on the transport system:

- The destruction of strategic transport infrastructure, such as the Harbour Bridge, Newmarket Viaduct, and Britomart; and
- Huge travel demands are placed on specific parts of the transport system that may differ markedly from standard travel patterns; and
- Emergency vehicles and specialised equipment needing to have quick access to affected areas.

For those catastrophes where there is opportunity for at least partial evacuation, such as a tsunami, the transport system will face extremely large one directional flows. Under such demands it may be prudent to re-allocate space on strategic routes, particularly state highways, to provide additional capacity in one direction. Recent evacuations in the U.S., such as in advance of Hurricane Katrina, may highlight additional ideas which could be implemented in Auckland. Successfully implementing contingency plans requires collaboration with Civil Defence and other emergency services, which are already likely to have initiated such work. It is recommended that new policies on management of unforeseen catastrophic events are included in the RLTS.

### **Develop policies to manage fuel supply shortages**

Uncertainty over future fuel supplies is a risk to the RLTS (Donovan and Genter, 2008). The International Energy Association (IEA) has issued increasingly strident warnings of the risks to the world's energy supply created by the growing imbalance between oil supply and demand. The IEA warnings relate primarily to:

- Under investment in developing oil fields, particularly from OPEC member states;
- Rapid decline in production from existing fields (6.7% per year); and
- Ongoing demand growth from developing countries.

The impact of these issues on oil prices have been somewhat obscured by recent economic malaise. Nevertheless, oil prices remain at historically high levels of around \$70 USD/barrel, which is a major concern. The future availability of oil can only be seen as a major risk to the transport system, both in the short and long term – particularly until such time as there is widespread improvements in the fuel efficiency of the vehicle fleet. In the face of uncertain fuel supplies many larger countries, such as China, have signed oil contracts with producer states in order to secure access to a fixed volume of oil at a particular rate. The increased prevalence of these agreements is likely to reduce the liquidity of international oil markets and have flow on consequences for the volatility of oil prices for small consumers, such as New Zealand.

Hence, the future supply of transport fuels is both a short and long term risk to the objectives of the RLTS. The policies of the RLTS focus almost exclusively on the long term risk associated with vehicle dependent land use and travel patterns. There is scope for additional policies that seek to manage short-term risks to the supply of transport fuels, particularly for emergency services. These may seek, firstly, to preserve social stability in times of shortage. International experiences with the hoarding of fuel during times of shortage suggest that rationing policies, such as fuel quotas, may be necessary. Such policies could draw on existing work from the Ministry of Economic Development, but provide more specific details on actual implementation and responsibilities. It is important that in the event of a constrained fuel supply these

policies are sufficiently detailed to provide certainty to households and businesses that essential needs for transport fuels will be managed in a fair and transparent manner.

## 4 Specific Policy Recommendations

In light of this assessment it is recommended that the RLTS be amended to incorporate the following additional sub-policies:

- Sub-policy 2.1.5: Ensure local government financial mechanisms, such as local government rates and contribution policies, support sustainable transport modes.
- Sub-policy 2.1.6: Investigate the development of new financial mechanisms, such as commercial parking levies, to fund local roads, internalise negative externalities generated by private vehicles, and support sustainable transport modes.
- Sub-policy 2.1.7: Advocate to central government to review tax treatments for employee transport benefits, such as parking, which undermine sustainable transport choices.
- Sub-policy 6.2.11: Encourage relevant government agencies to secure designation(s) and land required to support the strategic roading projects identified in the RLTS.
- Sub-policy 7.4.4: Support regional research into technical transport planning issues that support the objectives of the RLTS, particularly in relation to the links between sustainable transport modes and economic development in urban areas.
- Policy 8.1: Investigate and develop new regional revenue streams, such as commercial parking levies and land value uplift, to fund the implementation of the RLTS and reduce reliance on external funding sources, particularly central government.
- Policy 11.3: Develop measures and mechanisms to manage the short-term impacts of unpredictable events, such as fuel supply constraints and catastrophic events, on the socio-economic performance and stability of the region.

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