

NGAURANGA TO AIRPORT STRATEGIC STUDY
Technical Report 3: Recommended Strategy

Ngauranga to Airport Strategic Study

Technical Report III: Recommended Strategy

Prepared for



by



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Executive Summary

This report is the last of several investigating ways to address the transport issues between Ngauranga Gorge and the Airport and Hospital.

Our strategy takes a fully integrated approach to addressing future transport needs. The Strategy looks to increase the use of passenger transport and encouraging more active modes such as walking and cycling as an alternative to the car. While it also improves the roading capacity, the prime focus has been to reallocate existing road space so as to encourage general vehicles to use routes that do not adversely impact on land use, passenger transport or active modes. The strategy also develops proposals that support the improvement in land-use, particularly the development of mixed use higher density urban areas that minimise the need for motorised trips and make high quality passenger transport services more viable.

The Strategy support the ongoing Greater Wellington Regional Council's TDM initiatives which are intended to replacing an increasing number of single occupancy motorised trips with walking, cycling and passenger transport. It is argued that ongoing residential intensification within the CBD and the plan to create residential intensified areas at Adelaide Road and Kilbirnie is likely to have the greatest impact on mode change. Wellington City will continue to have an increasing population and will remain the primary location for employment, even if the population of the region does not increase in future years. Therefore, notwithstanding our efforts to reduce the number of trips being made by the car, it is predicted that the number of trips generated in future years due to increasing population and economic activity will outstrip our ability reduce car trips due to TDM, land use planning and enhancement to passenger transport.

A key component of the study is the strengthening of Wellington City Council's urban growth spine. To support and stimulate development in these intensified areas is to provide a high quality passenger transport corridor between the railway station and Newtown

Major roading improvements to provide a strong roading spine along the state highway are envisaged through a grade separated interchange at the Basin Reserve, the duplication of both the Terrace and Mount Victoria Tunnels and increasing capacity along Ruahine Street and Wellington Road. Improvements to traffic circulation at the Basin Reserve will separate local traffic movements from strategic traffic on the state highway as well as improve the level of service for buses using the passenger transport corridor between the railway station and Newtown. The reduction in traffic along the Waterfront permits the number of traffic lanes to be reduced, improving the pedestrian connections between the City and its waterfront. Wellington City Council is developing their own specific walking and cycling strategies which will include the development of a pedestrian and cycling route hierarchy for the whole city.

It is recommended that three elements of the strategy be implemented over the next 20 to 30 years including, bus priority measures, Ngauranga to Aotea 8-laning and Basin Reserve, with an indicative cost of between \$77 and \$165 million. All these projects have a benefit cost ratio of more than one.

1 Introduction

1.1 The Project

Opus International Consultants (Opus) has been commissioned by Transit New Zealand on behalf of Transit New Zealand, Wellington City Council and Greater Wellington Regional Council to undertake a study to investigate options to address the transport issues between Ngauranga Gorge and the Airport and Hospital. Opus worked in partnership with and acknowledges the assistance of Arup and the staff at the Greater Wellington Regional Council who undertook much of the traffic modelling using Greater Wellington Regional Council's strategic transport model. Arup also provided advice on light rail. Alistair Aburn and Deyana Popova, from Urban Perspectives, provided assistance with key planning and urban design issues.

The purpose of the study is to identify the future transport needs of the Ngauranga to Airport Transport Corridor and propose solutions that support land uses, social, business and recreational goals. Accordingly, the study investigates a range of transport modes including walking and cycling, passenger transport, the movement of goods (by road and rail), and private motor vehicles. A key element of the study is to understand and develop the relationship between urban form and transport corridors with the aim of ensuring the transport solutions support urban intensification - often referred to as Transit Orientated Development. Given the recent completion of the Inner City Bypass, no further improvements to this section of SH1 were considered as part of this study. Nonetheless, the effect of individual strategy elements on the inner city bypass was assessed.

1.2 Previous work

This report follows six previous reports: Phase 1 Consultation Report (July 2006); Problem Framing Report (August 2006); Golden Mile Capacity Assessment Report (August 2006); Technical Report One: Description of Options (April 2007), Technical report Two: Option Packages (July 2007), and Phase II Consultation Brochure (December 2007), Consultation II Report (April 2008).

Phase I Consultation identified a number of reoccurring themes, many of which were consistent with the problem framing report. These themes included passenger transport, access to the airport, protection of heritage and urban form, and walking and cycling. This information helped guide the study team to develop proposals for transportation improvements in the study area.

The Problem Framing Report set out the need to deliver an integrated land transport system that supports Wellington City's transport and urban development strategies (urban growth spine) and provides access to the CBD, airport, hospital and port. It is noted that increasing travel demand due to increasing population, employment and economic activity will put pressure on the existing transport network, parts of which are already at, or very close to capacity.

Golden Mile Capacity Assessment Report investigated the existing and likely maximum operating capacity for buses along the Golden Mile. The study concluded that while there is scope to increase capacity through the use of bus priority measures, signal and bus stop intervention in the short term, a step change in the form of busway or light rail may be required in the longer term.

Technical Report One set out a wide range of individual elements for improving passenger transport, addressing the needs of general motor vehicle users as well as enhancing walking and cycling opportunities throughout the Ngauranga to Airport corridor. The individual elements were identified to address one or more of the problems identified in the Problem Framing Report.

Many of these elements are mutually inclusive, meaning that they can be combined to form an integrated transport strategy for the study area. The combined contribution of these elements will make a much larger contribution to overcoming the problems identified in the Problem Framing Report than what each element might be able to achieve on its own. A key feature of this strategic study is to show that a range of elements are needed for the corridor in future years and how to identify their contribution to providing an integrated solution.

Technical Report Two investigated the effectiveness of alternative packages on addressing the issues identified in the Problem Framing Report and meeting the Regional Land Transport Strategy. Four packages were investigated, including providing a light rail spine between the hospital and the railway station, providing a busway between the hospital and railway station in conjunction with some minor road improvements, providing a busway between the hospital and railway station in conjunction with more significant improvements to the road network (including tunnel duplications) and providing the significant improvements to the road network with only minor improvements for passenger transport. The results of this study guided the steering group in the development of the agreed set of packages that would form part of the Phase II Consultation. The steering group agreed that an integrated solution best addresses the issues identified in the Problem Framing Report. And that the package providing a busway between the hospital and railway station in conjunction with more significant improvements to the road network (including tunnel duplications) could be best described as containing the elements that would form part of the Phase II Consultation.

Phase II Consultation: - A consultation brochure was published in December 2007. This brochure described those elements identified in the Technical Report One that looked most likely to form part of the final preferred strategy, partly as a result of the work undertaken as part of Technical Report Two. The brochure identified those elements that were affordable in the short term with early benefits. It also identified a number of other elements that could be implemented in the longer term.

Phase II Consultation Report: - The study team received over 4500 submissions as part of the consultation. There was general support for the idea of an integrated approach as outlined in the brochure. However, some submitters felt that we could solve present and future transport problems by only enhancing passenger transport, walking and cycling and not increasing road capacity. A number of submitters noted the need to adopt solutions that reduced fossil fuel consumption.

1.3 Scope and Purpose of Technical Report Three: Recommended Strategy

The purpose of this final report is to describe the range of transport initiatives that collectively form part of a future transport strategy for the study area. This plan is a long term strategy for meeting the transport needs of the study area, and includes projects that may be constructed over the next 20 to 30 years.

This technical report describes the various elements that form the transport strategy and explores how the various elements relate to each other and how they collectively create an integrated transport

solution for the study area. In this way, this report provides the technical background that will assist and support the Greater Wellington Regional Council in their development of a Strategy that will sit alongside the Regional Land Transport Strategy.

2 Strategic Planning Framework

2.1 New Zealand Transport Strategy (2002)

The New Zealand Transport Strategy (subsequently incorporated in the Land Transport Management Act 2003) has a vision that, by 2010, New Zealand will have an affordable, integrated, safe, responsive and sustainable transport system. The vision is underpinned by four principles: -

- ◆ Sustainability
- ◆ Integration
- ◆ Safety
- ◆ Responsiveness

The New Zealand Transport Strategy also has five key objectives. These are: -

- ◆ Assisting economic development
- ◆ Assisting safety and personal security
- ◆ Improving access and mobility
- ◆ Protecting and promoting public health
- ◆ Ensuring environmental sustainability

In terms of future roading projects the New Zealand Transport Strategy shows that these five key objectives will be achieved by addressing a number of common themes, as summarised in Table 2.1. These themes guided the project team in developing the strategy for the Ngauranga to Airport Strategic Study. The New Zealand Transport Strategy acknowledges the importance that transport has in improving access to social and economic opportunities. Equally it notes that the growth in use of the motor vehicle (at the expense of other modes) has brought a wide range of health and environmental problems.

Table 2.1 - Common Themes of NZ Transport Strategy

Common Themes	Key Objectives				
	Assisting Economic Development	Assisting Safety & Personal Security	Improving Access & Mobility	Protecting & Promoting Public Health	Ensuring Environmental Sustainability
Passenger Transport	√	√		√	√
Walking & Cycling	√	√		√	√
Reducing Congestion	√				
Intensification of land use		√			√
Enhancing Access, Mobility & Well-Being		√	√		
Improving Water Quality				√	√
Safety	√	√			
Reducing Severance				√	
Reducing Noise/Emissions				√	√
Economic Development	√				

There is a range of policies for implementing the above objectives. Those that are particularly relevant to this project are:

- ◆ Reducing severe congestion: congestion that has significant economic, social and environmental impacts.
- ◆ Improving passenger transportation, particular bus and rail.
- ◆ Promoting walking and cycling, particularly associated with the more intensified urban areas within and surrounding the CBD.
- ◆ Improving access, mobility and use of spaces.
- ◆ Supporting regional growth strategies, and in particular the intensification of residential areas around key transportation corridors.

2.2 Regional Policy Statement

The Regional Policy Statement makes a number of pertinent observations relating to the Region's urban areas being characterised by low densities and extended form of development; and the high degree of dependence on non-renewable energy sources, particularly by the transport sector. Key themes (objectives and policies) that are to be pursued include the promotion and application of energy efficiency and a moderation in energy demand through, for example, the design and operation of transportation systems; and integrated development of land use and activities and transport systems (urban form). Referring to the Region's 'transportation network', the Regional Policy Statement comments that: Transport is not an end in itself but a means of undertaking social, economic, cultural, recreational and other activities. The key question relates to the optimum way of meeting regional (and national) needs for the movement of people and goods. The optimum solution is one that provides, now and in the future, good accessibility to many different places for as many people as possible, whilst minimising the risk of damage to the environment and using finite fuel sources wisely. The Regional Policy Statement 'promotes' several objectives and policies that impact on this particular Study. A key method of implementation is the Regional Land Transport Strategy.

2.3 The Regional Land Transport Strategy

The Regional Land Transport Strategy has the following vision for the study area:

"Along the Ngauranga to Wellington Airport Corridor, access to key destinations such as CentrePort, Wellington City CBD, Newtown Hospital and the International Airport will be efficient, reliable, quick and easy. Priority will be given to passenger transport through this corridor, particularly during the peak period. Passenger transport will provide a very high quality, reliable, safe service along the Wellington City Growth Spine and other key commuter routes. The road network will provide well for those trips which cannot be made by alternative modes and will allow freight to move freely through the corridor. Traffic congestion through the corridor will be managed at levels that balance the need for access against the ability to fully provide for peak demands due to community impacts and cost constraints. Maximum use of the existing network will be achieved by removal of key bottlenecks on the road and rail networks".

The key principles that underpin the vision statement, and therefore 'guided' the development of solutions and investment in transport infrastructure are (in no particular order):

- ◆ Assist economic and regional development;
- ◆ Assist safety and personal security;
- ◆ Improve access, mobility and reliability;
- ◆ Protect and promote public health;
- ◆ Ensure environmental sustainability;
- ◆ Consider economic efficiency and affordability.

2.4 Wellington City Transport and Urban Development Strategy

The Council's own Transport and Urban Development Strategies seek to achieve the following outcomes:

- ◆ Concentrate future population and employment growth along the Growth Spine, supported by a dedicated, high quality and high frequency public transport corridor, a high quality state highway route with dependable travel times, bus priority along connecting arterial routes and convenient and safe walking and cycling routes.
- ◆ Limit commuter parking in the Central Area
- ◆ Improve access to the waterfront
- ◆ Comprehensive travel demand management programme.

3 Approach

3.1 Influence of social trends on transport

Reasons for the trips we make: - Mobility forms an important social function. Transport enables people to access work, education, health and sporting facilities as well undertaking other social activities, as shown in Table 3.1¹. A striking feature of Table 3.1 is the large percentage of trips made for social and recreational activities. This explains why, even at peak time, when congestion is most acute, less than 50% of trips are work related².

Table 3.1: - Purpose of trips made in NZ

Purpose	Trips by Purpose	
	% by number	% by distance
Work	22%	28%
Education	6%	4%
Shopping	18%	12%
Social/recreational	31%	37%
Other	23%	19%
Total	100%	100%

The need for mobility is a consequence of the spatial separation between different land uses within a city. And this spatial separation was created in response to the undesirability of living in intensified industrial city centres at the turn of the century and the lower cost of land in the suburbs³. In this way, our cities have been developed on the premise that people make trips, and our sprawled-car-orientated cities require us to rely on the car.

In our sprawled-car-orientated cities, the car has become such a popular means of providing mobility, that supply (in terms of road space) can no longer meet the demand at peak times. As a result, our transport routes are becoming congested, travel has become inefficient and journey times are unreliable. Because we have limited road space and this space is shared between cars, buses, cyclists and pedestrians, congestion also influences the travel time and safety for modes other than just cars. The over dependence on the use of cars for our mobility has also contributed to numerous health (including air pollution) and environmental impacts (including global warming). It has led to social exclusion, where those people without a car experience a lower quality of life than those that have a car. Because our existing car fleet relies almost completely on oil for energy, there are concerns about how long the world's supply of oil is able to meet demand and the impact of the increased cost of producing oil.

¹ Land Transport Safety Authority, <http://www.ltsa.govt.nz/research/travel-survey/index.html> (Accessed July 2004)

² Auckland Regional Council, Regional Land Transport Strategy, 2003

³ Wayne Stewart, "Society & Transport, Implications of achieving sustainable solutions", Proceedings towards Sustainable Land Transport, Wellington, November 2005

Social impacts on trip generation and use of the car: - Our culture, values and lifestyle all support the need to make numerous, individual journeys at times that are convenient to that individual and that don't require advance planning. Such journeys are well suited for the private motor car. Individual journeys are driven by a society where there is an increase in part time work, more women in paid employment, greater number and varied recreational opportunities, increased use of supermarkets and shopping plazas (replacing local shops) and a greater feeling by many guardians as to the necessity to provide personal security to our children, by driving them to school and other activities. Such a society enjoys, and demands, the flexibility and mobility offered by the private motor car.

Our society has undergone a number of social and demographic changes over the last 50 years. One of these changes is that there are more women, and more women with children, in paid employment. In 1936, only 26% of NZ workforce was women, but by 2001, this had jumped to 47%⁴. Many of these women - and an increasing number of men - combine childcare and domestic obligations with their work, while also caring for aged relatives. Not only has this increased the number of work trips per household; but has made these trips more complex. To manage these tasks, many women and men must combine their work trips to enable stops at childcare, school, the supermarket and the gym. The need to link these trips reduces their ability to use passenger transport; and many find that the car is the only mode that provides the flexibility needed.

Passenger transport is most effective when a high percentage of people travelling to work have a similar destination. But as a result of rising traffic congestion, an increasing number of businesses have moved to the suburbs. While this has benefited the roading network by distributing the traffic flows along key arterials, it has also significantly reduced the effectiveness of passenger transport, particularly rail passenger transport. Furthermore passenger transport is not suitable if your place of employment changes each day. A study of Auckland work journeys in 2003 revealed that of everyone who went to work, only 38% of all Aucklanders' work in the same place each day⁵.

Social exclusion is used to describe a group within society who are disadvantaged through lack of mobility. Several factors lead to social exclusion, including limited availability of a car, inability to drive and limited transport alternatives. In NZ, about 30% of people do not have access to a car⁶. Those people without a car are less likely to see friends and family, twice as likely to find it difficult to get to leisure centres and libraries⁷, twice as likely not to seek medical help, and less likely to find work⁸. For those without a car, employment must be limited to locations served by passenger transport and to hours of employment that match the services provided by it. While over the last 50 years, most low-skill jobs have shifted from the city centres to suburbs, the high quality passenger transport systems have continued to provide services to the city centre, a destination limited to mainly high-skilled jobs.

⁴ The NZ Year book

⁵ Debra Hall, Research Solutions; Aucklanders' Attitudes to Transport Funding, A public Opinion Survey, NZ Automobile Association, October 2003, 37 pages

⁶ Ministry of Transport; Transport For New Zealand; Overview, April 2002

⁷ Making the Connections: Final Report on Transport and Social Exclusion, Social Exclusion Unit, Office of the Deputy Prime Minister, February 2003

⁸ Brett Parker, Very long term job seekers' barriers to employment: a nationwide survey, Labour Market Bulletin, 1997:1

For all these reasons, we are likely to see a continued reliance on the motorcar for many (if not the majority) of the trips we make. However, there is also a need to increase the quality and availability of passenger transport, not only to make passenger transport a more viable alternative to the car but to provide for the minimum mobility needs of those who do not have access to a car.

3.2 The problems to be solved

Existing Conditions: Wellington is the region's largest city with a population of some 180,000. The Central Business District (CBD) accommodates approximately 35% of the region's employment. Whilst a higher proportion of commuters within Wellington City use passenger transport (bus and train) or walk to work than in any other city in New Zealand, car ownership levels and car use are still very high.

There are a number of urban design themes, including a proposed growth spine through the City, and improved access and a sense of connectedness to the Waterfront from the CBD. There are also a number of existing transport pressures within the study area. Specific issues identified include:

- ◆ The capacity of the motorway system on the approach to Wellington CBD from the north, where SH1 and SH2 merge at Ngauranga Gorge;
- ◆ The increased number of trips associated with the airport coupled with the need for the majority of the region's population (to the north of the CBD) to pass through the CBD;
- ◆ The capacity of the Mount Victoria tunnels and the Basin Reserve, and the effect that these bottlenecks have on the accessibility of the route between the airport (and adjacent suburbs) and the CBD;
- ◆ The capacity of the Terrace Tunnel, particularly the single lane in the southbound direction and the impact that this has on utilising the full capacity of the remainder of the motorway network;
- ◆ The heavy volumes of traffic that use the Waterfront route, and the resulting severance or "disconnection" between the waterfront and the CBD;
- ◆ The need for commuters to make a mode change at the railway station due to it being located on the northern edge of the CBD, along with the impact of the significant numbers of people who walk to their destination in the CBD from the railway station;
- ◆ The need to maintain good accessibility to/from key locations that are essential to the economic and/or social wellbeing of the region; and
- ◆ Increased demand for additional high quality and reliable passenger transport services and routes.

Emerging Issues: Increasing travel demand as a result of increasing population and predicted increases in vehicle usage in the Wellington Region, in particular with respect to the Wellington CBD and associated major regional facilities (such as the airport and port), will put pressure on the existing transport network and services, parts of which are already at, or very close to capacity at peak times. Amongst the key 'high-level' challenges facing Wellington City that need to be addressed with respect to those issues identified above are:

- ◆ Accommodating an overall increase in transport demand;
- ◆ Accommodating an increasing number of commuter trips to the CBD;
- ◆ Increasing the level of 'penetration' of passenger transport into the CBD to facilitate/encourage a change in transport mode choices;
- ◆ Providing relief to existing (and future) 'choke points';
- ◆ Accommodating an increasing number of trips to/from the port and airport as passenger and freight movements increase;
- ◆ Enhanced opportunities to cater for active modes of transport such as walking and cycling; and
- ◆ The need to integrate urban form considerations into transport planning.

3.3 Overview of approach taken to strategy development

The approach taken for the study has been detailed in earlier reports. Nevertheless, we provide a summary of the approach taken here together with key findings that guided the study team to arrive at this Strategy. The basic structure of good transportation planning is shown in Figure 3.1. It includes:

- ◆ A high frequency public transport spine.
- ◆ An 'activity street' that allows for easy access to activities such as shops, gyms or cafes
- ◆ High capacity motorway (or bypass).

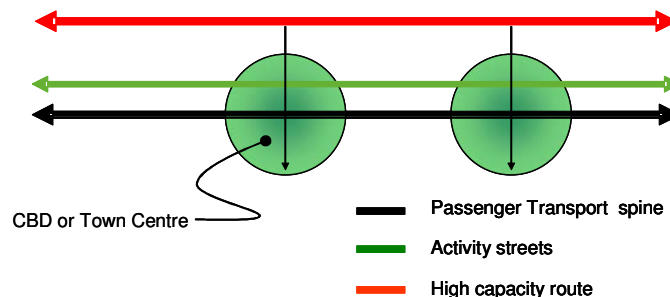


Figure 3.1: Good Transport Planning Design

The NZ Transport Strategy and the Regional Land Transport Strategy encourage an integrated and sustainable approach to solving future transport needs. They encourage solutions that improve accessibility but without undue reliance on mobility, particularly the private motorcar. Accordingly, in developing a transportation strategy for the Ngauranga to Airport corridor, we were guided by the following principles:

Land-use: Integrating land-use and transport corridors, particularly high quality passenger transport and mixed use high density developments – a concept often referred in North American Literature as

“Transit Orientated Development”. The key focus for the study group was connecting the Wellington City growth spine, particularly the growth areas along Adelaide Road and Kilbirnie with the railway station by a high quality passenger transport corridor.

Making best use of existing infrastructure:- Improving the return on investments made in previous years to the transport corridor by addressing remaining congestion points so as to maximise the capacity of the whole corridor. A key focus for the study team was to eliminate several known choke points on SH1. As shown in Figure 3.2, the city has a high capacity SH1 motorway which is intended to divert traffic away from the heart of CBD. The effectiveness of this route is compromised by a number of known ‘choke points’, particularly the Ngauranga to Aotea Motorway section, the Terrace Tunnel, the Basin Reserve, the Mt Victoria Tunnel and Ruahine Street and Wellington Road. A key focus of the study team was to investigate the benefits of removing these choke points and to confirm whether this would help to reassign traffic that presently uses local streets through the CBD onto a route more appropriately designed for high traffic volumes. Our earlier work on this study showed that removing these choke points did not increase the overall number of vehicles entering the CBD or significantly change mode share, but some projects were successful at getting traffic onto the right routes.

Improving the use of existing road space:- by acknowledging that all modes do not need to use the same road space and giving some transport modes priority along key routes. A key focus for the study team was to get the right traffic on the right roads. For Wellington, this means getting vehicles out of the Central Area – where space should be allocated for walking, cycling and passenger transport – and onto high capacity routes designed specifically for vehicles. To achieve this, the study team developed a roading hierarchy of corridors, as summarised in Figure 3.2 multi-modal transport network.

3.4 Key findings from study

The study team undertook a number of sensitivity tests to determine what sort of transport solutions might be achievable. Detailed results of these tests are described in our earlier reports. In summarising we found that:-

- The number of people living in Wellington City is expected to continue to grow, and a majority of these people will live in more intensified housing all within the study area. Wellington City is also expected to remain the primary location for employment. We can therefore expect the number of trips within the study area to continue to increase in future years.
- While implementing travel demand management, providing more frequent trains, more buses and a light rail system will result in an increase in the number of people using passenger transport or walking and cycling, this increase is not enough to offset an overall increase in predicted travel demand. As consequence, we can expect a lot more car trips in future years within the study area.
- The number of car trips being made into the city from the northern suburbs is not influenced by the capacity of the Motorway from Ngauranga Gorge to Aotea Quay. The reason for this is that the road network further north of the Gorge appears to create a limit on the number of car trips being made. This means that the only

affect of increasing the capacity of the state highway from Ngauranga Gorge to Aotea Quay is to decrease journey times (reduced congestion) for cars using this route. Because it does not increase overall capacity from the north, it permits vehicles to be reassigned from the Hutt Road to the Motorway, allowing bus lanes to be provided along the Hutt Road while minimising any negative economic benefits for cars due to the reduced capacity.

- The constraint provided by the Terrace Tunnel which provides only one southbound lane causes some vehicles to leave the Motorway at the Aotea Quay off-ramp and travel along the waterfront. The result is that more vehicles use the waterfront than use the motorway. Good transport planning aims to get the right vehicles onto the right roads. We found that increasing the capacity of the tunnel transferred a sufficient number of vehicles from the Waterfront to allow the council to consider reducing the number of lanes along the Waterfront from six to four. Duplicating the tunnel did not result in an increase in the number of vehicles using SH1 and SH2 to the north. More traffic through the Terrace Tunnel did, however, put the Inner City Bypass under greater pressure.
- The study team investigated the idea of providing a high quality passenger transport link from the railway station to Newtown (Hospital). We found that the predicted passenger numbers using this route would justify the expense of providing a higher quality passenger transport system. The return on the investment of this high quality passenger transport link would be enhanced if there were few competing conventional bus services along this route. It would be further enhanced with the development on the intensification growth area along Adelaide Road.
- The study team investigated the idea of providing a high quality passenger transport link to the eastern suburbs and airport using a frequent high quality light rail system instead of increasing the road capacity. While the light rail system did achieve a small uptake in passenger numbers over those using the bus based system at present, the increase was not sufficient to eliminate the need for additional road capacity between the eastern suburbs and the city. Furthermore, the number of passengers attracted to the light rail were very low, a long way short of the numbers needed to justify the cost of the providing such a system. And the cost of providing a light rail system to the eastern suburbs will be particularly expensive given the need to cross Mt Victoria.
- Increasing the capacity of the Mt Victoria tunnel does not significantly increase the car trips or change the mode share from the eastern suburbs. Instead, it attracts vehicles away from Constable Street and Evans Bay/Oriental Parades. Reduced traffic on Constable Street improves bus journey times for buses from Kilbirnie and Newtown – a key bus route.
- Wellington's topography severely limits the ability to provide alternative routes between the eastern suburbs and the city. The only feasible option that remains is to increase the capacity of the Mt Victoria Tunnel. Once this is done, further capacity can not be provided.

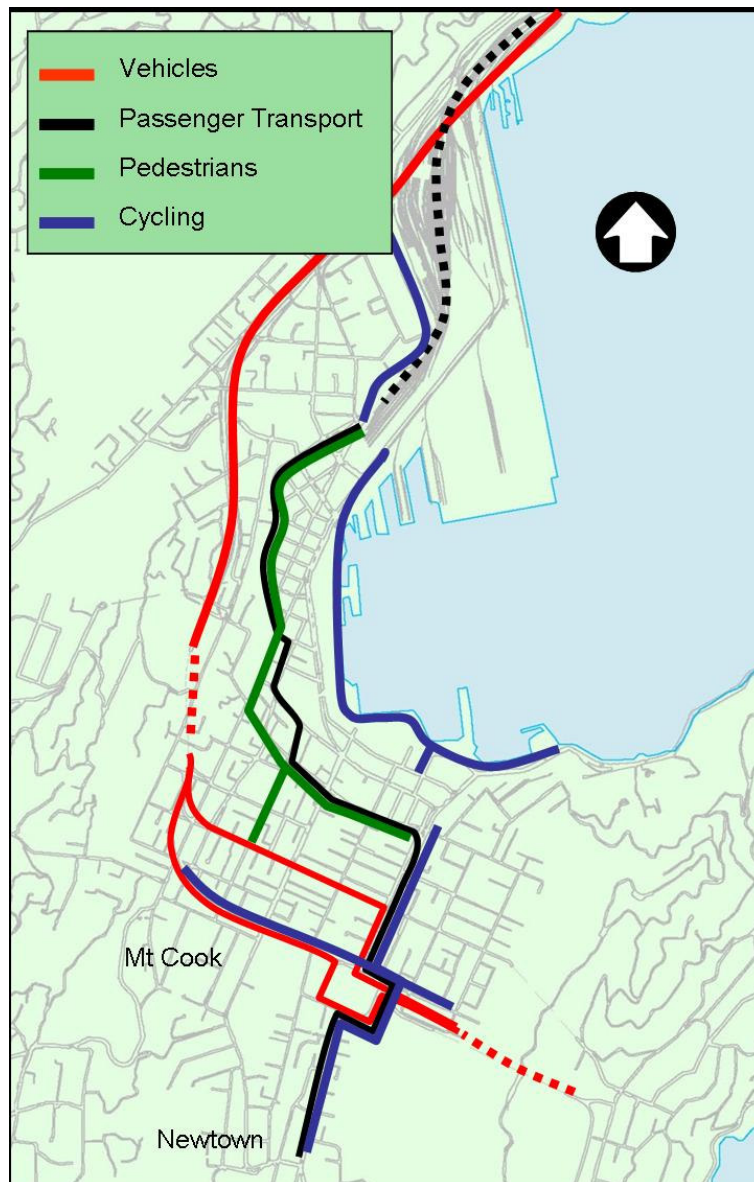


Figure 3.2: Integrated multi-modal transport network

3.5 The need for integrated solutions

An OECD study was undertaken to investigate best practice for future urban transportation planning projects. This study concluded that providing for our mobility needs while reducing many of the adverse effects of the car can only be improved by adopting an integrated approach⁹, such as:

- increasing passenger transport services and encouraging more active modes such as walking and cycling as an alternative to the car;

⁹ _____ "Urban Travel and Sustainable Development", Organisation for Economic Co-operation and Development, European Conference of Ministers of Transport, 1995.

- improving roading capacity, particularly with a view to reallocate existing road space so as to encourage general vehicles to use routes that do not adversely impact on land use, passenger transport or active modes;
- improving land-use, particularly the development of mixed use higher density urban areas that minimise the need for motorised trips and make high quality passenger transport services more viable.

The OECD study concluded that focusing on only one of these interventions without the others was unlikely to result in sustainable transport solutions. For example, passenger transport initiatives need to work hand-in-hand with incentives to get people out of their cars, rather than simply relying on an assumption that the provision of a high quality passenger transport system will automatically create a mode shift. We need to ensure that the significant investment needed to enhance passenger transport results in a significant mode shift from the private motor car. This is an important issue as the evidence suggests that a significant percentage of passengers being attracted to using new passenger transport services are diverted from other existing passenger transport services, walking and cycling, and not the motor car.¹⁰

A number of people expressed a view during the consultation that an integrated approach was not required and that only either investment in passenger transport or increased road capacity was needed. It is clear that these views are not consistent with the views of those with expertise in this field or with overseas experience, as discussed in the OECD study.

For these reasons, we have given more weight to the idea of adopting an integrated approach to addressing the transport needs of the study area. The various elements making up the Strategy are discussed in the following sections, together with the reasons for adopting these elements and the rejection of other elements that were discussed in Technical Report One. This is consistent with the national, regional and local policies, which all seek to ensure that an integrated, safe, responsive and sustainable transport system is developed.

3.6 Consultation

A key element of the study was consultation prior to development of a workable Strategy. Consultation was undertaken in phases. The purpose of Phase I was to inform stakeholders that the study was taking place and obtain their suggestions for issues facing the corridor. The purpose of Phase II was to seek views on the range of possible transport initiatives designed to address the issues defined through Phase I consultation. The number and type of responses to the consultation document released on 6 December 2008 is tabulated in Table 2: The main themes identified were (not in any particular order):

- General concern about reliance on fossil fuels and the effect of climate change
- Concern about funding priorities being directed away from Transmission Gully
- Support for active transport modes (walking and cycling).
- General support for and acceptance of the need for public transport.

¹⁰ Hensher D. A. A bus-based transitway or light rail? Continuing the saga of choice versus blind commitment. May 1999. Vol 8 No 3 September 1999 Roads and Transport Research

- General acceptance of the need to upgrade the city's public transport system.
- Submitters identified a range of advantages and disadvantage for the Ngauranga-Aotea traffic management proposals.
- The Terrace Tunnel duplication was seen by some as a reducing peak time congestion and providing a continuous motorway through the city but others as having a number of disadvantages including high cost and environmental damage
- The Adelaide Road Boulevard attracted a variety of responses, both positive and negative.
- The Basin Reserve Improvements were seen as reducing traffic congestion, but also as impacting on amenity (visual and noise).
- Mt Victoria Tunnel duplication was seen as providing congestion relief, but others felt it would encourage increased vehicle flow into the city and have amenity, heritage and environmental impacts.
- The Ruahine Street and Wellington Road improvements were seen by some as an effective way of reducing congestion, but others were concerned about the demolition of houses and removal of trees.
- The Cobham Drive Roundabouts were seen by some as being effective in reducing congestion while other perceived them as only a short term solution.

Table 3.1: Submission Type

Type	Quantity
Green Alliance Postcards	3750
Wellington Regional Chamber of Commerce Postcards	482
Online Questionnaire Forms (WCC Website)	204
Emails	95
Post/Letter	71
Other	71
Total	4673

4 Travel Demand Management

4.1 Overview

The primary aim of Travel Demand Management (TDM) is to reduce the number of car trips (particularly those trips with a single occupant) and encourage alternatives such as passenger transport, walking and cycling. A secondary aim of TDM is to reduce the number of trips that people make, but only if this does not adversely affect our ability to access work, education, health, sport and undertake social activities. This might be achieved by combining a single trip for more than one purpose (trip chaining), or removing unnecessary trips.

The extent to which TDM will reduce the number of trips or reduce private motorcar use remains unclear. Perhaps one of the most promising TDM tools is increasing the number of people who live in higher density residential areas, particularly where these areas are mixed use and served by a high quality passenger transport corridor that connects with key destinations. Another promising tool is travel planning schemes¹¹, which appear to have some success¹² in reducing motorised trips.

It is envisaged that a number of travel behaviour change projects throughout the Region will occur over the coming years regardless of this particular strategic study. As such, no additional costs for undertaking TDM measures beyond the \$10 Million budgeted for as part of the Regional Travel Demand Management Strategy have been included as part of this study. The behaviour change projects can be targeted and directed at the travel patterns and behaviour of the community or individuals within households, schools and workplaces. The Travel Behaviour Change Guidance Handbook¹³ indicates that such measures may result in a 5% reduction in car drivers in the morning and evening peak periods with a corresponding increase in car passengers, passenger transport, walking and cycling.

TDM initiatives are unlikely to be effective as a stand alone initiative. They need to be undertaken in conjunction with providing enhanced infrastructure for walking and cycling, and passenger transport. Proposed enhancements for walking, cycling and passenger transport that form part of the overall integrated solution for the study areas are discussed below. TDM measures must also integrate with land use changes, such as the development of a growth spine at Newtown and Kilbirnie and the expected ongoing intensification within Wellington CBD. The critical importance of land use changes and its relationship with TDM was discussed at length within Technical Report One.

Pricing TDM initiatives, such as road pricing or parking supply management techniques to discourage car use was beyond the brief of this study. While it is accepted that road pricing can be a key driver to reducing car use, it is acknowledged that it can also create a number of adverse social impacts such as increasing social exclusion. At present there is no legislative ability to implement such a scheme. Similarly, while car parking strategies will encourage more sustainable modes of transport

¹¹ ARTA Sustainable Transport Plan <http://www.arta.co.nz/xxarta/plans-and-policies> - "Sustainable Transport Plan 2006-16"

¹² Louise Baker; "Workplace Travel Plans - A New Rule of the Game", NZPI Conference March 2007 (yet to be published)

¹³ Land Transport NZ/EECA Travel Behaviour Change Guidance Handbook. December 2004.

for work trips to the CBD, they can also create a number of adverse impacts on the city and viability of retail areas. Car parking strategies need to consider local parking strategies in a regional context.

The idea of continuing to develop TDM was supported by the Phase II Consultation, where submitters felt that strategies were needed to help reduce our reliance on fossil fuel consumption and CO₂ emissions.

5 Walking

5.1 Overall Description

Improvements to the pedestrian environment within the CBD are essential in order to establish lively and safe public spaces¹⁴. Regardless of the mode of transport used to travel to and from the city, pedestrian movement around the city is essential and public spaces need to be planned and designed to provide a pedestrian friendly environment with a high level of service for pedestrian movements.

In line with the possible pedestrian route hierarchy for the City described in Technical Report One, improvements to assist pedestrian movements should be aimed at specific routes as shown in Figure 4.1. Improvements include widening footpaths, high quality walking surfaces, good lighting, 'green waves'¹⁵, security cameras, and walking space management¹⁶. It is envisaged that footpaths adjacent to a high quality passenger transport route through the CBD would be upgraded with respect to increased footpath widths. This would be done in conjunction with the reallocation of road space to passenger transport.

The initiatives to improve the roading network, such as duplication of the Terrace Tunnel, are designed to reassign cars from city streets to the motorway. This will reduce the number of vehicles using the waterfront route and make the reduction of the number of lanes more viable. The reduced lanes and traffic volumes will improve the connection between the city CBD and the waterfront, reduce severance and make pedestrian movements safer and more convenient. Reassigning vehicles to the motorway will also make the city more walkable, safer for pedestrians and improve amenity along inner city streets.

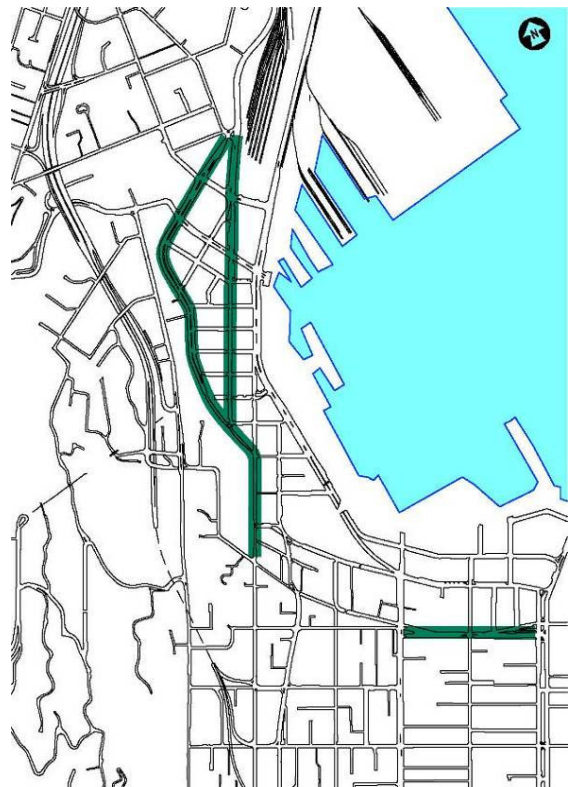


Figure 4.1: - Upgrade of Pedestrian Routes

It is proposed that access between the CBD and adjacent inner city residential suburbs (such as Newtown, Mount Victoria and Mount Cook) should be improved in order to ensure that the roading network around the CBD doesn't act as a barrier to movement – particularly from locations where public health gains can be made by encouraging

¹⁴ City to Waterfront - Wellington. Gehl Architects. October 2004

¹⁵ Phasing traffic signals timed to accommodate platoons of pedestrians travelling between the railway station and CBD.

¹⁶ Careful control of sandwich boards, street furniture and other intrusions to maintain walk widths.

walking and cycling and reducing trips by motor vehicles. Ideally, in residential areas adjacent to the CBD, the environment should be such that through walking (and cycling) forms the main competition to passenger transport.

Improvements to pedestrian crossing facilities such as reduced traffic signal cycle times at those key interchanges linking these pedestrian corridors¹⁷ to minimise 'wait times' for pedestrians should be considered.

The duplication of the Mt Victoria Tunnel will provide the opportunity to improve accessibility for pedestrians and cyclists from the eastern suburbs to the CBD. It is proposed that by duplicating the tunnel, it will be possible to provide enhanced facilities for pedestrians and cyclists.

The idea of providing enhanced facilities to encourage active modes were supported during the Phase II Consultation, with a number of people noting that walking helps improve health and environment outcomes.

Wellington City Council is developing a detailed implementation plan for walking and cycling.

5.2 Cost and Risk

It is important to note that such work would typically be undertaken in conjunction with street-scaping work. Costs for street-scaping associated with the passenger transport or pedestrian corridors are significant. However, they have not been included within the overall estimates of costs associated with these transportation initiatives.

¹⁷ Refer to Technical Report One

6 Cycling

6.1 Overall Description

Technical Report One identified the opportunity to use suitably designed wide bus lanes to accommodate cyclists along the key routes and corridors leading to and from the City. Whilst such an approach may limit the level of service experienced by cyclists given the need for buses to stop along the route, the provision of a suitably wide lane (ensuring minimal cyclist stress when buses pass cyclists) will assist cyclists given that during off-peak periods, cyclists may have unobstructed access and may also benefit from bus priority measures throughout the day.¹⁸

The segregated nature of busways means that they should be of sufficient width to allow clearances for cyclists. Opportunities should also be provided to allow cyclists to gain access to and from the busway where appropriate given the overall cycle network being developed by the City. However, the direct nature of the busway and separation from obstacles such as parked vehicles allows busways to provide a very valuable facility for cyclists subject to their suitable design.

Specific cycle routes in addition to those following passenger transport links, as indicated in Figure 5.1, should be planned in conjunction with cycling strategies and plans being developed by Wellington City Council. As part of this, it is important to connect the two east-west running links that currently exist around the Waterfront and along the Inner City Bypass with each other in order to help provide a more continuous network.

As noted in Technical Report One, the provision of enhanced cycle parking facilities throughout the study area is also essential.

The idea of providing improved facilities for active modes like cycling was supported during the Phase II Consultation. Wellington City Council is developing a detailed implementation plan for walking and cycling.



Figure 5.1: Possible Cycling Route Hierarchy - approaches to the CBD.

¹⁸ Land Transport NZ. Cycle Network and Route Planning Guide.

7 Passenger Transport Corridor: Railway Station to Newtown

7.1 Overview

A key focus of this study has been providing high quality, reliable and frequent passenger transport systems to connect and serve the proposed growth spine, particularly the intensified mixed use development at Newtown and Kilbirnie. Therefore a high quality passenger transport corridor is proposed between the railway station and Newtown. At present, buses use the same road space as general vehicles; and although some bus lanes are provided at key locations for the exclusive use of buses, buses using these lanes must interact with parked vehicles, vehicles crossing and turning vehicles all of which have the potential to create delay. A segregated right-of-way or busway, on the other hand, includes physical constraints that discourage, or even prevent, other vehicles using the road space allocated to passenger transport.

7.2 Route for the Passenger Transport Corridor

Between the Railway Station and Courtenay Place is the most complex part of the route given:

- ◆ the need to be near the large number of people generators;
- ◆ the need to pass through a number of narrow streets (which are also heavily used by pedestrians);
- ◆ the over-reliance of a one-way system within the CBD; and
- ◆ the lack of a single 'spine' or corridor that would improve visibility and the connection between Lambton Quay and Courtenay Place.

In Technical Report One, we discussed the advantages and disadvantages of several alternative routes. The final decision will be based on providing a balance between locating the route near people generators (as along Lambton Quay) against the faster uninterrupted journey times that a busway or light rail system would provide along the waterfront from the Railway Station to Courtenay Place. It is expected that the final route, as well as the type of vehicle, will be decided following a more detailed scheme assessment study undertaken for the passenger transport corridor.



Figure 6.1: Route through the CBD

If the route follows the existing bus route along the Golden Mile, as shown in Figure 6.1, it is recommended that the existing one-way route between Willis Street and Courtenay Place be

replaced with a conventional two-way system. This will help create a stronger spine to connect Lambton Quay with the Courtenay Place.

There are benefits in locating the passenger transport corridor along the western side of Lambton Quay (see Figure 6.2) with the remaining road space catering for wider and enhanced pedestrian footpaths, a one-way southbound general street-scaped vehicle lane and some parking for vehicles, taxis and other general vehicles.



Before



After

Figure 6.2: Passenger Transport Corridor on the west and one-way south bound vehicle lane on east of Lambton Quay (looking south)

Along Kent and Cambridge Terraces, it is recommended that the passenger transport corridor run in the centre of the boulevard, alongside the existing median, at the expense of car, taxi and coach parking, as shown in Figure 6.3. This will minimise the interaction between passenger transport vehicles and parked cars and other vehicles accessing properties. A side location like that proposed for Lambton Quay is not recommended, as this would create significant safety issues for other vehicles at intersections and pedestrians crossing Kent and Cambridge Terraces. If conventional buses are to operate along the busway, then an additional island will need to be provided between the busway and general lanes for waiting passengers.

Around the Basin Reserve, in conjunction with the proposed grade separated arrangement (Figure 12.1), it is necessary to provide lanes dedicated for passenger transport. This is discussed in more detail in section 12.

A number of submitters during the Phase II Consultation agreed that the provision of segregated busways would reduced journey times making passenger transport more reliable and hence more attractive as an alternative to the car.



Before



After

Figure 6.3: Passenger Transport Corridor along Kent/Cambridge Terrace (looking south)

7.3 Issues along Adelaide Road

It is proposed that the area around Adelaide Road will be redeveloped into a mixed use more intensified area, forming part of the Council's growth strategy. It is important that transport corridors that serve these areas are located and designed in a way that does not sever spaces and places or prevent or discourage walking and cycling¹⁹. Successful overseas examples have therefore generally adopted the following principles:

- Intensified mixed use areas need to be served by roading arterials and these arterials should be located at the edge of the area to minimise severance. This leaves an area free of barriers which enables safe walking and cycling while also maximising the land area used for intensive development.
- High quality passenger transport (rail, guided bus or bus) routes should pass through the middle of the intensified mixed use areas.

If the intensified mixed use area along Adelaide Road between the Basin Reserve and the hospital is to be the quality needed to maximise its success, then general vehicles should be discouraged from passing through the area.

An ideal solution is for passenger transport to pass along Adelaide Road and for other vehicles to be encouraged to use Wallace Street by widening it to four lanes. Widening Wallace Street would result in a number of adverse affects, as discussed in Technical Report One. The study team came to the view that these adverse effects were significantly greater than the benefits of providing the increased road capacity, and it was decided that Wallace Street would not be widened.

This leaves us with three options that should be included in a more detailed scheme assessment:

¹⁹ Passenger Transport Supportive Land Use and Urban Design Guidelines, Kingston Morrison (now SKM) December 1997

- One is for a four lane boulevard along Adelaide Road, giving two lanes for general vehicles and two lanes for passenger transport. With this arrangement, the passenger transport lanes could be located in the middle as shown in Figure 6.4. This will provide the highest quality of service minimising the interaction between buses or light rail with other vehicles. Alternatively, the passenger transport corridor could be located along outside lanes, probably in the form of bus lanes.
- A one-way pair system with Adelaide Road operating in a southerly direction and with the northbound traffic using King Street which would need to be extended the Basin Reserve. In this arrangement, the passenger transport corridor would be best located to the eastern side, operating in a similar way to that proposed for Lambton Quay (Figure 6.2).
- One is for a six lane boulevard along Adelaide Road, giving four lanes for general vehicles and two lanes for passenger transport. This option increases the overall road capacity serving the southern suburbs, but is likely to lower overall amenity, walkability and safety within the intensified land use area.



Before



After

Figure 6.4: Passenger Transport Corridor along Adelaide Road (looking south)

It is envisaged that the passenger transport corridor would extend along Adelaide Road and Riddiford Street stopping near Wellington Hospital in Newtown.

The key advantage of the use of a one-way pair is that it reduces the volume of traffic using Adelaide Road, and this improves the safety and amenity of the area for pedestrians. The advantage of the boulevard is that Adelaide Road will be perceived as a natural continuation of Kent/Cambridge Terrace, improving legibility.

7.4 Vehicle Type

For Wellington, a meaningful increase in the number of people using passenger transport is likely if there is a step change in the level of service provided, particularly reduced journey times²⁰, improved

²⁰ Total journey times are door-to-door, including walk time, wait time (including wait time between mode transfers) and actual journey time.

reliability, and if there is a change in urban form adjacent to the passenger transport corridor such as high quality intensification. A key element to achieving this step change is to provide the right-of-way as discussed earlier for passenger transport. There are three options for the types of vehicles that can use the passenger transport corridor:

- Conventional buses;
- High quality future generation buses;
- Light rail vehicles.

All three options are not mutually exclusive, as it may be desirable to use the passenger transport corridor initially with conventional buses and then adding (or replacing them) with higher quality buses or light rail vehicles in the future. The analysis undertaken as part of Technical Report One confirmed that there are likely to be a sufficient number of passengers in future years along this route to justify the use of high quality buses or light rail. In the future, new generation of buses are likely to exhibit many of the same benefits offered by light rail systems, but without the additional cost of having to lay rail tracks. These buses are likely to be of similar high quality and offer similar passenger carrying capacity to light rail. Like light rail, they may be powered by electricity, have multiple door loading and use electronic guidance to dock at platforms to minimise loading times.

If light rail or higher quality buses are used, it may be necessary to force many of the passengers using conventional buses serving the southern and eastern suburbs to transfer to the light rail or higher quality buses at Newtown and Courtenay Place. Alternatively, some conventional buses may provide an express service avoiding the need for transfers. Interchanges will be required at Newtown and Courtenay Place to allow bus/ light rail transfers. Additional space and facilities are needed (preferably at Newtown) for the storage and maintenance of the light rail vehicles.

During the Phase II Consultation, light rail was generally seen as a longer term solution, providing greater capacity and being less polluting than buses. However, there was concern about the additional costs and space required compared to a bus based system. The need for an interchange from buses to light rail was also considered a disadvantage.



Figure 6.5: Future Generation of Quality Buses and Light Rail

7.5 Staging

The development of a high quality passenger transport corridor can be staged to match the increase in passenger numbers associated with the increase in population within the growth spine. The first stage is to extend the existing bus lanes over the full length of the route. The second stage is to increase the capacity of the route by constructing a dedicated busway for use by our existing bus fleet. At a later stage, and as patronage increases, the existing buses could be replaced with larger high quality (and perhaps guided) buses or light rail vehicles.

One of the advantages of the busway or light rail system over the present system of bus lanes is that it creates a perceived 'permanence' needed for the development and growth of the intensified mixed use areas.

Submitters during the Phase II Consultation generally liked the idea that the passenger transport proposals could be staged: that the present bus lanes could be upgraded to a busway, which in turn could be upgraded to a higher quality system like light rail in future years.

7.6 Alternatives investigated

Once the link from the CBD to Newtown has been established, there is the opportunity to extend the passenger transport corridor to the proposed growth area at Kilbirnie in future years. Such an extension is likely to be costly and to adversely affect the level of service provided for other motorised road users. An extension to Kilbirnie is unlikely to be justified unless the Kilbirnie growth area is of sufficient size and density to generate the number of passenger trips needed to justify the expense. Furthermore, significant urban growth at Kilbirnie will see a significant increase in car trips through Mount Victoria which can only be accommodated if the existing Mount Victoria Tunnel is duplicated. Within the planning period of this study, and given the likely small size of the Kilbirnie growth area, the study team felt that the existing bus route from Courtenay Place to Kilbirnie via the Mt Victoria Bus Tunnel would provide an adequate level of service, albeit with some priority measures at intersections and a GPS bus tracking system to minimise delays at the Mt Victoria bus tunnel.

The concept of extending the light rail to the airport was investigated as part of the study. This investigation showed that it was not viable to extend the light rail to the airport given the very small number of passengers forecast to use it. Therefore, the high quality passenger transport spine is not envisaged as progressing beyond Newtown within the time frames envisaged within this strategic study.

The concept of extending heavy rail within a cut and cover tunnel along the waterfront to connect the railway station with Courtenay Place was also investigated. While one of the advantages of extending heavy rail is that avoids the time penalty for mode transfers at the railway station, particularly those that work in the CBD area, it would not avoid the need for a mode transfer at Taranaki Street, particularly for those travelling to the east and south along Wellington City's proposed growth spine. Nevertheless, the heavy rail extension did appear to make the Johnsonville rail line more attractive, albeit taking passengers from buses and not cars: showing the importance of the time penalty associated with mode transfers particularly for the shorter commuter distances like

the Johnsonville Line. The underground rail link was much more expensive than the busway or light rail options and there are risks that the cul-de-sac arrangement would restrict²¹ the number of commuter trains that would be able to use the link – reducing its effectiveness, certainly in future years. Given the significance of the time penalty at the railway station for this particular route, there may be some merit in considering extending any busway or light rail system from Newtown to Johnsonville in future years²².

7.7 Costs and risks

By not constructing the high quality passenger transport corridor from the Railway Station to Newtown there is the risk that Wellington City's proposed growth spine will not develop at all or achieve its full potential. The passenger transport route along the Golden Mile is already operating near capacity²³, and while some increase in performance can be achieved with more bus lanes (as presently proposed by Wellington City), electronic ticketing and bus stop improvements, these are only short to medium term solutions. In the longer term a step change will be required by way of providing a dedicated right-of-way and higher capacity for more quality vehicles. Failure to make this step change will put the existing bus system under pressure, making journey times unreliable and reduce passenger transport mode share. The key challenge for decision makers today is to plan for and protect a dedicated busway from the railway station to Newtown.

Total operating costs per passenger for light rail systems are typically higher than bus-based transitways²⁴. Whilst it is acknowledged that costs need to take passenger kilometres into account (given the usually longer nature of light rail systems), such comparisons need to be considered with respect to actual patronage rather than the capacity of the different modes of passenger transport.

For the light rail system to operate at a very regular frequency to provide the high quality of service required to achieve the needed step change, the light rail may not be full. Without forced transfers to prevent buses from competing with the light rail along the same route, it is unlikely that light rail would operate at capacity whilst still maintaining a high frequency – thereby significantly increasing operational costs.

However, forcing transfers between buses and light rail will induce a significant time penalty, unless the headways for light rail are less than 3 to 5 minutes. The issue of time penalties is particularly important for this project given the relatively short travel times between the railway station, Courtenay Place and Newtown. Time penalty makes passenger transport less attractive as an alternative to the car.

While the concept of providing a right-of-way for passenger transport will significantly improve journey times and passenger transport mode share, it will reduce the accessibility for general vehicles including taxis and service vehicles. It is acknowledged that removing general vehicles from city

²¹ While the present railway station also operates as a cul-de-sac, it also provides multiple platforms.

²² WORKS Consultancy Services & MVA Consultancy "Light Rail Transit Feasibility Study", March 1995

²³ Opus, "Ngauranga to Airport Strategy Study, Golden Mile Assessment", for Transit New Zealand, 2006

²⁴ Hensher D. A. A bus-based transitway or light rail? Continuing the saga of choice versus blind commitment. May 1999. Vol 8 No 3 September 1999 Roads and Transport Research.

streets can have some impacts on the amenity and safety of pedestrians as well as the retail activity along that street. Concerns along these lines were expressed by some submitters during the Phase II Consultation. For this reason, our proposals provide at least one lane for general vehicles along the entire passenger transport corridor. This provides the needed balance between having too many cars and not enough.

It should be noted that the cost of any street-scaping work associated with the passenger transport corridor could add another \$30 to \$70 million depending on what was undertaken and the extent of the works.

8 Other Bus Enhancements

8.1 Overall Description

As identified in Technical Report One, a number of passenger transport initiatives exist to extend the passenger transport spine to the north of the CBD. After the Golden Mile Facilities are in place, the GWRC will need to do a full service review to achieve full potential.

It has been decided to retain the heavy rail corridor between the CBD and Johnsonville, following the 2006 North-Wellington Public Transport Study. Given this decision, bus patronage to the north-western suburbs is likely to increase given the limited catchment of the present rail service. In order to assist bus movements along this section of the spine, a number of enhancements along Hutt Road and Thorndon Quay are proposed, including bus lanes along Thorndon Quay from Moore Street to Tinakori Road²⁵, plus improvements on the approaches to intersections along Hutt Road aimed at assisting bus movements – for instance through the use of bus lanes and pre-signals at the Hutt Road intersections with Ngauranga Gorge, Kaiwharawhara Road and Tinakori Road.

The ability to provide bus lanes along Hutt Road is dependent on providing additional roading capacity along State Highway One between Ngauranga Gorge and Aotea Quay. Only by providing this additional capacity is it possible to reallocate two of the four lanes used by general vehicles along Hutt Road to passenger transport.

Passenger transport improvements through to the Airport have also been identified through the use of bus lanes along sections of Cobham Drive (albeit not at the expense of traffic lanes) and pre-signals/slip lanes on the approaches to Troy Street and Calabar Road roundabouts.

Bus priority was considered by submitters during the Phase II Consultation process as being affordable and cost effective. They felt that bus lanes would help decrease journey time, making passenger transport more attractive as an alternative to the car.

²⁵ At expense of some car parking to provide a lane for general traffic and a lane reserved for buses in each direction

9 Other Passenger Transport Initiatives

9.1 Overall Description

Technical Report One identified a number of additional strategic interventions or concepts that are applicable to the delivery of the passenger transport spine (as well as network wide) in order to achieve improved reliability, reduced journey times, increased patronage and bus capacity. These include:

- Signal detection and bus activation at signals;
- Signal Management (SCATS) to link groupings and key bus corridors;
- GPS tracking, detection and route management;
- Bus stop capacity assessment and upgrade to improve current capacity and operational conditions (avoid queuing for bus stops);
- Consistent parking and loading strategy for key bus corridors;
- Enforcement strategy to be consistent with the parking, loading, traffic management and bus priority measures, including CCTV enforcement and compliance targets;
- Electronic ticketing on buses.

Submitters during the Phase II Consultation agreed that GPS tracking of buses, integrated ticketing across passenger transport modes, and linkages from the outer suburbs to city centre, hospital, and airport, and reducing the number of bus stops would help make passenger transport more attractive.

9.2 Other Issues

As indicated in Technical Report One, taxis have an important transport role in the City. Taxis can be more efficient than the private motor car in that they are better able to accommodate trip-chaining and reducing the need for car parking and traffic movements associated with finding a car park. Given the complementary role that taxis have with passenger transport and the desire to limit the number of private vehicles entering the CBD area which in turn adversely impacts on walkability, taxis (certainly those with multiple occupancies) could be permitted to use bus lanes and even the busway. This remains an operational decision to be made by Wellington City Council.

10 Ngauranga to Aotea Quay

10.1 Overall Description

It is proposed that an additional traffic lane in each direction be provided along SH1 (between Ngauranga and the Aotea on and off-ramps) for use during the peak periods²⁶. Such an arrangement can be accommodated within the existing highway carriageway. In this way, a fourth lane will be permitted to operate for southbound traffic during the morning peak while a fourth lane will be permitted to operate for northbound traffic during the evening peak period. Given the re-configuration of the existing motorway and the slight narrowing of the existing traffic lanes in order to accommodate this proposal, speed limits would be reduced to 80km/h during the peak time periods when the four lanes are in operation. It is proposed to provide four-lanes in both peak and inter-peak and in each direction along the Thorndon Overbridge.

In order to provide a fourth lane southbound on the Thorndon Overbridge, the existing bridge structure will need to be widened. Because the existing Thorndon Overbridge is supported on single column piers with umbrella pier caps, it will be necessary to provide additional columns to support the widening as it is unlikely that the existing substructure can be strengthened to withstand the increased eccentric gravity and seismic loads. It is expected that the existing Aotea Quay off ramp can remain with this arrangement.

During the Phase II Consultation, submitters felt that increasing the capacity by using the shoulders was a very effective use of the existing facility. They felt that it would improve access to Centre Port and reduce the number of vehicles using the Hutt Road. Concern was expressed that the removal of the shoulder may obstruct emergency vehicle access, and cause congestion when vehicles break down. However, these adverse effects could be mitigated by using Intelligent Transport Systems. Gantries will be provided for ATMS signs which will indicate permitted lanes and the prevailing speed limit for both directions of traffic. When four-lanes of traffic are in operation, there will be no separate roadside shoulder. Two separate lay-bys in each direction will be provided to allow vehicles to coast to a safe location in the event of a breakdown. A remote surveillance system could be implemented to enable early detection of breakdowns and minimise delays.

10.2 Impact on Hutt Road and provision of Bus Lanes

Reallocating road space on the motorway provides an opportunity to reallocate existing road space from general vehicle use to provide the bus lanes along Hutt Road without reducing overall capacity. This means that more vehicles use the motorway and less use the Hutt Road. Although the proposed increase in passenger rail frequency will improve the level of service for passengers living near the Johnsonville, Kapiti and Hutt railway, there are a number other northern and north-western

²⁶ The fourth lane will operate for southbound traffic during the morning peak period with the southbound carriageway reverting back to three lanes outside of this period. The same arrangement applies in the evening peak but with the northbound carriage.

suburbs that are only served by bus. Bus lanes along the Hutt Road will improve the level of service provided by buses, increasing its attractiveness.

The additional vehicles that are now using the motorway will put additional pressure on the Aotea Quay off ramp or the Terrace Tunnel. Therefore, the removal of lanes off the Hutt Road may need to be undertaken at the same time as the duplication of the Terrace Tunnel or Aotea Quay exit-slip may need to be widened to provide two lanes.

10.3 Cost and Risk

The provision of additional lanes between Ngauranga and Aotea Quay does not increase the number of cars entering the city CBD, but rather significantly improves travel times and reduces congestion for those vehicles that do. Without providing additional lanes on the Motorway, it will not be possible to provide bus lanes along Hutt Road. Improving bus journey times along Hutt Road will become more important in future years as this route becomes more congested and the numbers of buses increase to service the north-western suburbs.

11 Terrace Tunnel

11.1 Overall Description

In order to allow the state highway to serve its primary purpose (as shown in Figure 3.2), additional southbound capacity is required through the Terrace Tunnel in order to match the adjacent capacity particularly the two-lanes of traffic to the south of the City as part of the Inner City Bypass. The existing Terrace Tunnel is not wide enough to accommodate an additional lane and therefore increased capacity can only be provided through a new tunnel. It should be noted that the original Terrace Tunnel design envisaged a duplicate tunnel on the eastern side of the existing tunnel; and as such, some provision was planned for as part of the original design and construction.

It is proposed that the new alignment for the duplicated tunnel follow this original planned alignment with a slight modification at the south portal to tie into the new Inner City Bypass at Vivian Street prior to the Willis Street traffic signals. At the southern portal of the duplicated tunnel, the southbound carriageway will pass under Ghuznee Street and connect to a modified Vivian Street off ramp, modifying this section of the southbound Inner City Bypass between Ghuznee Street and the Willis Street signalised intersection.

Submitters during the Phase II Consultation supported the view that duplicating the Terrace Tunnel would help get general vehicles onto the right roads and off city streets making the city more walkable, safe and enhance amenity. However, there was concern about the cost of the duplicated tunnel.

11.2 Other alternatives

As part of a future scheme assessment study, the option of constructing a smaller single lane tunnel rather than a two lane tunnel should be further investigated. This would be done on the basis that the existing tunnel would continue to operate as it currently does with two-way traffic. A variation to this idea is to construct this tunnel to provide for small vehicles only. This would be done on the basis that large vehicles will be able to use the other northbound lane within the existing tunnel.

The study team also investigated the concept of using a 'reversible' traffic lane which can be used in either direction of travel depending upon the time of day. As such, two-lanes of traffic are given over to southbound vehicles in the morning peak period (with the remaining lane northbound) and vice versa for the evening peak hour as at present. Traffic flows through the Terrace Tunnel are not that tidal, and while the additional southbound lane in the morning peak did take southbound traffic off the water front, it increased the traffic along the waterfront in the opposite direction. Therefore the tidal flow arrangement is likely to make little difference to reducing severance between the city and the waterfront and improving access for pedestrians. Even though the cost of tidal flow is significantly less than duplication of the tunnel, it is also unlikely to result in sufficient benefits.

Unfortunately, the existing tunnel width is such that there is insufficient room available to provide a physical barrier without reducing traffic lane widths to only 3 metres²⁷. This raises serious safety concerns for a tidal flow system, particularly given the combination of the radius and grade change within the Terrace Tunnel and the complications of the Vivian Street off-ramp and Ghuznee Street Bridge at the south portal.

Some submitters during the Phase II Consultation indicated that they liked the lower cost of the tidal flow option, many accepted the concerns about safety and that it presented only a very short term solution. Some submitters suggested the alternative of widening the existing tunnel, but widening an existing tunnel is not feasible.

11.3 Impact on Waterfront

One of the key benefits of duplicating the Terrace Tunnel is that it has the potential to reassign traffic from the Waterfront arterial to the higher capacity motorway. Previous studies²⁸ have recommended that traffic volumes and traffic lanes be reduced along the waterfront so as to improve the pedestrian links between the CBD and its waterfront. Increasing the capacity of the Terrace Tunnel reduces vehicles along the waterfront and makes the idea of reducing the existing three lanes in each direction to two lanes in each direction more feasible. The increased traffic using SH1 will put the Inner City Bypass under greater pressure.

Should it be decided to locate the passenger transport corridor along the waterfront rather than along the Golden Mile, it would be essential to increase the capacity for general vehicles by duplicating the Terrace Tunnel.

11.4 Cost and Risk

Ground conditions for the duplicate tunnel are not expected to be ideal for tunnelling, and part of the length of the tunnel is likely to include The Terrace 'Fault Zone'. Given the low cover and poor ground conditions, subsidence at ground level above the tunnel can be expected.

The distance between the first and a second tunnel is much less than would be provided in ideal situations. While the existing tunnel was designed to accommodate the additional pressures that the second tunnel would impose given its close proximity, dealing with the effects of the two tunnels being so close together increases the cost uncertainty. Careful consideration will need to be given to the support of the tunnel during excavation, given the low cover and highly fractured rock material likely to be encountered, particularly in the fault zone.

The tunnel will produce large quantities of cut material and unless this can be used in other projects being constructed at the same time, will need to be carted to waste. CentrePort noted in their submission that surplus fill could possibly be used for reclamation purposes.

²⁷ Needed to provide minimum separation between the traffic lanes and the barrier and the tunnel walls

²⁸ GEHL Architects, City to Waterfront, Public Spaces and Public Life Study, Wellington 2004.

These issues create a number of uncertainties over the design, construction and costing for a duplicate tunnel. Greater cost certainly will be achieved following more detailed investigation forming part of a scheme assessment study.

11.5 Questions about Strategy and Funding

There is no question that the idea of reducing the severance between the CBD and its waterfront will improve the safety and amenity for active modes which, given the ongoing intensification of the city, is likely to represent an increasing proportion of trips in future years. Consequently, the removal of lanes is consistent with and supports the NZ Transport Strategy. However, because the duplication of the Terrace Tunnel is so expensive, and because the prime purpose is to re-assign vehicle trips (rather than decrease journey times and vehicle operating costs as would be the case with many other transport projects), the duplication of the Tunnel has a very low benefit cost ratio. And because the benefit cost ratio still remains as an important criterion for determining funding priority, there remains some uncertainty about how the element would be funded.

12 Basin Reserve

12.1 Overall Description

A grade separated interchange is proposed to resolve traffic congestion at the Basin Reserve and provide for the high quality passenger transport spine. It will provide a new direct link for westbound SH1 vehicles travelling from the existing Mount Victoria Tunnel to the Inner City Bypass along Buckle Street. Eastbound SH1 vehicles travelling from the Inner City Bypass along Vivian Street and then Kent Terrace are provided with a direct link to the new Paterson Tunnel – being a duplication of the existing tunnel. Both of these direct links are grade separated from other traffic movements around the Basin Reserve, minimising delays at intersections and removing the significant weaving problems that exist around the Basin Reserve. In this way, an underpass is provided for traffic, and more importantly buses, travelling from Sussex Street to Cambridge Terrace and from Kent Terrace to Adelaide Road.

The preferred arrangement for a grade separated interchange will be developed as part of the scheme assessment report. One option, based on an investigation completed by Maunsells is for the two most left lanes of Kent Terrace to provide access to Adelaide Road or Buckle Street. The two other Kent Terrace lanes rise up to pass over these two-lanes to provide access to the east through the Mt Victoria tunnel. The two-lanes providing access to Adelaide Road must loop away from the two approach lanes to the tunnel and drop below ground in a trench near the Dufferin Street and Paterson Street intersection to obtain the necessary clearance under the two-lanes above.

Westbound vehicles from the tunnel do not need to circulate around the Basin Reserve to get to Buckle Street, but are instead provided with a direct two-lane carriageway parallel to, and adjacent to, the eastbound lanes. This direct link is provided on viaduct, which passes over the road connecting Kent Terrace with Adelaide Road, over the Basin Reserve entrance and over the road linking the Sussex Street with Cambridge Terrace at the intersection of Sussex Street and Buckle Street. In this way, there are no intersections between the tunnel portal and Buckle / Tory Streets signal controlled intersection. The road linking Sussex Street with Cambridge Terrace passes under the viaduct. Two-lanes are provided for the road linking Sussex Street with Cambridge Terrace.

It has been assumed that as part of the connection to Buckle Street, that Buckle Street is realigned to the north, which is in keeping with the current proposals being studied to improve amenity in front of the National War Memorial in Buckle Street. This alignment also provides for better connections and more room for construction.

Some submitters during the Phase II Consultation felt that a grade separated solution was the only solution for the Basin Reserve, especially when implemented in conjunction with a duplicate Mt Victoria Tunnel. However, there were some concerns at the cost of the proposed improvements. Submitters also felt that any improvement be built in such a way that potential future uses are not restricted.



Before



After

Figure 12.1: Basin Reserve (looking south from Kent/Cambridge)

The elevated structure for the grade separation of the Basin Reserve will be visually prominent and will affect the perception, symbolic character and context of the Basin Reserve and will impact on the overall character of the wider surroundings. The grade separation may also adversely affect the experience of those using the Basin Reserve. Concerns about the visual impacts and traffic noise, along with vehicle emissions near the Basin Reserve, local schools and sports grounds were also expressed by some during the Phase II Consultation. It was felt that a grade separated solution would have significant impact on heritage and recreation values, and that it was difficult to mitigate these.

Nevertheless, there is the opportunity to enhance the entrance-way to the Basin Reserve by incorporating the viaduct structure into a grand entrance (as shown in Figure 11.1). The viaduct over the entrance to the Basin Reserve together with the relocation of other high volume roads away from the entranceway creates the opportunity to significantly improve enhanced pedestrian access to the Basin Reserve. At-grade pedestrian crossings could be modified on Kent and Cambridge Terrace to allow pedestrians to reach this area. A pedestrian route around the inside of the ring road connects the Basin Reserve entrance with other key pedestrian routes. Signal controlled crossing points for pedestrians could be provided across Dufferin Street (opposite St Marks) and Rugby Street (opposite Adelaide Road). The drop-off and pick-up areas in front of St Mark's school in Dufferin Street will be safer given the significant reduction of traffic volumes in this area.

Some submitters during the Phase II Consultation indicated that they preferred a two lane tunnel be constructed to connect Cambridge/Kent with Adelaide Road for passenger transport vehicles, pedestrians and cyclists and general vehicles. While this option was investigated by Maunsells in an earlier study of the Basin Reserve, they concluded that a flyover for SH1 traffic was a preferable option. These options may be further investigated during the scheme assessment phase of the project.

12.2 Passenger Transport Corridor

While this strategy confirms the need for a passenger transport corridor extending from the Railway Station and the Hospital, further work by way of a scheme assessment is required to confirm details of the preferred arrangement for the passenger transport corridor. Details of what should be done along Adelaide Road, for example, is dependent on the outcomes of a detailed urban design study for the intensified mixed use area along Adelaide Road, presently being undertaken by Wellington City Council. The issues of whether Adelaide Road will operate as a Boulevard or one-way pair, whether the provision for buses or light rail is made along the median or shoulder lane of Kent/Cambridge Terrace will impact on how provisions should be made for passenger transport at the Basin Reserve. Several options appear feasible, including:

- Allowing the passenger transport vehicles and general vehicles to merge at the Basin Reserve so as to use the same road space – this may only be a short term solution;
- If shoulder bus lanes are provided along Kent/Cambridge Terrace and Adelaide Road, then shoulder bus lanes can also be provided around the Basin Reserve;
- If passenger transport is located in the median along Kent/Cambridge Terrace and Adelaide Road, either providing bus lanes on the inside lane around the basin or pre-signals at the intersection of Kent/Cambridge Terrace with the Basin Reserve to allow passenger transport vehicles to change from the median lane to the shoulder lane.

The details of these options are further dependent on whether it is decided to provide only two lanes for general traffic along Adelaide Road or four lanes.

12.3 Cost and Risk

A key feature of the proposed improvements at the Basin Reserve is to minimise delays to the high quality passenger transport corridor proposed between the Railway Station and Newtown. Buses will experience increasing delays at the Basin Reserve in future years, making bus travel less attractive.

The final arrangement for how SH1 will be realigned along Buckle Street to improve amenity in front of the National War Memorial in Buckle Street may impact on what is feasible at the Basin Reserve.

13 Adelaide Road

13.1 Overall Description

It is proposed that Adelaide Road is retained as a major arterial for general vehicles while also acting as a passenger transport corridor. An urban planning study undertaken by Wellington City Council since publishing our Technical Report One favours providing two lanes for general vehicles and two lanes for passenger transport along Adelaide Road²⁹.

This proposal reduces the existing southbound capacity of Adelaide Road from two-lanes to one lane. The number of vehicle trips between the southern suburbs and the city is expected to continue to increase in future years, which will be further exacerbated by the intensification along Adelaide Road. Ideally capacity to the southern suburbs will need to be increased to meet this increased capacity. The proposal to retain only one lane in each direction along Adelaide Road for general vehicles will significantly reduce the level of service provided for general vehicles accessing the southern suburbs, encouraging more traffic to use Wallace / Taranaki Streets. This in turn will reduce the effectiveness of the bus system that also uses this route, increasing severance and reducing the safety and amenity for pedestrians and cyclists.

The improvements to SH1 from the Basin Reserve to Cobham Drive will reduce the number of vehicles using Constable Street and this will reduce the number of vehicles using Adelaide Road.

Comments made during the Phase II Consultation generally supported the idea of creating a mixed more intensified land use along Adelaide Road. The idea of a boulevard was seen as helping to create a pleasant and safe pedestrian environment, while providing for passenger transport and general vehicles.

13.2 Alternatives

An alternative to providing two lanes for general vehicles along Adelaide Road is to provide only one lane, which could operate in the southerly direction. In this arrangement, the northbound traffic would use a parallel route along King Street, which would need to be extended to the Basin Reserve. The remainder of the carriageway along Adelaide Road would be dedicated to passenger transport and pedestrians. King Street will have a narrow road reserve, only requiring one 3.5m wide lane, space for car parking and footpaths. This arrangement would minimise the number of vehicle crossing points needed to serve buildings on the west of Adelaide Road – which will improve the quality of the passenger transport corridor. It would also simplify the intersection at Adelaide Road, Riddiford Street and Johns Street. The idea of a one-way pair was suggested by some people during the Phase II Consultation.

Such a one-way pair arrangement also lends itself to increasing the capacity of Adelaide Road for general vehicles by creating a one-way system with two lanes in each direction. But this increased

²⁹ Adelaide Road Precinct; Transport And Traffic Engineering Issues Paper, TTM Consulting pty. Ltd, 4/April/08

capacity would need to be undertaken in conjunction with increased capacity at the Basin Reserve for vehicles travelling to and from Adelaide Road. It also increases the footprint required for transport making less land available for intensification. Submitters during the Phase II Consultation commented on the need to increase road capacity, which would assist traffic flows to Newtown and the hospital for all types of transport modes. However, concern was also expressed about the adverse effects on the urban environment through adding too many additional lanes and the adverse effects of the resulting increase in traffic volumes.

A one-way system like that described above would allow the option of placing the passenger transport lanes on the side, like that proposed for Lambton Quay. This is likely to create a higher quality passenger transport facility than locating the lanes on the shoulders. With the passenger transport lanes located on the shoulder through Newtown, a signal-pre-emption scheme will need to be provided at the junction of Adelaide Road and John Street to allow vehicles using the passenger transport right-of-way lanes to access the shoulder lanes safely and efficiently.

An alternative to locating the bus lanes on the shoulder is to locate them along the median (as proposed along Kent/Cambridge Terrace). While this is ideal for supporting a higher quality passenger transport service, it will require additional width, impacting on the land that is available for intensification.

13.3 Cost and Risk

The cost estimates for this part of the project have assumed the widening of Adelaide road to provide a carriageway width of 28m, providing two lanes for general traffic and two for passenger transport. One of the difficulties of estimating the cost of this corridor is that much of the work must be undertaken in conjunction with development of the intensified growth area itself. For example, the block length along Adelaide Road would need to be reduced to encourage intensification. However, the cost of providing these additional connectors has not been included in our indication of cost for this project. We have also assumed that the cost of land associated with any widening of Adelaide Road (or the alternative of developing a one-way pair using King Street extension) are incorporated within the cost of the development of the intensified growth spine and not the widening work needed for the transport corridor itself.

14 Mount Victoria Tunnel

14.1 Overall Description

It is proposed to provide a duplicate tunnel immediately adjacent to, and to the north of, the existing Mount Victoria Tunnel so as to create a one-way two-lane pair. This would require the conversion of the existing tunnel from two-way operation to a one-way operation northbound. The entry and exit points are such that a new tunnel is able to connect onto the existing roading network at Ruahine Street to the south-east and the Basin Reserve to the north-west.

The duplicated Paterson Tunnel would be located adjacent to the existing tunnel. Emergency pedestrian links could be provided between the two tunnels. Duplication of the Mt Victoria Tunnel creates the opportunity to refurbish the existing Mount Victoria Tunnel, removing the ventilation duct so as to improve lane width and provide shoulders.

Perceived advantages of the Mt Victoria duplication during the Phase II Consultation included the relief from existing congestion and improved traffic flows to the airport, along with improved journey times. It was considered a long term solution. Other submitters thought duplication was necessary to relieve future traffic increases associated with future residential development in the eastern suburbs, including the growth spine.

Concern was expressed during the Phase II Consultation that the tunnel duplication would discourage people from using passenger transport. However, our transportation modelling suggests that the construction of the tunnel, especially when undertaken in conjunction with other integrated initiatives forming part of the Strategy would have minimal impact on passenger transport mode share. Similar to comments about the Terrace Tunnel, some people felt that duplicating the Mt Victoria Tunnel would be prohibitively expensive, for the traffic involved. There was also concern that the duplicate tunnel would potentially impact the existing amenity of Mt Victoria and Hataitai communities and businesses and destroy heritage items.

14.2 Alternatives

An alternative to the Patterson Street tunnel that was investigated but not considered further was the Pirie Street Tunnel. This tunnel created a direct link for one-way southbound traffic using Vivian Street between the Inner City Bypass and Ruahine St via a new tunnel constructed under Pirie Street and Mount Victoria. This option was more expensive, had more social, community and environmental impacts than the Paterson Street tunnel. However, it offered few additional benefits.

14.3 Walking and cycling

Enhancements could be made for pedestrian and cycling by either improving security, noise and ventilation in the existing tunnel, or providing additional width in the new tunnel with facilities for pedestrians and cyclists that provide for their security, noise and ventilation requirements. Submitters felt that the duplication of the Mt Victoria tunnel would include improved amenity for pedestrians and cyclists.

14.4 Cost and Risk

Failure to increase the capacity of the State Highway between the City and the eastern suburbs, including the duplication of the Mt Victoria Tunnel, will severely limit the ability of the city to allow further growth in the eastern suburbs, including the growth spine at Kilbirnie.

Good ground conditions are expected for the bored section of the Paterson Tunnel, certainly better than that expected at The Terrace Tunnel. Given the close proximity of the new tunnel to the existing tunnel, there will be additional construction cost uncertainty. Construction of the Paterson Tunnel will create a large volume of waste material needing disposal. For the purposes of estimating the cost, it has been assumed that a disposal site would be found within 20km of the site. Excavation for the south-east portal would require careful consideration given its close proximity to the existing road and ventilation building.

An outlet for the Paterson Tunnel ventilation system would be required, although the town belt offers an ideal location away from residential areas and hence need to construct a ventilation stack of some height.

15 Ruahine Street and Wellington Road

15.1 Overall Description

On the eastern side of Mount Victoria, improvements include the four laning of Ruahine Street and Wellington Road with improvements at Ruahine Street and Taurima Road and Ruahine Street and Goa Street intersections. It is expected that these improvements should generally be able to be located within the existing Wellington City District Plan designations, put in place for this purpose. To locate the widened road within this designation will require the use of a narrower median and narrower shoulders than what might be provided in a green-field environment. Consequently, there may be insufficient space to provide a wide median and parking will be restricted. Cars that break-down may be forced to park on the footpath to prevent impacting on through traffic movement.

Right hand turns from Taurima Road onto Ruahine Street will be banned to improve safety³⁰. Vehicles from Hataitai that wish to complete this manoeuvre will need to divert to the south along Moxham Avenue to an upgraded intersection at Goa Street and Ruahine Street. A signalised intersection will be provided at Ruahine Street and Goa Street. This intersection also provides access to Hataitai Park. This intersection is expected to have an increased number of turning vehicles as a result of the banned right hand movements at Taurima Road. Right hand turns from Moxham Avenue to Goa Street may be sufficient in the morning peak to require a signalised intersection.

The existing Wellington Road and Ruahine Street intersection would also be signalised. It is proposed that the Wellington Road and Moxham Avenue and Wellington Road and Walmer Street intersections be restricted to left in and left out so as to maximise through traffic capacity. Only minor adjustments are required at the Wellington Road and Kilbirnie Crescent intersection. The existing signalised intersection at Wellington Road and Evan Bay Parade will also only require minor modification.

Submitters during the Phase II Consultation felt that the Ruahine Street and Wellington Road improvements would be a cost effective way of improving traffic flows and safety from the airport to the city. Submitters were generally comfortable with the arrangement, including the need to ban some traffic movements.

Along Wellington Road, the effect of using the full 25 m designation will be the removal of 10 houses and the acquisition of the frontage of four additional properties on the south side of Wellington Road. Some further property acquisition will be required at the corner of Goa Street and Ruahine Street to accommodate the proposed signalised intersection.

Concern was expressed during the Phase II Consultation about the need to demolish housing and remove trees.

³⁰ Although this route could still be used by cyclists and pedestrians to access the walkway and cycleway within the Mt Victoria tunnel.



Before



After

Figure 14.1: Wellington Road (looking west)



Before



After

Figure 14.2: Ruahine St (looking east)

15.2 Alternatives

To accommodate a wider cross-section, including 3 m wide median and wider shoulders, it will be necessary to encroach onto property beyond the existing designation. Along Ruahine Street, this encroachment could be to the west onto council owned land at Hataitai Park. Along Wellington Road, the wider cross section means that the existing 25 m designation would also need to be increased.

Some submitters during the consultation suggested that Wellington Road/Ruahine Street become one-way with Moxham Ave/Kupe Street acting as the one-way pair. While one-way pairs provide enhanced capacity for general vehicles while minimising the impact on urban form, the study group felt that the benefits of the existing designation along Ruahine Street outweigh the adverse impacts for those living along Moxham Ave. There would also be significant impacts on Hataitai village when connecting Moxham Ave with Mt Victoria Tunnel – even with one way operation.

15.3 Cycling

It is recommended that facilities be made for cyclists on a parallel route using Moxham Avenue and Hamilton Road and not along SH1. Concern about improving cycling along Ruahine Street and Wellington Road was expressed in the Phase II Consultation.

15.4 Cost and Risk

In some areas there are inadequate details about the extent and nature of the designation in place for widening that may need to be clarified during the scheme assessment phase of the project. Also during the scheme assessment phase, it will be necessary to decide on the option of constructing a carriageway with a cross-section that fits within the present designation (which will provide minimum standards) or increasing the designation to provide for wider shoulders and a wider median.

16 Roundabout Improvements along Cobham Drive

16.1 Overall Description

It is proposed to provide two additional lanes on the two roundabouts along Cobham Drive to improve capacity. As part of this work, it is recommended that additional bus lanes be provided on the approach to each roundabout so as to give buses priority in future years.

Cobham Drive /Troy St Roundabout: The provision of an extra lane on the Troy Street approach to the roundabout to provide three approach lanes, rather than two lanes, with sufficient space provided on the circulating carriageway to allow two-lanes of traffic. This would result in a left lane for left turners, middle lane for left and right turns and right lane for right turning vehicles.

Cobham Drive/Calabar Road Roundabout: The provision of a slip lane from Calabar Road to Cobham Drive to allow left turners from the airport the chance to access Cobham Drive without having to enter the roundabout with a merge on Cobham Drive just beyond the roundabout. This may require a reduction in the central roundabout island and the central island on Cobham Drive in the immediate vicinity of the roundabout in order to prevent any ingress into airport land.

Submitters' perceived that increasing the capacity of these roundabouts would be effective in reducing congestion while others argued that it is only a short term solution. Suggestions included more consideration of pedestrian and cycle safety and lowering speed limits on Cobham Drive and Calabar Road. Support was given to the idea of providing bus priority.

17 Network Performance

Modelling and network assessment undertaken in the final project phase was undertaken by Greater Wellington Regional Council. Their final modelling report is annexed to this document. Graphical outputs showing traffic flows forecast for each scenario are included in Appendices A1 (AM Peak), A2 (Inter-peak) and A3 (PM Peak). Each appendix presents the forecast 2016 Do-Minimum for the specified time interval. Traffic flows for each scenario are presented as the change in traffic flows from the Do-minimum. This section provides a summary of the multi-modal modelling forecasts.

17.1 Overview

The passenger transport initiatives along with the removal of choke points in the roading network collectively increase the mode share using passenger transport by 2% from 25.8% (predicted for 2006) to 26.3% (predicted for 2016) within the Wellington City area.

The passenger transport initiatives result in a 7% (1,500) increase in passengers boarding over the two hour morning peak period within the Wellington City area.

The provision of the additional lanes along SH1 between Ngauranga and Aotea during the peak periods, along with the provision of bus lanes along Hutt Road at the expense of general vehicle lanes, encourages southbound traffic off Hutt Road onto the state highway in the morning peak, and northbound traffic from the Hutt Road onto the state highway in the evening peak. As a result, the state highway will operate at or close to capacity in each direction in the peak periods. Similarly, the reduction in general traffic lanes along the whole length of Hutt Road will result in parts of Hutt Road operating at or over capacity in the morning and evening peaks, for instance on the northbound approach to the Kaiwharawhara Road intersection in the evening peak.

The off-ramp at Aotea Quay and the two lanes at the Terrace Tunnel are expected to operate at or close to their theoretical capacity by 2016 in the morning peak period. Overall however, southbound flows along Aotea Quay and the Waterfront in the morning peak period are much reduced from the 2016 do-nothing. The additional traffic using the Terrace Tunnel southbound loads additional traffic onto the Inner City Bypass, resulting in the route operating at or beyond its theoretical capacity.

The grade separation of the Basin Reserve coupled with increased roading capacity through Mount Victoria and along Ruahine Street results in the SH1 route attracting additional northbound and southbound traffic in both the morning and evening peak periods. As such, during the morning and evening peak periods, the duplicated Mount Victoria Tunnel will operate at or beyond its theoretical capacity – as it currently does with a single lane in each direction, albeit with a better level of service than at present. The capacity increases at and around the Basin Reserve and the associated additional traffic results in reductions in traffic flows elsewhere on the network such as Constable Street as well as along Evans Bay Parade. The reduction along Constable Street will improve journey times for buses that also use this route. This reduction in traffic around Evans Bay Parade presents the opportunity to improve facilities and safety for cyclists.

The grade separation of the Basin Reserve, the duplication of the Mount Victoria Tunnel and the widening of Ruahine Street and Wellington Road opens up the eastern suburbs for further growth

and residential development providing enhanced mobility between the CBD and Kilbirnie, the Airport and Miramar. The enhancements are predicted to increase both the number of motor vehicle occupants and passenger transport users compared to the 2016 do nothing. However, in order to control such development and limit inappropriate growth in certain areas, Wellington City Council needs to actively encourage the growth spine, particularly the intensified land use at Kilbirnie, and ensure that development occurs there, rather than elsewhere. Such directed growth would also assist with ensuring the extension of the high quality passenger transport corridor through to Kilbirnie in the future, probably via the Mount Victoria Bus Tunnel.

The traffic signals along Ruahine Street are forecast to encourage some southbound vehicles to use Moxham Avenue rather than Ruahine Street having travelled through the Mount Victoria thereby creating a 'rat-run' through Hataitai. The re-assignment of traffic from SH1 to Moxham Avenue through Hataitai as a 'rat-run' to avoid the delays at the two new sets of traffic signals results in the need to provide appropriate traffic management techniques in the area either through the provision of traffic calming aimed at motor vehicles (and not at the bus service) to discourage such a movement or through a change in the Wellington Road/Ruahine Street traffic signal controlled intersection to prevent delays occurring for State Highway traffic.

The widening of Adelaide Road into a boulevard with two lanes general traffic and two for passenger transport provides an improved link for passenger transport users between the CBD and hospital for all road users. However, it does little to provide for the expected increase in car trips, resulting in an increase in congestion along Wallace Street and Adelaide Road. The reduced level of service for general vehicles in this area may have negative impacts on the development of the growth spine.

17.2 Economic Benefits

The economic benefits are shown in Table 7.2. Benefits were calculated using the travel time savings and reduced vehicle operating costs predicted by the GWRC WTSM model for years 2016 and 2026. The modelling work was based on the premise that all projects are completed by 2016.

Table 7.2 Benefit Indication

Option	Annualised Benefits 2016 (\$M)	Annualised Benefits 2026 (\$M)	25 Yr Total Benefit (\$M)
Bus lanes ¹	3.0	4.6	45
SH1 8-laning	3.4	4.0	40
Basin Reserve	6.5	7.9	80
Mt Victoria Tunnel, Ruahine St & Wellington Rd	11.9	12.4	125
Terrace Tunnel	0.9	0.1	5
Busway ¹	7.7	9.3	90

Notes

1. Benefits may be over stated as the GWRC WTSM did not take into account the reduced level of service for general vehicles as a result of the reallocation of road space and priority given to buses. Ignoring these negative benefits can be useful as testing the sensitivity of economic benefits.
2. Benefits rounded to \$5 million

17.3 Cost

The capital costs to construct the identified infrastructure improvements are shown in Table 7.3. It should be noted that there is the potential for some lower cost designs, such as single lane duplication of the Terrace Tunnel with the existing Tunnel retained as currently operating. However, in order to provide a robust estimate, the full cost of options is included with the view that enhanced estimates based on a preferred design option would be further developed as part of any Scheme Assessment Report.

Furthermore, it should be noted that the costs associated with streetscape costs for walking and cycling initiatives have not been included in those shown below in Table 7.3.

Table 7.3 Cost Indication¹

Mode	Option	Cost Indication \$ Millions ²	
		Expected	95%ile
Passenger Transport Corridor	Busway ^{3,4}	30	40
General vehicles	Ngauranga to Aotea 8-laning	30	40
	Terrace Tunnel Duplication ⁵	170	255
	Mount Victoria Tunnel	175	280
	Basin Reserve	35	50
	Ruahine Street to Airport	45	70
TOTAL		485	735

Notes

1. Since Technical Report One: Description of Options, the costs to undertake this work have been revised to value shown in Table 7.3
2. Costs rounded to nearest \$5 million
3. Includes the Adelaide Road Boulevard element (but excludes PT component of works at the Basin Reserve which is included in the Basin Reserve elements). Busway (Railway station to Basin) is \$20M and Adelaide Rd is \$10M
4. The cost of land associated with the Adelaide Road improvements (including the widening) are assumed to be incorporated within the cost of the development of the intensification work and not in the cost of this option. Expected costs for providing a boulevard with three lanes or a two lane two-way pair would be greater than this figure
5. Based on a duplicated two lane tunnel. Using a restricted single lane tunnel would reduce this cost. The cost of a single smaller tunnel was reported in the Phase II Consultation Document

18 Staging

18.1 Drivers

Clearly not every element of the strategy can be implemented at the same time. The elements that make up the strategy will need to be implemented over the next 20 to 30 years for several reasons:

- The total cost of the plan is likely to exceed the budget available for the next 10 years. Clearly this is related to “affordability” which is one of the principles underpinning the Regional Land Transport Strategy;
- Some elements have higher benefit cost ratios than others, meaning that those elements with the greatest return on investment should generally be completed first. Those elements with the lowest return on investment should typically be completed in future years because the population and employment growth in the intervening years will improve the return on investment;
- Some elements must be completed before, at the same time or after other elements in order to maximise the effectiveness of other elements or to achieve the full benefits of those elements.

In July 2006, Wellington City Council decided to enhance the existing bus priority to improve bus travel times and reliability. Wellington City is now well advanced with the planning of these measures, including bus lanes and signal pre-emption from Ngauranga to the Wellington Railway Station, from the station along the Golden Mile to the hospital, from Newtown to Kilbirnie via Constable Street, and from the Hataitai bus tunnel to Kilbirnie. These measures therefore become the first step in a staging process over the next decade to enhance the bus passenger transport service within the study area.

Several constraints in terms of the order in which the various elements should ideally be implemented were identified during the study, including:

- Development of the passenger transport corridor between the railway station and hospital should be seen as a series of incremental steps, each designed to provide a step up in level of service and in response to increasing passenger numbers. The first step is to provide the bus lanes and priority measures. As discussed above, Wellington City is well advanced with the planning of these elements. The second step is to provide a right-of-way in the form of a busway, but continue to use existing bus vehicles. The last step is to review the type of vehicles being used along this route, perhaps with the introduction of higher quality larger buses or light rail;
- In order to avoid introducing further congestion, the bus lanes along Hutt Road should be implemented at the same time as increasing the capacity along SH1. Ideally, the additional capacity on SH1 should be provided at the same time as road space is re-allocation on Hutt Road. Authorities can find it difficult to claw back additional road space once it has been provided.

- In saying this, by reassigning vehicle trips from the Hutt Road to the Motorway, either additional capacity may need to be provided at the Aotea Quay off ramp or the Terrace Tunnel to accommodate the additional traffic using SH1. The alternative to these two options is to delay the placing of bus lanes on the Hutt Road and not reallocating road space until the Terrace Tunnel is duplicated;
- Both the Basin Reserve and the widening of Ruahine St and Wellington Road elements should be completed before the Mt Victoria Tunnel duplication. There are several reasons for this. Firstly, the Basin Reserve appears to provide the greatest bottleneck, and it will be difficult to maximise benefits for the Mt Victoria Tunnel until these issues are resolved. Secondly, delays along Ruahine St and Wellington Road are more acute given the numerous intersection delays. It is accepted that while Mt Victoria Tunnel capacity is restricted to only two lanes, this is mitigated to some extent by the fact that these lanes are only over a short length and there are no intersections. Thirdly, the Basin Reserve, Ruahine St and Wellington Road elements have a higher benefits and lower costs than the Mt Victoria Tunnel, indicating a better return on the investment of these two elements;
- Parts of the Ruahine Street widening element, such as the intersection of Ruahine Street/Goa Street, could be completed early perhaps as part of a wider strategy to improve access to Hataitai Park;
- Because the Basin Reserve element provides benefits for passenger transport by improving bus journey times between Kent/Cambridge and Adelaide Road, the Basin Reserve element should be seen as improving outcomes for both general vehicle users and passenger transport users.

Table 18.1 summarises the estimated cost and economic benefits (travel time and vehicle operating costs) for the various elements. The Table separates those elements that are expected to be completed early from those that can be completed later. Like many strategies, it is expected that the combined benefits of some or all of the elements is likely to be greater than the individual elements. For reasons given above, the economic benefits of the Terrace Tunnel duplication and the eight laning of Ngauranga to Aotea Quay is likely to have greater benefits than doing each project alone. However, the increase is not significant. The greatest synergy is the completion of the Basin Reserve, Mt Victoria Tunnel and the widening of Ruahine St and Wellington Road.

Table 18.1 Estimated Cost and Benefits

Element	Cost Indication (Expected) (million)	Economic Benefits ¹ (Estimated million)	Indicative BCR
Early Elements			
Bus Priority Measures ²	12	45 ³	3.8 ³
Ngauranga to Aotea 8-laning	30	40	1.3
Basin Reserve	35	80	2.3
Later Elements			
Busway ⁴	30	90 ³	3.0 ³
Mount Victoria Tunnel, Ruahine Street & Wellington Road	210	125 ⁵	0.6
Terrace Tunnel Duplication & Waterfront Lane Reduction	170 ⁶	5	0.0
Combination of Elements			
Strategy	485	335	0.7

Notes

1. Assume element is operational in 2016, benefits rounded to \$5 million
2. Cost for Golden Mile and Arterial Route Bus Priority measures
3. While this overestimates the overall benefits and BCR by ignoring the negative benefits of reduced road capacity, LTNZ indicated that they are willing to consider ignoring these negative benefits as part of a sensitivity test.
4. Includes the Adelaide Road Boulevard element (but excludes PT component of works at the Basin Reserve which is included in the Basin Reserve elements). Busway (Railway station to Basin) is \$20M, LRT is \$140M and Adelaide Rd is \$9M.
5. Excludes intersection at Goa Street and roundabout improvements along Cobham Drive.
6. Excludes cost of Waterfront Lane Reduction.

18.2 Recommended Staging

Figure 18.1 summarises those elements that are recommended to be completed first and Figure 18.2 shows those elements that could be complete later.

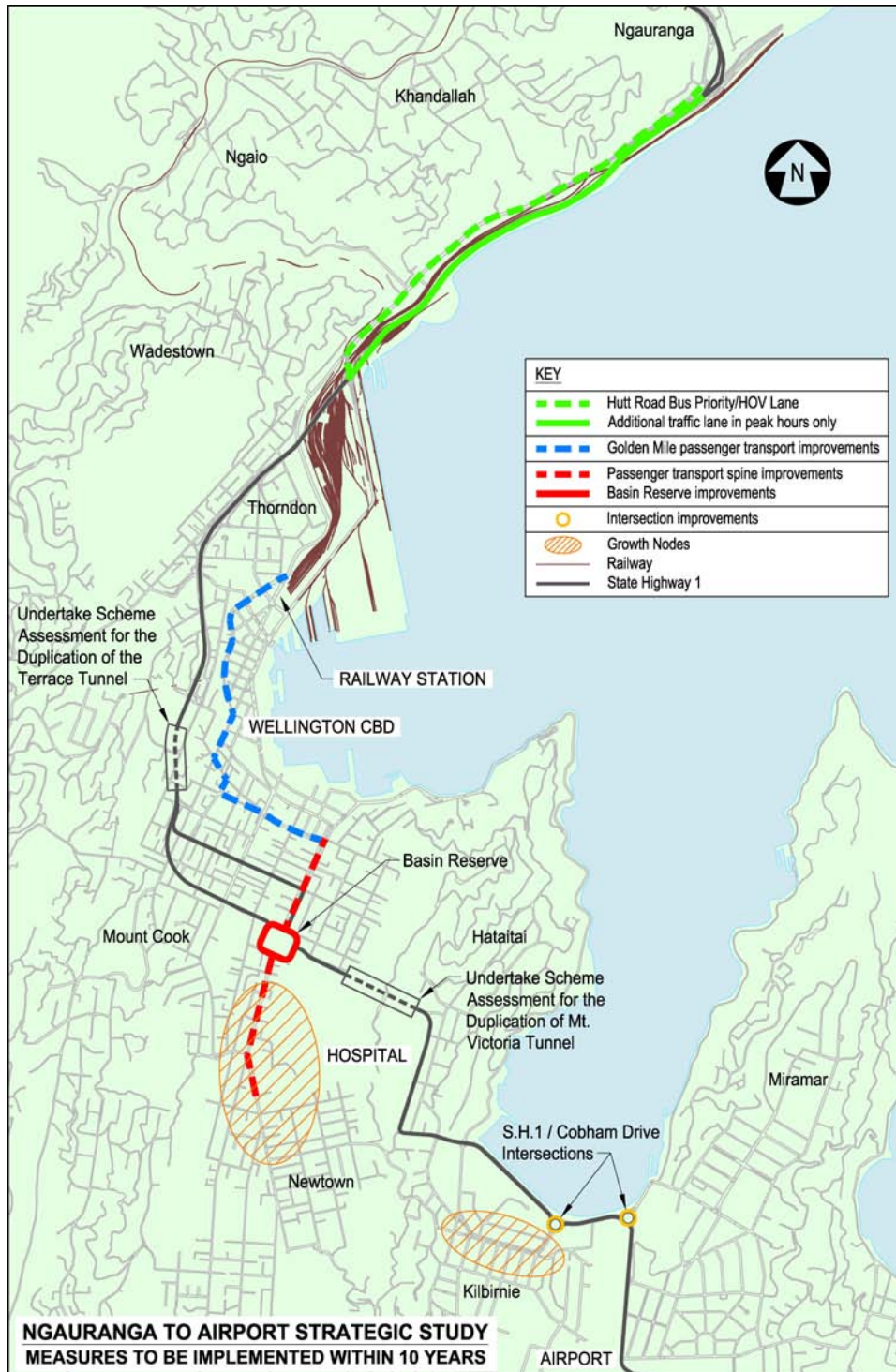


Figure 18.1: Short Term Elements

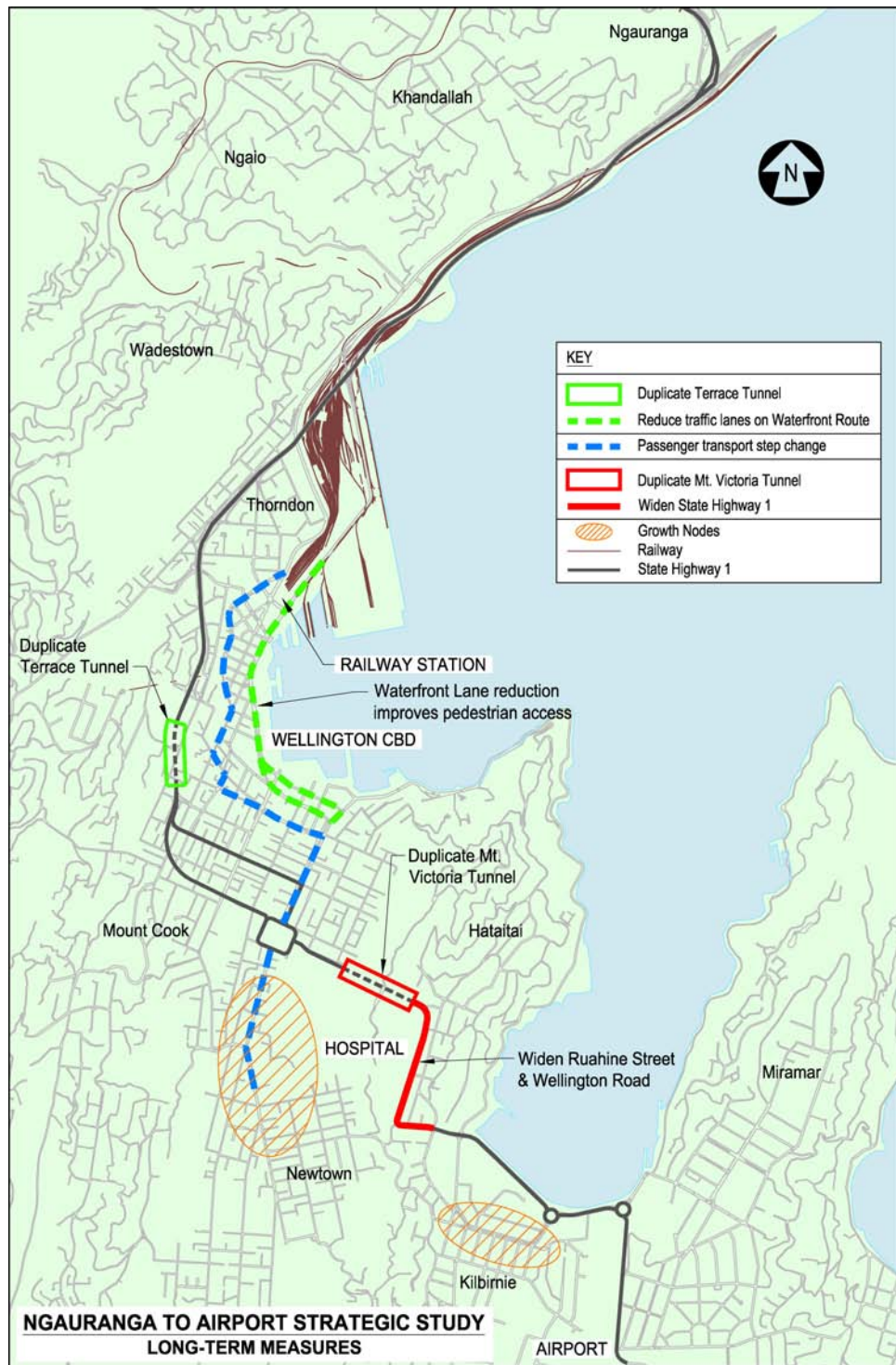


Figure 18.2: Long Term Elements

19 Regional Land Transport Targets

19.1 Regional Strategy

The Regional Land Transport Strategy has set a number of transport targets, as discussed below. We comment on the likely impact that this strategy will have on these targets. Where possible we have used the results from the Wellington Strategic Transport Model to predict the magnitude of the change. For simplicity, we have assumed that all the elements of the Strategy are completed by 2016, although it is likely that some of the elements forming part of the Strategy will not be completed before 2026.

19.2 Target One: Increase passenger transport mode

GWRC Regional Target: To get the percentage of people within the region (not just this study area) who use passenger transport from 17% (recorded in 2006) to 21% by the year 2016.

This Strategy will increase the passenger transport mode share during the morning peak period within the Wellington City area³¹ from 25.8% in 2006 to 26.3% in 2016: an increase of about 2%. During the inter-peak, passenger transport mode share is expected to increase from 8.6% to 8.8%: again an increase of 2%.

19.3 Target Two: Increase active mode share

GWRC Target: To get the percentage of people within the region (not just this study area) who walk or cycle from 13% (recorded in 2006) to 15% by the year 2016.

The key features of this Strategy that will influence active modes the most is the support the plan gives to the growth spine and the further dwelling intensification of the Wellington CBD. Journey to work census data shows that active modes are the predominant travel mode for those living in the Wellington CBD area and the adjacent suburbs, even as far away as Newtown. Therefore, increasing the population within these areas will result in even more people using active modes. Furthermore, we can expect active modes to play a significant role in the intensified areas forming part of the city's growth spine, like that proposed at Adelaide Road and Kilbirnie. The Strategy includes a number of strategies for walking and cycling that focus on improving the amenity, safety and convenience for these numerous trips, making walking and cycling even more attractive.

19.4 Target Three: Reduced Greenhouse gas emissions

GWRC 2016 target: to remain below 1065 tonnes (was 1,118 tonnes in 2006).

³¹ This figure is based on all trips to the suburbs within Wellington City Council in the morning 2 hour peak period, including those that originate within Wellington City. These figures are given, as the strategy is likely to have most impact on mode share within this area. The impact on the percentage mode share for the whole region is likely to be less than this

It has been estimated that as a result of implementing this strategy, annual green house gas emissions will reduce by about 2% in 2016³².

19.5 Target Four: Reduced severe road congestion

GWRC 2016 target: Average congestion on selected roads will remain below 20 seconds delay per km travelled (was 21 seconds in 2006).

The Strategy will reduce congestion particularly between Ngauranga Gorge and Aotea Quay, at the Basin Reserve, Mt Victoria tunnel, Ruahine Street and Wellington Road.

As a result of the Strategy, the number of vehicle travelled hours using the roading network with a level of service E or F will decrease from 9571 to 9212: a reduction of 4%.

Total travel time and vehicle operating economic benefits as a result of implementing the Strategy are estimated to be about \$481 million.

19.6 Target Five: Improved regional road safety

GWRC 2016 target: No road crash fatalities attributed to roading network deficiencies.

The likelihood of pedestrians being hit by vehicles is expected to reduce with the reduction of the number of vehicles using the Golden Mile. The number of vehicles will be reduced with the introduction of less frequent but larger passenger transport vehicles and the reduction of the number of general vehicles that use this route. The likelihood of pedestrians being hit by vehicles is also expected to reduce as a result of reassigning vehicles from using the Waterfront and local streets through the CBD to the Motorway.

19.7 Target Six: Improved land use and transport integration

GWRC 2016 target: All subdivisions and developments include appropriate provision for walking, cycling and passenger transport.

The Strategy supports the growth spine, including the growth areas at Adelaide Road and Kilbirnie. It also supports the continued dwelling intensification within the Wellington CBD.

19.8 Target Seven: Improved regional freight efficiency

GWRC 2016 target: Improved journey times for freight traffic between key destinations.

The Strategy will reduce congestion particularly between Ngauranga Gorge and Aotea Quay and the Basin Reserve, Mt Victoria, Ruahine Street and Wellington Road. Collectively this improvement will improve the efficiency for the movement of freight connected to the airport and port.

³² Annual CO₂ emissions reduce from 389 kilo tonnes (do minimum) to 381 kilo tonnes

20 Conclusions

1. Based on the challenges identified in the Problem Framing Report, a set of integrated transport packages cumulating in a strategy have been developed which collectively meet the strategy vision and where possible, the problems and issues identified within the study area:

“To deliver an integrated land transport system that supports the City’s transport and urban development strategies (urban growth spine) and provides access to the CBD, airport, hospital and port.”

2. Our strategy takes a fully integrated approach to addressing future transport needs, which is consistent with overseas best practice. The Strategy looks to increase the use of passenger transport and encouraging more active modes such as walking and cycling as an alternative to the car. While it also improves the roading capacity, the prime focus has been to reallocate existing road space so as to encourage general vehicles to use routes that do not adversely impact on land use, passenger transport or active modes. The strategy also develops proposals that support the improvement in land-use, particularly the development of mixed use higher density urban areas that minimise the need for motorised trips and make high quality passenger transport services more viable.
3. The introduction of TDM initiatives to support infrastructure planned for walking, cycling and passenger transport is essential to help promote changes in travel behaviour and to reduce reliance on the private motor car. Notwithstanding the best efforts to reduce the number of trips being made by the car, it is predicted that the number of trips generated in future years will outstrip our ability reduce car trips due to TDM, land use planning and enhancement to passenger transport.
4. The study team is mindful of the work being carried out by WCC in developing their own specific walking and cycling strategies. These strategies should include the development of a pedestrian and cycling route hierarchy within the city (combined with identified passenger transport corridors). This will allow for the development of improved facilities in which the needs of the specified road user has priority over other road users and for which certain standards should be met in order to provide the necessary and expected level of service.
5. A key component of the study is the strengthening of Wellington City Council’s urban growth spine. An appropriate way to promote and stimulate development in the proposed intensified areas of Newtown, Kilbirnie and Johnsonville is to provide a high quality passenger transport corridor between the CBD and these intensified areas. Passenger transport improvements are aimed to helping support the growth concept, particularly at Newtown. With care, long term planning and committed land use strategies in place, it is possible to stage the development of the high quality passenger transport spine to match growth needs in terms of the length and extent of the high quality service as well as the form and type of passenger transport used to cater for the forecast patronage. It is important that the high quality passenger transport spine achieves its aims of reducing the number of private motor vehicle drivers and attracting sufficient patronage to help justify its implementation.

6. Major roading improvements to provide a strong roading spine along the state highway are envisaged through a grade separated interchange at the Basin Reserve, the duplication of both the Terrace and Mount Victoria Tunnels and increasing capacity along Ruahine Street and Wellington Road. Improvements to traffic circulation at the Basin Reserve will aim to separate local traffic movements from strategic traffic on the state highway as well as improve the level of service for buses using the passenger transport corridor between the railway station and Newtown. The provision of the roading spine also reassigns traffic from parallel routes thereby reducing traffic flows around Evans Bay, Constable Street and around the Waterfront. The reduction in traffic along the Waterfront permits the number of traffic lanes to be reduced, improving the pedestrian connections between the City and its waterfront. Nevertheless, the reassigned traffic puts additional pressure onto the Inner City Bypass.

7. The elements that make up the strategy will need to be implemented over the next 20 to 30 years for several reasons. Those elements that should be completed within the next 10 years include: -
 - Bus priority measures
 - Ngauranga to Aotea 8-laning
 - Basin Reserve