



NorthWellington public transport **STUDY**

Scenarios Report

Contents

1	Introduction	13
2	Context	15
2.1	Study objectives	15
2.2	Strategic context	15
2.2.1	Regional Land Transport Strategy	15
2.2.2	Draft Wellington City Transport Strategy 2006	16
2.2.3	Draft Wellington City Urban Development Strategy	16
2.2.4	Ngauranga to Airport Strategic Study	17
2.3	Current public transport patronage	18
2.4	Affordability considerations	20
2.4.1	LTCCP as benchmark	20
2.4.2	Affordability envelope	20
2.4.3	Note on financial calculations	21
2.4.4	Performance of scenarios against affordability envelope	21
2.4.5	Land Transport NZ funding policies	22
3	Proposed improvements under all scenarios	23
3.1	General improvements to bus services	23
3.2	Johnsonville town centre and transport hub	24
3.3	Wellington CBD	24
4	Description of public transport scenarios	27
4.1	Enhanced Rail Scenario	28
4.1.1	Proposed service improvements	28
4.1.2	Bus priority measures	30
4.1.3	Advantages and disadvantages	30
4.1.4	Costs and funding	31
4.1.5	Implementation and construction	31
4.1.6	Other <i>Enhanced Rail Scenario</i> options considered	32
4.2	Bus with Walking and Cycling Scenario	35
4.2.1	Proposed service improvements	35
4.2.2	Bus priority measures	36
4.2.3	Advantages and disadvantages	36
4.2.4	Costs and funding	37
4.2.5	Implementation and construction	38
4.3	Busway scenario	40
4.3.1	Proposed service improvements	40
4.3.2	Bus priority measures	44

4.3.3	Advantages and disadvantages	44
4.3.4	Costs and funding	45
4.3.5	Implementation and construction	46
4.3.6	Other <i>Busway Scenario</i> options considered	47
4.4	Light Rail scenario	49
4.4.1	Proposed service improvements	49
4.4.2	Bus priority measures	50
4.4.3	Advantages and disadvantages	50
4.4.4	Costs and funding	51
4.4.5	Implementation and construction	52
4.4.6	Other <i>Light Rail Scenario</i> options considered	52
4.5	Other scenarios investigated but considered not appropriate	55
4.5.1	Refurbishment of the existing English Electric trains	55
4.5.2	Underground rail extension through CBD	55
4.5.3	Personal Rapid Transit	56
4.5.4	Monorail	56
5	Comparison of public transport scenarios	59
6	Next steps	66
Appendix A	Key issues for northern suburbs public transport	67
A.1	Issues and needs consultation	67
A.2	Development potential – greenfields and infill development	67
A.3	Congestion	71
A.4	Seamless service through to the CBD	72
A.5	Integrated automatic electronic ticketing	72
Appendix B	Current northern suburbs public transport services	73
B.1	Johnsonville railway line background	73
B.1.1	History of the Johnsonville railway line	73
B.1.2	Existing services	74
B.1.3	Existing rolling stock	74
B.1.4	Infrastructure ownership and maintenance	75
B.1.5	Rolling stock operation and maintenance	76
B.1.6	Rail business case	76
B.2	Northern suburbs bus service background	77
B.2.1	History of bus services	77
B.2.2	Bus journey times	78
B.2.3	Description of bus services by area and suburb	78
(1)	CBD bus route and Lambton bus Interchange	78
(2)	Johnsonville town centre and transport hub	79

(3)	Ngaio, Khandallah, Te Kainga, Cashmere (and Broadmeadows)	79
(4)	Johnsonville West and South	80
(5)	Churton Park	80
(6)	Grenada Village	80
(7)	Newlands Woodridge	81
(8)	Porirua / Tawa	81
B.2.4	Night buses to all areas	81
B.2.5	Bus depot facilities	81

Executive Summary

This document identifies credible future public transport scenarios for the northern suburbs and provides background information to enable informed public comment on options being considered.

In November 2005, Wellington City Council and Greater Wellington Regional Council asked people in the northern suburbs about their public transport needs. We've used what you told us to help generate four scenarios that could meet the current and future needs of the area.

We'd like to know what you think about these scenarios.

Scenario One – *Enhanced Rail*

The *Enhanced Rail Scenario* involves improving the existing rail services between Johnsonville and the Railway Station. The existing rail units would be replaced with either new or refurbished units from other parts of the rail network.



Scenario Two – *Bus with Walking and Cycling*

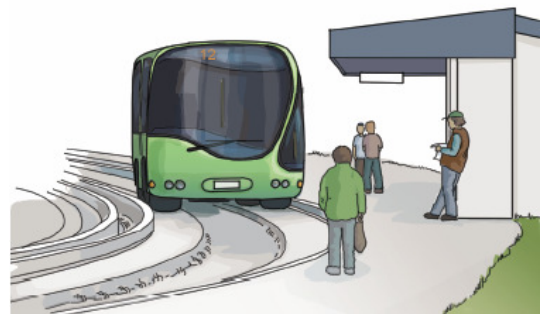
The *Bus with Walking and Cycling Scenario* involves replacing the current rail services with new buses running on existing streets, with the service extending through the CBD to Courtenay Place. The rail line could be transformed into a walking and cycling track or 'greenway', preserving the rail line as a transport corridor, and promoting more active forms of transport



and promoting more active forms of transport and creating new recreational opportunities. New bus routes operating through Khandallah, Wadestown and down the Ngaio Gorge would be used to replace the rail service.

Scenario Three – *Busway*

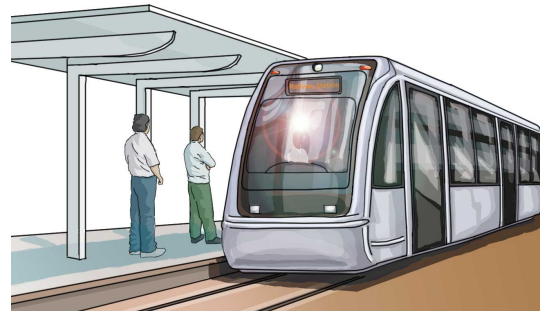
The *Busway Scenario* involves converting the Johnsonville rail line into a guided busway and extending services through the CBD to Courtenay Place. The busway would operate in the peak direction only, with return buses using the road network. It would be one lane wide for most of its length because of the narrow



corridor, steep drops and the narrow tunnels. Buses would be fitted with a guidance system to ensure safe operation. There are a number of ways of operating the busway. One way would be to use it for a mixture of services to replace the existing trains and express services which would be full when they entered the busway and travel without stopping to the Wellington Railway station.

Scenario Four – Light Rail

The *Light Rail Scenario* involves running new light rail vehicles on an extended Johnsonville line through the CBD to Courtenay Place. This will require improvements along the Johnsonville line and also require significant work through the CBD.



Other scenarios considered

Other scenarios considered were the extension of heavy rail, monorail and personal rapid transit (small, automated vehicles running along a separate guideway). These scenarios have not been put forward for further consideration, as they appeared to be inappropriate or unaffordable. Some also have shortcomings associated with passenger capacity, visual impacts and coverage of services.

Comparison of scenarios

The four scenarios are summarised as follows:

	Enhanced Rail	Bus with Walking and Cycling	Busway	Light Rail
Frequency	Frequency of trains 10 to 13 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods	Frequency of buses replacing trains 3 to 5 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods		Frequency of light rail services 10 minutes during peak periods (3 minutes for CBD section). Frequency of all other bus services 4 to 15 minutes during peak periods
Journey times	Journey times remain the same for existing rail users	Journey times increase for existing rail users who will travel on bus	Journey times similar for existing train users who travel on the busway with improvements for some express services	Journey times are similar for existing rail users who travel on light rail

Reliability	Travel time reliability for the 43% of peak period commuters who travel on train services will not be affected by traffic incidents and congestion	Travel time reliability for all bus services affected by traffic incidents and congestion, which will worsen as traffic grows (all peak hour commuters)	Travel time reliability for busway services not affected by traffic incidents and congestion (expected to be majority of peak period commuters)	Travel time reliability for light rail services from Johnsonville to Wellington Station not affected by traffic incidents and congestion
				Travel time reliability for light rail services between Wellington Station and Courtenay Place affected by traffic incidents and congestion, which will worsen as traffic grows
	Travel time reliability for the 57% of peak period commuters who travel on bus services will worsen as traffic grows		Travel time reliability for bus services not on the busway affected by traffic incidents and congestion (expected to be minority of peak period commuters)	Travel time reliability for bus services affected by traffic incidents and congestion, which will worsen as traffic grows
CBD congestion and priority measures	CBD congestion and traffic incidents will impact all services which run on roads including light rail			
	CBD will require some bus priority measures to cater for general growth in public transport use	CBD will require bus priority measures for additional buses. Road capacity and parking spaces in CBD may be reduced		CBD will require significant priority measures for light rail and consequential changes to bus priority measures. Road capacities and parking spaces in the CBD will be reduced
Northern suburbs congestion	Where additional bus priority measures are provided, the resultant decrease in road space for other users will increase general congestion			
Seamless service	Seamless service not possible through CBD to Courtenay Place	Seamless service possible through CBD to Courtenay Place		
Travel and waiting conditions	Vehicles more comfortable, reliable and attractive (new buses and new or refurbished rail vehicles where applicable)			
	Waiting environment more comfortable (new bus shelters and upgraded railway stations where applicable)			

Ability to understand services	Potential for regular clock-face timetable (same time past the hour) for 10 minute frequency	Operation similar to existing bus services	Potentially confusing operation for non-regular users as different bus stops may operate at different times of the day	Potential for regular clock-face timetable (same time past the hour)
Adaptability	Difficult and expensive to change route or extend coverage of rail service	Easy to change routes and extend coverage	Difficult and expensive to change route of busway but easy to change or extend bus routes at either end	Difficult and expensive to change route or extend coverage of light rail service
Cost	Cost between 104-133% of budgeted funding	Cost between 79-88% of budgeted funding	Cost between 100-108% of budgeted funding	Cost between 138-146% of budgeted funding
Other	Closure of Box Hill Station and relocation of Raroa Station to Fraser Avenue (required for 10 minute frequency option only)	Increased recreational opportunities with walking and cycling track along Johnsonville railway line	Closure of Johnsonville railway line during construction	Disruption on Johnsonville railway line and through CBD during construction

Proposed improvements under all scenarios

A number of public transport improvements are expected under all the scenarios put forward in this document.

General improvements to bus services

Under all scenarios existing bus services will be improved as funding becomes available. The following improvements are proposed for all scenarios except the *Busway Scenario*, which will have a different mix of services.

- New Broadmeadows route via Homebush Road and Khandallah, terminating in Johnsonville. This route would replace the Homebush Road section of the existing Route 43 and 44 loop, Route 46, Route 50 and the existing Route 53 service for Johnsonville West
- New Khandallah route via the Ngaio Gorge. This route would replace the Ngaio Gorge section of the existing Route 43 and 44 loop
- New Route 54 which removes the section of the existing Route 54 loop that uses Middleton Road. Services on this section of Middleton Road would be provided for by additional Route 59 services running to / from Courtenay Place and / or connecting with the Route 54 at Johnsonville
- Peak frequencies of between 4 and 15 minutes and off-peak frequencies of no less than 30 minutes to all suburbs served by bus

Before any significant changes are made, a full service review will be undertaken including public consultation.

Johnsonville town centre and transport hub

High quality public transport is integral to the successful growth and development of Johnsonville town centre. Improvements to the public transport facilities in Johnsonville will be required under all of the scenarios. The exact nature of the improvements will depend on the preferred scenario and the strategic vision for Johnsonville town centre, which is currently being developed in a separate exercise by Wellington City Council.

Wellington CBD

The Wellington Central Business District (CBD) is the primary employment area and destination for public transport users from the northern suburbs. Additional bus priority measures will be required under all scenarios where additional bus services are required through the CBD. An indicative cost of improvements has been included in all scenarios where appropriate.

Next steps

Decision making criteria

In reaching a decision on the preferred scenario, each scenario will be assessed against the following Regional Land Transport Strategy objectives, namely: assist economic and regional development; assist safety and personal safety; improve access, mobility and reliability; protect and promote public health; ensure environmental sustainability; consider economic efficiency and affordability.

In developing the scenarios for the future of passenger transport in the northern suburbs the issue of affordability has been considered and will limit the ability to suggest certain options. In terms of affordability, we have estimated that around \$70 million in today's equivalent dollars (NPV) will be available to fund public transport in the northern suburbs over the next 10 years. This figure includes contributions from local ratepayers and central government.

Public meetings

To find out more about the scenarios, please come to presentations at the Johnsonville Community Centre on Wednesday 21 June at 4.00pm or 7.30pm. Feel free to drop into the Community Centre any time between 3pm and 7pm that day, to look at the display and talk to project team members. You can also log onto www.gw.govt.nz to view the full Scenarios Report and make your submission online. Hard copies of the Scenarios Report are available at the Wellington Central Library and libraries in the northern suburbs.

Next stages

Your comments will feed into the next phase of the study that will develop and evaluate the scenarios in greater detail to identify a preferred scenario. You will have an opportunity to comment on the preferred scenario later this year.

1 Introduction

This document identifies credible future public transport scenarios for the northern suburbs and provides background information to enable informed public comment on options being considered.

In November 2005, Wellington City Council and Greater Wellington Regional Council asked people in the northern suburbs about their public transport needs. The main overall need identified was for a sufficiently frequent, reliable public transport system with convenient routes. This included concern over the run down and poor condition of trains¹.

These submissions have been used to inform the investigation of various future public transport scenarios. The outcome has been the identification of four scenarios for further consideration and consultation:

- 1) *Scenario One – Enhanced Rail* – improvements to existing rail services
- 2) *Scenario Two – Bus with Walking and Cycling* – replacement of rail with buses running on street (the existing railway line would be converted to a walking and cycling track)
- 3) *Scenario Three – Busway* – replacement of rail with buses on a guided busway
- 4) *Scenario Four – Light Rail* – replacement of rail with a light rail service along the existing railway line

This report describes each of these scenarios and compares the advantages and disadvantages of each. Although it contains cost information, no attempt has been made to quantify the economic benefits of each scenario. This will be done during the next stage of the study when selecting the preferred scenario.

A number of other scenarios have also been considered and are discussed in this document but initial investigations have shown that these are either not appropriate for the northern suburbs or are unaffordable. The Scenarios Technical Appendices document contains further technical detail on all scenarios considered.

Information on the Study is available at www.gw.govt.nz

¹ North Wellington Public Transport Study, Stage 1 – Issues and Needs Analysis – Summary of Submissions (available at http://www.gw.govt.nz/story_images/2604_NorthernSuburbsP_s4943.pdf)

2 Context

This section identifies the objectives of the study and explains the strategic context within which it is being undertaken. This section also provides background information on current public transport patronage and explains the affordability criteria used to help identify viable scenarios.

2.1 Study objectives

The purpose of the North Wellington Public Transport Study is to develop a strategic framework for future investment in public transport. The study objectives are:

- 1) to identify the current and future passenger transport needs of the northern suburbs
- 2) to develop a passenger transport strategy to meet these needs
- 3) to develop a passenger transport strategy which supports and informs the strategic land use and transport planning objectives of the Regional Land Transport Strategy, the draft Wellington City Council Transport Strategy and the draft Wellington City Council Urban Development Strategy.

In achieving these objectives the study must consider investment efficiency and economic costs and benefits as well as environmental and urban planning matters.

2.2 Strategic context

A primary objective of this study is to support and inform the strategic land use and transport planning objectives of the following strategies:

- 1) Regional Land Transport Strategy
- 2) Draft Wellington City Council Transport Strategy
- 3) Draft Wellington City Council Urban Development Strategy

In addition this study is closely aligned to the Ngauranga to Airport Strategic Study which is looking at how to address transport issues between Ngauranga Gorge and the airport, including the Wellington CBD.

Each of these strategies and the Ngauranga to Airport Strategic Study are outlined below.

2.2.1 Regional Land Transport Strategy

The Regional Land Transport Strategy sets out the vision, objectives, policies and plans for land transport in the Wellington region. It offers the potential to significantly improve the economic and social wellbeing of the region. The Strategy fulfils the formal requirements of a Regional Land Transport Strategy and incorporates the Regional Passenger Transport Plan.

The strategy represents a balanced vision for land transport that is shared by local government and transport organisations represented on the Regional Land Transport Committee. The Regional Land Transport Strategy is a "living" document and is currently under review, with an updated version due for release later in 2006.

2.2.2 Draft Wellington City Transport Strategy 2006

The Draft Transport Strategy sets out Wellington City Council's long-term direction for transport. It identifies how the transport system is to be developed to support the city's vision for its future growth and function.

The draft strategy includes among its objectives developing public transport systems as the main means of moving people along the urban development "growth spine" and ensuring continued access to the CBD for commuters. The major issue for transport is the need to support the city's land use and urban form objectives which are contained in the Urban Development Strategy.

A key consideration for the current study is the desire for a seamless passenger transport system along the "growth spine", which has been identified by the Urban Development Strategy for intensification and includes Johnsonville and the CBD. The strategy also identifies the need for bus-priority measures on all main arterial routes to and through the city, to ensure a fast and efficient passenger transport system.

2.2.3 Draft Wellington City Urban Development Strategy

The Draft Urban Development Strategy sets out Wellington City Council's long-term direction for the physical development of the city. It aims to direct growth to where the benefits are greatest and adverse effects are minimised, and to ensure high quality development.

A key component of the strategy is the "growth spine" concept which identifies the benefits arising from transit-oriented intensification of employment and housing along the major north/south axis of the city, and which includes Johnsonville and the CBD.

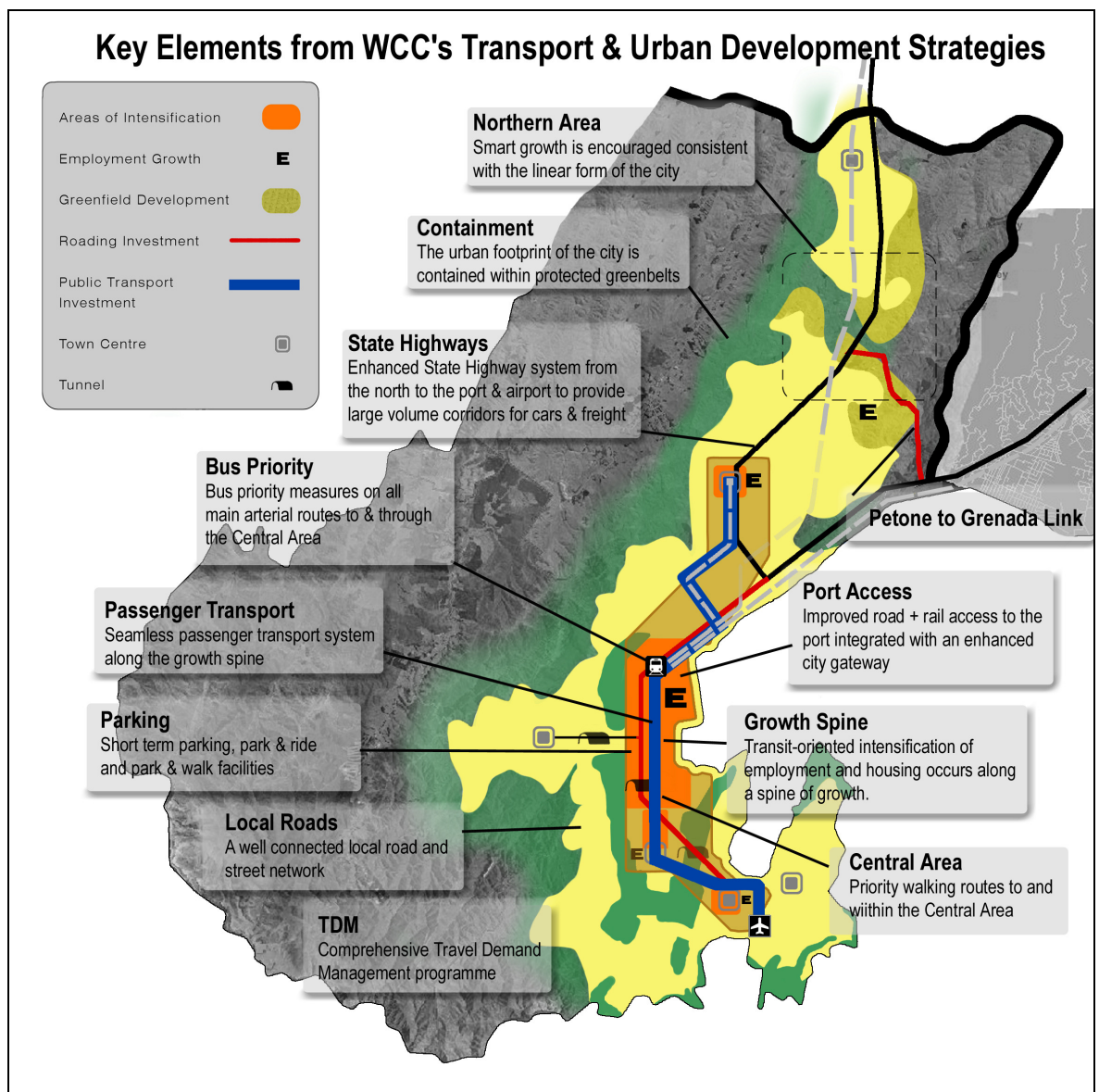
The strategy also identifies the importance of residential growth in the northern suburbs. The Northern Growth Management Framework developed by the Council in consultation with the community identifies how both employment and population growth is to be managed in the northern suburbs. The framework identifies new areas for both residential and economic development and may result in significant changes to land use patterns in the northern suburbs.

Refer Figure 1 below for a summary of the key elements of both the Urban Development Strategy and Transport Strategy.

2.2.4 Ngauranga to Airport Strategic Study

The Ngauranga to Airport Study is being undertaken in parallel with this study and is looking at how to address transport needs between Ngauranga Gorge and the airport, including the CBD and the performance of the bus lanes. There is significant overlap with the current study because the CBD public transport corridor may be at or near capacity and the implications of sending more buses through the CBD from the northern suburbs must be considered.

- **Figure 1 Wellington City combined draft Urban Development Strategy and Transport Strategy diagram**



2.3 Current public transport patronage

Public transport figures have been collected from a number of sources and used to calibrate the regional transport model (WTSM). Journey to work data from the 2001 Census has also been obtained for those areas shown in Figure 2. Due to patronage figures generally being commercially sensitive the following figures are not actual figures but are either outputs of the regional transport model or data collected from the Census 2001.

Annual patronage – Approximately 3.1 million trips were made in 2005 on public transport services from the northern suburbs. Of these trips, 1.3 million trips (42%) were on the Johnsonville railway line and 1.8 million trips (58%) on either Stagecoach or Newlands bus services².

Morning peak patronage – Approximately 3,000 trips were made to the CBD in 2001 during the two hour morning peak period on public transport services using the northern suburbs. Approximately 1,300 (43%) of these trips were on the Johnsonville railway line³ and 1,700 (57%) on either Stagecoach or Newlands bus services⁴.

Proportion of journey to work – Census 2001 data showed public transport carried 3,102 trips and accounted for 14.9% of all journeys to work each day from the northern suburbs. Of these trips 1,137 (37%) were by train and 1,965 (63%) by bus⁵.

The population of the northern suburbs in 2001 was approximately 38,000 and by 2016 is projected to increase by 15% to approximately 44,000. This projection is consistent with additional growth that may occur through the implementation of the Urban Development Strategy growth spine concept. Most of this growth will be in greenfields areas to the north of Churton Park and Newlands.

The 15% increase in population is anticipated to result in a 35% increase in the use of public transport during the two hour morning peak period over the same period. The use of public transport is expected to increase at a faster rate than population for a number of reasons, including increasing impacts of traffic congestion.

² The 1.8 million trips on bus are made up of: 0.4 million on Stagecoach and 1.4 million on Newlands bus services

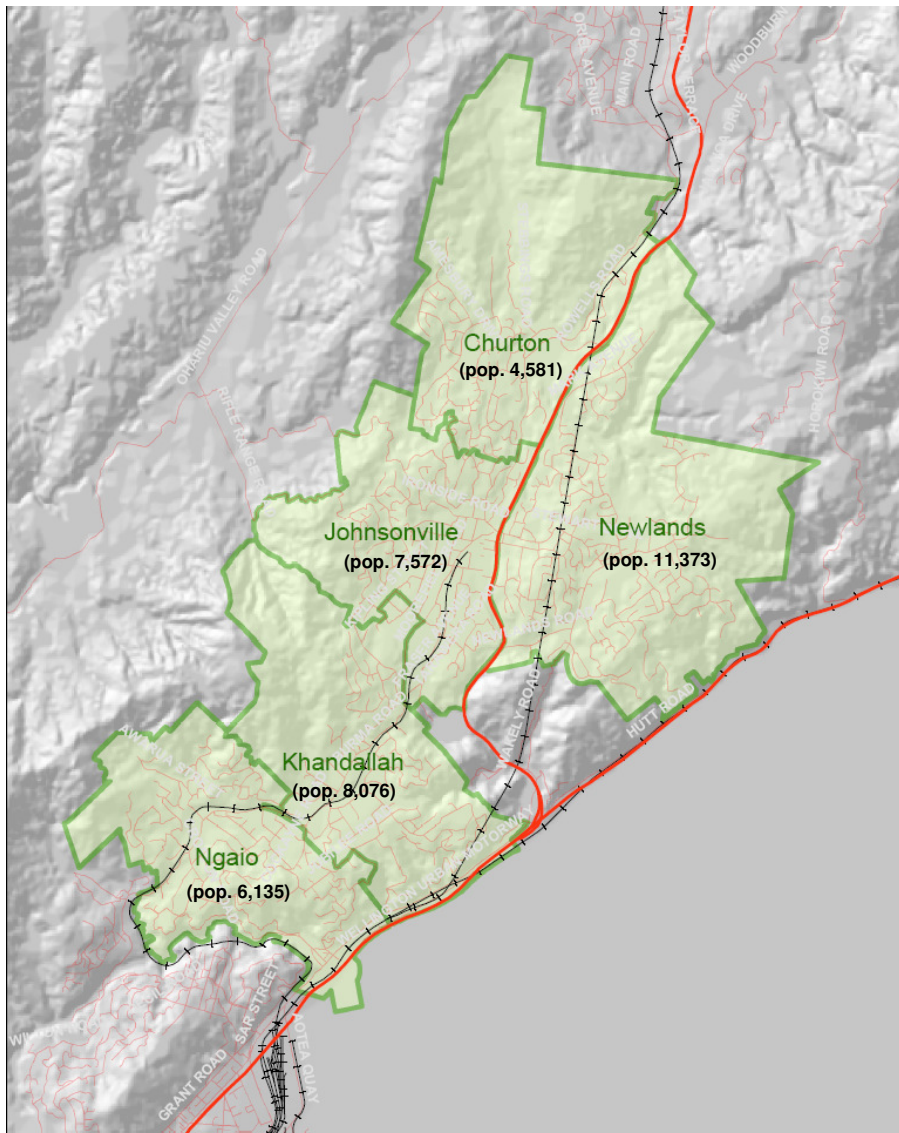
³ Rail guard counts in 2001

⁴ Factored WTSM model 2001

⁵ Census 2001 population and journey to work information for Wellington North

By 2016 general traffic growth is expected to result in increased congestion and longer journey times for both private vehicles and buses. For example the average amount of time taken to travel from the Newlands onramp to the Aotea off-ramp via the SH1 Ngauranga Gorge in the two hour AM peak is expected to increase by 20%⁶.

Figure 2: Census 2001 Areas used for Population and Journey to Work Information



⁶ WTSM model base forecasts

2.4 Affordability considerations

In developing public transport scenarios for the northern suburbs the issue of affordability is expected to limit the number of viable options as discussed below.

2.4.1 LTCCP as benchmark

A benchmark for what is affordable to the region is the amount of funding currently identified in Greater Wellington’s Long Term Council Community Plan (LTCCP) for public transport improvements in the northern suburbs.

The amount of funding identified in the LTCCP includes anticipated rates increases over the plan’s 10-year period and it is therefore unlikely more money will be available.

The public transport improvements that have been included in the “funding envelope” are those identified for improvements on the Johnsonville railway line as set out in Table 1. The LTCCP funding assumed running refurbished Ganz-Mavag units on the Johnsonville railway line, however, the affordability calculations used to determine the funding envelope assumes new units.

■ Table 1: Northern suburbs passenger transport improvements allowed for in the Greater Wellington LTCCP

Improvement	Timing	Cost
Minor Johnsonville Station refurbishment	06/07	\$0.2m
Infrastructure improvements to allow the new larger trains to operate on the Johnsonville railway line (Tunnel Lowering)	07/08	\$3.0m
Increased length of passing loops at Wadestown and Khandallah to accommodate longer car lengths	07/08	\$9.0m
Replacement of the existing English Electric trains which run on the Johnsonville railway line with new EMUs (12 units) or refurbished Ganz-Mavag units	08/09	\$42m
Minor station refurbishments	12/13 – 13/14	\$1.3m
New EMUs to meet demand (4 units)	11/12	\$12m
Total		\$67.5m

Note: These values are in nominal dollars and include capital costs only. They are therefore not comparable with NPV values used elsewhere.

2.4.2 Affordability envelope

The twenty-five year affordability envelope for public transport in the northern suburbs is anticipated to be in the order of \$120m, with \$70m available over the next ten years. In accordance with existing Land Transport NZ funding criteria the total regional contribution would be \$55m,

with \$35m contributed over the next ten years as part of the current LTCCP⁷. The balance would be funded by Land Transport NZ. Greater Wellington is also able to borrow to fund capital items and smooth its cash flow.

2.4.3 Note on financial calculations

In this document, except where otherwise noted, it has been assumed that all capital investments in infrastructure and new rolling stock would be debt funded and paid annually. The calculations also include operational costs for both rail and bus, which are assumed to be paid annually in the year incurred. The cost estimates are expressed in today’s equivalent dollars (net present value or NPV) and include both capital costs and operational subsidies after fare revenue is deducted. Depreciation is not included in these figures as it is a non-cash item. In other words the cost of each scenario is based on the NPV of the total financing cash flow, including Greater Wellington and Land Transport NZ contributions. In addition the calculations include an amount allocated on a region wide basis for bus service improvements which will be part of the Wellington Bus Service Review to be undertaken in 2008.

2.4.4 Performance of scenarios against affordability envelope

Table 2 below compares the total cost of each scenario to the funding currently available in the LTCCP for public transport in the northern suburbs. These figures are not directly comparable with the figures in Table 1 as those figures are in nominal dollars and include capital costs only.

■ **Table 2: Option Costs relative to base LTCCP**

Scenario	Cost (25 yr NPV)	% of LTCCP funding envelope
LTCCP base case	\$120 million	100%
Enhanced Rail	\$125 to \$160 million ⁸	104% to 133%
Bus with Walking and Cycling	\$95 to \$105 million	79% to 88%
Busway	\$120 to \$130 million	100% to 108%
Light Rail	\$165 to \$175 million	138% to 146%

⁷ These figures are expressed in today’s equivalent dollars (NPV) and are based on the infrastructure improvements detailed above, information provided on current bus and rail subsidy costs and a percentage of the bus improvement funds available for the region. Affordability calculations have been done over a 25 year analysis period with any capital or operational expenditure outside of the 25 year analysis period not incorporated in the calculations.

⁸ Since these costs were prepared additional work has been undertaken by Ontrack indicating costs could be significantly lower than quoted here. It is not clear, however, whether these results are directly comparable to the figures quoted here. This issue will be considered in more detail during the next stage of this study.

It is important to note that scenarios costing significantly more than \$120m are unlikely to proceed without significant additional funding.

2.4.5 Land Transport NZ funding policies

Land Transport NZ is the government agency responsible for transport funding, including public transport. Land Transport NZ subsidise public transport services throughout New Zealand in accordance with their funding policies. These funding policies were used in determining the amount of funding available for each scenario.

Current Land Transport NZ funding policies state that they will contribute 60% towards rail costs and 50% towards bus costs after accounting for fare box revenues. The region is required to cover the remaining funding.

3 Proposed improvements under all scenarios

A number of public transport improvements are expected under all the scenarios put forward in this document. Appendix A describes the current public transport services in the northern suburbs.

3.1 General improvements to bus services

The scenarios mostly impact on the current rail corridor serving Johnsonville, Khandallah and Ngaio, and not on other areas of the northern suburbs. Additional bus improvements are therefore proposed under all scenarios, except the Busway⁹, to benefit Newlands (Route 56), Woodridge (Route 57), Grenada Village (Route 55), Churton Park (Route 54), Johnsonville West (Route 53), Broadmeadows (Route 46) and Khandallah East and Ngaio (Routes 43, 44 & 45).

These additional bus improvements will cater for new patronage. Before any improvements can be implemented Greater Wellington will need to carry out a full bus route service review to ensure that changes meet the needs of residents and are economically viable.

At this stage a service review has not been undertaken, so the following list of potential improvements are simply indicative of those that may take place under all scenarios (except the busway⁹) subject to a full service review. The potential enhancements to bus services in the northern suburbs include:

- New Route B – Broadmeadows via Homebush Road and Khandallah and terminating in Johnsonville. This route replaces the Homebush Road section of the existing Route 43 and 44 loop, Route 46, Route 50 and the existing Route 53 service for Johnsonville West.
- New Route K – Khandallah via the Ngaio Gorge. This route replaces the Ngaio Gorge section of the existing Route 43 and 44 loop.
- New Route 54 which removes the section of the existing Route 54 loop that uses Middleton Road. Capacity for this section of Middleton Road would be provided for by additional Route 59 services running to / from Courtenay Place and / or connecting with the Route 54 at Johnsonville.
- Peak frequencies of between 4 and 15 minute and off-peak frequencies of no less than 30 minutes to all suburbs served by bus.

These general improvements to bus services are shown on Figure 3. This figure is the *Enhanced Rail Scenario* but includes the proposed general improvements to bus services.

⁹The *Busway Scenario* includes a comprehensive redesign of bus operations throughout the northern suburbs as detailed under that scenario.

It is assumed that these improvements would take place incrementally over the next ten years as justified by patronage with all improvements proposed to be in place by 2016.

3.2 Johnsonville town centre and transport hub

Improvements to the public transport facilities in Johnsonville town centre are planned and will be required under all the scenarios identified. The exact nature of the improvements will depend on the preferred scenario and the strategic vision for Johnsonville town centre, which is currently being developed in a separate exercise.

Johnsonville town centre is a key component of Wellington City Council's two key urban form strategies – the Urban Development Strategy and the Northern Growth Management Framework. These strategies recognise that Johnsonville is the largest and most significant town centre in Wellington outside of the CBD. The importance of this centre will grow with the implementation of the Northern Growth Management Framework and subsequent population expansion in the north. Johnsonville is also identified by the Urban Development Strategy as a centre for intensification.

In implementing its strategic vision for Johnsonville town centre, Wellington City Council will consider how Johnsonville can be promoted as a public transport hub that is integrated with the town centre. This will take into account location, amenity, connectivity and supporting facilities.

3.3 Wellington CBD

The Wellington Central Business District (CBD) is the primary employment area and destination for public transport users from the northern suburbs. Journey to Work data from the 2001 Census indicates that 26.8% of all journey to work trips from the northern suburbs are made by train or bus and finish in the CBD¹⁰.

All rail journeys currently finish at the Wellington Railway Station which is located at the northern end of the CBD, adjacent to the Lambton Bus Interchange. Bus routes enter the CBD from various directions and are directed through a single CBD bus corridor between the Lambton Bus Interchange and Courtenay Place.

The benefits of extending public transport services from the railway station through the CBD are highlighted by the large patronage increases achieved when Newlands bus services were reorganised in 2000 and extended from Lambton Bus Interchange through to Courtney Place (that is, a seamless service was implemented through the CBD). This resulted in a 40% increase in

¹⁰ 9.7% of journey to work trips from the Northern Suburbs are made by train and terminate in the CBD, while 17.1% are made by bus

patronage as frequency increased and a seamless service provided where passengers were able to travel through the CBD without having to interchange.

The patronage increases achieved in 2000 highlight the benefits of a seamless public transport service through the CBD. They also indicate a possible unsatisfied demand for a seamless service where services do not extend through the CBD.

Although major patronage increases may arise from extending bus services through the CBD, the existing bus corridor is currently at or near capacity. The capacity issue is made worse by the region's topography and layout which means that all traffic is funnelled through the CBD. The Ngauranga to Airport Strategic Study, which is being undertaken in parallel with this study, will consider these issues in further detail.

What is clear is that additional bus priority measures, which aim to overcome the problem of buses and other vehicles competing for limited road space, will be required under all scenarios where additional bus services are required through the CBD. An indicative cost of such measures has been included in all scenarios where appropriate.

4 Description of public transport scenarios

The following scenarios are set out for consultation and initial testing and evaluation below:

- *Scenario One – Enhanced Rail Scenario*
- *Scenario Two – Bus with Walking and Cycling Scenario*
- *Scenario Three – Busway Scenario*
- *Scenario Four – Light Rail Scenario*

These scenarios will be developed further, based on the feedback from this stage of consultation. They will then be evaluated in detail to help determine the most appropriate strategy for public transport in the northern suburbs.

A number of other scenarios were also investigated but considered not appropriate for the northern suburbs for various reasons. These are discussed in the last part of this section.

4.1 Enhanced Rail Scenario

The *Enhanced Rail Scenario* will involve improving the existing rail services between Johnsonville and the Wellington railway station by replacing the existing trains, which are at the end of their economic lives, with new or refurbished units and improving the frequency of trains to either 10 or 13 minutes.

The general improvements to bus services discussed in section 3.1 will be implemented in addition to rail improvements.

4.1.1 Proposed service improvements

This section explores possible service improvements under the *Enhanced Rail Scenario*.

4.1.1.1 Operation of railway

Trains will operate on the existing railway line much as they do at present but with some infrastructure and timetable improvements.

The following infrastructure improvements are required for both the 13-minute (ER1) and 10-minute (ER2) frequency options:

- Tunnel floor lowering
- Horizontal track realignment
- Reduction of cant may be required to provide necessary clearances¹¹
- Introduction of slabtrack (or similar) to improve track fixity
- Bridge lowering adjacent to tunnels
- Extension of the Wadestown passing loop
- Some signal relocation
- Platform lengthening, raising and realignment, including upgrade of Johnsonville railway station
- Re-registration and regrading of the overhead wiring system
- Relocation of Crofton Downs Station platform to reduce curvature and stepping distance
- An additional passing loop may be considered to ensure reliable operation

The following infrastructure improvements will also be required for the 10-minute (ER2) frequency option:

¹¹ 'Cant' is the tilt of the line and the smaller the radius of turn, the greater cant required.

- Removal of the Raroa Station
- Construction of a new station and passing loop at Fraser Avenue
- Removal of the station at Box Hill and construction of a passing loop in the same location
- Construction of a passing loop in the Wellington Yards

Tranz Metro has advised that they intend to operate refurbished units on the line during the peak periods and new units during off-peak periods. During peak periods the new units would be used on other parts of the network where they are required for longer routes.

Further detail on the proposed operation of the *Enhanced Rail Scenario* is contained in the Scenarios Technical Appendices document.

4.1.1.2 Coverage of services

The proposed rail and bus routes for the *Enhanced Rail Scenario* are shown for the 13-minute frequency option (ER1) in Figure 3 and for the 10-minute frequency option (ER2) in Figure 4.

This scenario also includes the general improvements to bus services discussed in section 3.1.

4.1.1.3 Frequency of services and travel time

The frequency of services along the railway line would be 13 or 10 minutes during peak periods and between 30 and 15 minutes during non-peak periods.

For the 13-minute frequency option (ER1) the service timetable will be increased to four trains per hour, one more than present. This will require four lots of four-car sets (16 units) for operation.

For the 10-minute frequency option (ER2) the service timetable will be increased to six trains per hour. This will require four lots of four-car sets and two lots of two-car sets (20 units).

Both these options require an additional two-car set for operation during breakdowns and maintenance. These additional sets can be provided from stocks held for the rest of the network but to ensure a conservative analysis an allowance for them has been included in all calculations.

Travel times will remain similar to existing travel times, with services taking 21 minutes to travel between Johnsonville and the Wellington railway station.

4.1.1.4 Capacity of services

For the 13-minute frequency option (ER1) the maximum planning capacity of the railway line is 1,520 passengers per hour assuming 4-car sets operating at 13-minute frequencies. For the 10-

minute frequency option (ER2) the maximum planning capacity of the railway line is 2,250 passengers per hour assuming 4-car sets operating at 10-minute frequencies¹².

These capacities could be increased if the length of passing loops and stations were extended further to allow for 6-car trains.

4.1.2 Bus priority measures

Under this scenario no additional bus priority measures are proposed, other than any required as part of the general improvements to bus services in the city.

4.1.3 Advantages and disadvantages

This section highlights some of the advantages and disadvantages of the *Enhanced Rail Scenario*.

4.1.3.1 Advantages

- Frequency of trains 10 to 13 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods
- Journey times remain the same for existing rail users
- Travel time reliability for the 43% of peak period commuters who travel on train services will not be affected by traffic incidents and congestion
- Vehicles more comfortable reliable and attractive (new or refurbished rail vehicles)
- Waiting environment more comfortable (upgraded railway stations)
- Potential for regular clock-face timetable (same time past the hour) for 10 minute frequency

4.1.3.2 Disadvantages

- Travel time reliability for the 57% of peak period commuters who travel on bus services will worsen as traffic grows
- CBD congestion and traffic incidents will impact all services which run on roads
- CBD will require some bus priority measures to cater for general growth in public transport use

¹² The planning capacity used for these calculations was 190 passengers per set

- Where additional bus priority measures are provided, the resultant decrease in road space for other users will increase general congestion
- Seamless service not possible through CBD to Courtenay Place
- Difficult and expensive to change route or extend coverage of rail service
- Closure of Box Hill Station and relocation of Raroa Station to Fraser Avenue (required for 10 minute frequency option only)

4.1.4 Costs and funding

For the 13-minute frequency option (ER1) the total cost of the scenario will be in the order of \$125-135m¹³ in today's equivalent dollars (net present value) with \$70-90m of this spent in the next 10 years. These figures include an allocation of \$3m for bus priority measures from the Lambton bus interchange through the CBD to Courtenay Place.

To fund this option Greater Wellington will need to contribute a total of \$55–65m in today's equivalent dollars with \$30–40m of this to be funded in the next ten years as part of the current LTCCP. Land Transport NZ will fund the balance in accordance with their existing funding policies.

For the 10-minute frequency option (ER1) the total cost of the scenario will be in the order of \$140-160m in today's equivalent dollars (net present value) with \$85-95m of this spent in the next ten years. These figures include an allocation of \$3m for bus priority measures from the Lambton bus interchange through the CBD to Courtenay Place.

To fund this option Greater Wellington will need to contribute a total of \$60–70m in today's equivalent dollars with \$35–45m of this to be funded in the next ten years as part of the current LTCCP. Land Transport NZ will fund the balance in accordance with their existing funding policies.

4.1.5 Implementation and construction

It is proposed for the *Enhanced Rail Scenario* to be completed by 2008/09 for the 13-minute frequency option, or by 2011/12 for the 10-minute frequency option (the latter option is deferred to enable patronage growth before implementation). Infrastructure work can be carried out within 12 months and will require the line to be closed for short periods of up to a week at a time.

¹³ Since these costs were prepared additional work has been undertaken by Ontrack indicating costs could be significantly lower than quoted here. It is not clear, however, whether these results are directly comparable to the figures quoted here. This issue will be considered in more detail during the next stage of this study.

4.1.5.1 Timeframe for implementation

A possible timeframe for the implementation of the *Enhanced Rail Scenario* is outlined in Table 3.

■ **Table 3: Tasks and timeframes for implementation of *Enhanced Rail Scenario***

Task		Timing
Option ER1: Base timetable	Option ER2: Improved timetable	
Infrastructure improvements for new units (tunnel lowering, stations etc.)	Infrastructure improvements for new units (tunnel lowering, stations etc.)	07/08
New EMU units (14 units)	New EMU units (18 units)	08/09
Purchase of new buses (4 units) and service improvements to provide for general improvements to bus services	Purchase of new buses (4 units) and service improvements to provide for general improvements to bus services	08/09
	Infrastructure improvements for new timetable (passing loops etc.)	10/11
New EMU units (4 units)	New EMU units (4 units)	11/12
Replacement buses (4 units)	Replacement buses (4 units)	23/24
Half life refurbishment of EMUs (14 units)	Half life refurbishment of EMUs (18 units)	23/24
Half life refurbishment of EMUs (4 units)	Half life refurbishment of EMUs (4 units)	26/27

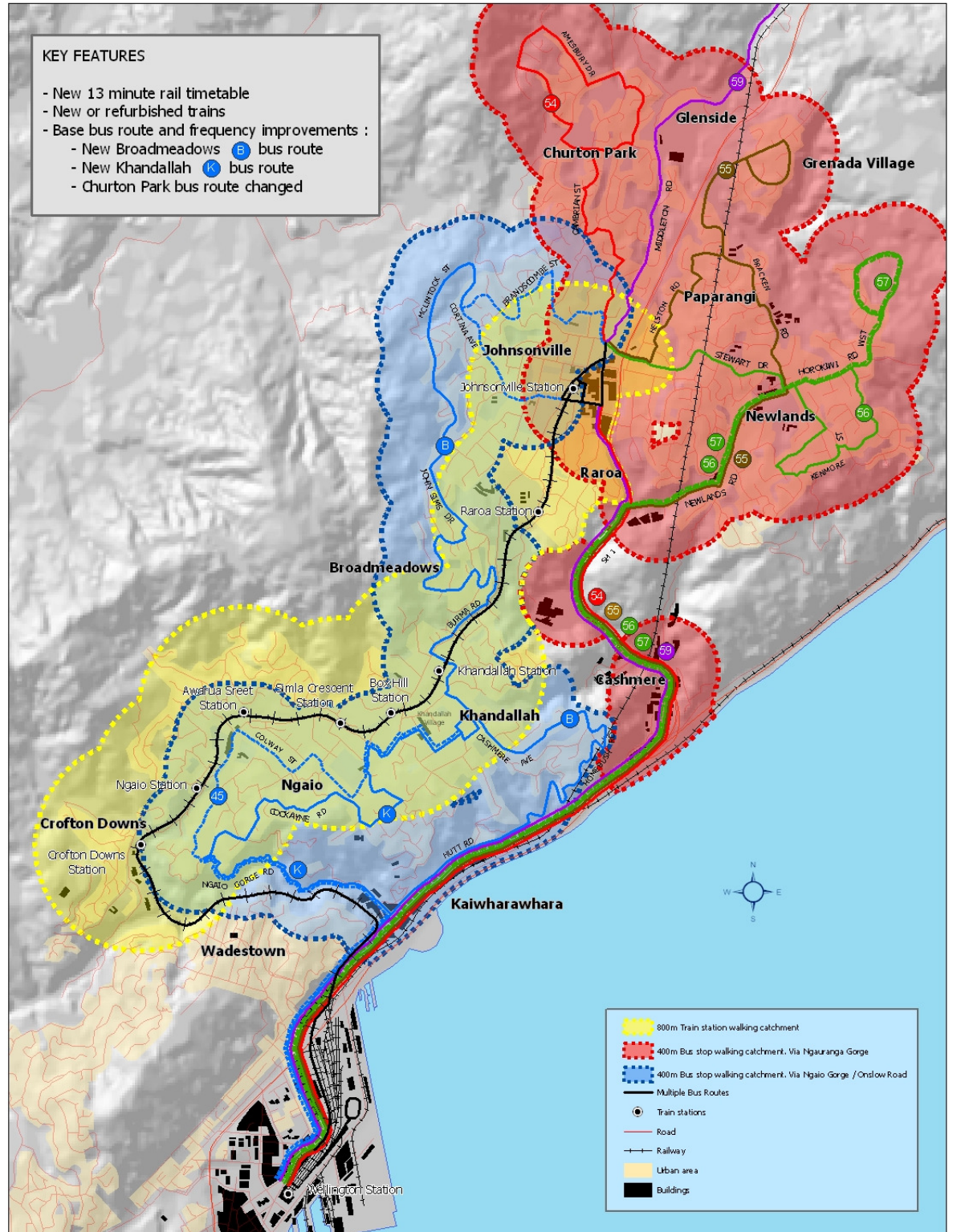
4.1.5.2 Construction period

The proposed infrastructure improvements could be completed within 3 months for the 13 minute option or 12 months for the 10 minute option.

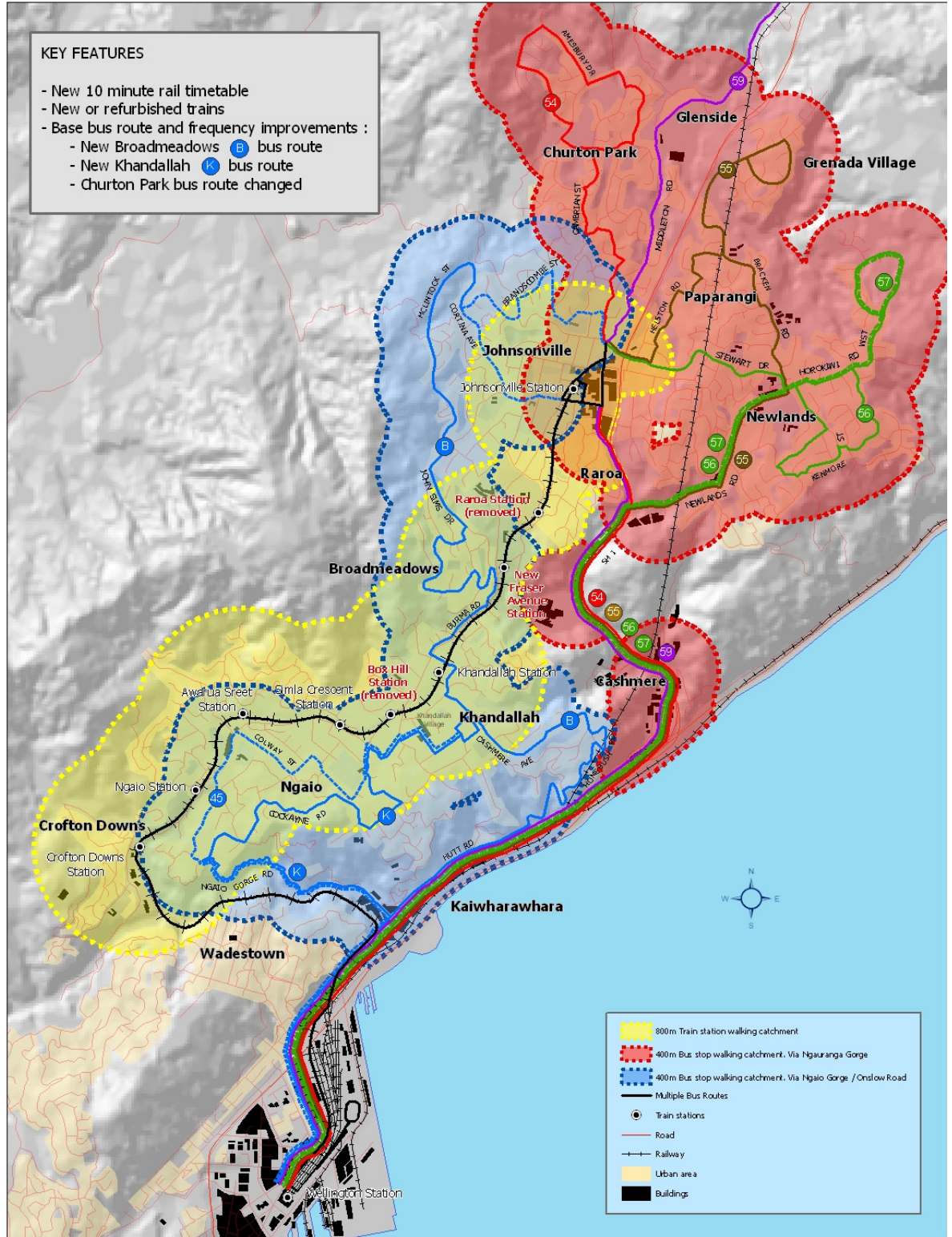
4.1.6 Other *Enhanced Rail Scenario* options considered

In developing this *Enhanced Rail Scenario* a number of other options were considered including the possibility of using refurbished Ganz-Mavag units, which currently operate on other parts of the network on the Johnsonville railway line. Further technical information on this scenario and the other options considered is available in the Scenarios Technical Appendices document.

■ **Figure 3: Enhanced Rail Base Timetable - Option ER1**



■ **Figure 4: Enhanced Rail Improved Timetable - Option ER2**



4.2 Bus with Walking and Cycling Scenario

The *Bus with Walking and Cycling Scenario* will involve replacing the existing rail services with bus services and providing enhanced bus services for the rest of the northern suburbs.

The railway line could be converted to a walking and cycling track or “greenway”, preserving the railway line as a transport corridor and helping to promote active modes of transport and additional recreational amenity.

4.2.1 Proposed service improvements

This section explores possible service improvements under the *Busway Scenario*.

4.2.1.1 Operation of bus services

New low floor buses will be purchased to replace the existing train services. These buses will operate on Routes X, Y and Z as shown in Figure 5. Nineteen new buses will be required to provide the services identified.

It is assumed that the following infrastructure improvements would be undertaken:

- New bus shelters on the replacement routes
- Installation of a real time passenger information system
- Removal of rail infrastructure and construction of a walking and cycling track in the rail corridor

It may be possible to use cleaner environmentally friendly alternatives to diesel buses such as hybrid diesel-electric and hydrogen fuel cell buses in the future. This will need to be considered in detail before proceeding with any bus-based option.

Further detail on the proposed operation of the *Bus with Walking and Cycling Scenario* is contained in the Scenarios Technical Appendices document.

4.2.1.2 Coverage of services

The proposed bus routes for this scenario are shown in Figure 5.

This scenario also includes the general improvements to bus services discussed in section 3.1 but with route Z replacing route 45 between the Khandallah and the CBD giving this route an off-peak service.

4.2.1.3 Frequency of services and travel time

The frequency of new bus services would be 10 minutes during peak periods, combining in some locations to provide 3 to 5 minute frequencies.

Travel times from Johnsonville to Wellington railway station under this scenario will average approximately 25 minutes compared to the existing train service which takes approximately 21 minutes. This additional length of journey time is due to the need for buses to contend with general traffic.

4.2.1.4 Capacity of services

The ultimate capacity for this scenario is a function of the road capacity, and cannot be calculated directly based on the capacity of buses.

The limited capacity of the CBD to cater for additional bus services from the northern suburbs is a major issue. One way of addressing this issue could be to run northbound services that currently terminate at the Lambton bus interchange through to Johnsonville or other destinations in the northern suburbs. For example buses that currently run from Houghton Bay or other areas through the CBD to Lambton bus interchange could be extended through to Johnsonville. This could reduce the number of buses running through the CBD but the travel time reliability of longer routes may be adversely affected as these routes would have fewer opportunities to make up lost time arising from delays along their routes.

4.2.2 Bus priority measures

A number of bus priority measures are required under this scenario to enable the efficient operation of the bus network. The following bus priority measures may be required:

- Bus lanes along Hutt Road and Thorndon Quay between Kaiwharawhara Road (Ngaio Gorge) and Lambton Interchange requiring reallocation of parking and removal of the existing angle parking
- Traffic signal priority measures and extension of the Kaiwharawhara Road bus lane to the Hutt Road intersection
- Construction of a bus interchange at Johnsonville to replace the existing train station
- Bus priority measures at intersection around Johnsonville centre

Bus priority measures are required through the CBD and are being investigated as part of the Ngauranga to Airport study. Priority measures are required to maintain journey times for all bus services through the CBD, including services from outside the Study area. A description of the CBD bus priority measures is contained in the Scenarios Technical Appendices document.

4.2.3 Advantages and disadvantages

This section highlights some of the advantages and disadvantages of the *Bus with Walking and Cycling Scenario*.

4.2.3.1 Advantages

- Frequency of buses replacing trains 3 to 5 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods
- Seamless service possible through CBD to Courtenay Place
- Vehicles more comfortable reliable and attractive (new buses)
- Waiting environment more comfortable (new bus shelters)
- Operation similar to existing bus services
- Easy to change routes and extend coverage
- Increased recreational opportunities with walking and cycling track along Johnsonville railway line

4.2.3.2 Disadvantages

- Journey times increase for existing rail users who will travel on bus
- Travel time reliability for all bus services affected by traffic incidents and congestion, which will worsen as traffic grows (all peak hour commuters)
- CBD congestion and traffic incidents will impact all services which run on roads
- CBD will require bus priority measures for additional buses. Road capacity and parking spaces in CBD may be reduced
- Where additional bus priority measures are provided, the resultant decrease in road space for other users will increase general congestion

4.2.4 Costs and funding

The total cost of the *Bus with Walking and Cycling Scenario* will be in the order of \$95–105m in today's equivalent dollars (net present value) with \$50–60m of this spent in the next 10 years. These figures include the construction of a walking and cycling track and an allocation of \$3m for bus priority measures from the Lambton bus interchange through the CBD to Courtenay Place.

In calculating the costs of this scenario it was assumed that buses would be purchased by private operators and paid for by a combination of fares and subsidies, as happens with existing bus services.

To fund this scenario Greater Wellington will need to contribute a total of \$45–55m in today's equivalent dollars with \$25–35m of this to be funded in over the next 10 years as part of the current

LTCCP. Land Transport NZ will fund the balance in accordance with their existing funding policies.

4.2.5 Implementation and construction

It is proposed for new bus routes to be implemented by 2008/09.

Approval will be required from central government to use the Johnsonville railway line for non-rail purposes, including the proposed walking and cycling track.

4.2.5.1 Timeframe for implementation

A possible timeframe for the implementation of the *Bus with Walking and Cycling Scenario* is outlined in Table 4 below.

■ **Table 4: Tasks and timeframes for implementation of *Bus with Walking and Cycling Scenario***

Task	Timing
CBD bus route improvements	07/08
Hutt Road bus priority measures	07/08
Johnsonville Hub improvements	07/08
New bus shelters on replacement bus routes	07/08
Remove rail infrastructure and replace with walking / cycling track	08/09
Purchase of new buses (4 units) and service improvements to provide for general improvements to bus services	08/09
New 12.6m rigid buses (17 units)	08/09
Bus replacements (21 units)	23/24

4.2.5.2 Construction period

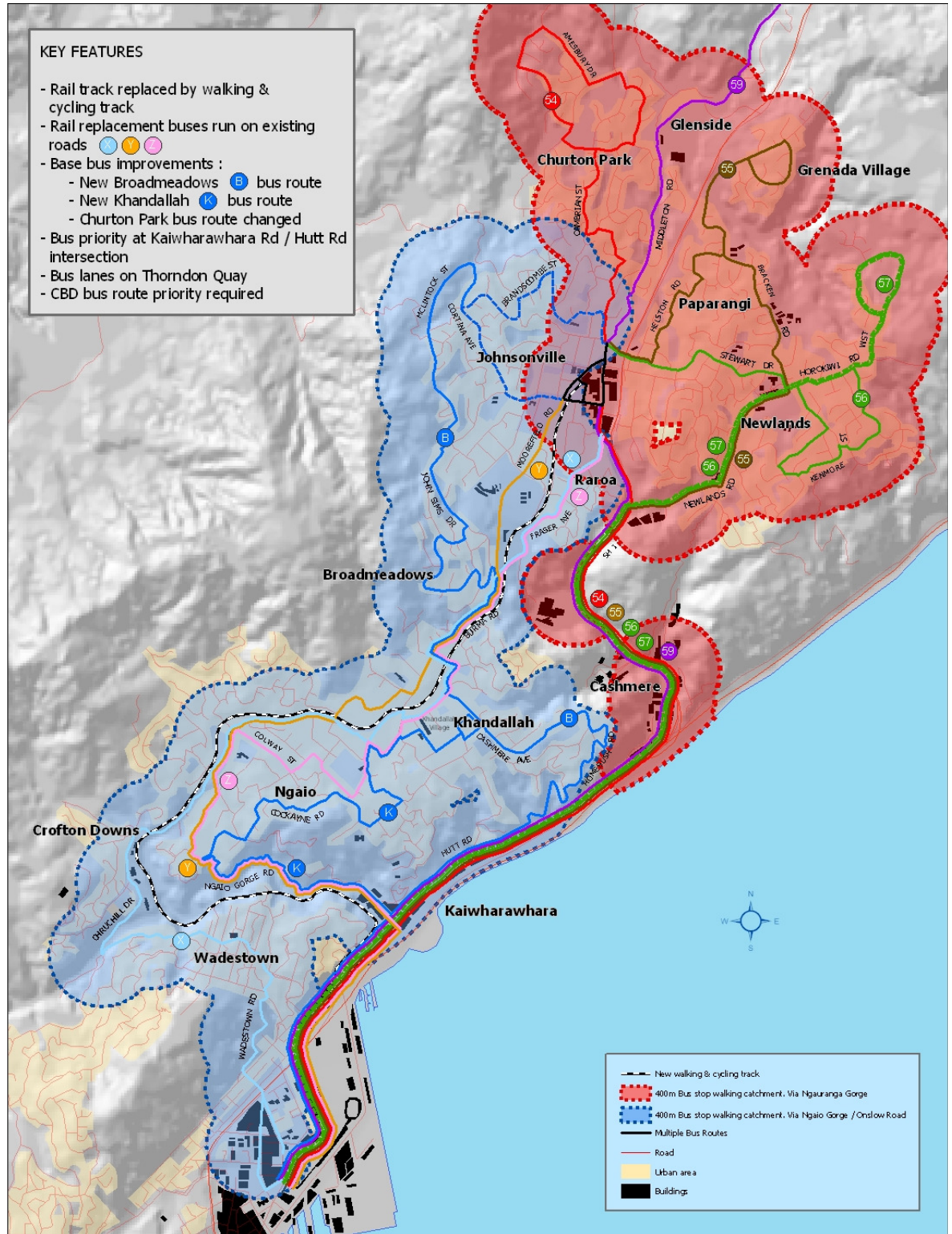
No construction period is required prior to implementing this scenario. However the construction of a walking and cycling track to replace to railway line will take approximately 12 months.

Construction of bus shelters and improvements to the Johnsonville hub can be done progressively.

4.2.5.3 Other *Bus with Walking and Cycling Scenario* options considered

There were no other *Bus with Walking and Cycling Scenario* options considered. Further technical information on this scenario is available in the Scenarios Technical Appendices document.

■ **Figure 5: Bus Routes for Bus with Walking and Cycling Operation**



4.3 Busway scenario

The *Busway Scenario* will involve converting the existing Johnsonville railway line to a guided busway.

The busway will operate in a similar fashion to rail between Johnsonville town centre in the north and Hutt Road in the south. The busway will be a dedicated right-of-way with buses able to enter from and exit to the existing road network and travel the length of the busway with no delays from congestion.

The busway will be one-lane wide for most of its length because of the narrow corridor, steep drops and narrow tunnels¹⁴. In addition buses will be fitted with a guidance system to ensure safe operation and provide an improved ride quality. One possible guidance system is the “O-Bahn” type system used in Adelaide which works by fitting small guide wheels on standard buses and installing raised curbs on the busway to guide the buses. Further details on guidance systems are available in the Scenarios Technical Appendices document.

As the busway will only be one-lane wide it will operate in the peak direction only with return buses using the existing road network. The busway will operate with services running along the busway from Johnsonville to the CBD during the morning peak and then switching at some point during the day so that services travel back along the busway from the CBD to Johnsonville during the evening peak.

4.3.1 Proposed service improvements

This section explores possible service improvements under the *Busway Scenario*.

4.3.1.1 Operation of busway and other bus services

Combined with a comprehensive package of bus priority measures the busway will form the backbone of a mass transit corridor providing reliable, efficient peak services from the northern suburbs through to the CBD.

It is proposed that the busway will operate with a mixture of express and ‘rail replacement’ bus services to replace the existing trains during peak periods. Express services will operate from Churton Park, Grenada Village, Glenside, Paparangi and Newlands with services from the last four areas turning right at the Newlands Overbridge to travel north and enter the busway at Johnsonville. The busway will improve the journey time reliability for all these services, although

¹⁴ A two-lane busway was looked at but is not considered viable due to cost and construction difficulties – refer to the SKM Technical Appendices to Scenarios document for more detail.

travel time for services that currently use the Ngauranga Gorge will increase from 16 minutes to approximately 20 minutes¹⁵.

Express services are expected to be full by the time they enter the busway and will run through to the CBD without stopping. Other services could also enter part way along the busway when full.

Rail replacement services will carry people who currently use the train, stopping at every stop on the busway. These services will not start in Johnsonville town centre but will start in nearby residential areas (for example, Johnsonville West) so as to provide additional coverage and to pick up passengers before entering the busway.

Another way of operating the busway would be to run rail replacement bus services and services from Churton Park and Tawa (which would operate as express services) on the busway. All other bus services would operate on roads, including services from Grenada Village, Glenside, Paparangi and Newlands which would continue to travel down the Ngauranga Gorge.

An alternative way of operating the busway would be to reserve it for exclusive use by express buses travelling from Churton Park, Grenada Village, Glenside, Paparangi and Newlands. Rail replacement services would run on existing roads parallel to the busway to Ngaio Station and then down the busway to the CBD. This would have the advantage of providing shorter travel times for express users.

In addition to peak express services on the busway, normal non-express services will run throughout the day (including peak periods) on existing roads and will ensure a bus service to most bus stops at all times of the day. This should reduce any confusion arising from peak direction services operating only on the busway.

There are clearly many ways in which the busway could be operated. If it is chosen as the preferred scenario, further work will be undertaken to determine the details.

It may be possible to use cleaner environmentally friendly alternatives to diesel buses such as hybrid diesel-electric and hydrogen fuel cell buses in the future. This will need to be considered in detail before proceeding with any bus-based option.

Further detail on the proposed operation of the *Busway Scenario* is contained in the Scenarios Technical Appendices document.

¹⁵ These figures are travel time between Newlands overbridge and the Lambton bus interchange. Current schedules show travel time of 16 minutes, although during peak periods actual travel times are often significantly longer.

4.3.1.2 Coverage of services

The proposed bus routes for this *Busway Scenario* are shown in Figure 6. The proposed bus routes are as follows:

- **Proposed routes along busway (X, Y, Z)**
 These three routes will replace the existing train services. They will operate on the busway stopping at all stations, with return and non-peak services running on existing roads. It is expected that these routes will not start in Johnsonville town centre but rather start in nearby residential areas (1–2km away) to provide additional coverage and pick up additional passengers before entering the busway.
- **Proposed route in West Johnsonville (W)**
 This route will replace route 46 and route 53, serve Johnsonville West and Broadmeadows, and will enter the busway at Khandallah.
- **Proposed routes in Churton Park (54) and Glenside (59)**
 These routes operate in line with the general improvements to bus services discussed in section 3.1 except that peak express services could enter the busway at Johnsonville rather than use Ngauranga Gorge.
- **Proposed routes in Paparangi (55), Newlands (56) and Grenada Village (57)**
 These routes operate in line with the general improvements to bus services discussed in section 3.1 except that peak express services could cross the Newlands over-bridge and travel north on the motorway to enter the busway at Johnsonville rather than use Ngauranga Gorge.
- **Proposed routes in Ngaio, Homebush and Khandallah (43, 44, 45)**
 These routes will remain similar to existing services but the frequency of these services will be improved.
- **An alternative for West Johnsonville, Ngaio, Homebush and Khandallah (B, K)**
 An alternative to proposed routes W, 43, 44 above would to implement new routes for Broadmeadows (B) and Khandallah (K) in line with the general improvements to bus services discussed in section 3.1. Proposed route B would service Johnsonville West, Broadmeadows, Khandallah and Cashmere (Homebush and Onslow Roads) and would operate on existing streets. Proposed route K would replace the Ngaio Gorge, Cockayne Road, Te Kainga, and Khandallah Village section of routes 43 and 44 and would also operate on existing streets. These changes would result in a longer journey times for Johnsonville West and Broadmeadows, however the additional catchment would mean more frequent peak services and possible off-peak and weekend service improvements.

- **Note regarding Onslow College**

At present a significant number of students travel on the railway line in the counter-peak direction to Onslow College, alighting at Raroa Station and walking to the college.

Proposed busway routes X, Y and Z will provide services to Onslow College. These routes will also increase the size of the public transport catchment area as they extend through a much greater area than the existing railway line. There is also an opportunity to divert other routes to provide direct access to the school.

4.3.1.3 Frequency of services and travel time

The frequency of services along the busway would be 3 to 5 minutes during peak periods and 10 minutes during non-peak periods. These frequencies are a substantial improvement on the existing train service and will be achieved by the three new bus services that will replace the existing train service.

The new busway services, which stop at every station, will take approximately 21 minutes to travel between Johnsonville and the Lambton bus interchange. This is comparable to the existing train service.

Express services entering or leaving the busway at Johnsonville will take approximately 17 minutes to travel between Johnsonville and the Lambton bus interchange. Express services from Newlands will take approximately 20 minutes to travel from the Newlands over-bridge via Johnsonville to the Lambton bus interchange compared to 16 minutes on current schedules which use Ngauranga Gorge¹⁶.

The shortest possible travel time depends on how fast buses can travel on the busway. The maximum speed achievable is constrained by the horizontal alignment of the route and necessity for speed restrictions through tunnels. It may be possible to achieve shorter journey times than those used above but further investigation is required. A possible two minute saving could be achieved but will need to be confirmed through detailed design work.

4.3.1.4 Capacity of services

The maximum theoretical capacity of the busway significantly exceeds likely demand based on current patterns of growth. A peak planning capacity of 6,000 passengers per hour can be achieved on the busway with articulated buses operating as express services with one minute headways and

¹⁶ Current schedules show travel time of 16 minutes, although during peak periods actual travel times are often significantly longer.

limited stops. Under the same conditions non-articulated buses would achieve a peak planning capacity of 3,300 passengers per hour¹⁷.

For this scenario it has been assumed that articulated buses would provide a new service along the busway to replace the existing train service. However, the feasibility of using articulated buses still needs to be confirmed.

The limited capacity of the CBD to cater for additional bus services from the northern suburbs is a major issue. One way of addressing this issue could be to run northbound services that currently terminate at the Lambton bus interchange through to Johnsonville or other destinations in the northern suburbs. For example buses that currently run from Houghton Bay or other areas through the CBD to Lambton bus interchange could be extended through to Johnsonville. This could reduce the number of buses running through the CBD but the travel time reliability of longer routes may be adversely affected as these routes would have fewer opportunities to make up lost time arising from traffic conditions along their routes.

4.3.2 Bus priority measures

A number of bus priority measures are required under the *Busway Scenario* to enable the efficient operation of the busway and bus network. The following bus priority measures may be required:

- Bus lanes along Hutt Road and Thorndon Quay between the busway entrance and Lambton Interchange. Reallocation of car parking and removal of the existing angle parking, may be required
- Bus priority measures at intersections around Johnsonville centre
- Construction of a bus interchange at Johnsonville to replace the existing train station

Bus priority measures are required through the CBD and are being investigated as part of the Ngauranga to Airport study. Priority measures are required to maintain journey times for all bus services through the CBD, including services from outside the Study area. A description of the CBD bus priority measures is contained in the Scenarios Technical Appendices document.

4.3.3 Advantages and disadvantages

This section highlights some of the advantages and disadvantages of the *Busway Scenario*.

¹⁷ The planning capacity used was 100 passengers for articulated buses and 55 passengers for non-articulated buses

4.3.3.1 Advantages

- Frequency of buses replacing trains 3 to 5 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods
- Journey times similar for existing train users who travel on the busway with improvements for some express services
- Travel time reliability for busway services not affected by traffic incidents and congestion (expected to be majority of peak period commuters)
- Seamless service possible through CBD to Courtenay Place
- Vehicles more comfortable reliable and attractive (new buses)
- Waiting environment more comfortable (new bus shelters including busway stations)

4.3.3.2 Disadvantages

- Travel time reliability for bus services not on the busway affected by traffic incidents and congestion (expected to be minority of peak period commuters)
- CBD congestion and traffic incidents will impact all services which run on roads
- CBD will require bus priority measures for additional buses. Road capacity and parking spaces in CBD may be reduced
- Where additional bus priority measures are provided, the resultant decrease in road space for other users will increase general congestion
- Potentially confusing operation for non-regular users as different bus stops may operate at different times of the day
- Difficult and expensive to change route of busway but easy to change or extend bus routes at either end
- Closure of Johnsonville railway line during construction

4.3.4 Costs and funding

The total cost of the *Busway Scenario* will be in the order of \$120–130m in today's equivalent dollars (net present value) with \$65–75m of this spent in the next ten years. These figures include an allocation of \$3m for bus priority measures from the Lambton bus interchange through the CBD to Courtenay Place.

The majority of the costs for this scenario are associated with decommissioning the existing railway line, building the busway, providing bus priority measures, constructing bus platforms and shelters at stations and providing shelters adjacent to the existing train station locations.

In calculating the costs of this scenario it was assumed that buses would be purchased by private operators and paid for by a combination of fares and subsidies as happens with existing bus services.

To fund this scenario Greater Wellington will need to contribute a total of \$55–65m in today’s equivalent dollars with \$30–40m of this to be funded in the next 10 years as part of the current LTCCP. Land Transport NZ will fund the balance in accordance with their existing funding policies.

4.3.5 Implementation and construction

It is proposed for the *Busway Scenario* to be completed by 2011/12 with construction taking 12 – 18 months. Details of the possible timeframe and construction period are outlined below.

Approval will be required from central government to use the Johnsonville railway line for non-rail purposes.

4.3.5.1 Timeframe for implementation

A possible timeframe for the implementation of the *Busway Scenario* is outlined in Table 5 below.

■ **Table 5: Tasks and timeframes for implementation of *Busway Scenario***

Task	Timing
CBD bus route improvements	07/08
Johnsonville hub improvements	07/08
Hutt Road bus priority measures	07/08
Busway construction	10/11-11/12
Rail replacement service during construction	10/11-11/12
New articulated buses (12 units)	11/12
Purchase of new buses (7 units) and service improvements to provide for general improvements to bus services	08/09
Articulated bus replacement (12 units)	25/26
Replacement buses (7 units)	25/26

The timetable given in this table is relatively optimistic and may need to be extended to allow for obtaining resources consents and funding.

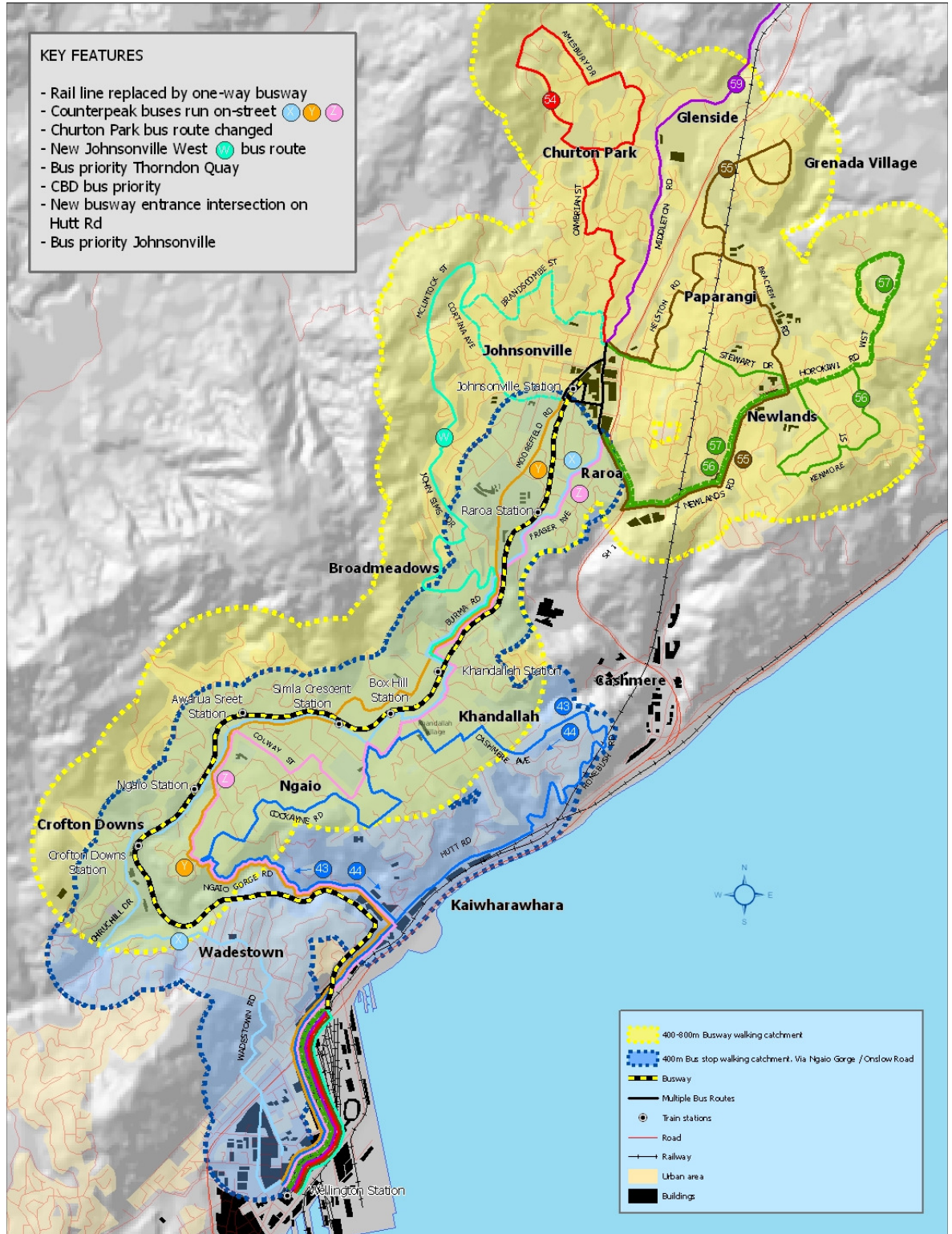
4.3.5.2 Construction period

There would be a period where train services have to be stopped to construct the busway. This could take 12 – 18 months because of the constrained nature of the site and would require implementation of a bus service operating on the existing road network while construction takes place. If bus priority measures from Ngaio Gorge into the CBD were implemented prior to the closure of the rail service, the level of service during construction of the busway would be equivalent to that for the bus on-street scenario. Construction could be staged with the section from Ngaio to the CBD constructed first and available for use within one year.

4.3.6 Other *Busway Scenario* options considered

In developing the *Busway Scenario* a number of other busway options were considered including the possibility of a two-lane busway and the use of alternative busway technology. Further technical information on this scenario and the other options considered is available the Scenarios Technical Appendices document.

■ **Figure 6 : Bus Routes for *Busway Scenario* Operations**



4.4 Light Rail scenario

The *Light Rail Scenario* will involve replacing the existing trains with new light rail vehicles running on an extended Johnsonville railway line through the CBD to Courtenay Place.

The general improvements to bus services discussed in section 3.1 will be implemented in addition to light rail improvements.

4.4.1 Proposed service improvements

This section explores possible service improvements under the *Light Rail Scenario*.

4.4.1.1 Operation of light rail and bus services

Light rail vehicles will operate on the existing railway line much as trains do at present but with some infrastructure improvements.

The railway line between Johnsonville and the Wellington railway station will require similar infrastructure improvements as outlined for the 10 minute *Enhanced Rail Scenario* in section 4.1, except tunnel lowering will not be required. However, to extend services through to Courtenay Place significant additional infrastructure will be required including construction of an 'at-grade' twin track line through the CBD and reconfiguration of existing CBD bus routes.

Further detail on the proposed operation of the *Light Rail Scenario* is contained in the Scenarios Technical Appendices document.

4.4.1.2 Coverage of services

The proposed light rail and bus routes for the *Light Rail Scenario* are shown in Figure 7. Figure 8 shows a potential light rail route through the CBD.

This scenario also includes the general improvements to bus services discussed in section 3.1.

4.4.1.3 Frequency of services and travel time

The frequency of services along the railway line during peak periods would be 10 minutes between Johnsonville and the Wellington railway station and approximately 3 minutes through the CBD. During off-peak periods the frequency of service would be between 15 and 30 minutes along the Johnsonville railway line and 6 minutes through the CBD.

To achieve these peak frequencies 13 light rail vehicles will be required to operate on the Johnsonville railway line section. An additional eight light rail vehicles will be required to operate through the CBD and one additional light rail vehicle on the Johnsonville railway line section so that the timetable can be maintained even with irregular services running through the CBD.

4.4.1.4 Capacity of services

A peak planning capacity of 1,400 passengers per hour can be achieved on the Johnsonville railway section with a 10-minute service frequency¹⁸.

4.4.2 Bus priority measures

Light rail systems require a high level of priority over other traffic to provide an efficient and reliable service and in many cases are given their own right of way and priority over other traffic at intersections.

The existing bus route through the CBD is heavily congested and is currently shared by conventional buses, trolley buses and general traffic. Road space would need to be reallocated to enable light rail tracks to be placed on lanes currently used by buses and general traffic. It is likely that existing bus lanes would need to be opened up to general traffic. This would have a significant impact on existing bus services and general traffic.

Further detail on the priority measures that could be required for the *Light Rail Scenario* is contained in the Scenarios Technical Appendices document.

4.4.3 Advantages and disadvantages

This section highlights some of the advantages and disadvantages of the *Light Rail Scenario*.

4.4.3.1 Advantages

- Frequency of light rail services 10 minutes during peak periods (3 minutes for CBD section). Frequency of all other bus services 4 to 15 minutes during peak periods
- Journey times are similar for existing rail users who travel on light rail
- Travel time reliability for light rail services from Johnsonville to Wellington Station not affected by traffic incidents and congestion
- Seamless service possible through CBD to Courtenay Place
- Vehicles more comfortable reliable and attractive (new light rail vehicles)
- Waiting environment more comfortable (upgraded light rail stations)
- Potential for regular clock-face timetable (same time past the hour)

¹⁸ The planning capacity used is 230 passengers per light rail train (2 vehicles)

4.4.3.2 Disadvantages

- Travel time reliability for light rail services between Wellington Station and Courtenay Place affected by traffic incidents and congestion, which will worsen as traffic grows
- Travel time reliability for bus services affected by traffic incidents and congestion, which will worsen as traffic grows
- CBD congestion and traffic incidents will impact all services which run on roads including light rail
- CBD will require significant priority measures for light rail and consequential changes to bus priority measures. Road capacities and parking spaces in the CBD will be reduced
- Where additional bus priority measures are provided, the resultant decrease in road space for other users will increase general congestion
- Difficult and expensive to change route or extend coverage of light rail service
- Disruption on Johnsonville railway line and through CBD during construction

4.4.4 Costs and funding

The total cost of the *Light Rail Scenario* will be in the order of \$165–175m in today’s equivalent dollars (net present value) with \$90–100m of this spent in the next 10 years. These figures include an allocation of \$50–70m to extend the existing Johnsonville railway line through the CBD. This compares to the other scenarios which all included \$3m for additional bus priority measures through the CBD¹⁹.

The majority of the costs for this scenario are associated with building the light rail extension through the CBD, purchasing new light rail vehicles, providing light rail and bus priority measures, and constructing platform stops. An allowance has also been made for the half life refurbishment of the light rail vehicles.

To fund this scenario Greater Wellington will need to contribute a total of \$70–80m in today’s equivalent dollars with \$35–40m of this to be funded in the next 10 years as part of the current LTCCP. Land Transport NZ will fund the balance in accordance with their existing funding policies.

¹⁹ The Ngauranga to Airport Study will investigate the potential for light rail extension through the CBD on a region wide basis.

4.4.5 Implementation and construction

It is proposed for new light rail services to commence operation by 2012/13.

4.4.5.1 Timeframe for implementation

A possible timeframe for the implementation of the *Light Rail Scenario* is outlined in Table 6 below.

■ **Table 6: Tasks and timeframes for implementation of *Light Rail Scenario***

Task	Timing
Johnsonville Station Refurbishment	07/08
Infrastructure improvements to Johnsonville railway line	07/08
Purchase of new buses (4 units) and service improvements to provide for general improvements to bus services	08/09
Light rail track construction to Courtenay Place	11/12-12/13
New Light rail vehicles (22 units)	12/13
Raroa, Khandallah, Simla Crescent, Awarua Street & Crofton Downs stations refurbishment	15/16
Box Hill & Ngaio stations refurbishment	16/17
Replacement buses (4 units)	23/24
Half life refurbishment of light rail vehicles (22 units)	26/27

The timetable given in this table is relatively optimistic and may need to be extended to allow for obtaining resource consents and funding.

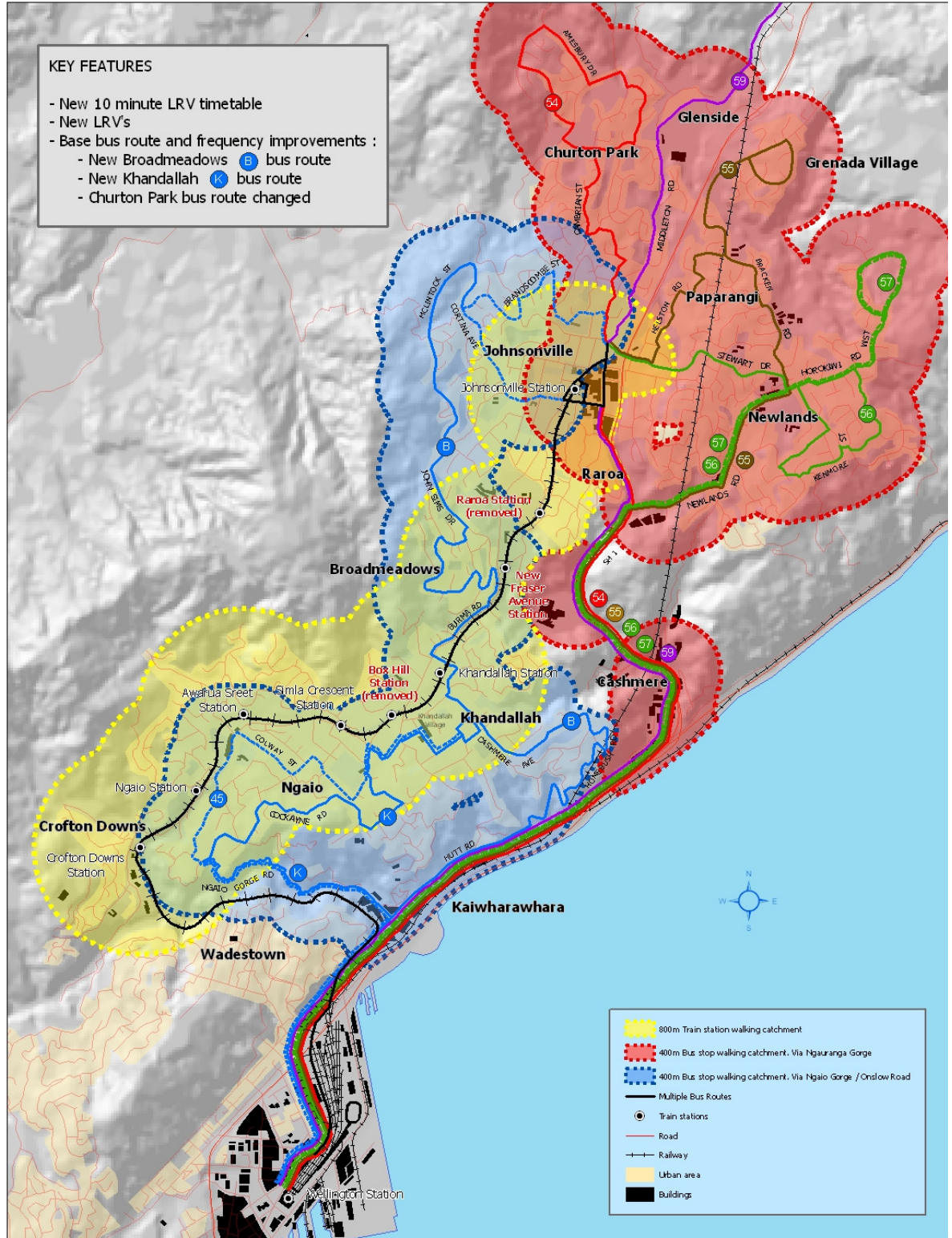
4.4.5.2 Construction period

Construction of the CBD section of the line could take a significant period of time with significant service relocation required prior to installation of the track.

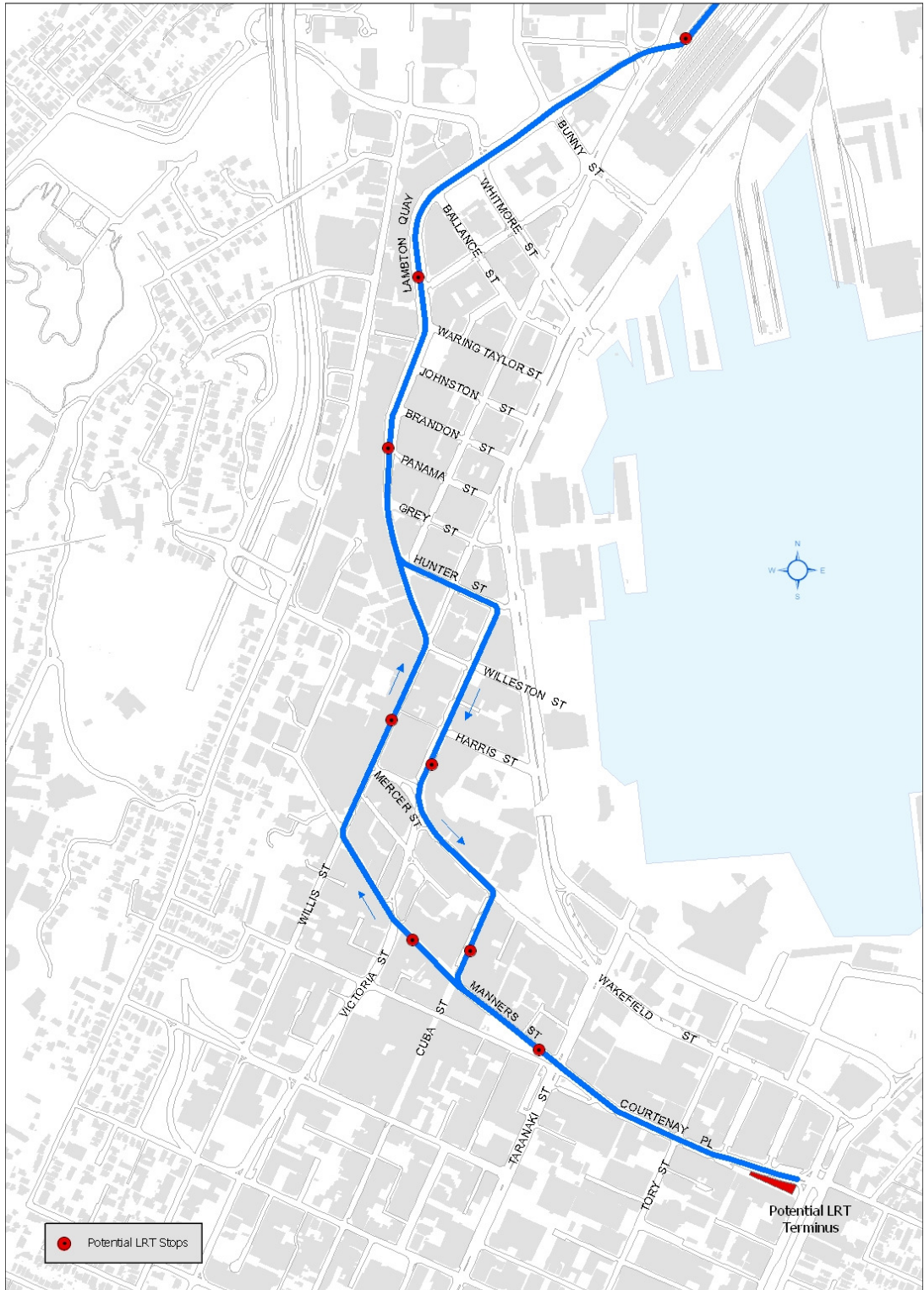
4.4.6 Other *Light Rail Scenario* options considered

In developing this *Light Rail Scenario* some other options were considered, including the possibility that low floor vehicles be operated on the Johnsonville railway line where high floor vehicles and elevated platforms are currently used. Further technical information on this scenario and other options considered is available in the Scenarios Technical Appendices document.

■ **Figure 7: Light rail and bus routes for *Light Rail Scenario* operations**



■ **Figure 8: Potential light rail route through the CBD**



4.5 Other scenarios investigated but considered not appropriate

Four other scenarios were looked at during this phase of the study but ruled out from further investigation:

- Refurbishment of the existing English Electric Units
- Underground rail extensions into the CBD
- Personal Rapid Transit
- Monorail

Initial investigation has shown that these options are either not appropriate for the northern suburbs or fall outside the affordability envelope. The reasons are set out below.

4.5.1 Refurbishment of the existing English Electric trains

This scenario is to refurbish the existing English Electric Multiple Units (EEMUs) to allow them to continue to operate on the line.

The refurbishment work currently being undertaken would only extend the lives of the units for three to five years. A much more extensive refurbishment programme would be required to extend the lives of the units for some 10 years and would cost in the order of \$1m to \$2m per unit. At the end of the ten years, it is likely that due to their age and poor crash performance, the units would no longer be suitable for operation on the network and would need to be retired.

The EEMUs are already 50-years old and have low passenger appeal. The units utilise obsolete technology giving an inferior ride quality, poor crashworthiness compared to modern rolling stock, low passenger comfort and poor accessibility for the less able. Given these issues and the high cost of refurbishment for a limited life, refurbishment of the EEMUs for continued operation on the Johnsonville railway line is not considered a viable option. However, Tranz Metro have advised that they consider refurbishment a viable option.

Refer to the Scenarios Technical Appendices document for further information about EEMU refurbishment options considered.

4.5.2 Underground rail extension through CBD

This scenario is the same as in the 10 minute frequency *Enhanced Rail Scenario*, however includes the construction of a twin track underground railway line from Wellington Station to the Taranaki Street / Courtenay Place intersection.

New units and infrastructure improvements to give a 10 minute frequency on the Johnsonville railway line form only a small proportion of the cost of the underground rail construction. It has

therefore been assumed that a 10 minute frequency service would be provided on the Johnsonville railway line by new EMU units compatible with the rest of the Wellington network.

The investigations to date into this scenario suggest it would cost about \$300m in today's equivalent dollars (excluding operational costs and other improvements that would be required in any case). Given the level of funding available, this scenario is highly unlikely to be affordable. Even if only a proportion of the cost of the rail extension (based on patronage) was assumed to be borne by the northern suburbs, it would still be unaffordable.

The Ngauranga to Airport Study which is currently under way will investigate the potential for rail extension into the CBD on a region wide basis. If rail extension was found to have merit, then the potential for the Johnsonville railway line would need to be reconsidered.

Refer to the Scenarios Technical Appendices document for further information about rail extension scenarios considered.

4.5.3 Personal Rapid Transit

Personal Rapid Transit is automated small-group point-to-point transportation along separated guideways. Current systems have the vehicles running on two tracks on top of the guideway, though new concepts are being developed. The services can be timetabled or operated on demand. The operating speed and carrying capacity of this technology are low. This technology is in the early stages of its development and currently there are no larger scale systems in operation.

These types of systems have been considered in relation to the northern suburbs passenger transport needs. For their benefits to be realised, a comprehensive coverage of the CBD would be required, which is outside of the scope of this study. As there are also no large scale systems in operation, it is considered that the technology is not sufficiently proven to be considered in detail as part of this study.

4.5.4 Monorail

Monorail consists of vehicles supported by a single elevated beam from which the vehicles can be suspended below or straddle. The elevated nature of Monorail means that it has high visual impact and can be intrusive on the surrounding environment. The carrying capacity of each vehicle is limited but several vehicles can be linked to form a train. The maximum speed of Monorail is generally low compared with other Rapid Transit systems, though the overall travel times can be comparable due to the fact that Monorail doesn't compete for space with other transport modes. Station spacing can be similar to that for LRT systems; 400-800m within main centres and 800-1500m in other areas. The Monorail systems currently in place are generally short in length; the most extensive are up to 10km in length in Japan. The systems also tend to be operated in loops due to complexities of switching from one track to another.

A Monorail system has been considered in relation to the passenger transport needs of the northern suburbs. It is considered that a Monorail provides no more benefit than a traditional light rail but costs more. In addition, a comprehensive coverage of the CBD would be required to realise Monorail's claimed benefits and objections are likely to the way it looks. Therefore, Monorail will not be considered further as part of this study.

5 Comparison of public transport scenarios

This section gives a comparison of the four passenger transport scenarios identified for further consideration.

■ **Table 7: Comparison of scenarios – Across all the northern suburbs**

	Enhanced Rail	Bus with Walking and Cycling	Busway	Light Rail
Frequency	Frequency of trains 10 to 13 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods	Frequency of buses replacing trains 3 to 5 minutes during peak periods. Frequency of all other bus services 4 to 15 minutes during peak periods		Frequency of light rail services 10 minutes during peak periods (3 minutes for CBD section). Frequency of all other bus services 4 to 15 minutes during peak periods
Journey times	Journey times remain the same for existing rail users	Journey times increase for existing rail users who will travel on bus	Journey times similar for existing train users who travel on the busway with improvements for some express services	Journey times are similar for existing rail users who travel on light rail
Reliability	Travel time reliability for the 43% of peak period commuters who travel on train services will not be affected by traffic incidents and congestion	Travel time reliability for all bus services affected by traffic incidents and congestion, which will worsen as traffic grows (all peak hour commuters)	Travel time reliability for busway services not affected by traffic incidents and congestion (expected to be majority of peak period commuters)	Travel time reliability for light rail services from Johnsonville to Wellington Station not affected by traffic incidents and congestion
	Travel time reliability for the 57% of peak period commuters who travel on bus services will worsen as traffic grows		Travel time reliability for bus services not on the busway affected by traffic incidents and congestion (expected to be minority of peak period commuters)	Travel time reliability for light rail services between Wellington Station and Courtenay Place affected by traffic incidents and congestion, which will worsen as traffic grows
				Travel time reliability for bus services affected by traffic incidents and congestion, which will worsen as traffic grows

CBD congestion and priority measures	CBD congestion and traffic incidents will impact all services which run on roads including light rail			
	CBD will require some bus priority measures to cater for general growth in public transport use	CBD will require bus priority measures for additional buses. Road capacity and parking spaces in CBD may be reduced		CBD will require significant priority measures for light rail and consequential changes to bus priority measures. Road capacities and parking spaces in the CBD will be reduced
Northern suburbs congestion	Where additional bus priority measures are provided, the resultant decrease in road space for other users will increase general congestion			
Seamless service	Seamless service not possible through CBD to Courtenay Place	Seamless service possible through CBD to Courtenay Place		
Travel and waiting conditions	Vehicles more comfortable, reliable and attractive (new buses and new or refurbished rail vehicles where applicable)			
	Waiting environment more comfortable (new bus shelters and upgraded railway stations where applicable)			
Ability to understand services	Potential for regular clock-face timetable (same time past the hour) for 10 minute frequency	Operation similar to existing bus services	Potentially confusing operation for non-regular users as different bus stops may operate at different times of the day	Potential for regular clock-face timetable (same time past the hour)
Adaptability	Difficult and expensive to change route or extend coverage of rail service	Easy to change routes and extend coverage	Difficult and expensive to change route of busway but easy to change or extend bus routes at either end	Difficult and expensive to change route or extend coverage of light rail service
Cost	Cost between 104-133% of budgeted funding	Cost between 79-88% of budgeted funding	Cost between 100-108% of budgeted funding	Cost between 138-146% of budgeted funding
Other	Closure of Box Hill Station and relocation of Raroa Station to Fraser Avenue (required for 10 minute frequency option only)	Increased recreational opportunities with walking and cycling track along Johnsonville railway line	Closure of Johnsonville railway line during construction	Disruption on Johnsonville railway line and through CBD during construction

■ **Table 8: Comparison of scenarios – Churton Park / Glenside**

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
New Route for 54 which removes the section of the existing Route 54 loop that uses Middleton Road. This will result in a more direct service.			
Middleton Road catchment will be catered for by the increased frequency on Route 59 with possible off-peak transfer from Route 59 to Route 54 at Johnsonville			
Route 54 frequency increased to 4 minutes in the peak of the peak, and 30 minutes interpeak and offpeak.			
Route 59 frequency increased to 10 minutes in the peak of the peak, 30 minutes interpeak and offpeak			
Improved rail services could be accessed by interchange or park 'n' ride at Johnsonville		New Route 54 and 59 services will use the newly constructed busway between Johnsonville and Hutt Road instead of the Ngauranga Gorge. Providing a more reliable journey time	New light rail services could be accessed by interchange or park 'n' ride at Johnsonville

■ **Table 9: Comparison of scenarios – Johnsonville**

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
Increased bus frequency of approximately 4 minutes in the peak of the peak		Increased bus frequencies of approximately 4 minutes in the peak for express services and 3 – 5 minutes for bus services replacing rail	Increased bus frequency of approximately 4 minutes in the peak of the peak
More frequent peak train service – between 10 and 13 minute frequency	New Routes X, Y and Z via the Ngaio Gorge and Wadestown (3 – 10 minute frequencies in the peak of the peak)	Improved travel time for express services (17 minutes), other services similar to existing rail	More frequent peak LRT service –10 minute frequency
		Increased congestion at Johnsonville due to bus priority measures	

■ **Table 10: Comparison of scenarios – Raroa**

Enhanced Rail	Bus with Walking and Cycling	Busway	Light Rail
More frequent peak train service – between 10 and 13 minute frequency	New bus Routes X and Z via Fraser Avenue	Increased peak frequency (3-5 minutes) for buses replacing rail	More frequent peak LRT service –10 minute frequency
Raroa Station removed and replaced by a new Station at Fraser Avenue (10 minute frequency only).			Raroa Station removed and replaced by a new Station at Fraser Avenue

■ **Table 11: Comparison of scenarios – Johnsonville West**

Rail	Bus with walking and cycling	Busway	Light Rail
New Route B would follow the existing 46 route from the CBD to Broadmeadows. From here the route would utilise the yet-to-be-constructed John Sims Drive extension, then McLintock Street and its proposed extension to the top of Cortina Avenue, then via one of two possible routes to a terminus at Johnsonville.		New bus route W through Johnsonville West and Broadmeadows would feed into the busway at Khandallah	New Route B would follow the existing 46 route from the CBD to Broadmeadows. From here the route would utilise the yet-to-be-constructed John Sims Drive extension, then McLintock Street and its proposed extension to the top of Cortina Avenue, then via one of two possible routes to a terminus at Johnsonville.
Offpeak and weekend service for Johnsonville West			
Bus frequency of 10 minutes in the peak of the peak, 30 minutes interpeak and off-peak			
Improved rail services could be accessed by interchange or park 'n' ride at Johnsonville			New light rail services could be accessed by interchange or park 'n' ride at Johnsonville

■ **Table 12: Comparison of scenarios – Broadmeadows**

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
New Route B would follow the existing 46 route from the CBD to Broadmeadows. From here the route would utilise the yet-to-be-constructed John Sims Drive extension, then McLintock Street and its proposed extension to the top of Cortina Avenue, then via one of two possible routes to a terminus at Johnsonville.		New bus route W through Johnsonville West and Broadmeadows would feed into the busway at Khandallah	New Route B would follow the existing 46 route from the CBD to Broadmeadows. From here the route would utilise the yet-to-be-constructed John Sims Drive extension, then McLintock Street and its proposed extension to the top of Cortina Avenue, then via one of two possible routes to a terminus at Johnsonville.
Offpeak and weekend service for Broadmeadows			
Frequency of 10 minutes in the peak of the peak, 30 minutes interpeak and offpeak			Frequency of 10 minutes in the peak of the peak, 30 minutes interpeak and offpeak
Improved rail services could be accessed by interchange or park 'n' ride at Johnsonville or Khandallah			New light rail services could be accessed by interchange or park 'n' ride at Johnsonville or Khandallah

■ **Table 13: Comparison of scenarios – Khandallah / Ngaio West**

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
More frequent peak train service – between 10 and 13 minute frequency	New Routes X, Y and Z via Ngaio Gorge and Wadestown (3 – 10 minute frequencies in the peak of the peak)	Increased peak frequency (3-5 minutes) for buses replacing rail	
New Route K – Khandallah via the Ngaio Gorge. This new “Khandallah Route” would replace the Ngaio Gorge section of the existing Route 43 and 44 loop and follow the Ngaio Gorge and Cockayne Road, terminating at Khandallah.		Current Route 43 and 44 loop maintained	New Route K – Khandallah via the Ngaio Gorge. This new “Khandallah Route” would replace the Ngaio Gorge section of the existing Route 43 and 44 loop and follow the Ngaio Gorge and Cockayne Road, terminating at Khandallah.

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
Route K frequency of 5 minutes in the peak of the peak, 30 minutes interpeak and 30 minutes and offpeak.			Route K frequency of 5 minutes in the peak of the peak, 30 minutes interpeak and 30 minutes and offpeak.
Route 45 continuing on its current route during peak times via the Ngaio Gorge and terminating in Khandallah			
More frequent bus services for Khandallah during the peak			More frequent services for Khandallah during the peak
Box Hill Station closure (10 minute frequency only)			Box Hill Station closure

■ **Table 14: Comparison of scenarios – Ngaio East**

Rail	Bus with walking and cycling	Busway	Light Rail
More frequent peak train service – between 10 and 13 minute frequency	New bus Routes X and Z via Fraser Avenue	Increased peak frequency (3-5 minutes) for buses replacing rail	More frequent peak LRT service – between 10 and 13 minute frequency
New Route K – Khandallah via the Ngaio Gorge, would replace the Ngaio Gorge section of the existing Route 43 and 44 loop and follow the Ngaio Gorge and Cockayne Road, terminating at Khandallah.		Current Route 43 and 44 loop maintained	New Route K – Khandallah via the Ngaio Gorge, would replace the Ngaio Gorge section of the existing Route 43 and 44 loop and follow the Ngaio Gorge and Cockayne Road, terminating at Khandallah.
Route K frequency of 5 minutes in the peak of the peak, 30 minutes interpeak and 30 minutes and offpeak.			Route K frequency of 5 minutes in the peak of the peak, 30 minutes interpeak and 30 minutes and offpeak.
Route 45 continuing on its current route during peak times via the Ngaio Gorge and terminating in Khandallah			
More frequent peak train service – between 10 and 13 minute frequency	New Routes X, Y and Z via Ngaio Gorge and Wadestown (3 – 10 minute frequencies in the peak of the peak)		Increased peak LRT frequency (10 minutes)

■ **Table 15: Comparison of scenarios – Crofton Downs**

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
More frequent peak train service – between 10 and 13 minute frequency	New bus Route X via Waikowhai Street and Wadestown	Increased peak frequency (3-5 minutes) for buses replacing rail	Increased peak LRT frequency (10 minutes)
Improved disabled access and reduced stepping distances at station	Route X frequency of 10 minutes in the peak of the peak, 15 minutes interpeak and 15 minutes and offpeak.		

■ **Table 16: Comparison of scenarios – Newlands, Grenada, Paparangi, Woodridge**

Enhanced Rail	Bus with walking and cycling	Busway	Light Rail
Route 55 and 56 frequencies of 10 minutes in the peak of the peak, 30 minutes interpeak and off-peak.			
Route 57 frequency of 15 minutes in the peak of the peak.			
An approximately 3-4 minute frequency for Newlands Road during the peak of the peak			
Improved rail services could be accessed by interchange or park 'n' ride at Johnsonville		New busway could be accessed at Johnsonville by express services. Increased journey times for much of the day but improved journey time reliability	New light rail services could be accessed by interchange or park 'n' ride at Johnsonville
		Alternative to continue to operate bus services down the Ngauranga Gorge	

6 Next steps

This report has identified four scenarios that could be implemented to meet the current and future passenger transport needs of people living and working in the northern suburbs. These scenarios are:

- *Scenario One – Enhanced Rail Scenario*
- *Scenario Two – Bus with walking and Cycling Scenario*
- *Scenario Three – Busway Scenario*
- *Scenario Four – Light Rail Scenario*

Following the receipt of comments from this stage of consultation, the next phase of the study will investigate and evaluate the scenarios in greater detail to identify a preferred scenario. The initial findings will be publicly released later this year. A further opportunity for comment will be provided at that time.

The outcome will be a strategic framework for future investment into public transport within Wellington City's northern suburbs. At the end of the process, the findings will feed into the respective Council transportation and urban development strategies for the area, and be incorporated into the review of the Wellington Regional Land Transport Strategy (WRLTS), which is due to be updated this year.

Appendix A Key issues for northern suburbs public transport

A.1 Issues and needs consultation

“Issues and Needs” consultation was undertaken in Stage 1 of this study to help identify the key issues and needs as seen by the community. The main overall issue that submitters reported was to achieve a sufficiently frequent, reliable public transport system with convenient routes. General issues and needs raised in the Stage 1 consultation included:

- frequency
- reliability
- proximity
- cost
- journey time
- capacity
- condition of vehicles
- condition of waiting areas
- accessibility for less able
- parking provision
- passenger transport integration (connectivity, integrated ticketing etc)

It should be noted that the responses from the Stage 1 consultation were primarily received from current public transport users and were dominated by access issues.

A.2 Development potential – greenfields and infill development

The population of the northern suburbs is expected to grow in the future and with it the demand for public transport will increase. The potential for growth is due to infill (subdividing existing properties or redeveloping them with higher density uses) and greenfield development (opening up new sections on land which is currently undeveloped).

Future infill development is near impossible to predict given the number of other factors that affect the intensification potential. However, some trends can be derived from past activities, and provide a basis for prediction in the near future.

Using the data on new dwellings over the past five years²⁰, projections have been made regarding infield development potential over the next five years in

■ **Table 17 Infill Housing predictions in the Study Area**

Area	New dwellings over the past five years	Potential for growth over next five years (dwellings)	Number of people based of 2.6 people per household
Grenada	10	10	26
Paparangi	20	20	52
Crofton Downs	25	25	65
Woodridge	30	N/A	N/A
Broadmeadows	50	50	130
Raroa	60	60	156
Ngaio	100	50	130
Khandallah*	160	100	260
Johnsonville*	220	100	260
Newlands*	230	100	260
Churton Park*	280	N/A	N/A

*Development within Churton Park and Woodridge appears to be predominantly from Greenfield subdivision, and therefore the potential for infill is close to nil as these are typically developed to maximum site coverage under the District Plan.

It is anticipated there will be a small demand for apartments in sub-regional centres, particularly Johnsonville Shopping Centre²¹. However such density is hard to predict, is unlikely to represent a large proportion of the housing sector, under current policies.

The Northern Growth Management Framework (NGMF) provides a ‘strategy for achievement’ for the future development of the northern part of Wellington City. The framework arose from the 2000/2001 Strategic Review, which saw the immediate pressure for new urban development in the Wellington region being in the northern areas, from Johnsonville to Kapiti.

In terms of the area covered by the NGMF, it is larger than the Study area in that it also extends to south of Porirua, where there is the demand and space for more ‘greenfield development’.

² Housing needs and demands, open space and community facilities, working paper no. 12, prepared by Property Economics Ltd, April 2005.

²¹ Data supplied from Wellington City Council, based on approved building consents.

In terms of population projections, the framework predicts growth of 9,000 over the next 20 years. This contrasts to the 4,000 more people allowed for in the current Wellington City Council District Plan zoning regime, and Greater Wellington projections of 5,000 people in the next twenty years.

Existing greenfield development is very much centred in the northern part of the study area being Churton Park and Woodridge to the northeast. Churton Park is a large subdivision in the northwest of Johnsonville, and has experienced steady growth in the order of 50 new dwellings per annum. This trend is predicted to continue into the future. Churton Park currently provides for around 3-4% of the WRS Study Area’s housing needs. The potential for Greenfield development within the study area is outlined in the table below.

Zoning	Number of households	Number of people based of 2.6 people per household ²²	Time frame
Existing Outer Residential	256	665	Immediate future – within next 10 years
Rural land appropriate for development under Plan Change 32 and 33	90	234	Immediate future – within next 10 years
Potential Future growth land identified under the Northern Growth Management Framework	3610	9386	Longer term – 5 – 10 years +

Note: These projections have been reviewed by Wellington City Council as part of this report.

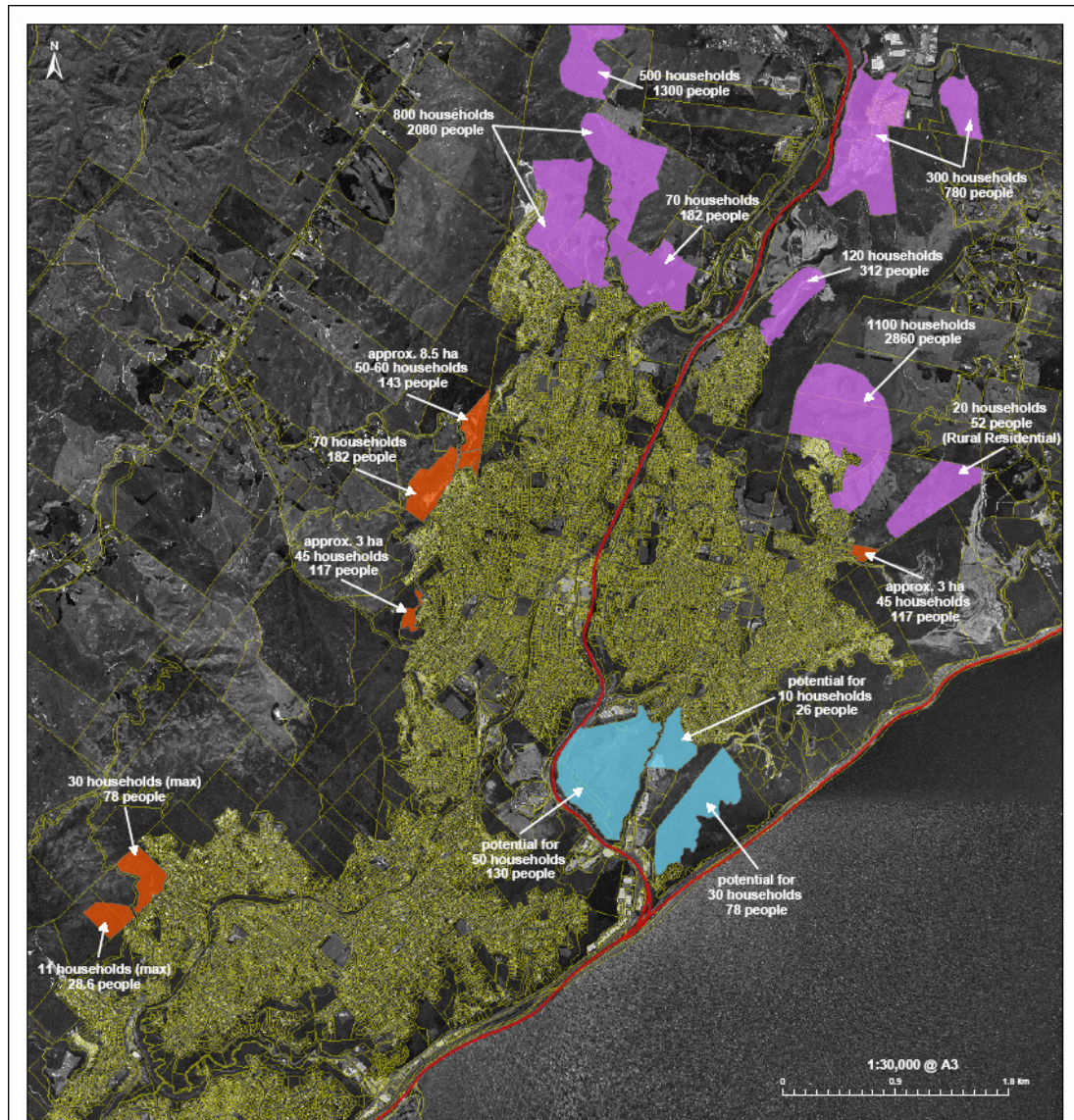
The potential areas of greenfield development are shown diagrammatically in

Figure 9.

Because of their locations, these growth areas are likely to be serviced by bus-based public transport under any scenario considered.

²² 2.6 people per household is the Wellington average.

■ **Figure 9 Potential Areas for Greenfield Development**



NORTH WELLINGTON TRANSPORT STUDY
- Potential Greenfield & Infill Development -

Areas Defined

- **Outer Residential zoned land not yet subdivided**
 - Based on 10% of site excluded from calculations for infrastructure purposes.
 - Based on 600 m
 - Number of people based on 2-6 people per household

Total number of households = 256
Total number of people = 665
- **Rural zoned land identified for development in Plan Changes 32 & 33**
 - Total number of households = 90
 - Total number of people = 234
- **Northern Growth Management Framework (Future Growth Areas)**
 - Potential number of households = 3610
 - Potential number of people = 9386
 - This includes 700 households (1820 people) to the area North of Takapu Industrial.*

A.3 Congestion

The road network that serves the northern suburbs is restricted by topography which means there are only a few routes into Wellington CBD and so they become heavily congested. The strategic road that provides a link between the area north of (and including) Johnsonville and Newlands is the State Highway 1 Motorway through Ngauranga Gorge. Links from the lower Study area include the Ngaio Gorge Road which becomes Kaiwharawhara Road and Cashmere Avenue which becomes Onslow Road. Both Kaiwharawhara Road and Onslow Road feed onto Hutt Road which continues into the CBD.

A review of the 2003 base year Wellington City SATURN model was undertaken and identified the road network links that have a Volume/Capacity ratio which exceeds 1.0, indicating that those links are over capacity²³. The following links in the northern suburbs, or that feed into central Wellington were identified as currently being over capacity.

- SH1 Ngauranga Gorge
- SH1 motorway on approach to CBD
- Onslow Road on approach to Hutt Road intersection
- Kaiwharawhara Road on approach to Hutt Road intersection
- Grant Road (end of Wadestown Road)

This indicates that most routes into the city from the northern suburbs experience significant congestion.

The Ngauranga Gorge provides particular congestion problems for buses during the peak periods. This also affects buses in the contra-peak direction in the afternoon, which in order to follow the Hutt Road into the CBD must exit the Motorway via the same link as vehicles travelling to the Hutt (becomes congested with northbound traffic on SH2).

Congestion is likely to get worse in the future extending journey times for private vehicles and for buses and reducing journey time reliability. The average length of a trip from Newlands onramp to the Aotea off-ramp via the SH1 Ngauranga Gorge in the two hour morning peak is anticipated to increase by some 20% between 2001 and 2016²⁴.

²³ The Volume/Capacity ratio is the ratio of the actual capacity of a road to its theoretical capacity. Anything over 0.85 is considered unsatisfactory and likely to cause major delays.

²⁴ WTSM model base forecasts

A.4 Seamless service through to the CBD

The Wellington Railway Station is situated on the northern fringe of the Wellington CBD and does not provide rail penetration into the central city. This means that passengers wanting to access many locations in the southern CBD must walk substantial distances or transfer to bus to continue their journey.

The benefits of extending services into the CBD are highlighted by the large patronage increase achieved on Newlands bus routes in 2000, largely as a result of extending routes from the northern suburbs to terminate at Courtenay Place. Combined with frequency improvements, this resulted in some 40% increase in patronage as passengers were able to travel further into the CBD without having to interchange.

The terms of reference for this study require the consideration of a “seamless transport service” between the northern suburbs, through the CBD. This is reinforced by Wellington City Council’s Urban Development Strategy “growth spine” concept, which proposes a growth corridor between Johnsonville in the north, the CBD, Newtown, Kilbirnie and Wellington Airport in the south.

A.5 Integrated automatic electronic ticketing

Greater Wellington have advised that integrated ticketing for both rail and bus services is being investigated at present and is expected to be put in place in the future. It is expected that when it is introduced, fares would be related to distance travelled, not by mode or service provider.

For all scenarios, integrated automated electronic ticketing machines are assumed to be installed at all stations as part of the current Greater Wellington Draft Passenger Transport Strategy. This could facilitate driver-only operation of the units with enforcement undertaken by roving inspectors.

Appendix B Current northern suburbs public transport services

B.1 Johnsonville railway line background

The Johnsonville railway line is a 10.5 km suburban passenger railway line. It runs between Johnsonville in the north and the Wellington Railway Station in the south. The stations served by the line are:

- Johnsonville
- Raroa
- Khandallah
- Box Hill
- Simla Crescent
- Awarua Street
- Ngaio
- Crofton Downs
- Wellington

The Johnsonville railway line is a single track line with three sets of passing loops which are located at Wadestown, Ngaio Station and Khandallah Station. The track gauge is 1,067mm which is the common gauge for rail in New Zealand but less common internationally where standard gauge track is more common, particularly with new rail applications. There are seven tunnels which have restricted cross-sections that only cater for the existing English Electric Multiple Units (EEMU), and are too small for the other rolling stock used on the remainder of the Wellington Electrified Network (the Network). The 1600v (1500v nominal) DC power supply is provided via overhead wires. Operation of points and signals is under Central Traffic Control (CTC), but is usually automatic.

The line rises approximately 150m from Wellington Station to Johnsonville and the line's ruling gradient is 1 in 20.4. The current permissible line speed is 50km/h, with permanent restrictions existing through tunnels and crossing loops (40km/h and 25km/h respectively).

B.1.1 History of the Johnsonville railway line

The Thorndon-Tawa (via Johnsonville) line was opened in 1885 by the Wellington & Manawatu Railway Company after blasting through significant amounts of rock and negotiating steep gorges. The Company later sold the line to the Government in 1908 after the 1937 completion of the North

Island Main Trunk (NIMT) Railway Tawa deviation, which allowed the steeply graded Johnsonville saddle to be bypassed.

Wellington City Council was subsequently offered the use of the line for the City's tramway network, however the offer was declined. This resulted in the Government deciding to close the Tawa to Johnsonville section of the line. In 1938 the Government upgraded the remaining Johnsonville to Wellington section, resulting in New Zealand's first electrified suburban passenger railway, using purpose-built electric multiple unit trains and making Wellington the third city in Australasia to electrify its first suburban railway line. The English Electric Multiple Unit (EEMU) trains were introduced between 1938 and 1953 – the last 36 of which are still in service.

Between 1984 and 1995, a series of studies were undertaken on the Johnsonville railway line, with some including potential transport scenarios through the Wellington CBD and beyond to the airport. These studies were primarily driven by the need to look for options for northern suburbs access to the Wellington CBD once the economic life of the existing EEMUs was exhausted. This was anticipated to be during the mid 1990's, however the units are still in operation in 2006.

B.1.2 Existing services

The timetabled running time between Johnsonville and Wellington Railway Station is 21 minute in each direction. During peak times (approx. 6:00am to 9:30am and 3:30pm to 6:00pm Monday to Friday) services are scheduled to operate a 13 minute - 13 minute - 26 minute timetable, allowing three trains (four car sets) to run in 52 minutes.

On weekdays in the interpeak and evenings, the trains operate generally on a 30 minute timetable in each direction, that is, two trains per hour. On Saturdays and Sundays, the trains operate generally on a 30 minute timetable over the whole day with some very widely spaced early morning services.

The busiest services arrive at Wellington Station at 8:07am and 8:20am on weekday mornings. The Peace Train monthly ticket, which does not include travel on these trains, is an attempt to spread the very peaked demand for the Johnsonville railway line at these times.

B.1.3 Existing rolling stock

The existing rolling stock operated on the line are English Electric Multiple Units (EEMU) which were originally purchased new in 1953. The EEMUs operate as a coupled pair consisting of one motive car (Class DM unit) and one trailer car (Class D unit) with combined seating capacity of 128 seats. The units are in a very poor condition, providing an unattractive service to the public.

There are 36 units available. About half are used for Johnsonville railway line services and the rest on the Hutt line. There are 18 units operating as two-car sets (9 x 2 car) which are suitable for use

on the Johnsonville railway line and are all in similar condition. The existing timetable requires 12 of these units, operating as four-car sets (3 x 4 car) with the remaining units being spares.

The remaining 18 units are operated as three-car sets and are therefore not suitable for use on the Johnsonville railway line unless they are broken up to operate in two-car sets (1 power and 1 trailer car). One six car set could run on this line but, station platforms would need to be extended to cater for them. In addition, two six-car trains would not be able to pass one another on the existing passing loops.

The EEMU units have undergone major refurbishments over their life, the last of which was undertaken in the mid 1980s. The units are currently undergoing a cosmetic and rust refurbishment programme, which would extend their lives for some three to five years at a cost of \$5.4m.

B.1.4 Infrastructure ownership and maintenance

ONTRACK took responsibility on behalf of Central Government for the Operation, Maintenance and Development of the railway infrastructure including tracks, overhead wires and platforms following Central Government's repurchase of the Network from Toll NZ in September 2004. As part of the agreement, Central Government provided Toll with access to the rail infrastructure from ONTRACK as part of a 68 year lease. The maintenance of this infrastructure is funded by Toll through the TrackCo Access Agreement (Access Agreement), the value of which is currently negotiated on a yearly basis.

Greater Wellington have no direct relationship with the Access Agreement, but do have an agreement with Toll. Greater Wellington pays Toll an amount to cover the Passenger Transport share of the maintenance costs, while Toll pays ONTRACK for all track maintenance costs. Currently, Greater Wellington pay Toll approximately 10% of Toll's total Access Agreement charge for the entire regional rail network. The amounts paid as maintenance contributions are not broken-down by line, but cover the whole of the network so it is difficult to determine the exact maintenance costs associated with the Johnsonville railway line.

ONTRACK have advised the study team that only routine maintenance of the Johnsonville is anticipated at present. No significant power supply or rail renewal schemes are envisaged at present, except normal maintenance allowed for as part of the Access Agreement.

Toll is not involved in funding track or station improvements. As such, if Greater Wellington wanted to raise platform heights or modify track configurations for example, they would negotiate directly with ONTRACK who would undertake the work. Greater Wellington would then negotiate with Toll over disruption to their services as a result of infrastructure improvement works.

B.1.5 Rolling stock operation and maintenance

The rolling stock on the Wellington Network is owned, operated and maintained by Toll NZ though their commuter rail division Tranz Metro. In the near future Greater Wellington will be taking ownership of rebuilt Wairarapa cars and new EMUs, so this picture will change.

At present Greater Wellington have a fixed fee (approx. \$16.5m) contract with Tranz Metro for operating the existing timetable and providing and maintaining the rolling stock for the network as a whole. This amount is not broken down by line so again it is difficult to determine the exact Johnsonville railway line component. A cost fluctuation to cover inflation is also calculated and paid annually (approx \$1.15m 04/05). These amounts are in addition to the fare box revenues generated from passengers. A new agreement is being negotiated on an open-book basis whereby Greater Wellington would have access to the operator's financial accounts.

B.1.6 Rail business case

No investment has been made in the Wellington suburban rail infrastructure for some time. As a result of this, substantial investment is now required to retain a viable commuter rail system in Wellington.

The Wellington Commuter Rail Network Business Case, Warwick Walbran Consulting Ltd, 2004 (RBC) was produced for Greater Wellington. It sets out a programme for the minimum investment which is required from Regional and Central governments to maintain a commuter rail system in Wellington allowing for small annual patronage growth (1.7% pa).

As noted above, minor refurbishment of the EEMU units to extend their life by three to five years is currently being undertaken and is programmed to finish in the next 18 months. These minor modifications centre mainly on rust repairs and painting of the units. The RBC envisaged that this refurbishment would allow time for new units to be purchased so that existing Ganz-Mavag rolling stock (operated on other parts of the network) could be freed up and refurbished for continued use on the Johnsonville railway line.

In relation to the Johnsonville railway line, the investment proposed includes:

- Minor refurbishment of the EEMUs to buy time for purchase of new units – \$1.8m (currently underway)
- Refurbishment of the Ganz-Mavag units 05/06 –06/07 - \$7.2m
- New EMU units 14/15 – 15/16 - \$36m
- Tunnel improvements on the Johnsonville railway line to allow refurbished Ganz-Mavag units to replace the existing EEMUs starting 06/07 - \$3m

- Track improvements on the Johnsonville railway line (inc. Raroa and Stadium Passing Loops) to allow for more frequent peak period services 10/11 – 11/12 - \$5.5m.
- Station Refurbishment: Johnsonville 06/07 – \$0.2m, Simla Crescent, Raroa, Khandallah, Awarua, Crofton Downs, Ngaio and Box Hill 12/13 – 13/14 - \$1.1m and Johnsonville 26/27 - \$0.75m

As government agencies are reluctant to fund the capital of private organisations, it is anticipated that Greater Wellington would need to own the assets funded through a government capital contribution, and these would be leased back to Tranz Metro to operate. Greater Wellington's LTCCP does not include provision for depreciation on the new and refurbished units.

B.2 Northern suburbs bus service background

There are nine bus routes (and two Night Bus routes) that operate in the study area and cater for a much larger area of the northern suburbs than rail. Services extend out to Churton Park, Newlands, Grenada Village, Woodridge, Johnsonville West, Paparangi, Broadmeadows, Cashmere and Te Kainga. Generally, buses provide services that run into Wellington CBD and do not act as feeder services for the Johnsonville railway line. The information set out below includes changes that were implemented in the Newlands, Paparangi, Grenada Village and Woodridge areas on 30 January 2006.

B.2.1 History of bus services

Newlands Coach Services have been operating bus routes from Newlands to Wellington City for over 40 years. The routes were expanded over the years to include limited services to Churton Park and Grenada. Mana Coach Services bought Newlands in November 1998 and now service the study area north of Broadmeadows.

In December 2000, the routes were extended to Courtenay Place, the feeder service from Grenada was extended into the CBD and the timetable was improved to give peak hour frequencies of approximately 5 minutes for Johnsonville and Newlands Road. These changes played a significant role in increasing total patronage in the northern suburbs by approximately 40% over this time.

Stagecoach purchased Wellington City Transport Ltd from Wellington City Council. Wellington City Transport had purchased the Khandallah operation of Cityline (formerly New Zealand Railways Road Services). Improvements to Stagecoach's services in the recent past have been limited. A number of extra peak buses and higher capacity buses have been introduced. Most changes have involved improvements to night and weekend services.

At present, Stagecoach is in the process of acquiring Mana / Newlands. This move requires Commerce Commission approval. If this purchase is approved this will provide a single operator for bus services in the northern suburbs.

B.2.2 Bus journey times

Table 18 shows the scheduled journey times between the northern suburbs and Lambton Interchange in the AM-peak period.

■ **Table 18: Scheduled Bus Journey Times from the Northern Suburbs to Lambton Interchange**

Origin	Time (minute)
Churton Park	32
Grenada Village	29
Newlands	19
Johnsonville	16
Ngaio	17
Khandallah	22

In vehicle travel times from Johnsonville are greater on the railway line (21 minute +) than the scheduled time on bus services which run via the Ngauranga Gorge. Observed bus travel times from Johnsonville to the CBD can be substantially longer than this in the morning peak due to general traffic delays down the Ngauranga Gorge and along Hutt Road. Greater access to the CBD is provided by bus services that run into Wellington from the northern suburbs, as passengers can travel further into the CBD (via Lambton Quay) and Courtenay Place without the need for interchange.

B.2.3 Description of bus services by area and suburb

(1) CBD bus route and Lambton bus Interchange

There is a defined bus route through the Wellington CBD from Courtenay Place to the Lambton Interchange, which most bus routes follow. A significant amount of work has been undertaken to provide bus priority through the central city. Bus lanes, one-way roads with contra-flow bus lanes, and signal pre-emption have been installed in some locations.

The way the central bus route and the associated bus stop facilities are configured and operated at present, the route is near capacity during peak times and the journey through the CBD can take up to 20 minutes. For example there are 196 services that stop at the Lambton Quay – Farmers stop each weekday in the two hour evening peak, with sometimes up to six buses scheduled to arrive in the same minute. The bus stops are very closely spaced and all buses stop at all stops. This means that the buses must decelerate, stop and accelerate many times along the route.

This problem is exacerbated by inefficient ticketing systems, which result in long dwell times at each stop for boarding and alighting, with buses backing up behind each other to access stops. This is particularly noticeable southbound, where there are bus lanes without adjacent general traffic

lanes to allow buses to pass one another. There is scope to address the capacity of the central bus route and typical measures are discussed below.

The Lambton Interchange is located adjacent to the Wellington Railway Station and was opened in 2003 to provide Wellington's major passenger transport interchange. The facility provides for interchange between the rail and bus and also between different bus services. The majority of buses that serve the CBD are routed through the Lambton Interchange. However, some services start and terminate at Brandon Street.

(2) Johnsonville town centre and transport hub

The Johnsonville Hub is the interchange facility at the Johnsonville Mall, adjacent to Johnsonville Station. The interchange currently takes place on the Mall car park owned by Dominion Funds. Bus stands are provided in the car park against the Caltex service station and Ford car dealership's retaining wall. Two bus stops are located outside the train station and two shelters are provided however, in general the interchange facilities are very poor. There is little shelter, no effective kerb space, and no co-ordinated signage.

A very frequent service is provided from the Johnsonville Hub to the CBD. In weekday peaks, Route 54 buses provide the main service, and are supplemented by some Route 53 and 59 services which continue on to the CBD (or come from the CBD). This results in an approximately five minute frequency for most of the peak hour.

Bus movements into and out of the Johnsonville Hub take place in general traffic lanes and no bus priority is provided. As a result, buses accessing the Hub can experience significant delays in Johnsonville during the peak periods.

(3) Ngaio, Khandallah, Te Kainga, Cashmere (and Broadmeadows)

Ngaio, Khandallah, Te Kainga, Cashmere and Broadmeadows are served by Routes **43, 44, 45** and **46**, which are operated by Stagecoach Wellington.

The Route 43 runs up the Ngaio Gorge and services Ngaio, Te Kainga, the Khandallah shops and Cashmere before returning to the CBD via the Hutt Road. The Route 44 covers the same route as the 43, however it does the loop in the opposite direction from Hutt Road through Cashmere, Khandallah and Ngaio. Most of the 43 and 44 services extend south of the CBD and on to Strathmore. There are issues with the legibility of the current loop system.

During peak periods, Routes 45 and 46 also operate. Route 45 services Ngaio and Khandallah via the Ngaio Gorge and the Route 46 serves Broadmeadows via Homebush Road. As well as servicing wider catchments in Ngaio and Broadmeadows respectively, the No. 45 and 46 routes

have the effect of supplementing the No. 43 and 44 routes by increasing the frequency of peak services over substantial lengths of the routes between the CBD and the northern suburbs.

(4) Johnsonville West and South

Johnsonville West and South are catered for by Routes **50** and **53** which are operated by Newlands Coach Services.

Like Route 46 detailed above, Route 50 also services Broadmeadows, but these routes do not operate at the same times. Route 50 only operates between the peaks (9am to 4pm) and is described as a “Shopper” service, taking passengers to the Johnsonville Mall and also servicing the Malvina Major Retirement Village. During the Inter-peak periods, this route can act as a feeder service to Johnsonville allowing the passengers to interchange and continue into the CBD by rail or bus.

Route 53, from the CBD, uses the Ngauranga Gorge (SH1) and serves Johnsonville West and North. The 53 services generally only run between Johnsonville West and Johnsonville; effectively providing a feeder service. This requires passengers to transfer to or from the train or alternative buses services at the Johnsonville Hub for the section of the trip between Johnsonville and the CBD. In the peak period, some services extend to the CBD.

(5) Churton Park

Churton Park is catered for by Route **54**, which is operated by Newlands Coach Services.

The Route 54 makes a loop through Churton Park before continuing to the CBD. The Route 54 service provides most of the five minute service from Johnsonville to the CBD during the weekday peak periods.

There are two morning express services which do not stop at the Johnsonville Hub when returning from Churton Park, travelling straight to the Lambton Interchange via the Ngauranga Gorge.

(6) Grenada Village

Grenada Village is catered for by Route **55**, which is operated by Newlands Coach Services. The current routes servicing Grenada Village and Newlands have recently been modified with the latest amendments taking effect on 30 January 2006.

Outside the peak periods, Route 55 buses connect with Route 56 buses at a stop on Newlands Road. Passengers transfer here and the Route 56 bus makes the trip to or from the CBD.

(7) Newlands Woodridge

Newlands and Woodridge are catered for by Route **56** and **57**, which are operated by Newlands Coach Services. Route **57** services Woodridge and only operates during the peak. Combined, Route **55**, **56** and **57** services provide a 4-5 minute frequency along Newlands Road.

As noted above, outside the peak periods, Route **56** buses connect with Route **55** buses at a stop on Newlands Road. Passengers transfer here and the Route **56** bus makes the trip to or from the CBD.

Link services are also provided in Newlands and are operated by smaller vehicles. They are available to all passengers connecting to or from Route **55**, **56** or **57** services along Newlands Road. No formal bus stops are provided on the Link routes and they are operated on a stop on request basis.

(8) Porirua / Tawa

Although Porirua and Tawa are not within the study boundaries, we must consider the impact of their bus services on the Study area. Porirua and Tawa are catered for by Route **59**, which is operated by Mana Coach Services. Some Route **59** services pass through Johnsonville to the CBD helping to maintain the five minute frequency from Johnsonville.

B.2.4 Night buses to all areas

Two night bus routes operate in the study area. The N4 runs from Courtenay Place and caters for Thorndon, Wadestown and Wilton to Ngaio, Khandallah and Broadmeadows. The N5 runs from Courtenay Place and caters for Newlands, Grenada and Churton Park to Johnsonville. Both services operate 3 services on Saturday and Sunday mornings at 1am, 2am and 3am.

B.2.5 Bus depot facilities

Bus depots are required to provide bus storage, fuelling, maintenance, office and staff facilities. Depots are currently provided by the bus companies at the following locations:

- Onepu Road, Kilbirnie (Stagecoach)
- Newlands Road (Mana/Newlands)
- Commerce Crescent, Waitangirua, Porirua (Mana/Newlands)