Business Case

Auckland CBD Rail Link

Prepared for KiwiRail and ARTA

By APB&B

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Revision History

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Action	Name	Signed	Date
Prepared by	team		
Reviewed by	David Adams		19th November 2010
Approved by	Alan Burford		19th November 2010
on behalf of	APB&B		

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Glossary

Term	Definition
ACC	Auckland City Council (www.Aucklandcity.govt.nz)
Annualisation factor	The multiplier used to convert AM peak PT patronage forecasts into annual figures
APB&B	The consultant group undertaking the CBD Rail Link Study comprised of AECOM, Parsons Brinckerhoff, Beca and Hassell
APT	Auckland Passenger Transport model. ARC's PT patronage and forecasting and benefit assessment tool
ARC	Auckland Regional Council (www.arc.govt.nz)
ART3	Third generation of the ARC's Auckland Regional Transport Model developed for the 2010 RLTS
ARTA	Auckland Regional Transport Agency (www.arta.co.nz)
ASP	Auckland Strategic Planning Model - the ARC's strategic integrated land-use model
BCR	Benefit-Cost Ratio
BCR (G)	Benefit Cost Ratio to Government - the BCR when PT revenue during the evaluation period is netted off the capital and recurrent costs.
CBD	Central Business District
Central Connector	The bus priority scheme in central Auckland linking Khyber Pass to Britomart
DART	"Developing Auckland Rail Transport" - the current KiwiRail programme of rail infrastructure upgrading in Auckland
DM	The Do-Minimum case in the Economic Evaluation. In this case, the No CBD Rail Link case.
EEM	(NZTA) Economic Evaluation Manual (http://www.nzta.govt.nz/resources/economic-evaluation-manual/volume-2/index.html)
EMU	Electric Multiple Unit - self propelled passenger rail vehicle
EPA	Environmental Protection Agency
FPF	Future Planning Framework - Auckland City Council land use planning document
GDP	Gross Domestic Product
KiwiRail	The trading name for the New Zealand Railways Corporation (www.kiwirail.co.nz)
LTMA	Land Transport Management Act
NAL	North Auckland Railway Line (also known as the Western Line)
NOR	Notice of Requirement. The application made by a Requiring Authority to designate land for transport or utility purposes under the

Term	Definition
	Resource Management Act
NZTA	New Zealand Transport Agency (www.nzta.govt.nz)
OECD	Organisation for Economic Co-operation & Development
PPP	Public Private Partnership
PT	Passenger Transport
RLTS	Regional Land Transport Strategy. In this case the 2010 Auckland Regional Land Transport Strategy
RoH	"Rule of Half" - each new PT user will on average receive half the new user benefit
SSR	Standing Seated Ratio the total number of persons standing and sitting in a train carriage divided by the number of seats
TDM	Travel Demand Management
TOD	Transit Oriented Development
TPH	Trains per Hour
VoT	Value of Time - figure used to assess generalised cost of a transport journey
WEB	Wider Economic Benefit

Executive Summary

This Business Case has been developed by APB&B at the request of Auckland Regional Transport Authority and KiwiRail to investigate the economic viability of using a tunnel to improve rail linkages into the Auckland CBD. The CBD Rail Link investigated in this Business Case consists of a tunnel through the CBD and three new stations at key locations configured to provide maximum rail coverage that makes most CBD areas accessible to stations within a 500 metre walk.

The investigations reported here show that the CBD Rail Link as configured is economically viable under standard transport appraisal. Furthermore, the potential urban regeneration and additional growth that can be derived from investment in this infrastructure also makes it transformative for Auckland and New Zealand. The results reported here make the case for proceeding with this project immediately in terms of:

- Lodging a Notice of Requirement (NOR) to protect the route identified under the Auckland CBD for the future tunnel and underground services;
- Opening discussions around the funding of the NOR process; and
- Further investigation of the funding and financing mechanisms, plus procurement options, for the tunnel itself.

The proposed CBD Rail Link is the best high-capacity foundation for meeting the increased transport needs of Auckland CBD until 2041. This Business Case for the CBD Rail Link straddled the introduction of the New Zealand Government's new Capital Asset Management approach, but has been developed in a manner that is consistent with the new methodology (i.e. The Treasury's Better Business Cases guidelines). The rest of this summary outlines the analysis of the CBD Rail Link.

Resolving Auckland's Transport Issues also Unlocks Opportunities

Auckland is New Zealand's largest and fastest growing urban area. The current population of 1.3 million is projected to increase to around 2.2 million people by 2051 . These additional people will bring extra transport demand with them. Current Ministry of Transport figures indicate that in Auckland there are on average approximately 640 privately owned vehicles per 1,000 people. If this trend remained stable, then even with more people living in inner city environments, there is potential for at least another half a million vehicles on the region's roads.

Current population and economic growth rates mean Auckland's transport system, which is reliant on the road network, already faces significant constraints. These are characterised by:

- Road network congestion in the AM peak, as measured by delay in minutes per kilometre, has increased from 0.59 minutes per kilometre in 2002 to 0.88 minutes per kilometre by 2009. This is indicative of the road network being over capacity at key points around state highway junctions and local road intersections at critical times.
- On the rail network, the Britomart terminus is the most serious constraint, limiting the number of train paths into and out of the CBD. ARTA's post DART and electrification peak period electric train timetable consists of 20 trains per hour (tph) in and out of Britomart during Peak periods, comprised of 6 tph on each of the Southern, Western and Eastern routes, together with 2 tph from Onehunga. Thus by 2013, almost all of the useable train paths into and out of Britomart will be in use, providing virtually no room to add additional services in future.
- The fortunes of the bus network are largely tied to the ongoing traffic conditions of the road network and the constraints imposed by the narrow streets with the CBD. Using a maximum desired lane capacity of 100 buses per hour for CBD streets, then the majority of key inner city

routes reach capacity between now (2010) and 2020. This is based upon Option C PTIS routing and single lanes operating across most of the CBD. Without the CBD Rail Link, the CBD would require twin or triple bus lanes on both sides of the road on most corridors.

Therefore, the current transport links into the CBD act like a funnel, getting progressively narrower as they approach the CBD, making the CBD the most congested area in Auckland. Current systems are either already at capacity (road), or will be at capacity within the next 10 years – less than 5 years for the rail network and up to 10 years on one or two inner city bus routes (with the other bus routes at capacity before then). To reap the full economic benefits of the projected population and employment growth, the transport network requires significant investment and management.

Auckland is estimated to account for around 36% of New Zealand's GDP and 32% of employment, with Auckland having a productivity premium over the rest of the country, and the Auckland CBD more so. Motu (2008) research compared the differences in value-added per worker across Auckland with the rest of New Zealand. The Auckland region has a 25% productivity premium over the rest of New Zealand, but the CBD value added per worker is 63% higher than the rest of the region, implying that the value added per worker in the CBD is more than double the New Zealand average.

There is lack of available space to provide for road network expansion. Development of the strategic network beyond the current Auckland Roads of National Significance projects becomes progressively more difficult because of the narrowness of the Auckland isthmus and the built-up nature of central Auckland and the consequent high cost of land acquisition. In addition, further land acquisition for roads could alter land use patterns and interfere with the benefits arising from agglomeration of economic activities in the CBD.

The massive opportunity that exists for Auckland is to unlock the existing capacity within the rail network to meet a significant proportion of the CBD's current and future transport needs. The rail network provides complementary capacity to support the road network and recent investments there, helping to improve journey times and reliability – therefore helping to optimise the region's transport network. There is also the opportunity to capitalise on infrastructure investment as a catalyst for growth in both economic competitiveness and productivity – the World Economic Forum's Global Competitiveness Report shows a positive correlation between well developed infrastructure and international competitiveness.

Since the local government legislation was amended for Auckland, which brought ARTA into existence, investment in and management of the public transport networks have increased considerably. Where this investment has been placed into dedicated public transport infrastructure, such as the Northern Busway and the commuter rail network, patronage has increased markedly. Since 2003 rail passenger numbers have grown from 2.5 million annually to 8.5 million by 2010. This is confirmed by international experience which shows that strong patronage growth follows investment in quality services.

Growing demand for transport due to increasing employment and population in the Auckland region, and the Auckland CBD in particular, drives the need for high capacity, high quality transport infrastructure to underpin the ongoing development of Auckland's strategic role in the New Zealand national economy.

Consideration of Alternatives

A comprehensive list of alternatives for providing sufficient transport capacity into and within the CBD to meet the challenge was considered during the preparation of the Business Case. This list was winnowed down to four options based upon the ability to deliver the required capacity into the CBD:

- On-surface bus capacity improvements

- A central area bus tunnel with 3 stations
- An expanded Britomart rail station
- A CBD rail tunnel with 3 stations (CBD Rail Link)

Multi-criteria analysis and cost-effectiveness analysis were used to rank the four main alternatives. These analyses concluded that the CBD Rail Link was ranked highest for cost effectiveness and impact because of the way the project unlocks the unused capacity that exists within the rail network. In this way, the CBD Rail Link aligns with national strategic priorities, as over 50% of transport benefits are decongestion related.

The CBD Rail Link utilises existing network infrastructure to boost capacity (a key requirement in the Government Policy Statement), but also complements current investment in the strategic road network by freeing up road space for freight and other (e.g. commercial and recreational) trips. This brings greater network resilience and reliability for Auckland, as well as a greater range of commuting choices, while improving safety on the network, increasing economic production and providing environmental and health benefits.

Description of the CBD Rail Link

The proposed CBD Rail Link is an approximately 3.5 km double track underground rail line running beneath the central business district from Britomart to the Western (North Auckland Line) near the existing Mount Eden Station. Britomart will become a 'through' station and will be modified to suit this new purpose. Up to three intermediate underground stations are proposed:

- ***Aotea*** (under Albert St between Wellesley and Victoria Sts)
- ***Karangahape Rd*** (under the intersection of Pitt St and Karangahape Rd)
- ***Newton*** (under Symonds St between the intersections with Khyber Pass/ Newton Rd and Mt Eden and New North Roads)

Eastern and western junctions with the North Auckland Line at Mt Eden are proposed. These will provide both operational flexibility and permit a variety of service patterns to be operated. In particular, rail services from the west of Auckland will have a more direct route to the CBD, by eliminating the need to travel via Newmarket as at present.

The topography of central Auckland, together with the operational constraints for rail vehicles, results in the CBD Rail Link having steep gradients and deep underground stations over most of its route. There is an approximate 76 metre difference in elevation between Britomart and the Western line at Mt Eden; in addition, the tunnels have to pass at sufficient depth beneath the Central Motorway Junction to avoid impacting motorway operations.

The operational evaluation indicates that, with base level signalling, 15 trains per hour in each direction could operate through the Rail Link, increasing to 30 trains per hour with enhanced signalling. This provides for between 30 and 60 services per hour through the CBD stations. This compares with a maximum of 21 trains per hour currently able to access Britomart. The CBD Rail Link provides significant capacity to move passengers – between 23,100 and 46,200 depending upon the changes to signalling.

Rail service patterns potentially provided by the CBD Rail Link include the ability to provide 6 trains per hour on each route at peak periods, extending to 8 trains per hour post 2030. Transport modelling shows that in the 2040 daily AM peak, while the key load point on the network is on the eastern approaches to

Britomart, with around 17,700 passengers, the Aotea station is projected to become the busiest station, handling just under 12,000 passenger movements.

Standard Transport Appraisal

Standard transport appraisal, as prescribed by NZTA's Economic Evaluation Manual (EEM), was carried out on the CBD Rail Link, using population and employment projections from the land use scenario developed for the Regional Land Transport Strategy modelling. The appraisal examined the variants of the CBD Rail Link, reflecting different timing of components such as rail connections, stations and new rolling stock. It has also compared the CBD Rail Link to a "Do Minimum" alternative. The Do Minimum involves continued operation of the existing CBD rail network and some capital expenditures to alleviate existing Britomart operational constraints.

Table E-1 summarises the results of the economic modelling, which finds that the present value of the benefits, including wider economic benefits (WEBs), outweighs the present value of the costs, to produce a benefit-cost ratio (BCR) that is greater than 1. This uses the current standard 8% real discount rate prescribed by The Treasury. The use of lower discount rates improves the BCR.

Table E-1: Benefit Cost Ratios from Standard Transport Appraisal ($ million Present Value)

Item	Reference	Estimated Benefit		
		8% Discount Rate	6% Discount Rate	4% Discount Rate
Capital Cost and Incremental O&M costs less revenue [1]	5.2	-$1,330	-$1,440	-$1,538
Transport Benefits	5.9.8	$1,319	$2,057	$3,277
Wider Economic Benefits (EEM)	5.9.9	$185	$288	$459
Net Benefit (Cost)		$173	$905	$2,197
Benefit Cost Ratio [2]		**1.1**	**1.6**	**2.4**

1. Full project over 30 years
2. Rounded to 1 decimal place as per NZTA EEM

Sensitivity testing carried out as part of the EEM appraisal methodology looked at the impact on the BCR of altering key variables used in the analysis. Tests for purchasing the minimum amount of rolling stock needed on opening showed that this has a minimal impact upon the case for the CBD Rail Link, with the Link not being sensitive to how the network is operated. Tests using faster land use pattern changes and longer evaluation periods increase the BCR by factors of 100% and 50% respectively. Curtailed growth in patronage has minimal impact on the BCR. Finally, a 95th percentile test on cost showed that the BCR remained stable around 1.0.

Urban Regeneration and Transformation

The benefits of the CBD Rail Link far exceed travel time savings due to enhanced transport efficiency. The essential long-term benefit of the CBD Rail Link, which a traditional evaluation approach does not fully take into account, is a "place making" benefit, enabling urban regeneration to take place. The CBD Rail Link facilitates peak hour commuter access into the CBD and increases CBD employment by 20,000 to 25,000 without requiring additional road capacity or using scarce CBD land for additional parking. This enables the Auckland CBD to become a much more vibrant and exciting pedestrian environment, supported by evidence derived from the North American case studies and literature review.

The higher concentration of pedestrian activity stimulates Transit Oriented Development (TOD) around the new proposed stations, opening up essentially the entire CBD, which will fall within walking distance of

the stations. This more exciting and vibrant sense of place enables Auckland to serve as New Zealand's outward facing global city for retaining and attracting the highly educated younger workforce that will underpin productivity growth (and also international competitiveness) in the future.

As Auckland becomes more appealing for residents, its tourism appeal will also increase. Already Auckland is the international port of arrival for tourists visiting the spectacularly scenic New Zealand countryside. Ease of access to the heart of Auckland City provided by enhanced transport links will provide a better quality stay for international and domestic tourists alike, potentially increasing the average length of stay and average daily spend in the process.

Without the Rail Link, peak hour commuting access into the CBD will be constrained resulting in increasing congestion. In response to this congestion, real estate developers will move to create secondary and tertiary centres of employment outside the motorway loop. This decentralisation of economic activity and urban energy reduces the dynamism of Auckland and compromises its future ability to compete for the highly skilled labour force in the global context.

The CBD regeneration benefits analysed in this Business Case include the wider economic benefits (WEBs) specified in NZTA's Economic Evaluation Manual (EEM), such as the agglomeration effects associated with increased densification, and the output increases provided by a larger and more productive CBD labour force. They also fully satisfy all EEM criteria for national strategic factors.

The accelerated employment growth are additional to the transport benefits assessed in accordance with the EEM.The benefits can therefore be combined as presented in Table E-2 below. The combined benefit-cost ratio is **3.5** at the current Treasury discount rate of 8%. At reduced discount rates of 6% and 4%, the benefit cost ratio increases to 4.7 and 6.6 respectively.

Table E-2 Benefits and Costs of CBD Rail Link Project ($ million Present Value)

Item	Reference	Estimated Benefit		
		8% Discount Rate	6% Discount Rate	4% Discount Rate
Capital Cost and Incremental O&M costs less revenue [1]	5.2	-$1,330	-$1,440	-$1,538
Transport Benefits	5.9.8	$1,319	$2,057	$3,277
Net Value Added from CBD Increased Productivity	5.6	$3,333	$4,720	$6,879
Net Benefit (Cost)		$3,322	$5,337	$8,618
Benefit Cost Ratio [2]		**3.5**	**4.7**	**6.6**

1. Full project over 30 years
2. Rounded to 1 decimal place as per NZTA EEM

Conclusions

The proposed CBD Rail Link aims to alleviate the transport constraints of the growing inner city, but will also unlock Auckland's strategic growth potential in many ways:

- Support agglomeration in the CBD areas;
- Stimulate additional employment growth in the CBD where higher productivity (both in levels and growth potential) is already being achieved compared to elsewhere in New Zealand;
- Provide a catalyst for land use intensification and regeneration of CBD areas, thus inducing capital investment in development of the city;

- Support higher density development at suburban stations, which provides the region with environmental and land use benefits.

Because the Auckland CBD is surrounded by a motorway loop and the harbour, there are a limited number of access points into the CBD consisting of roadways and one rail line into Britomart. As the New Zealand economy grows and pressure for CBD intensification mounts, the employment capacity of the CBD will be determined by transport capacity during the peak period.

The North American case studies presented in this business case, combined with Auckland market analysis, indicate that rail investment focused on the CBD will accelerate CBD development and employment growth. The transport demand analysis suggests that, without the Rail Link Project, CBD employment growth will be constrained due to increasing congestion on roadways leading into the CBD and lengthened travel times for commuters coming by car and bus.

In this sense, Auckland's strategic role in the national economy is intertwined with the CBD Rail Link - the City needs the Rail Link to support its current growth but also to stimulate its future growth along the lines described by the Regional Growth Strategy. Therefore the CBD Rail Link Project is not just an essential element in Auckland's transformation into a globally competitive urban centre; it is perhaps the most critical.

Next Steps

The proposed next steps for the CBD Rail Link Project are to:

- Proceed with lodgement of the Notice Requirement documentation, once it has been completed at the end of 2010, in order to protect the route and station locations;
- Provide information for discussions between different levels of government in respect of funding arrangements for the project; and
- Begin preparation of a detailed Implementation Plan for the project in accordance with the Treasury Business Case Guidelines.

These activities should be undertaken in parallel, in order that completion of the CBD Rail Link Project can be achieved by 2021.

1 Introduction

1.1 Objective

The overarching objectives for the CBD Rail Link project have been agreed to between KiwiRail, ARTA, Auckland City Council (ACC) and the Auckland Regional Council (ARC). The preparation of this Business Case is guided by these objectives:

- Support the desired future growth and development of the CBD and region;
- Optimise public transport patronage potential and accessibility to/from and within the CBD;
- Optimise efficiency and potential of the Rapid Transit network including integration with passenger transport, active modes and freight requirements; and
- Continue to develop Auckland rail as part of an integrated national rail network.

1.2 Purpose of the Business Case

This Business Case was prepared by APB&B for KiwiRail and Auckland Regional Transport Authority in accordance with the principles of the New Zealand Treasury guidelines for Business Case preparation (as shown in Appendix B). While the guidelines were released after the commencement of this business case, every effort has been made to reconcile the project brief with the guidelines, and to produce a business case that complies with them.

This Business Case has been prepared to:

- Enable a decision to be taken by KiwiRail, as the Requiring Authority for the designation of railways under the Resource Management Act, whether to protect the route and station locations for the CBD Rail Link through the lodgement of Notice of Requirement (NOR) Documentation, being prepared concurrently with this Business Case; and
- Enable the production of a detailed Implementation Plan for the CBD Rail Link as defined by the Treasury Business Case methodology.

Consistent with the Treasury Business Case Guidelines, the full description and evaluation of the CBD Rail Link Project is provided in this Business Case. The Business Case also explains the protection of the route required for the CBD Rail Link and contains preliminary discussion of implementation of the entire project.

1.3 Land Use Scenarios

Much of the input utilised in developing this business case is underpinned by land use scenarios and associated data that are derived from Auckland Regional Council (ARC) and Auckland Regional Transport Authority (ARTA) modelling of land use for the Regional Land Transport Strategy 2010. The models used by ARC and ARTA produce projections for growth in population and employment for different areas of Auckland, including the CBD, and it is these projections that have been fed into this project's traffic and patronage modelling.

1.4 Outline

The sections of this Business Case are described below:

Section 2 – Need for change

Section 3 – Evaluation of alternatives

Section 4 – Description of proposed solution

Section 4 – Economic evaluation

Section 6 – Implementation

Appendices contain supporting material, namely:

A	Assumptions
B	Capital Asset Management Framework
C	Legislative and policy context
D	Alternatives Paper
E	Construction costs summary
F	Evaluation Option Specifications
G	Review of land use and transit share impacts
H	Developments around stations
I	NZTA Assessment
J	Literature review
K	Real estate market and financial analysis

2 The Need for Change

2.1 Background

The Auckland region's transport network is already receiving significant road and rail investment to cope with current population growth and transport demand, especially in the morning peak. Recent investment and project announcements indicate that Auckland is already receiving about $1.4 million to improve transport network infrastructure. Auckland and its CBD will be an ongoing attractor of population and employment and will require further significant investment to capitalise on this growth potential.

Projections prepared as part of the 2010 Regional Land Transport Strategy (RLTS) indicate that the resident population and employment within the CBD will increase significantly over the next 30 years. The number of trips into the CBD in the morning peak is projected to increase by almost 50,000 by 2041. The complexity of handling this increase is compounded by the multi-directional nature of these trips, with the growth originating from the north, west and south/east. New transport capacity will clearly be needed to meet the increasing transport demand and to facilitate economic development of the City.

Road network capacity is severely tested during the peak commuting periods in the mornings and afternoons. This is evidenced by growing congestion, measured as the average delay per kilometre in minutes[1], which has risen 49% in the morning peak from 0.59 minutes per kilometre in March 2002 to 0.88 minutes per kilometre by March 2009. Peak spreading is also becoming an issue, with inter-peak delays increasing from 0.10 minutes per kilometre in 2002 to being nearly double at 0.19 minutes per kilometre by 2009.

The currently planned network could not accommodate the growth in traffic likely to be generated by the projected additional one million people who will make Auckland their home over the next 40 years. Current private vehicle ownership per capita figures[2] show a reasonably stable trend over the past 10 years, averaging about 640 cars per thousand people. If this trend continued, then even with increased inner city living, more than half a million additional vehicles could be on the region's road network by 2041. This situation would be compounded by any increase in bus numbers that would be needed to provide service levels to meet the expected population growth.

The recent investment in rail is providing substantial increases in rail capacity across the network, but utilising spare capacity is restricted by the operational bottleneck at Britomart. The Britomart platform and track configuration limit rail maximum capacity and create an imbalance of capacity between Newmarket and waterfront routes. There are insufficient train paths on the line from Newmarket, which serves the Western and Onehunga routes as well as the majority of Southern route services.

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[1] See http://monitorauckland.arc.govt.nz/transport/transport-patterns/average-delay-per-kilometre.cfm which is gathered by ARC from an annual survey.

[2] See the Ministry of Transport web site at:
http://www.transport.govt.nz/ourwork/TMIF/Pages/TV035.aspx

2.2 Drivers for Change

2.2.1 Auckland's Strategic Role in National Economic Development

The Ministry of Economic Development website states:

> "OECD research shows that successful member countries have at least one strong international city. These cities drive national economic growth and compete for skilled workers, international and innovative companies, and high value economic activities. In New Zealand, Auckland is the only city that is positioned to take on the international city role... Despite transport issues, the city also appears to be benefiting from economies of scale. Recent evidence shows that Auckland has a productivity premium of around 50% higher than that outside Auckland."

The Auckland Policy Office emphasises the role of Auckland within the national economy:

> "Auckland has long had a significant impact on the rest of New Zealand ... Its share of the national population and its growth rate is both unusually high in international terms, and place significant pressure on central government services and finances. Its growth has also been seen as a driver of social and environmental challenges that are seen as unique in New Zealand ... the increasing importance of cities with globalisation and urbanisation."

The Auckland region is currently estimated to account for 36% of New Zealand's Gross Domestic Product and contains 32% of the country's jobs (by employment count). Table 2-1 below shows that the CBD is a significant contributor to employment and economic activity within the region.

The OECD report 'Competitive Cities in the Global Economy, 2006' found:

- Cities are drivers of national economies.
- Most metro-regions display not only higher GDP per capita than the national average but also faster growth rates.

The primary reason for this pattern is because cities are agglomeration economies, where employment and labour are concentrated. The deep labour markets that develop in urban agglomerations allow for greater specialisation and division of labour within the workforce, while business concentration offers scale and greater demand for highly skilled employees within an easily accessible geographic area. Greater business concentration also promotes increased connectivity between suppliers and markets, whilst also allowing for knowledge spillovers and transfers between firms. Industry clustering effects benefit the economy as they offer opportunities for innovation as knowledge is transferred between people and firms and further skills and capital are attracted.

The OECD's Economic Survey of New Zealand (2009)[3] reported that the standard of living in New Zealand is low compared to that of other OECD countries and attributed this to its low labour productivity. The NZ Treasury emphasises the importance of productivity improvements in its policy research, while the current government has set increasing productivity as one of its primary policy objectives.

Density, created by firm and labour concentration within a geographic area, facilitates productivity growth by creating access to markets that have scale, through lower communications costs. Transport infrastructure is an important driver of productivity growth because it enables effective

[3] http://www.oecd.org/document/31/0,3343,en_2649_34569_42539359_1_1_1_1,00.html

density to be created in business areas through increased access; lower journey times increase both employment opportunities and access to customers while lowering travel costs.

The Eddington (2006) study[4] of the UK's transport system suggested targeting investment in transport networks at those areas where economic activity is concentrated, especially the major urban areas. The study found that, in areas with an established built form and mature transport networks, the projects with high benefit-cost ratios were those that sought to optimise the use of the existing network. Similar issues arise in regards to the transport requirements for servicing CBD demands – concentration of economic activity contained within an established built form that is served by a mature road network which is severely congested. On Eddington's scale then, it could be expected that a project which provides better transport linkages and congestion relief by making best use of the existing networks available should have a higher benefit-cost ratio attached to it.

Auckland already exhibits a number of characteristics of a strong international city. It is New Zealand's international gateway, with the main port and airport. It also attracts the bulk of New Zealand's international migrants, and has average skill levels second only to Wellington. However, the small domestic market in New Zealand limits Auckland's ability to achieve economies of scale and to develop the business environment to compete globally. To overcome these constraints, further agglomeration within Auckland is required so that the City and hence the nation can extract more benefits from the clustering effects as suggested by the OECD above.

2.2.2 Vibrancy of the CBD

National and regional recognition of the importance of the CBD is matched equally by local determination to maximise the value of the CBD as an asset. Auckland City Council has a number of strategies, including its economic development strategy, CBD into the Future and Waterfront 2040 strategies (see Appendix C), that press for the ongoing development of the area. The economic development strategy calls the waterfront area of the CBD the premium business location[5] in New Zealand, and identifies other parts of the CBD such as the learning quarter around the two universities as strategically important.

The strategies jointly offer a means of increasing the amenity of the CBD as both an economic and cultural location, requiring better transport links into and around the CBD to improve connectivity and for a more pedestrian friendly and less congested street environment. These strategies seek to resolve issues around providing increased connectivity whilst preserving the built form and essential character of the CBD and surrounds. To this end they are consistent with the major strategic studies, such as Eddington, which emphasise making best use of existing networks.

2.2.3 Agglomeration Forces within the CBD

Agglomeration is about creating effective density within a certain area, which is a mix of employment and business concentration in highly productive industries that derive some of their productivity premia from close association with one another. This is already happening in the CBD and is being shaped by recent transport investment, especially the investment associated with

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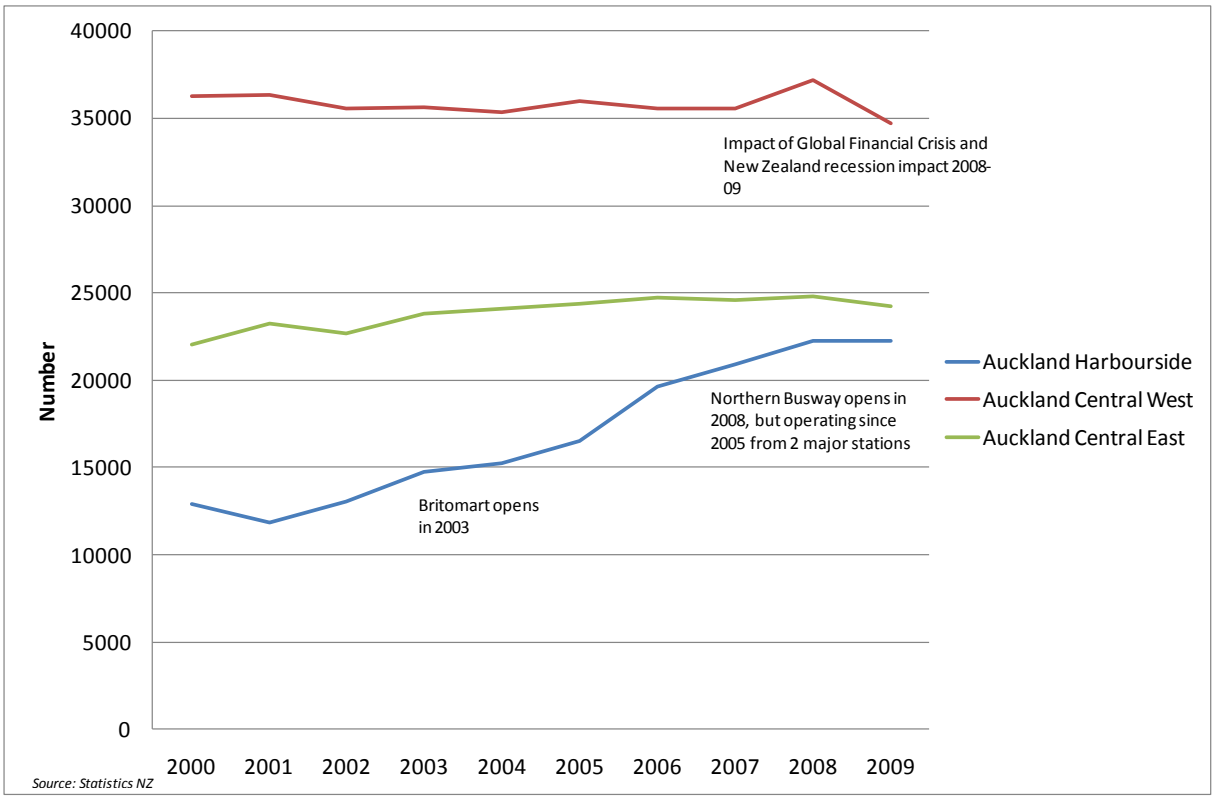
[4] http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/

[5] See page 14 of the economic development strategy, which is located at: http://www.aucklandcity.govt.nz/council/documents/edstrategy/docs/edstrategy.pdf

improving and expanding the Britomart terminus. Employment data from Statistics New Zealand illustrates the agglomeration effects in the CBD, as shown in Figure 2-1.

Figure 2-1 Changes in Employment within CBD Area Units



The graph shows the Harbourside area of the Auckland CBD as the significant driver of employment growth, while the other two area units have been static to moderately declining. The flattening off and drop in employment across the three CBD area units between 2008 and 2009 is the result of the impact of the Global Financial Crisis and the domestic recession in New Zealand. Relative to the investment horizon considered in this business case, the impact of the recession will have a relatively short-term effect on employment trends within the CBD.

Growth in the Harbourside area has been driven by the development around the waterfront, but accelerated by the opening of the Britomart transport terminus and Northern Busway. Moreover, the CBD features concentrations of firms in knowledge intensive industries that employ highly skilled workers, whose proximity to each other is one of the factors driving the emergence of agglomeration benefits.

Table 2-1 shows the distribution of employment by broad (ANZSIC single digit) industry and provides a clear picture of the direct contribution made by Auckland's CBD to the economies of Auckland City, Auckland Region and New Zealand. Based upon employee counts[6], the data indicates that by total industry employment, the CBD comprises 26% of employment in the

[6] Note that employee counts listed here are different from the employment data quoted under the RLTS land use scenario. Employee counts from Statistics New Zealand count the total number of employees engaged within an area, whereas the RLTS data generated by the land use and transport models uses full-time equivalent (FTE) employment.

Auckland City local authority area, 13% of regional employment and 4% of New Zealand employment.

This is a significant economic contribution, which is highlighted further when viewed as employment by industry. Table 2-1 shows that the pattern of industry concentration is skewed towards service sector industries, and that there are significant concentrations of employment across the scales of city, region and country in the following areas:

- Information, media and telecommunications
- Financial and insurance services
- Professional, scientific and technical services

The occupations in these industry groups tend to also command the most high-skill, high-wage jobs which provide the basis for the CBD's greater contributions to value added and productivity. These issues are discussed in more detail in Section 5.

Table 2-1: Distribution of employment in the Auckland CBD

Distribution of 2009 Employee Counts in Auckland							
	Auckland CBD				As Percentage Of		
	Harbourside	Central West	Central East	Total	City	Region	NZ
A Agriculture, Forestry and Fishing	15	9	3	27	5.9%	0.5%	0.0%
B Mining	3	20	0	23	30.7%	5.8%	0.4%
C Manufacturing	810	340	120	1,270	4.6%	1.7%	0.6%
D Electricity, Gas, Water and Waste Services	40	0	6	46	2.2%	1.2%	0.3%
E Construction	140	360	55	555	4.0%	1.6%	0.5%
F Wholesale Trade	990	1,120	370	2,480	8.9%	4.7%	2.4%
G Retail Trade	900	1,690	1,210	3,800	16.4%	6.2%	1.9%
H Accommodation and Food Services	2,430	3,300	2,260	7,990	39.3%	21.7%	6.1%
I Transport, Postal and Warehousing	3,620	620	520	4,760	41.8%	15.0%	5.7%
J Information Media and Telecommunications	1,370	2,680	1,400	5,450	37.8%	28.8%	13.3%
K Financial and Insurance Services	3,930	5,230	2,990	12,150	63.1%	48.0%	22.6%
L Rental, Hiring and Real Estate Services	360	760	450	1,570	27.2%	15.3%	5.6%
M Professional, Scientific and Technical Services	4,570	7,330	5,430	17,330	38.9%	27.6%	12.1%
N Administrative and Support Services	1,770	3,620	1,310	6,700	33.4%	20.2%	7.6%
O Public Administration and Safety	410	3,970	1,230	5,610	44.1%	20.3%	5.4%
P Education and Training	150	690	6,060	6,900	29.7%	13.0%	4.2%
Q Health Care and Social Assistance	200	260	200	660	2.7%	1.2%	0.3%
R Arts and Recreation Services	280	2,180	190	2,650	43.6%	24.3%	7.0%
S Other Services	260	520	430	1,210	12.7%	5.9%	1.9%
TOTAL INDUSTRY	**22,250**	**34,700**	**24,250**	**81,200**	**26.4%**	**13.1%**	**4.2%**

Source: Statistics New Zealand Business Demographics

The industries described in Table 2-1 clearly show that the strongest industries in the CBD are also closely related to the knowledge industries classification adopted by the Department of Labour, indicating that there is a significant concentration of knowledge industry employment in the CBD. Overall, the Auckland region accounts for around 35% of New Zealand's knowledge industry employment – this is discussed further in Appendix D. The concentration of knowledge based firms and corporate head offices employing highly skilled workers in the Harbourside area is characterised by a number of large firms that have located there in recent years, including:

- Vodafone
- GE
- Westpac
- ASB

- Air NZ
- Fonterra

In line with Eddington, an appropriately specified transport solution with strategically located nodes providing wide CBD coverage could potentially provide the sort of growth experienced in the Harbourside area to other parts of the CBD. This would be achieved through improved transport access, opening up new opportunities based on enhanced availability of the growing regional labour force, and therefore constituting an economically attractive project.

2.2.4 Government Priorities

The current government has set priorities for action around improving New Zealand's economic position, both in terms of output and productivity growth, in order to improve the general living standard of the population. At the start of the current parliamentary term, the Speech from the Throne[7] (2008) signalled the intention of the present government to address critical infrastructure 'blockages' impacting upon both the medium-term and long-term performance of the New Zealand economy. In the transport sector both new road development and public transport projects will be the main focus for initiatives.

The government has carried through its intention from the outset, with the reformulation of the *Government Policy Statement on land transport funding 2009/10 – 2018/19* (GPS), emphasising the removal of transport bottlenecks to improve economic performance. The short-term focus of the GPS is on State Highway construction and Roads of National Significance (discussed below). Beyond this, the longer-term solutions to improving transport's contribution to economic growth and productivity include ways to help alleviate congestion, derive better use from existing networks, provide more transport choices and reduce the environmental impacts created by transport. In comparison to other alternatives (see Section 3 and Appendix D), the CBD Rail Link provides the most cost-effective solution to these issues. Section 4.2 and Appendix C also provides more discussion on the alignment of the CBD Rail Link with the evaluation criteria described in the GPS and other key policy documents.

The government's commitment to rail as a complement to other parts of the transport network, over both the short-term and long-term, is evidenced in its 2010 budget, which allocated funding for major investment in the rail network. This included $750 million over three years as a contribution to KiwiRail's turnaround plan, which is additional to the $500 million committed to the purchase of electric rolling stock for Auckland.

2.2.5 Roads of National Significance

The government has identified seven Roads of National Significance infrastructure projects that it sees as being critical to the transport network because of their proximity to centres of population growth, around which major movements of commuters and freight take place. These roads are given priority for development – they are all to be largely completed by 2020, because doing so supports the accomplishment of nationally strategic goals:

- Congestion reduction;
- Safety improvements; and

[7] See www.beehive.govt.nz/speech/speech+throne+0

- Support for economic growth.

The Auckland urban area contains two projects classified as Roads of National Significance - the Western Ring Route and the Victoria Park Tunnel. The Western Ring Route provides an alternative route through Auckland and improves the capacity for traffic heading into Auckland. The Victoria Park Tunnel relieves congestion and bottlenecks at a critical part of the State Highway network just before the CBD. Once the Auckland projects are completed they will provide medium term capacity improvements that will help with the movement of both commuters and freight around the region.

By 2041, population and implied traffic growth will more than likely over-run the capacity of local roads and State Highways, and impinge upon transport network performance. To put this into perspective, the following measures identify the ongoing transport issues currently faced today by the city:

- During the period 2005 to 2009, the local road network in the Auckland region expanded by 160 km, while the State Highway network grew by 13 km.
- Between 2005 and 2009, Statistics New Zealand estimated the population in the region had increased by 89,000 to 1.44 million.
- Similarly for 2005 to 2009, vehicle fleet statistics from the Ministry of Transport show the number of light passenger (private) vehicles increased by 27,000 to 837,000; the number of light commercial vehicles increased by 3,000 to 79,000; the number of motorcycles grew by 9,000 to 27,000; and the number of heavy commercial vehicles increased by 300 to 25,000.

Note that the figures above are slightly different than the Ministry of Transport private vehicle ownership of vehicles discussed in Section 2.1, with the bullet point above referring to total vehicles in the region, as opposed to privately owned vehicles per capita[8]. The critical issues for the transport network are the continued growth in the population so that it approaches nearly 2 million by 2041, the likelihood that this will bring additional traffic to the network (discussed above) and the lack of available space to provide for road network expansion. The current projects on the regional State Highway network are easiest to tackle and can be seen as the “low hanging fruit”. Further development of the strategic road network becomes progressively more difficult because of the narrowness of the Auckland isthmus and the built-up nature of central Auckland.

The current investment in the road network has been undertaken in conjunction with renewed investment in the regional public transport networks. Since ARTA’s inception dedicated investment has been made to improve the quality of service, frequency and reliability of the region’s public transport services. This has been undertaken mainly to increase the capacity of the main transit spines – the so-called Rapid Transit Network, and has involved investment in the Northern Busway and commuter rail network. In a similar fashion to overseas experience, patronage growth has followed investment in quality services. The Northern Busway is at capacity, while growth in rail passenger numbers has risen from 2.5 million annually in 2003 to 8.5 million by 2010.

2.3 Auckland’s Transport Demand

The distribution of population across the region is impacted by the regional and territorial local authority land use policies. Land use projections prepared as part of the 2010 RLTS indicate that the usually resident population and employment within the CBD will increase to 102,000 and

[8] The difference being partly attributable to fleet effects associated with private firms and public institutions owning fleets of passenger vehicles.

122,000 respectively by 2041. These projections from the RLTS come off a 2006 base of 17,900 people usually resident in the CBD and 63,800 full-time equivalent (FTE) persons employed in the area.

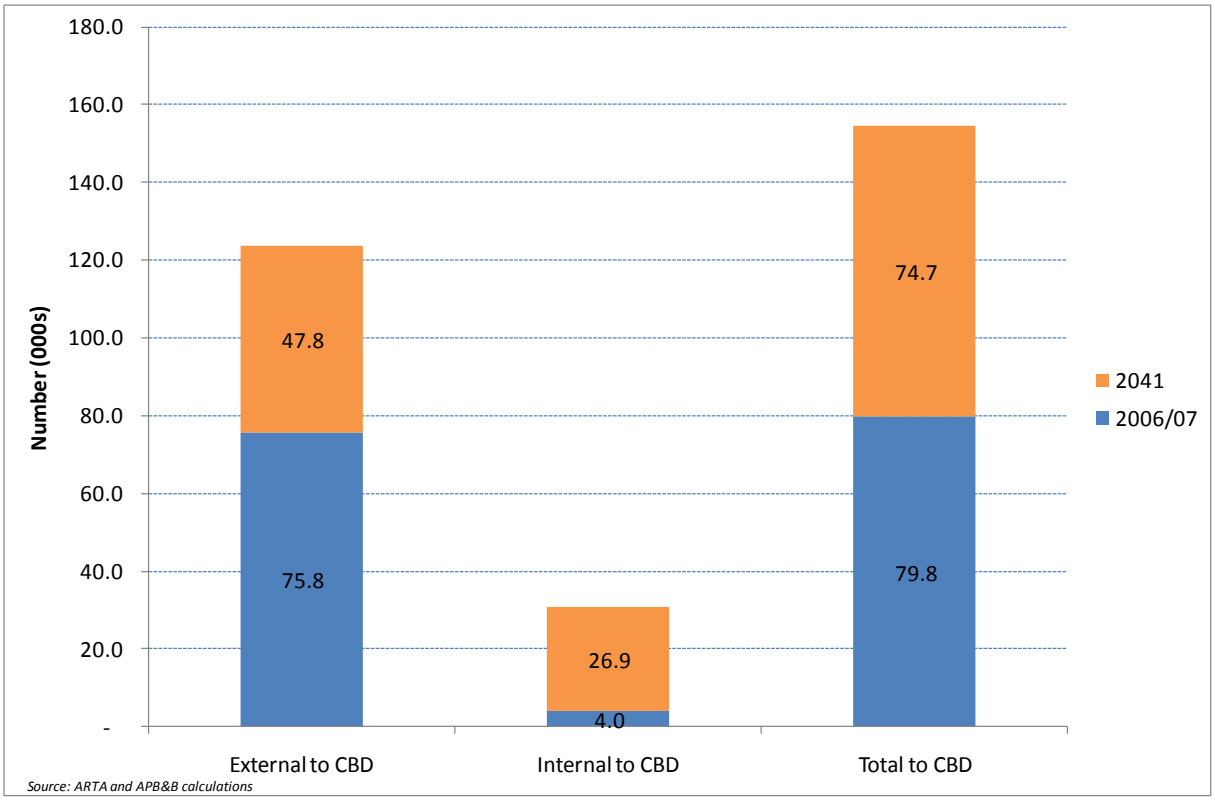
Even with relatively high CBD population forecasts, the additional trips into the CBD in the morning peak will increase by 48,000 by 2041. The complexity of handling this increase is compounded by the multi-directional nature of these trips, with the growth originating from the north, west and south/east. New capacity will clearly be needed and recent government guidelines point to investment maximising existing infrastructure as a priority.

2.3.1 Projected Demand

With population projected to grow at a much higher rate than employment, there will be a marked increase in the number of work trips made inside the CBD. The 2006 census data indicated that about 45% of CBD residents worked in the CBD. As both CBD population and employment grows, it is likely that this proportion will increase as more CBD workers choose to live in the CBD. A proportion of 55% was assumed for 2041 (by comparison, the proportion in the Sydney CBD is almost 60%).

Applying these parameters leads to an estimated increase in the number of trips into the CBD in the morning peak, as shown in Figure 2-2.

Figure 2-2 Estimated Change in Morning Peak CBD Trips under the RLTS Land Use to 2041



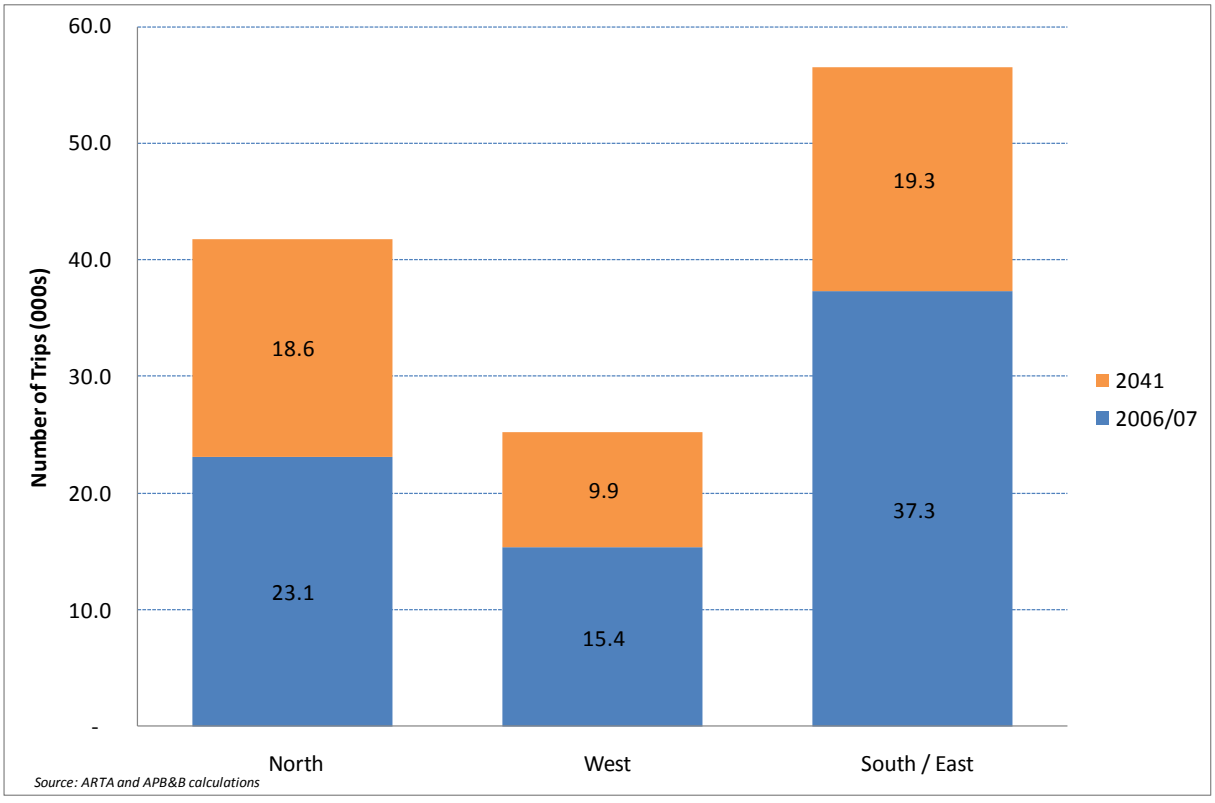
Under the RLTS scenario, total trips into and around the CBD area nearly double from the estimated 80,000 trips in 2006/07 to 155,000 trips in the 2041 period. The large increase in internal trips within the CBD from 4,000 to 31,000 by 2041 is reflective of the population growth and the internal dynamics of the resident CBD population. The Census 2006 data revealed significant proportions of the core CBD population are within the working age category of 15-64 years old and median ages are below the average for Auckland – this is a trend that is likely to continue.

The youthful profile of internal residents is likely to generate trips that involve active modes, but also could involve use of more public transport to commute across the CBD. Currently, about 80% of CBD residents walk or cycle to work. Based on the estimates outlined in the preceding section, the number of CBD residents walking or cycling to work in the CBD will increase by about 700%, through the growth in internal trips illustrated above. Additionally, there will be a major increase in people walking into the CBD from the Britomart rail station and from CBD bus stops.

These major increases will need to be accommodated on internal streets by way of footpath widening (such as that implemented recently in Queen Street) and increased pedestrian priority at signals (such as the “Barnes dances” used in Queen Street and other locations). There may also be a desire to create dedicated cycle facilities such as those being implemented in Sydney CBD. In combination, the increased dedication of street space and intersection capacity to pedestrians and cyclists would seriously compromise the ability to accommodate an increased number of cars and buses in the CBD.

The origin of external trips into the CBD is shown in Figure 2-3, which shows how the increase to 123,600 trips into the CBD in 2041 (from 75,800 in 2006/07) is distributed around Auckland.

Figure 2-3 Origin of 2041 External Trips into the CBD in the AM Peak



Strong trip growth is generated from the north of the CBD from the North Shore area and its surrounds, with trips increasing from 23,100 to 41,700 in the 2041 AM peak. This is an interesting result given the population on the North Shore is expected to increase by about 100,000 people by 2051 (under Statistics New Zealand population projections from a 2006 base of 216,900) and for the area to have a proportionately older population profile than other areas of Auckland, particularly in contrast with the central and southern areas.

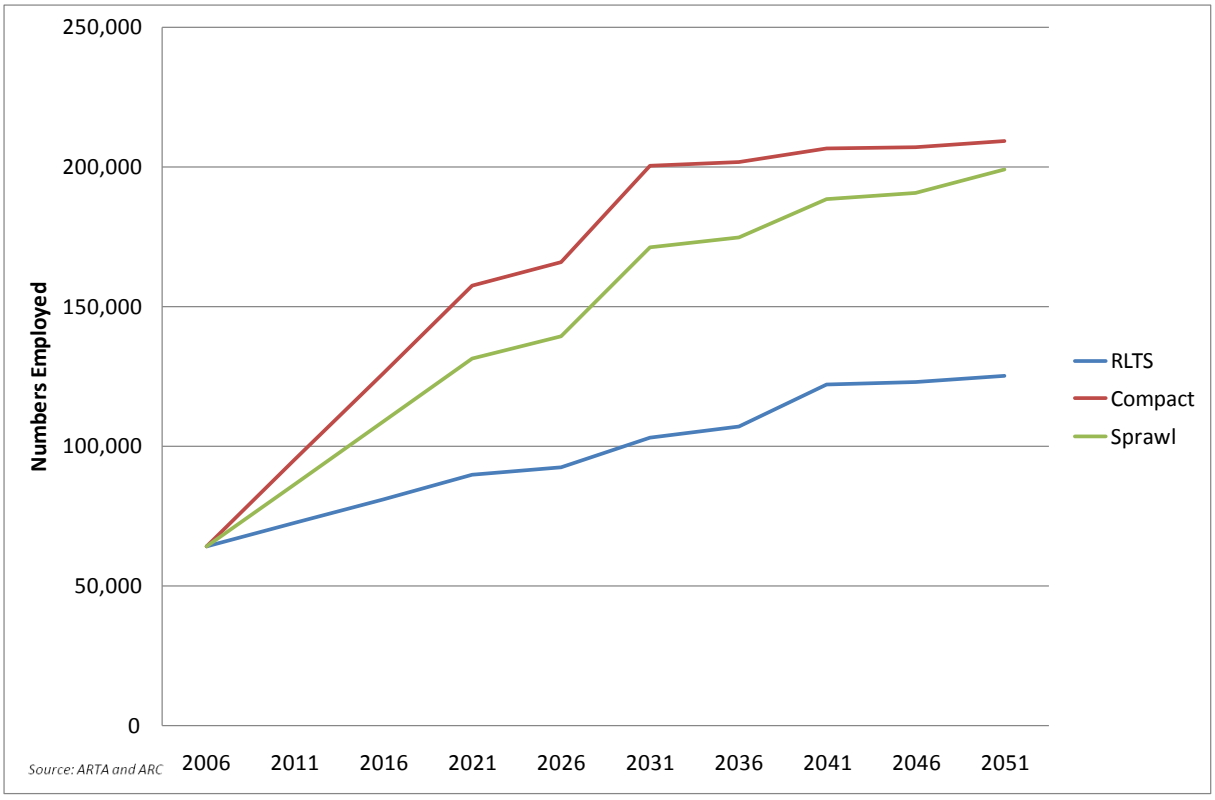
The increase could be attributed to changes in land use around the northern parts of Auckland under the RLTS, but also to the demographic profile of residents on the North Shore. The 2006

census reveals that the North Shore tends to attract people with higher levels of qualifications, that have higher incomes and also a greater proportion working in occupations that fit with the predominant industries located within the CBD.

Northern trip growth is matched by that coming from the South and East of the CBD, which are projected to be the areas of Auckland with the most population growth (see Appendix D). Growth from the southern and eastern areas is expected to reach 56,600 trips in the AM peak in 2041, up from 37,300 in 2006/07. When this is combined with another 9,900 trips in the AM peak originating out of western areas, the demand for capacity and additional management required on the transport network grows non-linearly in response to the increased demand and the complexity associated with multiple directions.

It should be noted that the projected growth of the CBD population used in the RLTS modelling is very high relative to historical and international comparisons. However, some of the projections, notably by Auckland City, suggest lower CBD population growth for the same CBD employment. More recent work by Auckland Regional Council[9] has also provided a number of alternative scenarios that show lower CBD residential populations and higher levels of employment. Figure 2-4 contrasts the RLTS scenario with alternative scenarios from the recent Auckland Regional Council study.

Figure 2-4 Alternative CBD Employment Scenarios



Should the employment reality that eventuates approximate to any of these alternatives, then demand for travel to the CBD will be even greater than projected, implying that rail patronage

[9] Future Land Use and transport Planning Project: evaluation of future land use and transport planning scenarios. Auckland Regional Council, April 2010.

estimates and benefits will be higher than estimated in this report. In this way, the employment environment exceeding projections from the base scenario, while good, creates a situation where transport investment will need a combination of capability to manage network capacity increases and flexibility around the service design to accommodate growth beyond expectations.

There is also the possibility that an investment, such as the CBD Rail Link, boosts the transport capacity serving the CBD to the point where it acts as a source of growth stimulus itself. There is already evidence from Auckland (e.g. Britomart as discussed in Section 2.3.3) that such effects will occur with the development of high capacity transport corridors and this is further explored, along with overseas evidence, in Section 5.

2.4 Auckland CBD Transport Supply

The demand factors impose critical pressures on the existing configuration of the transport network. Without further investment to cope with the projected additional demand, the increased traffic poses significant reliability risks on the network, with consequent unreliability and delays. Under these conditions, it is unlikely that growth of the CBD and the associated benefits would eventuate.

Growth in population and employment puts increasing pressure on the main type of transport infrastructure, namely roads, but creates opportunities to widen investment and create a balanced transport configuration. This is likely to be more facilitative of the medium-term to long-term national and regional aims around economic growth and productivity improvements, as well as reducing overall failure risk from too much reliance on one single piece of infrastructure underpinning the network. Continued dependence on roads means the Auckland of tomorrow would be little different from the Auckland of today, with a heavy over-reliance on the availability of road space to deal with large volumes of single occupancy vehicles during peak commuting times.

In the scenario testing undertaken for this Business Case, it is assumed that future growth in trips by car to the CBD will be limited by the capacity of streets in the CBD and surrounding areas, as well as parking constraints. As the CBD population and employment grows, there will be more demand for bus and pedestrian priority at signals and amenity improvements (such as footpath widening) – this demand will give no opportunity for increased road capacity for cars.

An allowance has been made for a modest growth in trips by car of about 10%. This is based on small increases in average car occupancy, from modest increases in ride sharing, and a limited amount of peak spreading as people choose to set off either earlier or later to complete their journeys to work. This assumption of modest car trip growth is based on conclusions drawn from regional and local strategy documents. These conclusions emphasise the lack of space within the inner city to accommodate more vehicle movements and the likely constraints imposed by car parking availability longer term. Table 2-2 provides an indicative breakdown of mode share by CBD approach direction for the base year (2006/07) and the two future growth scenarios, namely:

- ‘Bus unconstrained’ – in which there is effectively no limit to buses while rail is subject to current Britomart bottlenecks; and
- ‘Rail unconstrained’– in which there is effectively no limit to rail (following the completion of the CBD Rail Link) while buses are subject to current road capacity.

These two scenarios provide two extreme approaches to increased public transport.

Table 2-2 Percentage changes in mode share between 2006 and 2041

Indicative mode shares by direction									
	2006/07			2041 Bus growth unconstrained			2041 Rail growth unconstrained		
Mode	North	West	South/East	North	West	South/East	North	West	South/East
Bus	26%	27%	31%	51%	33%	41%	51%	13%	20%
Train	0%	11%	7%	0%	23%	11%	0%	48%	28%
Ferry	15%	0%	0%	11%	0%	0%	11%	0%	0%
Car	59%	54%	54%	37%	36%	39%	37%	31%	42%
Active	0%	8%	8%	0%	8%	9%	0%	7%	10%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

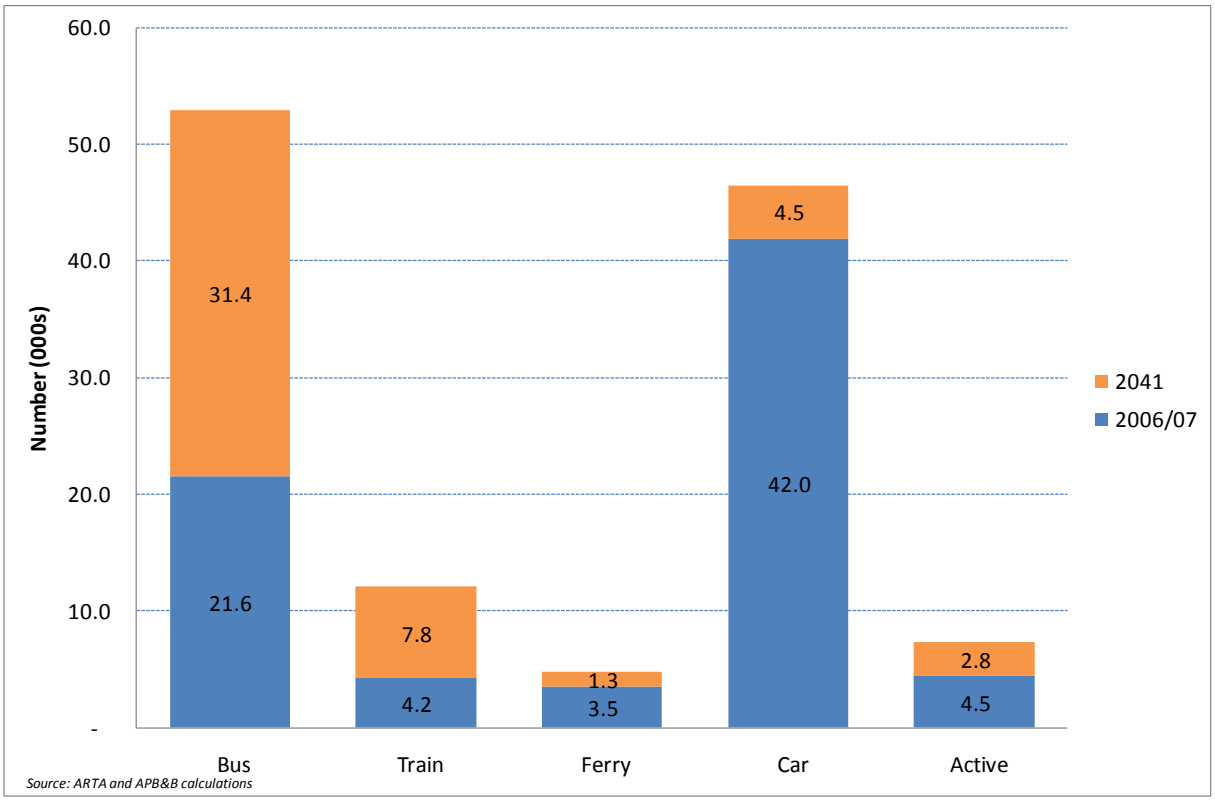
Table 2-2 shows key assumptions regarding the ability for bus and rail to accommodate growth for each direction:

- Rail mode is not available to people travelling to the CBD from the North – in both scenarios limited car growth results in a major increase in bus mode share from 26% to 51%;
- Rail is likely to have a significant impact on mode share for travel from the West under both scenarios – rail mode share is expected to increase from a low base in 2006/07 of 11% to about 23% in the bus unconstrained case and 48% in rail unconstrained case;
- Rail is expected to have a more modest impact on the South / East direction where some corridors, such as Dominion Road, will continue to rely on bus – rail mode share increases from 7% in 2006/07 to 11% in the bus unconstrained and 28% in the rail unconstrained scenarios; and
- Ferry mode share is likely to fall as a percentage relative to the other modes. This is based upon the observations and assumptions that ferry services are restricted by their geographic locations and therefore will not grow as fast relative to both bus and rail, which offer wider coverage across the network.

It should be emphasised that these are indicative expectations, which are only intended to develop an understanding of the broad transport task associated with CBD growth. Detailed modelling has been undertaken as described in Chapter 4.

In terms of physical trip numbers across modes, Figure 2-5 illustrates the growth across the differing transport modes assuming there is no increase in rail but sufficient increase in bus services to accommodate the additional 47,800 trips coming into the CBD in 2041 (shown by the orange sections of the columns in the graph). This potential mode split of commuting trips creates a less balanced network, which makes meeting national and regional strategic transport objectives of best use of existing infrastructure, creating network resilience and managing risk harder to achieve.

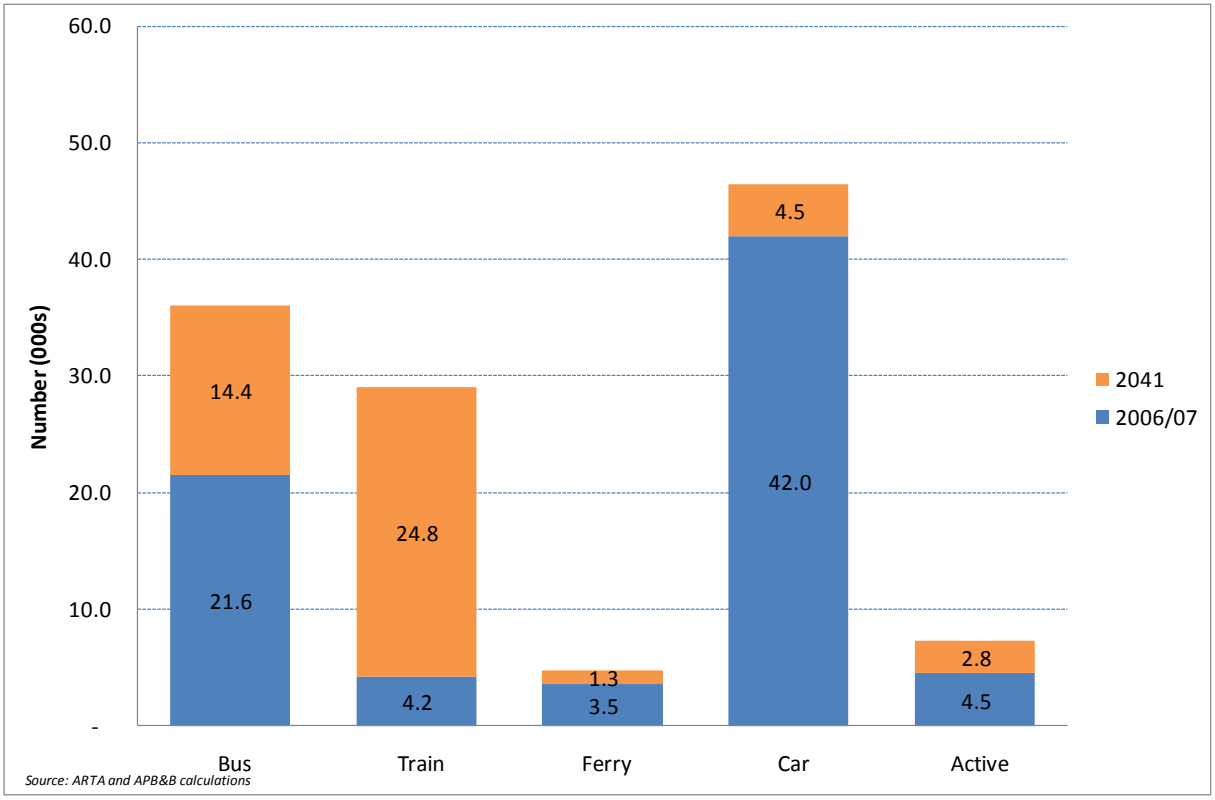
Figure 2-5 Mode Split Assuming Increases in Bus Services but not Rail Services



This has implications for management of the additional buses through the CBD, regardless of the investment (whether by tunnel or otherwise) in enabling increased capacity for bus running. Buses on the surface of the CBD would also pose a risk in terms of the larger number of pedestrian commuters and the presence of more active modes sharing road space with a significantly larger vehicle.

With increased rail capacity, the mode distribution changes to reveal a more even balance, as shown in Figure 2-6. The rail network would be able to absorb an extra 24,800 trips in the morning peak, complementing the capacity in the bus network to provide balanced service provision. This matches more closely the strategic priorities associated with improving both the services obtained from public transport investment and the operation of the regional arterial road network.

Figure 2-6 Mode Split Assuming Increases in Rail Services but not Bus Services (in the AM Peak)



The additional investment in the rail network spreads the travel demand load across the three large scale networks in Auckland. The additional mode share going to rail does not stop growth in the bus demand, which increases by 14,400 trips in the 2041 AM peak. The effect of more rail trips would be to reduce congestion by reducing the number of cars on the road network and also relieve the CBD of some of its bus congestion from the south, east and west. The latter would allow north originating (where a significant number of new trips come from) buses better access to the area, increasing the efficiency and longevity of the Northern Busway.

2.5 Conclusions

The conservative nature of the RLTS forecast has upside risk implications for the region. Even minor deviations upward from the land use patterns in the RLTS could drive CBD employment growth and transport demand higher. Transport network investment will have to take into account the potential for capacity increases beyond what has been planned for under a land use scenario projected by the RLTS.

Road based transport solutions, including bus-centred public transport, will struggle to keep pace with growth and impose reliability risks from network sharing. Already there are over 2,000 buses sharing the road network with the growing number of other forms of vehicles. Without an alternative set of infrastructure and other management mechanisms, even the completion of the Auckland Roads of National Significance will not provide the long-term solutions needed to manage congestion reduction, improve safety and help facilitate the continued transformation of Auckland into an internationally competitive city (with the accompanying economic and productivity growth).

The next section discusses the possible investment alternatives for improving transport infrastructure into the CBD, given current constraints, and shows why the CBD Rail Link provides

flexibility to the transport network by being able to increase capacity and reconfigure service patterns to handle more trains. This would not necessarily be the case for extending the bus network because it has to share road space with private cars, cyclists and pedestrians.

3 CBD Transportation Constraints and Alternatives Examined

Chapter 2 outlined the transport issues facing the Auckland CBD if the outcomes of land use planning eventuate and employment in the CBD grows significantly in the future. This chapter summarises the evaluation of alternative investment options for providing sufficient transport capacity into and within the CBD to meet the transport challenges identified above. The detailed evaluation is described in the Alternatives Paper, contained in Appendix D.

3.1 Transport Policy Measures Considered

Transport policy measures that have an impact upon demand and supply factors affecting the Auckland transport network were derived from the region's strategic planning documents. The measures forming the comprehensive list can be classified into three distinct groups:

- Alternative modes
  - Travel demand measures
  - Increased walking
  - Increased cycling
- Road based solutions
  - Increased private car usage with current road capacity
  - Increased road capacity
- Public transport
  - Increased ferry usage
  - Increased bus usage – on surface improvements
  - CBD bus loop
  - Central area bus tunnel with 3 stations
  - Light rail
  - Expanded Britomart terminus
  - CBD Rail Link with no intermediate stations
  - CBD Rail Link with 3 stations

Of the three broad categories, the alternative modes provide good options to support the general transport task, but they lack the capacity to deliver the movement of significant numbers of people that Auckland will require. Rather, they are supporting modes to the systems that offer scale.

The road based solutions quickly run into problems with road / land capacity issues. Increased car usage on the existing network is not feasible, given current congestion rates and the population growth projected for the region, which could potentially put another half a million cars on the region's roads in the next 45 years. Increasing road capacity runs into the scarcity of available space for the extended road network. Further land acquisition for roads would be expensive and could alter land use patterns that are not in line with current regional strategies and could also interfere with the attainment of the economic and productivity benefits that arise from agglomeration.

The public transport options are also not without issue. Increasing ferry usage only works for people living near ferry terminals, which is not the majority of the population who would want to utilise public transport capacity for their commuting journeys. Similar to the issues impacting upon greater car usage, surface public transport options also run into space scarcity problems when having to share surface corridors with existing traffic. The cost for grade separation across enough of the surface transport network to make commuting routes viable over the long-term would be significant.

The choice essentially comes down to making investments that better exploit the excess capacity of existing transport infrastructure, by finding additional capacity from new infrastructure that is complementary to the existing network. For Auckland this involves the possibility of making adjustments to either the rail network or the bus network. In general, both these options face network constraints which will need to be addressed before each alternative could successfully fulfil the transport task required.

3.2 Existing Auckland Rail Network Constraints

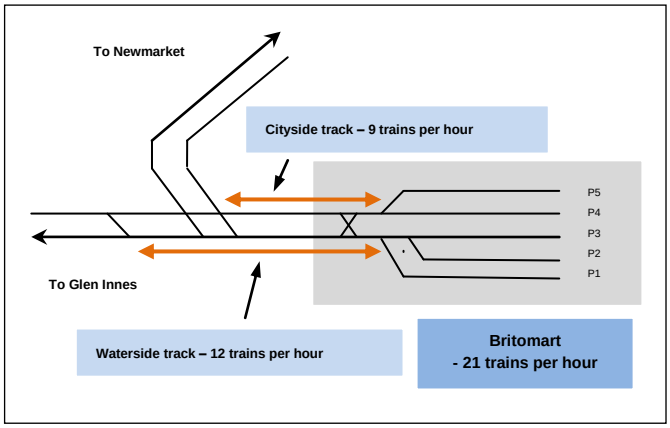
The current Auckland passenger rail system comprises four routes, totalling approximately 110 kilometres of line with 41 stations. The addition of the Manukau City Branch line and restoration of services to Huapai in 2011 will expand the passenger network to 113 km and 44 stations. Following completion of the current electrification project in 2013, electric trains will operate between Swanson, Papakura, Manukau City, Onehunga and Britomart. The network configuration after completion of the current Project DART and Auckland Electrification projects is shown in Figure 3-1.

Figure 3-1 Post DART and Auckland Electrification Project Passenger Rail Network

Historically the topography of central Auckland meant that the resulting gradients were too steep for surface rail lines to be built through what is now the CBD, with an easier route from the waterfront through Parnell to Newmarket being constructed. The original downtown station on the current Britomart station site was replaced by a station in Beach Rd, Parnell in the late 1920s and trains only returning to the northern edge of the CBD in 2003, with the opening of the Britomart Transport Centre.

The ability of the existing Auckland rail network to handle the projected growth in CBD transport demand that has been outlined in preceding sections of this Business Case is constrained by the current configuration of the station at Britomart which is configured as a terminus with five platforms (see Figure 3-2).

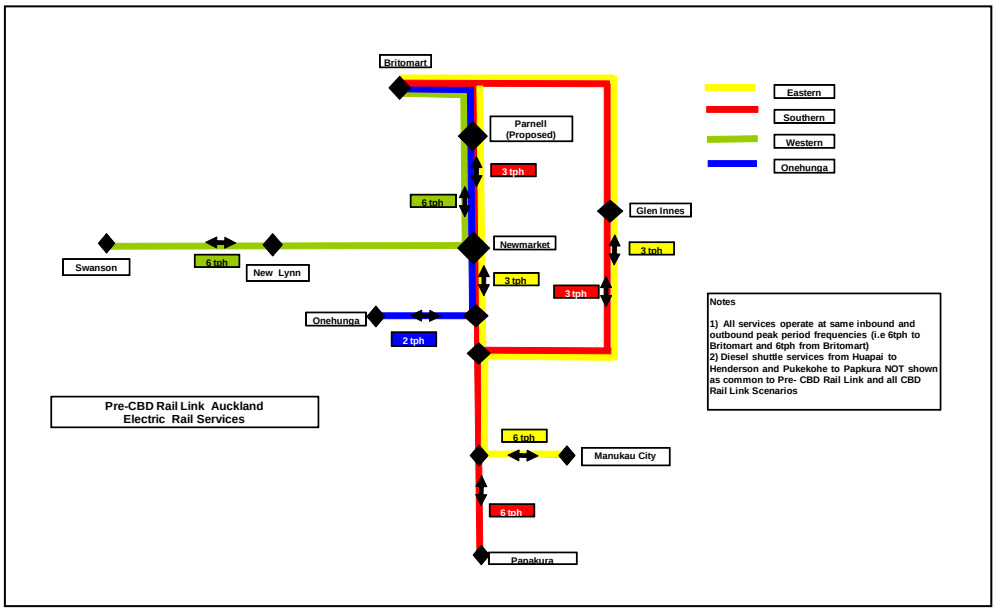
Figure 3-2 Current Arrangement of Britomart Approach Tracks and Platforms



The new signalling and train control system being provided as part of the electrification project will enable each of the two approach tracks into Britomart to be operated as independent bi-directional lines. KiwiRail has estimated that the maximum practical number of trains which will then be able to be operated into Britomart is around 21 trains per hour (tph), comprised of 9 tph from Newmarket and 12 tph via the waterfront line from Glen Innes. This imbalance in train paths results in there being only two platforms at Britomart to service trains from Newmarket compared to three for trains from Glen Innes.

ARTA's post DART and electrification peak period electric train timetable consists of 20 tph in and out of Britomart during peak periods, comprised of 6 tph on each of the Southern, Western and Eastern routes, together with 2 tph from Onehunga (refer to Figure 3-3). Thus by 2013, almost all of the useable train paths into and out of Britomart will be in use, providing virtually no room to add additional services in future.

Figure 3-3 Pre CBD Rail Link Electric Train Services



Note that the diesel shuttle services that will also operate from Huapai to Henderson and Pukekohe to Papakura have been omitted for clarity, but are assumed to continue operating after the CBD Rail Link is completed.

Outside of Britomart however, the new post electrification signalling system will provide for the following maximum numbers of trains to be operated per hour (Table 3-1):

Table 3-1 Maximum Capacity for EMUs provided by Post Electrification Signalling System

Line Section	Trains Per Hour (in each direction)
Papakura- Westfield	15
Manukau City- Wiri	15 [1)]
Westfield- Newmarket	20
Onehunga- Penrose (single track)	15 [1)]
Swanson- Morningside	15
Morningside- Newmarket	20
Westfield- Britomart	20
Newmarket- Britomart	22

Note 1) Equivalent to 4 minute headways for following trains on single line

Whilst operation of both freight and passenger trains will in practice limit the maximum throughput of trains over some sections of the network, it is evident that the current configuration of Britomart as a terminus constrains the ability to exploit the latent capacity that will exist on the rest of the Auckland rail network after re-signalling. This is highlighted in Table 3-1.

Post electrification, passenger services will be operated largely by electric multiple unit (EMU) trains (6 cars long on all routes except for 3 cars on the Onehunga line), with a planned seated plus standing capacity of 385 for a 3 car EMU and 770 for a 6 car. Therefore ARTA's proposed 20 tph service would provide an hourly carrying capacity of around 16,100- 16,200 passengers into Britomart, although the actual number of CBD passengers able to be transported by rail will in practice be determined by the number of passengers travelling to intermediate destinations such as Newmarket.

The current configuration of Britomart appears to provide adequate capacity into the CBD for rail passengers in the future; however, Britomart's position on the northern periphery of the CBD effectively limits the catchment for CBD rail journeys to those passengers travelling to destinations within 400-500m distance of Britomart. The rail development plan provides for the current upgrading and capacity improvements to the existing Auckland rail network (these are in progress), enabling the delivery of more passengers. The addition of the CBD Rail Link would offer better exploitation of these improvements through penetration of the central and southern parts of the CBD, extending the service that can be provided for rail passengers. Through-routing at Britomart not only would allow for capacity utilisation, but also would afford better network optimisation from flexibility in services patterns and scheduling.

3.3 Bus Network Constraints

Bus network constraints are different from those faced by the rail network. While rail has latent capacity within its own segregated corridor, buses share surface space with other modes, namely private vehicles, cyclists and pedestrians, competing for priority on the main corridors and, importantly, at at-grade intersections. Therefore, surface network constraints hold back the delivery of effective bus rapid transit services into the Auckland CBD. Previous investigations have shown that key CBD bus streets and facilities, including Fanshawe Street, Queen Street and Albert Street have limited capacity due to:

- A potential bottleneck on the Central Connector, at the intersection of Symonds Street, Karangahape Road and Grafton Bridge due to the motorway access;
- Albert Street road widths and configuration limiting the potential for bus priority measures and bus bays;
- Impacts on Victoria Park and developments fronting Fanshawe Street on the potential for bus stops to increase bus capacity of Fanshawe Street. Despite the Victoria Park tunnel project being expected to reduce traffic on Fanshawe Street, traffic generated by the Wynyard Quarter development would be likely to result in no effective reduction in private traffic in Fanshawe Street;
- Limited capacity for additional bus priority in Hobson Street because of its role as a motorway connection and future increased traffic role in the CBD;
- Limited capacity for buses in Queen Street due to footpath widening, pedestrian-friendly signal phasing, and its designation as a Greenway in Council's Long Term Road Function Plan. Queen Street has been reinforced as a pedestrian-focused corridor in recent work by consultant Jan Gehl. A bus lane proposal for Queen Street was recently rejected because of perceived inconsistencies with its pedestrian function; and
- Limited capacity and effectiveness of city centre bus terminals and interchanges including Britomart interchange and Mid City to cater for increased service frequency.

Current bus capacity into the CBD is complex to measure and it is difficult to ascertain when the maximum is reached. Using a number of assumptions, including accepted bus flow service volumes and lane capacities from the Transportation Research Board[10], an assessment was carried out as to when bus services into the CBD would reach capacity. Observations were made assuming high operational efficiencies leading to levels of service similar to guidelines for arterial bus lanes (max 130 buses per hour). In reality, service levels for CBD locations (100 buses per hour) may be possible in some locations only.

Without the CBD Rail Link, Auckland CBD would require twin or triple bus lanes (both sides of road) on most corridors and, in the absence of these, constraints on inner city network capacity would occur as follows:

- Fanshawe Street between Beaumont and Hobson Street, would be at capacity in 2019;
- Symonds Street between Karangahape Road and Wellesley Street, would be at capacity by 2014;

[10] See "Transit Capacity and Quality Service Manual", 2003, Transportation Research Board.

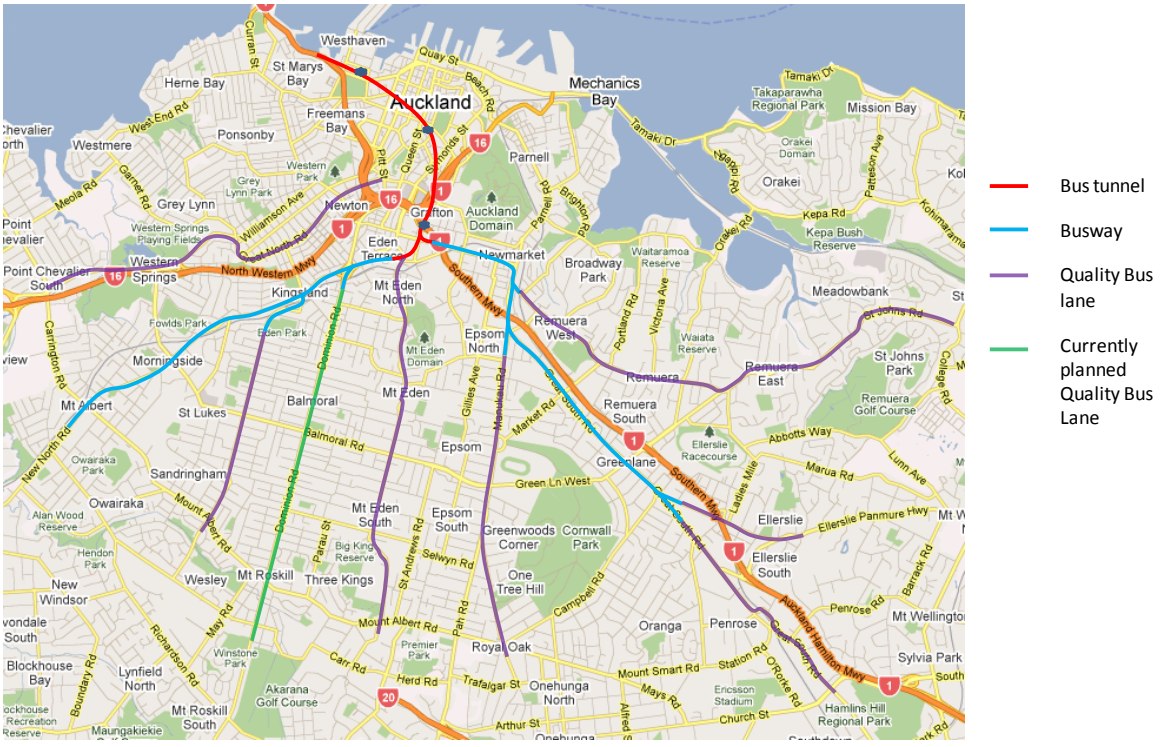
- Symonds Street between Khyber Pass Road and Karangahape Road, would be at capacity by 2019;
- Albert Street southbound, between Customs and Wellesley Streets, would be at capacity by 2016; and
- Albert Street northbound, between Customs and Wellesley Streets, would be at capacity by 2020.

Maintenance of bus operations on CBD surface streets would require rerouting of buses within the CBD in response to identified capacity constraints. In some cases (such as for North Shore buses), this could potentially improve passenger servicing of the CBD (by providing more direct access to the Civic precinct) but in others (such as Central Connector services) there would be less effective servicing of the northern CBD.

Buses would continue to be highly susceptible to traffic incidents and conflict with other modes (most notably pedestrians) and most CBD bus streets would be operating at or near their effective capacity, worsening the impact of incidents. Bus travel times within the CBD could be expected to continue to decay, increasing operating costs.

Further out into the wider road network, continual improvements would need to be made to maximise the effectiveness of the bus rapid transit network and to maintain the transport benefits derived from it. Bus movements from the north are expected to grow considerably and would require bus lanes either on the existing harbour bridge, or the proposed new harbour crossing (or both), while services from the south, west and east would require significant surface measures, including grade separated intersections, to ensure bus priority (as shown in Figure 3-4).

Figure 3-4: Required Wider Network Infrastructure to Support Bus Rapid Transit



3.4 Multi-criteria Analysis

Based upon the above discussions, four potential transport investment alternatives were brought forward for further analysis on a qualitative basis:

- On-surface bus capacity improvements
- A central area bus tunnel with 3 stations
- An expanded Britomart rail station
- A CBD rail tunnel with 3 stations (CBD Rail Link)

Multi-criteria analysis was used in the first instance as a coarse filtering mechanism to reduce the list of four alternatives down to two options capable of providing the depth of capacity, reliability and robustness to deliver the transport outcomes sought. The Auckland CBD of 2041 needs a solution that can provide additional transport capacity without causing congestion and other environmental externalities (such as air pollution).

The broad categories adopted for the multi-criteria analysis consist of the following areas:

- Strategic fit – looking for consistency of purpose with national and regional land use and transport strategies;
- Patronage demand – creates enough utility to ensure that peak period ridership is maximised and there are high levels of ridership at other times;
- Cost factors – whole of life project costs are minimised and disruptions to the wider network are minimised during construction;
- Maximisation of benefits – conventional transport benefits are maximised (such as improved travel to work journey times) and wider economic benefits are generated across the community;
- Environmental and sustainability factors – the project helps to minimise non-renewable fuel use, minimise emissions and improve local air and water quality.

The alternatives listed above were scored using this range of assessment criteria with both uniform and non-uniform weightings. Table 3-2 below summarises the assessment. The two highest scoring alternatives both require significant new underground infrastructure, with the CBD Rail Link with 3 stations being ranked highest for both sets of weights, while the Central Area Bus Tunnel with 3 stations is rated second highest. All other options are rated significantly lower.

Table 3-2: Summary Multi-Criteria Assessment of Alternatives

Alternatives	Uniform Weights	Non-Uniform Weights
On Surface Bus Route Improvements	1.64	1.52
Central Area Bus Tunnel with 3 Stations	2.27	2.23
Britomart as Terminus with Increased Capacity	1.64	1.67
CBD Rail Link with 3 Stations	2.73	2.58

The Central Area Bus Tunnel and the CBD Rail Link, in spite of higher construction costs, score more highly than the On Surface Bus Route Improvements and the Britomart Terminus for the following reasons:

- The CBD Rail Link and Central Area Bus Tunnel come closest to fulfilling the requirements of the Rapid Transit Network by providing network backbone along a dedicated high density corridor. Britomart is the constraint in the rail network, while surface bus schemes rely on sharing existing road space.
- On Surface Bus Improvements and Britomart Terminus both have capacity constraints attached to them, which limits the natural growth of patronage and prevents optimisation of patronage over time.
- Because of lower expected patronage growth, over time Britomart Terminus and the On Surface Bus Improvements will not have the same impact upon congestion, fuel consumption and emissions. These impacts were adjudged to lead to lower improvements in local air quality and fewer people being likely to adopt active travel modes.
- Conventional transport benefits are more likely to arise with the CBD Rail Link and the Central Bus Tunnel because each of these schemes promotes the reduction of traffic on the road network through patronage uptake. Separate corridors imply better journey times, while the removal of vehicles from the road at peak times potentially helps traffic flow and travel times on the roads. The CBD Rail Link is the only option with potentially significant non-transport benefits based upon additional development that gets undertaken around rail stations. Section 5 presents evidence and discussion of the potential role of these benefits in the case of the CBD Rail Link.
- The CBD Rail Link and the Central Bus Tunnel provide closer alignment with Auckland City Council's strategies for the CBD and Waterfront, in terms of connectivity, traffic improvements at street level, better pedestrian access, linkages between the waterfront and wider CBD, and environmental benefits within the CBD and surrounds.

Further discussion on the scoring differences between the four options listed in Table 3-2 can be found in Section 6.2 of the Alternatives Paper (Appendix D). As the two highest scoring options, the CBD Rail Link with three stations and the Central Area Bus tunnel with three stations were then compared for cost effectiveness to find the superior alternative, assuming benefit delivery is similar.

3.5 Cost Assessment

The two highest ranked alternatives from the Multi- Criteria Assessment were ranked in terms of cost effectiveness. The CBD Rail Link with 3 stations has costs in present value terms of $1,520m, which is approximately 60% of the present cost of $2,640m for the Central Area Bus Tunnel with 3 stations. Table 3-3 shows that these rankings are not sensitive to the choice of discount rate. Lower discount rates favour the CBD Rail Link more strongly over the bus tunnel, because the rail and bus tunnels are assumed to have similar construction periods.

Table 3-3: Sensitivities of costs ($m PV, 2010 terms)

Discount rate	CBD Rail Link with 3 Stations	Central Bus Tunnel with 3 Stations	Ratio of CBD Rail / Bus Tunnel
4% Real	$2,230	$3,750	59%
6% Real	$1,820	$3,120	58%
8% Real	$1,520	$2,640	58%

3.6 Conclusions

The Alternatives Paper in Appendix D did not seek to quantify the benefits of either the CBD Rail Link or the Central Area Bus Tunnel. However, both alternatives are broadly equally effective at delivering the required extra capacity into the CBD, so a simplifying assumption is that the underlying benefits are comparable. Therefore the benefit-cost ratio of the CBD rail link is approximately 70% higher than that of the Central Area Bus Tunnel - inversely proportional because the costs of rail are approximately 60% of those of the bus tunnel. An alternative way of looking at this is to assume that the benefit cost ratios are broadly equivalent. Then, because the CBD Rail Link costs are approximately 60% of those for a CBD bus tunnel, the benefit stream attached to the bus tunnel would need to be around 1.7 times larger than the benefits for the CBD Rail Link.

A large part of the cost and performance advantage of the CBD Rail Link is due to the project releasing excess capacity currently residing in the rail network, which is unable to be realised due to the capacity constraints of the Britomart Terminus. In contrast, the bus tunnel option has to be built from scratch, and requires further investment out into the wider Auckland network to continue to deliver the benefits of the original investment. This accounts for the higher infrastructure and operational expenditure of the bus tunnel option compared to the rail option and therefore its lower performance.

Over time, as congestion on bus routes away from the CBD increases, there will be a continuing need for major bus infrastructure investment to maintain the capacity, reliability and speed of bus services. In contrast, there will be significant capacity still available in the rail network without the need for major infrastructure investment.

4 Description of Proposed Solution

The problem described in Chapter 2 is to unlock the growth potential in the Auckland CBD, given land use projections that show significant increases in resident population and employment through to 2041 and beyond. The strategic intervention required involves increasing the capacity of the transport network to deliver more commuters into the CBD in the morning peak in a manner which optimises economic, social and environmental benefits.

As explained in the previous chapter, the CBD Rail Link is the best way of doing so. This chapter describes the CBD Rail Link, including how it conforms to legislative requirements governing land transport investment, and supports national, regional and local strategy and policy objectives.

4.1 Description of CBD Rail Link Project

The proposed CBD Rail Link is an approximately 3.5 km double track underground rail line running beneath the central business district from Britomart to the Western (North Auckland Line) near the existing Mount Eden Station. Britomart will become a 'through' station and will be modified to suit this new purpose.

Up to three intermediate underground stations are proposed:

- ***Aotea*** (under Albert St between Wellesley and Victoria Sts)
- ***Karangahape Rd*** (under the intersection of Pitt St and Karangahape Rd)
- ***Newton*** (under Symonds St between the intersections with Khyber Pass/ Newton Rd and Mt Eden and New North Roads)

The proposed route and station locations are shown in Figure 4-1. Eastern and western junctions with the North Auckland Line at Mt Eden are proposed. These will provide both operational flexibility and permit a variety of service patterns to be operated.

The CBD Rail Link will result in significant reductions in public transport journey times to the CBD from across the current rail network, as indicated in Table 4-1. In particular, rail services from the west of Auckland will have a more direct route to the CBD, by eliminating the need to travel via Newmarket as at present.

The topography of central Auckland, together with the operational constraints for rail vehicles, results in the CBD Rail Link having steep gradients and deep underground stations over most of its route. There is an approximate 76 metre difference in elevation between Britomart and the Western line at Mt Eden; in addition, the tunnels have to pass at sufficient depth beneath the Central Motorway Junction to avoid impacting motorway operations.

Twin tunnels, each having an outside diameter of approximately 7 metres, will be provided, and connected by cross passages at a minimum spacing of 240 metres, for evacuation purposes. The tunnels will be constructed by a combination of Tunnel Boring Machines and Cut and Cover construction methods.

The three stations have provision for underground island platforms (maximum 170 metres long or equivalent to a 7 car long train), connected to subsurface concourses via escalators and lifts. The station depths vary between 18 metres below the surface at Aotea and 43 metres below ground at Newton.

Table 4-1: PT Journey Times to CBD Station Locations Before and After the CBD Rail Link

Origin	Estimated PT Journey Times to CBD Stations (Minutes)							
	Newton		Karangahape Rd		Aotea		Britomart	
	Before [1]	After	Before [1]	After	Before [1]	After	Before	After
Henderson	43	33	40 [2]	34	50 [2]	35	47	37
New Lynn	30	20	40 [2]	22	45 [2]	23	34	24
Morningside	16	6	28 [2]	7	28	8	22	10
Grafton	14 [3]	3 [4]	13 [4]	5 [4]	23 [5]	7 [4]	14	9 [4]
Newmarket	17 [5]	6 [4]	17 [5]	7 [4]	17	8 [4]	10	10
Panmure	45 [6]	27	47 [2]	25	32	23	19	19
Onehunga	53 [2]	26	57 [2]	27	40	29	27	27
Middlemore	50 [6]	34 [7]	65 [2]	35 [7]	46	36	34	34
Manukau City	60 [6]	41 [7]	75 [2]	42 [7]	55	44	42	42
Papakura	71 [6]	55 [7]	80 [2]	56 [7]	67	57	55	55

Notes
(1) rail plus walking time
(2) Average Bus journey time
(3) walking time only
(4) via Newton and Eastern connection with Western line
(5) bus plus walk
(6) Train plus bus plus walk
(7) Includes changing trains at Newmarket

A long section and gradient profile of the route is shown in Figure 4-2. Further details are provided in the *CBD Rail Link Study Concept Design Report*.[11]

4.1.1 Route Selection

The concept of an underground railway through the Auckland CBD has been proposed and studied on several occasions since before the First World War; however, none of these schemes has progressed beyond planning stages. Since Britomart was opened in 2003, a number of studies have been undertaken by the Auckland City Council and subsequently ARTA on the feasibility of connecting Britomart to the Western Line at Mt Eden. These studies formed the basis for a comprehensive assessment of alternative routes and station locations undertaken during Phase 1 of the CBD Rail Link Study in late 2009, as required under the Resource Management Act for Notice of Requirement Applications.

Eleven technically feasible routes and eleven station locations were developed (refer to Figure 4-3) and subsequently assessed using a two stage multi-criteria assessment process. The criteria were developed from KiwiRail and ARTA's objectives for the project and were designed to identify the number and optimal location of stations along the route, taking into account factors such as proximity to surface activities, other transport services, environmental impacts and technical feasibility.

[11] APB&B Auckland CBD Rail Link Study- Concept Design Report September 2010 produced for KiwiRail and ARTA

Figure 4-1 Proposed CBD Rail Link Route and Station Locations

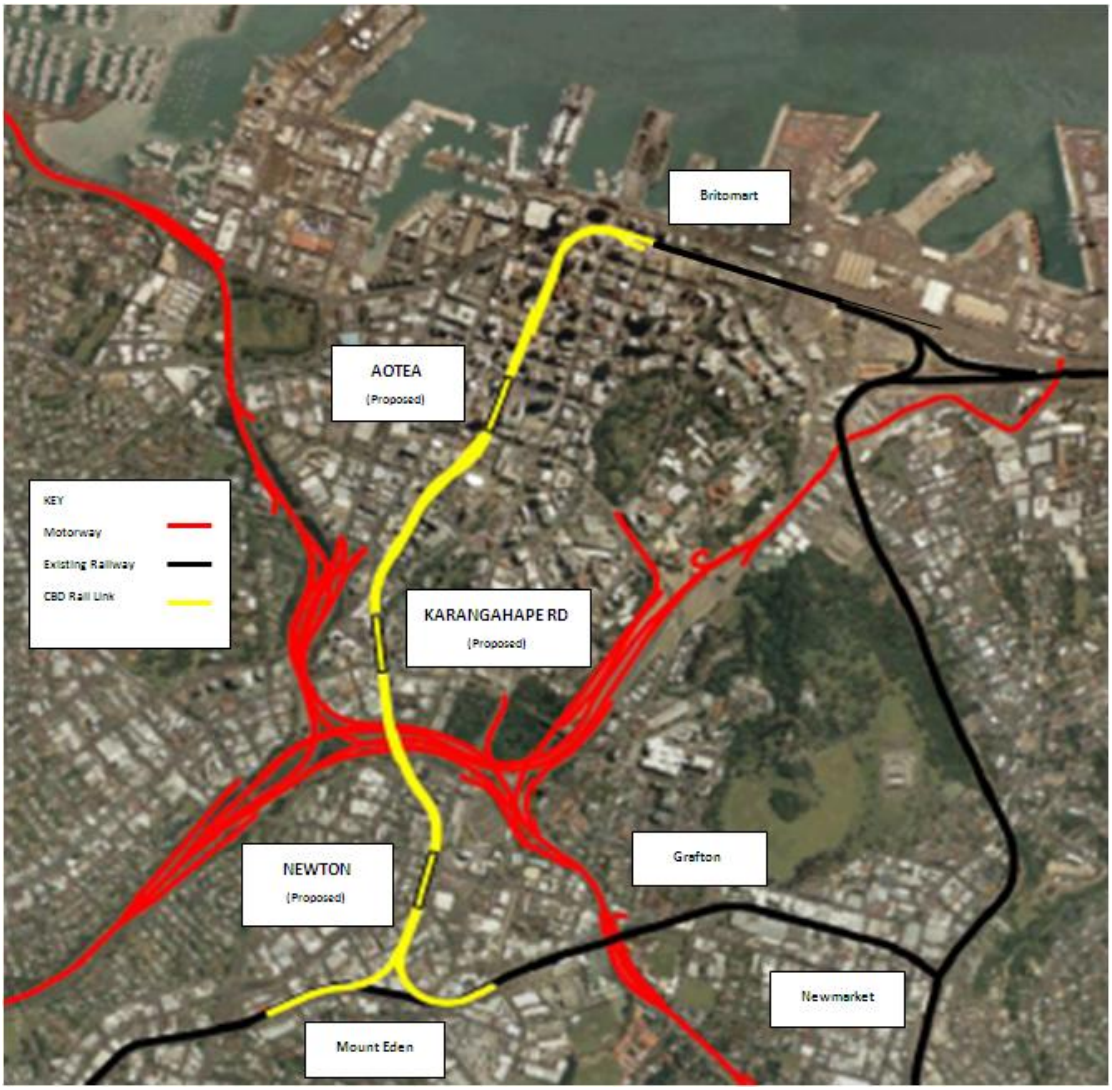
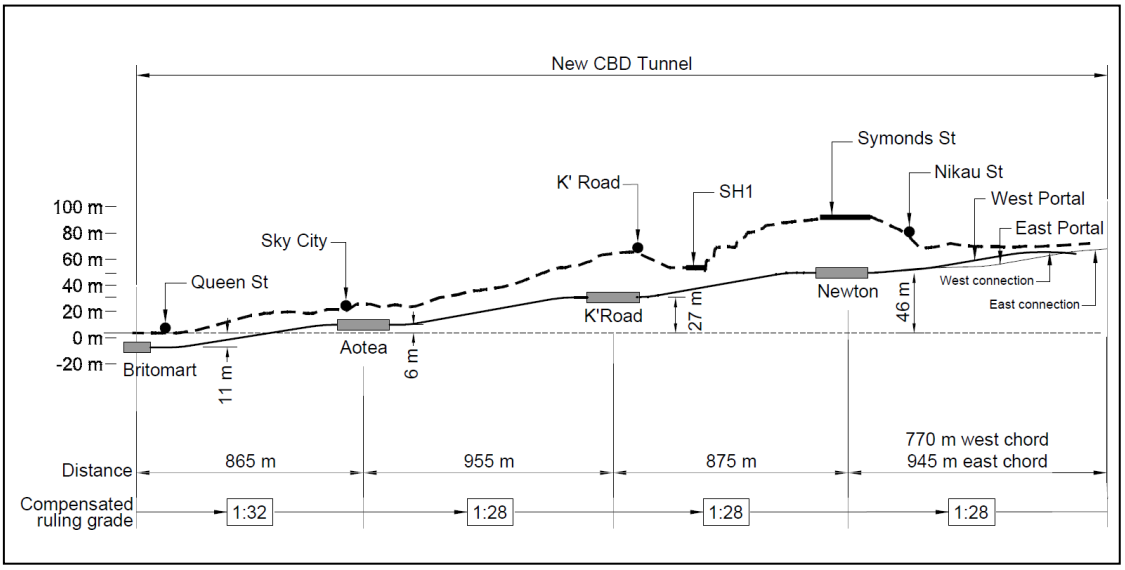


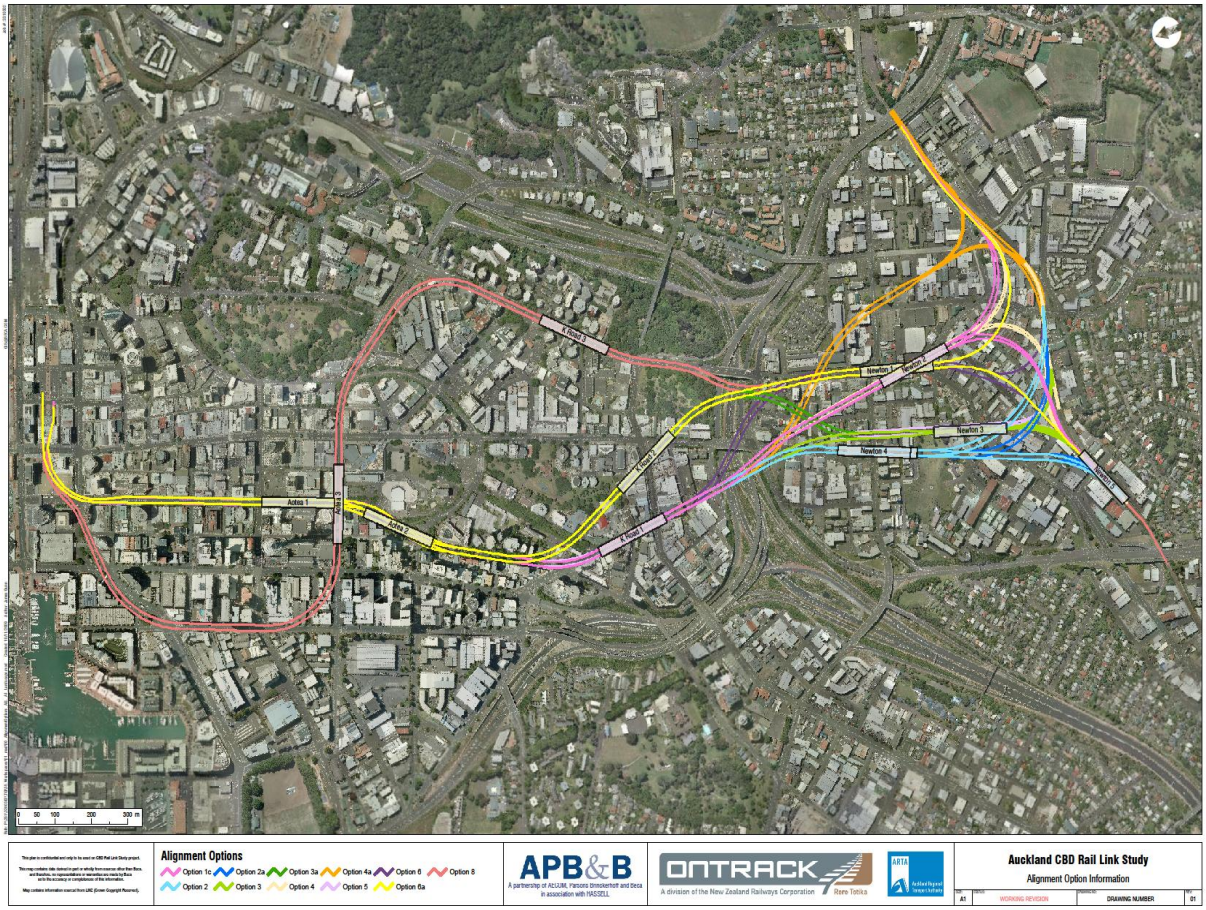
Figure 4-2 Proposed CBD Rail Link Long Section and Gradient Profile



It was identified during this phase of the study that there was little difference in overall length of route between those with only one station (Aotea) and those with two or three stations. As there was insufficient information about the costs and benefits of the stations available at that time, it was decided to identify the optimal three station route, for subsequent further development and assessment during Phase 2 of the study (Concept Design and Business Case). For further details, please refer to the *CBD Rail Link Study-Options Evaluation Report (Draft) January 2010* [12].

The preferred route and station locations for the CBD Rail Link, shown in Figure 4-1, were accepted by KiwiRail and ARTA in February 2010 and were supported by Auckland City Council, Auckland Regional Council and the Regional Land Transport Committee.

Figure 4-3 CBD Rail Link Study Phase 1 Route and Station Location Options



4.1.2 Impacts of CBD Rail Link

In summary, the CBD Rail Link will:

- Provide greatly improved penetration of the CBD by rail, with most locations being within 500m of a station (see Figure 4-4). Table 4-2 shows the estimated population and numbers of jobs located within 500 metres of a CBD railway station by 2041, with and without, the CBD Rail Link;

[12] APB&B CBD Rail Link Study-Options Evaluation Report (Draft) January 2010 produced for KiwiRail and ARTA

Table 4-2: 2041 Population and Jobs within 500 metres of a CBD Railway Station

2041 CBD Population and Jobs	Popn.	% of RLTS	Jobs	% of RLTS
2010 RLTS CBD Landuse Targets	102,000	-	122,000	-
CBD Rail Stations 500m Catchment without CBD Rail Link	37,788	37%	55,159	45%
CBD Rail Stations 500m Catchment with CBD Rail Link	104,850	103%	121,749	98%

Figure 4-4 Catchment of CBD and CBD Fringe Rail Stations

- Reduce overall journey times for rail trips starting or finishing in the central and southern parts of the CBD, as indicated by Table 4-1;
- Provide a catalyst for land use intensification and regeneration of areas surrounding the new stations in both the CBD and Newton areas, plus facilitating the development of Transit Oriented Developments (TODs) around suburban stations such as Panmure and New Lynn - refer to Chapter 5 for more details; and

- Enable rationalisation in the number of bus services running into the CBD, by reconfiguring services in areas served by rail (for example New North Rd), to form feeder services to connect with rail services. This will free up CBD road lanes to provide more capacity for bus services from parts of the isthmus and North Shore, not served by rail.

4.1.3 Operational Evaluation

The CBD Rail Link will be suitable for use only by electrically powered passenger trains, due to its steep gradients and long tunnel sections. Freight trains will not use the CBD Rail Link.

KiwiRail has advised that the fire rating of the existing SA/SD carriage trains is not compatible with extended operation in tunnels. Therefore, the assumption used in the CBD Rail Link study is that all services will be operated using Electric Multiple Units (EMUs), either those currently being procured by KiwiRail or those bought in subsequent batches. It is understood that KiwiRail's current technical specification for the Auckland EMU's requires that these trains must be compatible with the CBD Rail Link. The current maximum train length for the Auckland rail network is 6 carriages (approximately 144 metres long), which is reflected in the concept design for the CBD Rail Link stations.

Although the final number of EMUs to be purchased in the current KiwiRail procurement process has not yet been finalised, KiwiRail and ARTA's assumption for the purpose of this Business Case is that, prior to the opening of the CBD Rail Link, all electric train services on the Auckland network will be operated by EMUs.

Operational simulations of the CBD Rail Link by KiwiRail indicate that the theoretical capacity of the rail link between Britomart and Mt Eden, is between 15 and 30 trains per hour in each direction, depending on the configuration of the signalling system which is provided[13]. This would provide the maximum available hourly passenger carrying capacities shown in Table 4-3.

Table 4-3 CBD Rail Link Maximum Available Hourly Passenger Carrying Capacities

Trains per Hour (in each direction) through CBD Rail Link	Number of Services serving CBD stations per Hour	Hourly max capacity (6 car EMUS with 1.6 SSR*)
15- base level signalling	30	23,100
30- enhanced signalling	60	46,200

*SSR is Seating Standing Ratio- a SSR of 1.6 equates to 6 passengers standing for every 10 seated passengers.

The capacity that will be provided to the CBD by CBD Rail Link services may in practice be rather less than these theoretical figures. The service levels provided will be a function of passenger demand in the catchments served by rail, numbers of trains available and capacity constraints elsewhere on the network. Nevertheless, comparison with the current capacity limits of the existing Britomart Terminus station (21 tph) shows that the CBD Rail Link will provide considerable potential for future growth and network expansion.

4.1.4 Rail Service Patterns

A number of possible post CBD Rail Link service patterns were investigated to establish their effect of rail patronage and to test the impact of differing configurations of the CBD Rail Link project

[13] Source KiwiRail OPENTRACK simulation Report for CBD Rail-Link- July 2010

infrastructure. This work concluded that it was not possible to run a sensible post CBD Rail Link service pattern, which did not entail unacceptable reductions in service levels to some parts of the network, with only the pre-existing fleet of EMUs. However, there was at least one service option which requires only a small initial purchase of additional EMUs, but which did not provide the full routing options facilitated by the CBD Rail Link.

Appendix F provides details of the rail operating and rolling stock assumptions used in the economic evaluation in Chapter 5. A summary of these assumptions is provided below.

The Base Option CBD Rail Link Operating Pattern is shown in Figure 4-5. Initially, 6 trains per hour would be operated at peak periods on each of the routes into the CBD. From 2030, the peak service frequency on each route is assumed to be increased to 8 trains per hour to provide additional capacity.

Figure 4-5 Base Option Electric Train Services

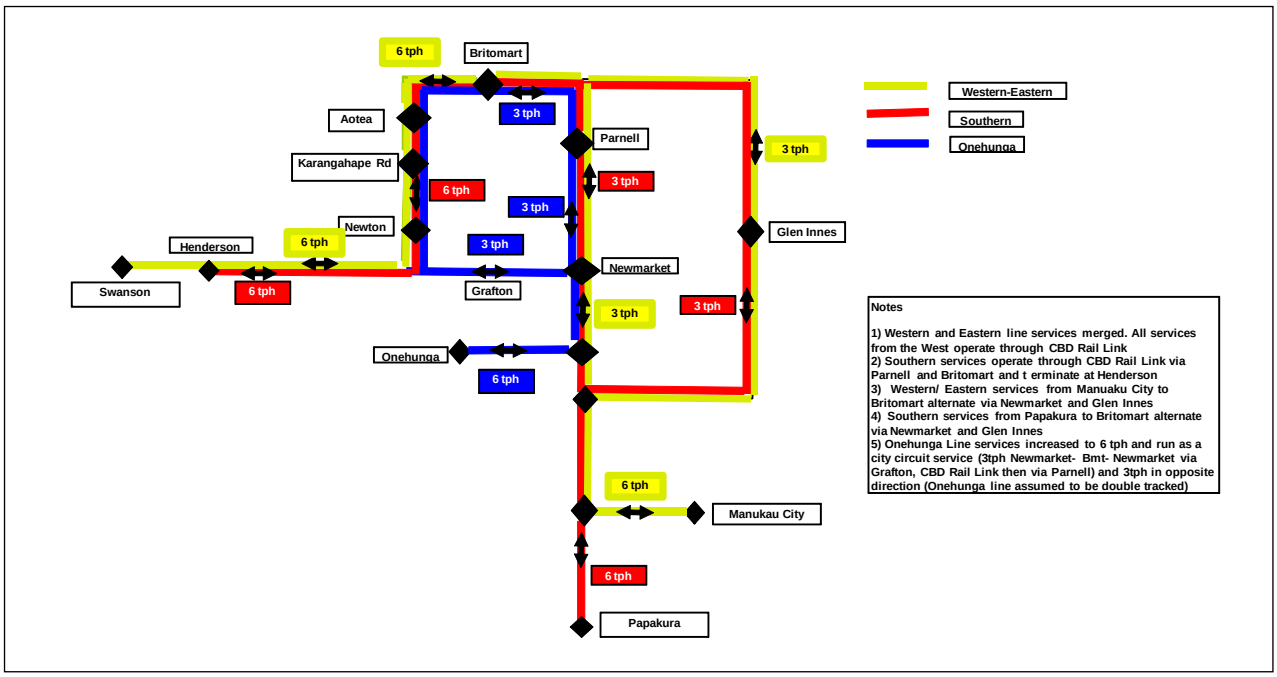


Figure 4-6 shows a reduced initial post CBD Rail Link service pattern, which aims to minimise the initial rolling stock purchase required at the time the CBD Rail Link opens. This service pattern forms the Minimum Rolling Stock sensitivity tests outlined in Section 5.9.11. The sensitivity test assumes that additional rolling stock is bought around five years after the CBD Rail Link opens, so that services can be upgraded and expanded to the 8 tph peak frequency variant of the base service pattern outlined above.

Figure 4-6 Minimum Rolling Stock- Initial Electric Train Services

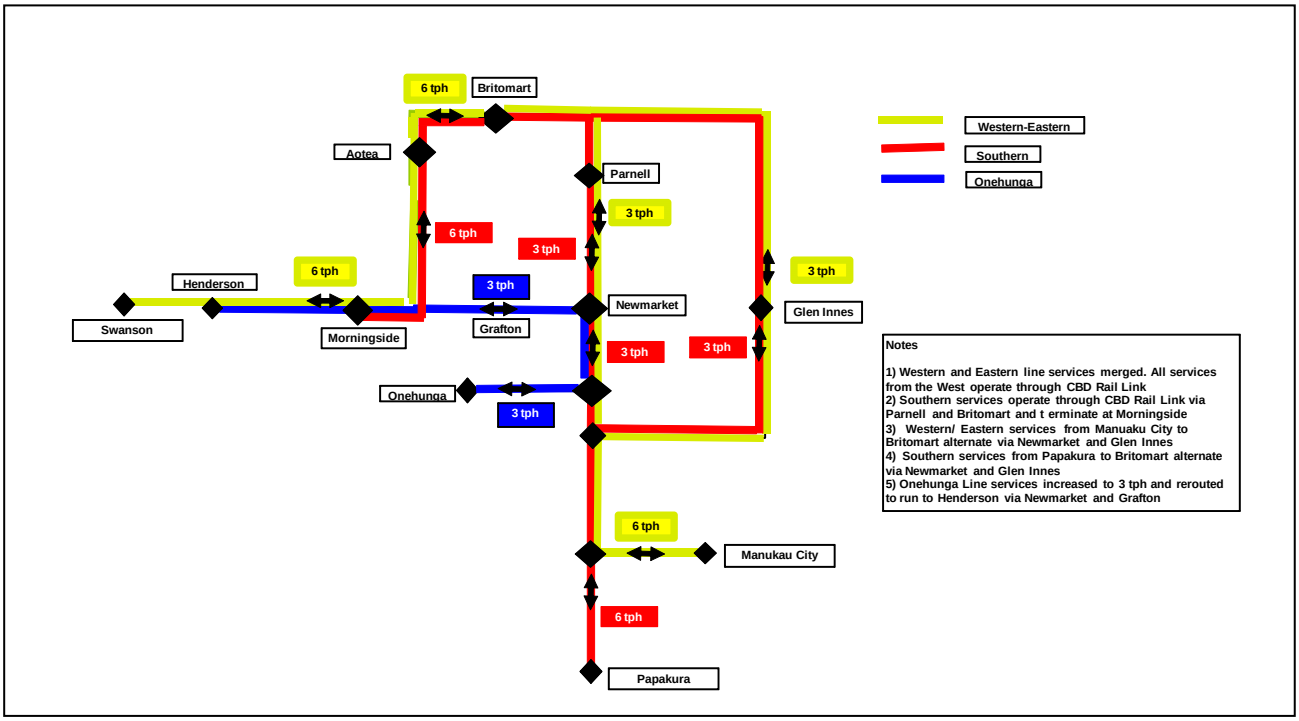


Table 4-4 shows the number of peak period services assumed to be operated through the CBD Rail Link in each direction for both the Base Option and the Minimum Rolling Stock Sensitivity Test.

Table 4-4 CBD Rail Link Peak Period Services

Peak Period CBD Rail Services (Trains Per Hour in Each Direction)	At Opening (2021)	Later Service Expansion
Base CBD Rail Link Option	15	20 by 2030
Minimum Rolling Stock Sensitivity Test	12	20 by 2027

4.1.5 Rolling Stock Requirements

Table 4-5 sets out the number of additional EMUs, beyond those assumed to be already in service by 2015, required to operate each option, both initially and to cater for growth in patronage demand later in the evaluation period. In addition for the Do- Minimum (No CBD Rail Link case) in the Economic Evaluation in Chapter 5, it has been assumed that a small number of additional EMUs would need to be bought by around 2023 in order to lengthen all peak period services to 6 car consists.

Table 4-5: Rolling Stock Requirements

Option	Extra 3 car EMUs at Opening	Further 3 Car EMUS for Service Expansion
Do Minimum – No CBD Rail Link	0	10 by 2023 (1)
Base CBD Rail Link Option	24	26 by 2030 (2)
Minimum Rolling Stock Sensitivity Test	4 (3)	46 by 2027

Notes

(1) All trains strengthened to 6 cars to maximise capacity of available trains paths to Britomart.

(2) Peak Frequency increased on all routes to 8tph to provide additional peak period capacity.

(3) Onehunga- Henderson cross town services initially assumed to be operated by 4 car loco hauled SA carriage trains to reduce initial rolling stock purchase associated with Staged Construction operations.

4.1.6 Impact of the Rail Link on CBD Passenger Flows

Transport modelling outputs from the APT model indicate the CBD Rail Link will dramatically alter the flow of passengers moving around the Auckland CBD, with wider transport network and economic development impacts.

Table 4-6 summarises the passenger flows generated from the APT transport model for the CBD Rail Link configured with three stations, consistent with the base option electric service pattern discussed above. The first column looks at the flows of people on the rail network around the stations (on trains travelling in both directions), while the other three columns summarise station usage.

Table 4-6: Passenger flows and station usage for new CBD stations

Station	Total passengers on network	Passengers alighting at station	Passengers boarding at station	Total Passengers using station
Britomart (from Parnell)	17,686	7,057	1,721	8,778
Aotea	15,659	9,663	2,015	11,678
“K” Road	15,755	4,056	1,433	5,489
Newton	15,116	1,875	1,441	3,316
To Mt Eden	16,185			

The busiest part of the network in the 2041 2-hour morning peak would be the eastern approach to Britomart, with around 17,700 passengers. Flows on the Rail Link itself are forecast to be around 15,700 passengers on either side of Aotea station and 16,200 passengers where it leaves the Western Line. The implications of this include:

- the new station at Aotea is forecast to become the busiest station on the network, with almost 12,000 passengers every peak compared to 9,000 at Britomart by 2041;

- the three new stations in total are forecast to have over 20,000 passengers every peak in 2041;
- annual rail patronage with the CBDRL is forecast to reach 50 million by 2041, more than twice what it would be if the Link wasn't built; and
- the CBDRL will remove around 15 million car-kilometres from the network in the year 2041.

The RLTS employment growth projections for the CBD discussed in Section 2.3 mean that a significant number of new jobs will need to be accommodated within the CBD and the surrounding area. The opening of the new stations accompanying the development of the CBD Rail Link tunnel will help facilitate this by widening the scope for development in the CBD.

Passenger flows highlighted in the above bullet points provide a measure for future development potential. Evidence presented in Section 2.2.3 illustrated the nature of the agglomeration forces currently at work within the CBD area and the impact on development and employment that the Britomart terminus has had on the Harbourside area unit. The potential development and regeneration benefits that Aotea and the other stations provide are significant and are discussed in further detail in Section 5.

Forecasts using APT modelling indicate that the number of AM peak passengers using "K" Road station would be around 5,500 and the equivalent figure for Newton is 3,300. The Newton station also serves as a significant transfer point for passengers changing trains between services using the CBD Rail Link and services operating to Newmarket via Grafton. However, these figures take no account of the expected regeneration impact of the stations (discussed in Section 5); the APT model has no feedback mechanism from the network to land use. In practice, the presence of the stations would lead to development in the vicinity and this would considerably increase the ridership over these forecasts.

4.2 Alignment with Government Priorities

As a project, the CBD Rail Link is consistent with central government legislative and policy documents concerning land transport and is closely aligned with regional and local strategic planning documents. Table 4-7 summarises the major legislative and strategic policy relationships that the CBD Rail Link has at the national and regional levels.

The CBD Rail Link is both complementary to and supportive of the ongoing development of the road network; especially through the Roads of National Significance projects (see Section 2.2.4). With the Roads of National Significance completed around 2020, ongoing investment will be needed to cope with growth beyond this time and to ensure that the benefits ascribed to these projects are not eroded by increasing traffic and congestion.

The 2021 completion date for the CBD Rail Link follows one year after the two strategic network projects, providing alternative infrastructure and management mechanisms to cope with growing demand over time. Better access along the western lines and improvements to the eastern and southern lines provides realistic travel alternatives for people in these areas and will relieve any traffic pressure along the Western Ring Route and through the Victoria Park Tunnel.

Constructing the CBD Rail Link provides a systematic way to drive economic growth and productivity in the Auckland region, by providing the means to facilitate the necessary land use and transport changes that bring about increased effective density and industry concentration in New Zealand's largest and most important commercial area. Appendix C provides a more detailed discussion of the strategic fit between the CBD Rail Link and the various levels of national, regional

and local planning and policy documents, as well as the impact of the changing legislative environment.

Table 4-7: CBD Rail Link Consistency and Alignment with Major Legislation and Strategic Policy Planning Documents

Document	CBD Rail Link Consistency and Alignment
Land Transport Management Act (LTMA)	Economic development is assisted through better transport capacity being supplied into the country's leading urban agglomeration, since jobs in the CBD have a higher value added per employee than elsewhere. Travel time benefits from congestion relief will happen for both private and commercial journeys. Safety, access and mobility are also improved. Rail operates within its own segregated corridor away from pedestrians and other transport users. By opening up rail, the tunnel will remove buses and cars from CBD streets for a more pedestrian friendly environment. Better network operations and modern stations provide improved access to transport and walkable precincts. Public health and environmental sustainability are also promoted. The project facilitates lower vehicle kilometres travelled on the road network by car and bus, helping to reduce emissions, air pollution, water run-off and noise.
Government Policy Statement on Land Transport Funding	The project is consistent with GPS planning and evaluation factors: • Supports productivity growth by facilitating access to the high value jobs in the CBD and opening up the area for more intensive land use opportunities, resulting from improved journey times and increased reliability. • Use of latent capacity within the existing rail network yields a lower overall whole of life cost than for other public transport options which require road space. • Promotes integrated planning by enabling bus resources to be diverted from the CBD to other parts of the network (e.g. North Shore) that are not served by rail. This also opens up travel choices for the public across wider parts of the transport network. • Unlocking rail capacity makes better use of both the existing rail and road network infrastructure, increasing current carrying capacity and delaying further significant investment in the surface network. • Reduces the environmental effects from land transport via reduced emissions and less pollutants running off into water systems. Lower air pollution is also likely to provide health benefits and be more conducive to promoting walking and cycling options in conjunction with rail based public transport. • Rail provides an alternative separate corridor and additional transport network capacity which will help to mitigate the effects of increasing and/or volatile fuel

Document	CBD Rail Link Consistency and Alignment
	prices, by both providing an alternative to using private vehicles for commuting and through reducing traffic congestion resulting in more efficient vehicle operation.
Auckland Regional Land Transport Strategy 2010 (RLTS)	The CBD Rail Link helps to achieve the strategic priorities set out in the RLTS: • Supports compact development along the rail corridor by increasing capacity at Britomart, through the three new stations in the wider CBD and potential developments around suburban stations such as Panmure and New Lynn. See Chapter 5 for more details. • Increased frequency, capacity and reliability on rail encourages commuters to switch to public transport. Recent growth in rail patronage following investment shows this. • Provides for critical investment in public transport, not just in rail, but supports the redeployment of bus resources to stretch coverage. • By taking trips off the road network it improves network functioning while limiting and/or delaying the need for future additional road capacity. • Provides environmental benefits of lower emissions, pollution and noise. However, some degree of disruption to existing commuting patterns should be expected during the construction phase.
ARTA Passenger Transport Network Plan	Improves Rapid Transit Network functionality: • The CBD Rail Link provides critical infrastructure that supports the ongoing development of the passenger transport backbone. • The CBD Rail Link improves connectivity to the growth areas to the south, around Manukau City, and to the West from New Lynn through to Henderson. • Influences future development patterns and intensification of land use. The CBD Rail Link supports increasing densification around existing stations based upon increased frequency and higher capacity services. Improves Rapid Transit Network operations: • Enables high speed, high capacity, high reliability and high frequency services to operate between the CBD and key centres along the rail corridor. • Reliably delivered journey times. • Service areas are restricted to catchments around the track, requiring coordination with other infrastructure and/or services to provide access. • Services will use modern electric multiple units and the network pattern provides for contingencies in case of breakdowns or required maintenance. Consistent with Rapid Transit Network characteristics: • Provides a separate corridor – removes congestion and right of way / access issues. • Offers high amenity at stations through increased

Document	CBD Rail Link Consistency and Alignment
	security and greater coverage of the CBD for walking.
Auckland City Council's CBD and Waterfront Strategies	The Rail Link supports the objectives contained in both these plans by providing increased accessibility to the waterfront with a through station at Britomart and increased waterfront – CBD connectivity with stations at Aotea, Newton and Karangahape Road.
Changes to Legislation Governing Auckland	Under the governance changes in Auckland that create a unitary authority, the 2010 Auckland Regional Land Transport Strategy remains in effect. Auckland Transport replaces the Auckland Regional Transport Authority and the transport functions of the previous city and district councils. Auckland Transport will be required to give effect to the 2010 RLTS and deliver transport outcomes that are consistent with it and the new Auckland Council Spatial Plan. The CBD Rail Link is already named as a key project in the RLTS. Therefore, the priority for the CBD Rail link does not change with the transition to the new organisation and becomes an important project for helping the Auckland Transport to optimally manage the Auckland transport network.

5 Economic Evaluation

5.1 Evaluation Methodology

This section presents quantitative economic evaluation of the CBD Rail Link. In accordance with NZTA guidelines, the evaluation compares the project against a “Do minimum” case. The Do Minimum involves continued operation of the existing CBD rail.

In this evaluation, two major categories of benefits arising from the construction of the CBD Rail Link have been identified and estimated:

- ‘Economic Development’ benefits occurring in the form of stronger employment growth, higher value added, and real estate value appreciation that would flow from regeneration of the CBD; and
- ‘Conventional’ transport benefits that include direct transport benefits such as time savings and decongestion; and Wider Economic Benefits (WEBs) such as agglomeration, as set out in the EEM.

Quantified costs and benefits of options were discounted over 30 years using a discount rate of 8%. The sensitivity of evaluation results to changes in the discount rate was tested using 6% and 4% discount rates.

5.2 Costs

This section summarises capital and operating costs used in the evaluation. Further details of costings are contained in Appendices D, E and F.

5.2.1 Capital Costs

Table 5-1 summarises the capital costs estimates used in the economic evaluation for:

- CBD Rail Link construction
- Property acquisition
- Rolling Stock
- Associated Rail Network Infrastructure works

Table 5-1 Summary of Capital Costs

Capital Costs	$M (2010 Dollars)	Present Value (8% Discount Rate)
CBD Rail Link Construction Costs (Mean cost estimate) [1)]	1,861	1,151
Property Acquisition Costs [2)]	130	140
Additional Rolling Stock needed at Opening (24 by 3 car EMUs) [3)]	240	111
Associated Rail Network Infrastructure works [4)]	100	46
Total Initial Capital Cost	**2,311**	1,448
Further batch of rolling stock in 2030 (26 by 3 car EMUs) [5)]	260	60

Notes:

1) Refer to Appendix E for a summary of the Construction costs.

2) Net costs after disposal of properties following construction.

3) Refer to Appendix F for details of post CBD Rail link rail operations and rolling stock requirements.

4) Allowance for possible rail network infrastructure upgrade works to accommodate post CBD Rail Link rail service patterns and frequencies- refer to Appendix F for more details.

5) A subsequent batch of trains has been allowed for in 2030 to enable further rail passenger service enhancements to cater for patronage growth.

5.2.2 Recurrent Costs

Recurrent costs for infrastructure maintenance and operations, train operations and maintenance, together with annual cost savings from post CBD Rail bus network rationalisation are summarised in Table 5-2. Refer Appendix F for details of these costs.

Table 5-2 Summary of Recurrent Costs

Recurrent Costs	Annual Cost $M (2010 Dollars)	Total Cost – Present Value (8% Discount Rate)
Additional Stations & Rail Infrastructure Operating & Maintenance Costs	7.5	36
Additional Train Operating Costs	0.4 per 3 car EMU	66
Reduction in Bus Network Operating Costs	-9	-43

5.3 CBD Regeneration Benefits of Rail Link

The investment in major transportation infrastructure, in addition to providing mobility benefits for residents and employees, shapes how metropolitan areas develop over decades. As part of the development of the Business Case for the Auckland CBD Rail Link Project, the team examined and estimated the benefits of this major rail infrastructure investment on the regeneration and future development of the Auckland CBD. The Auckland CBD is defined for this analysis to include APT Zones 191 to 199, which generally encompasses the area between the harbour and the motorway loop.

5.3.1 Case Study Comparisons

In order to better understand how rail transit system investment influences CBD development, the team compared city pairs that had similar CBDs with one of the pair having invested in a rail transit system and the other not. North American cities were used in the case studies because they urbanised during the 20th Century like Auckland and because they offered a larger sample for selecting matched pairs. Since cities are built over decades if not centuries and rail transit investment provides transport services over many decades, the construction impact was examined over a 20-year period. Most CBDs today are dominated by office use, and office construction was selected as the indicator of CBD vitality. The city pairs are:

- San Francisco, California and Los Angeles, California
- Portland, Oregon and Memphis, Tennessee
- San Diego, California and St. Petersburg, Florida

Realising that no two cities are exactly alike, the city pairs were selected on the basis of similar metropolitan area size, comparable international stature, similarity of employment profile and, perhaps most important of all, similar geographic context. While the Los Angeles metropolitan area is considerably larger than that of San Francisco, the two cities are comparable in terms of international stature. Portland and Memphis are both medium size American cities that had a similar number of employees with nearly identical employment profiles, and each CBD is adjacent to a river. The Portland CBD is on the bank of the Willamette River, and the Memphis CBD is on the bank of the mighty Mississippi River. Both San Diego and St. Petersburg are harbour front cities, and their CBDs are very comparable in size and orientation to the harbour. San Francisco, Portland and San Diego built rail rapid transit systems and Los Angeles, Memphis and St. Petersburg did not for the time period of analysis. Los Angeles has been aggressively building rail transit but much of the actual implementation has been subsequent to this analysis period.

5.3.2 San Francisco and Los Angeles, California

The Bay Area Rapid Transit (BART) rail transit system that serves the San Francisco Bay Area commenced service in 1972. The 20-year period analysed for this case study is from 1970 to 1990. Development progress in San Francisco's CBD is compared to that of Los Angeles, the largest city in California.

In 1970, the Los Angeles region had a population over twice that of San Francisco. The median household income in the city of San Francisco was $37,160 compared to $41,260 in Los Angeles. The proportion of the city's population that was employed and unemployment rates were very similar (see Table 5-3).

Table 5-3 San Francisco and Los Angeles Comparison, 1970 Census Data

1970	Regional Population	City Median HH Income [1]	City Employed Residents	Unemployment Rate
San Francisco[2]	2,901,604	$37,161	329,405	6.2%
Los Angeles[3]	8,463,213	$41,259	1,164,511	6.9%

[1] in 2006 US dollars

[2] Region includes San Francisco, Alameda, Contra Costa and San Mateo Counties

[3] Region includes Los Angeles and Orange Counties

1970 Census of Population

The first segment of the system to open was 28 miles and the initial phase emphasised rail transit between San Francisco and the East Bay cities and suburbs of Contra Costa and Alameda Counties. Currently, BART operates five lines on 104 miles of track with 43 stations in four counties.

To compare CBD development progress in San Francisco and Los Angeles during the 20-year period from 1970 to 1990, the boundaries of the CBD and surrounding region for each city were defined. These boundaries were established based on our understanding of each city's downtown core and either natural or man-made geographic boundaries. The San Francisco CBD area encompasses approximately 2.0 square miles (5 square kilometres) and the Los Angeles CBD encompasses approximately 2.3 square miles (6 square kilometres). The surrounding region for San Francisco CBD includes the remainder of San Francisco County, Alameda County, Contra Costa County and San Mateo County. The surrounding region for Los Angeles CBD includes the remainder of Los Angeles County and Orange County.

Figure 5-1 San Francisco and Los Angeles CBD Boundaries

San Francisco CBD

Los Angeles CBD

Of the 114 million square feet of new office space built in the San Francisco region between 1970 and 1990, 30% was located within the San Francisco CBD. A much smaller proportion of new office development in the Los Angeles region occurred within its CBD; just 8% of the over 300 million square of new office space. As a region, Los Angeles built over 2.6 times the square footage of office space compared to San Francisco. Even in absolute terms, the San Francisco CBD built ten million square feet more office space during this period than the Los Angeles CBD. Los Angeles did start to plan its rapid transit system during the 1980s, but the primary impact of its system occurred after our 1970 to 1990 analysis period.

Figure 5-2 New Office Space Development in square feet (SF) in San Francisco CBD / Los Angeles CBD and Surrounding Region, 1970-1990

Square Feet (% of Total)	San Francisco	Los Angeles
CBD	34.80 million (30%)	24.70 million (8%)
Region	79.33 million (70%)	276.89 million (92%)

Note Percentage shares in brackets

Source: CoStar 2010

5.3.3 Portland, Oregon and Memphis, Tennessee

During the early 1980s Portland decided to use its Federal funds initially allocated for the Mount Hood Freeway to develop its first light rail line, the Banfield Line, which extended from the Portland CBD to the semi-rural eastern suburb of Gresham. In contrast, Memphis elected to build a motorway ring road out from its CBD. The first Portland light rail line was completed in 1986, and the 20-year period analysed for this case study is from 1980 to 2000.

Office construction in Portland's CBD is compared to that of Memphis, a city of similar size also with a downtown situated along a riverbank. In 1980, the population of the Portland region was greater than that of the Memphis region; however, the city of Memphis had more jobs at 313,410 than the city of Portland at 302,900. The median household income in Portland was $41,050 compared to $38,980 in Memphis (see Table 5-4).

Table 5-4 Portland and Memphis Comparison, 1980 Census Data

1980	Regional Population	City Median HH Income [1]	City Employment	Unemployment Rate
Portland[2]	1,050,411	$41,048	302,920	6.9%
Memphis City[3]	777,113	$38,984	313,411	5.2%

[1] in 2006 US dollars

[2] Region includes Multnomah, Clackamas and Washington Counties

[3] Region includes Shelby County

1980 Census of Population

When the Portland MAX light rail system began service, it covered 15 miles of track with 27 stations, five park-and-ride facilities, and five bus transfer centres. The system has expanded a number of times, most recently in 2009, and currently includes 84 stations located along 52 miles of track.

To compare CBD development progress in Portland and Memphis during the 20-year period from 1980 to 2000, boundaries for the CBD and surrounding region were established for each city. The CBD boundaries are shown below. The Portland CBD area encompasses approximately 1.1 square miles (2.8 square kilometres) and the Memphis CBD encompasses approximately 1.0 square mile (2.6 square kilometres). The surrounding region for Portland CBD includes the

remainder of Multnomah County, Clackamas County and Washington County. The surrounding region for Memphis CBD includes the remainder of Shelby County.

Figure 5-3 Portland and Memphis CBD Boundaries

Portland CBD

Memphis CBD

As shown below, of the 29.4 million square feet of new office space built in the Portland region between 1980 and 2000, 24% was located within the Portland CBD. In comparison, of the 20.9 million square feet of new office space built in the Memphis region, only 5% occurred within its CBD. In absolute figures, Portland CBD saw 7.1 million square feet of new office space development during the same period that Memphis CBD saw 1.05 million square feet. In part due to the construction and expansion of its regional light rail system, the Portland CBD built nearly seven times the office space as compared to the Memphis CBD. As Portland has continued to expand its light rail system, the Memphis region has recently decided once again against building such a system.

Figure 5-4 New Office Space Development (sq ft) in Portland CBD / Memphis CBD and Surrounding Region, 1980-2000

Square Feet (% Total)	Portland	Memphis
CBD	7.10 million (24%)	1.05 million (5%)
Region	22.33 million (76%)	19.85 million (95%)

Note Percentage shares in brackets

Source: CoStar 2010

5.3.4 San Diego, California and St. Petersburg, Florida

The San Diego Trolley, a light rail system, began revenue service in 1981. The 20-year period analysed for this case study is from 1980 to 2000. Office development in the San Diego's CBD is

compared to that of St. Petersburg, Florida, also a coastal city that has a CBD bounded by major motorways and located adjacent to a harbour.

In 1980, the population of the San Diego region was 1.86 million which is somewhat larger than that of the St. Petersburg region at 1.57 million. The median household income in San Diego was also higher at $45,560 as compared to $32,760 in St. Petersburg (see Table 5-5). The employment profiles in the cities of San Diego and St. Petersburg were roughly comparable.

Table 5-5 San Diego and St. Petersburg Comparison, 1980 Census Data

1980	Regional Population	City Median HH Income [1]	City Employment	Unemployment Rate
San Diego[2]	1,861,846	$45,563	485,387	5.2%
St Petersburg[3]	1,569,134	$32,761	95,047	5.6%

[1] in 2006 US dollars

[2] Region is San Diego County

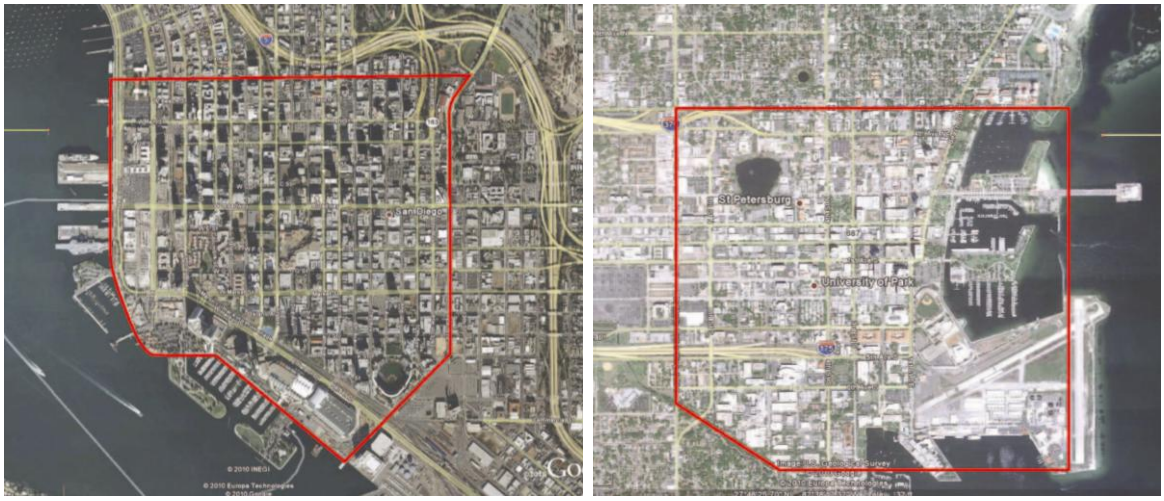
[3] Region includes Pinellas, Pasco and Hillsborough Counties

1980 Census of Population

The San Diego Trolley system opened in 1981 with 13.5 miles of operations on the Blue Line. The system has increased its service area several times, with the most recent expansion occurring in 2005, the extension of the Green Line. The light rail system currently has 52 miles of rail and 53 stations.

To compare CBD development progress in San Diego and St. Petersburg, boundaries for the CBD and surrounding region were established. The San Diego CBD area encompasses approximately 1.2 square miles (3.1 square kilometres) and the St. Petersburg CBD encompasses approximately 1.0 square mile (2.6 square kilometres). The surrounding region for San Diego CBD includes the remainder of San Diego County. The surrounding region for St. Petersburg CBD includes the remainder of Pinellas County, Pasco County and Hillsborough County.

Figure 5-5 San Diego and St. Petersburg CBD Boundaries



San Diego CBD St. Petersburg CBD

The San Diego region and the St. Petersburg region each added 55 million square feet of new office space between 1980 and 2000. Of this space, 11% was built within the San Diego CBD

compared to only 3% in St. Petersburg CBD. Approximately 6.14 million square feet of office space was built in the San Diego CBD and 1.68 million square feet was built in the St. Petersburg CBD. San Diego built a light rail system and St. Petersburg did not.

Figure 5-6 New Office Space Development (sq ft) in San Diego CBD / St. Petersburg CBD and Surrounding Region, 1980-2000

Square Feet (% Total)	San Diego	St. Petersburg
CBD	6.14 million (11%)	1.68 million (3%)
Region	49.22 million (89%)	53.74 million (97%)

Note Percentage shares in brackets

Source: CoStar 2010

5.3.5 Implications for Auckland from the Case Studies

Accepting the fact that the comparisons are less than perfect and the three city pairs represent a limited sample size, the analysis showed that the CBDs that enjoyed new rail rapid transit systems captured on average 21.6% of its regional office market over a 20 year period following the start of construction as compared to 5.3% for the CBDs that did not enjoy the development of such systems. On average this represents a four-fold increase in CBD office market share. These case studies demonstrate that the construction of rail rapid transit systems oriented to serve the CBD lead to accelerated CBD office construction. A larger office concentration in the CBD creates many benefits for the region, including higher average salaries, a larger economy, a greater range of retail and restaurant offerings in the CBD and likely more cultural and entertainment opportunities. The key reason employers prefer a central location with good peak hour access is proximity to the largest possible labour force. Being able to select from the widest possible range of employees allows an employer to maximise productivity for wages paid.

Rather than being an entirely new system, the Auckland CBD Rail Link completes an existing system that currently does not fully service the CBD. Because the Auckland case differs from the North American cities that built new systems, the impact of the CBD Rail Link on the Auckland CBD office market share will not be as great. However, the case studies suggest that if the CBD Rail Link project is built, the Auckland CBD can expect accelerated office space construction over the 20 years following start of construction. Based upon the multiples generated between those cities that developed a rail system and those that did not, a doubling of office construction over this 20 year period would be a reasonable expectation, compared to the no build scenario.

5.3.6 Real Estate Value Increase at Stations

In addition to accelerating office construction in the CBD, there is evidence that the value of all types of real estate benefit from proximity to rail transit stations. The consultant team searched the databases of libraries and transit research institutes in the United States, which has a substantial body of literature in this field; to gather relevant information on the effect rail based transit has had on property value and real estate development. In all over 30 academic studies were reviewed (see Appendix J: *Literature Review of Transit's Impact on Property Value in North America*).

The majority of these studies utilised hedonic price modelling to quantify rail's effect on property value. Hedonic modelling is a regression model that is used to explain how consumers value the different attributes that comprise real property. The methodology attempts to control the different

attributes of real property to determine if the study variable has an effect on the overall price of the property. In the case of these studies, the variable is the property's distance to a rail station or track.

For this literature review, only those studies that were most significant and relevant were selected. All of the studies included in this literature review confirmed that for properties located within walking distance (up to 750 metres in most cases) of a transit access point, the introduction of a rail-based transit system will ultimately have a positive influence on property value and development. However, supportive local policies and demographics, well-designed stations, efficient and effective transit systems, and a strong real estate market must also exist for transit to have a significant effect on property value and development. Benefits associated with a close proximity to transit are thought to be greatest and development typically most profitable in fast-growing, congested areas with a buoyant economy and transit supportive public policies.

With the introduction of rail-based transit, residents and property owners have increased mobility. While this increased mobility can be viewed as an amenity, a negative nuisance effect can also occur. Rail transit systems, particularly heavy or commuter rail lines can produce excessive noise, vibration, air pollution, increased bus and car traffic. However, with thoughtful system design and careful vehicle selection, the negative nuisance effect can be minimised. Since the Auckland CBD Rail Link will be underground, the nuisance effects are buried.

Residential and commercial properties value transit for different reasons. For residential properties improved access to transit can ease the commute to work and reduce travel cost. For commercial properties transit access gives their users greater exposure to the rest of the community by increasing the number of citizens who can access the businesses, as employees or clients, and services located on the property. When studies evaluated both commercial and residential properties, researchers found rail transit to have a greater effect on commercial rather than residential property value. Furthermore, if both commuter and light rail systems service the area, researchers determined that commuter rail had a stronger effect on property value. Thus, one can conclude that a commercial property located within walking distance of a commuter rail station will experience the greatest price premium as a result of the introduction of a rail-based transit system.

However, simply building a rail-based transit system will not automatically increase property value and stimulate development. A number of other factors must also exist for the transit system to have a positive effect on property value. These factors include the existence of public policy that encourages transit oriented development; a community whose demographics indicate that they will be highly inclined to utilise transit; a transit system that is reliable and effective in both service and design; a strong real estate market; and station design that encourages transit use and decreases potential nuisance effects. Auckland appears to have these attributes.

Furthermore, as the studies of San Diego, San Francisco and Portland concluded, transit's positive effect on property value increases with system maturity. As a transit system ages, residents of the area begin to incorporate the use of the system into their everyday activities. In addition, as a system matures, it typically increases its service area and frequency of service, as was the case in all of the regions included in this study. The residents of the community place a greater value on transit access as they experience increased amenity due to the expanded service area and increase in service frequency.

While the strength of transit's effect on property value and development varies among the regions, all of the academic studies agree on the following:

- Rail-based transit can have a positive effect on property value.
- Properties within walking distance of a rail station experience the greatest benefit.

- The positive value impact increases with system maturity due to some combination of system expansion, user familiarity, improved operations and new development around the stations.
- Properties located in densely populated settings experience greater price premiums.
- Transit oriented developments can be financially successful if there is supportive public policy and market demand.

The research summarised in this paper has the following implications for Auckland:

The Auckland CBD is a geographically contained area (see Figure 5-7) defined by a motorway loop and the harbour. Based upon the benefit distances found in the literature, essentially all of the area within this well defined CBD and the Newton area would be within walking distance of and well served by the three planned rail stations. All properties within the Auckland CBD can be expected to benefit from the Rail Link Project although the properties within 400 metres of the stations will benefit the greatest.

Figure 5-7 Auckland CBD Geographic Boundaries

Properties near suburban stations that experience substantially improved service into the CBD and other employment centres due to the Rail Link project can also expect value increases. The literature indicate that it is the office commercial land use that tends to benefit to the greatest extent from improved rail service, and the Auckland CBD is primarily an office commercial centre.

As the New Zealand economy grows and the Auckland region gains population, a significant share of the new population will be immigrants from countries that have greater population densities (see the demographics appendices attached to the Alternatives Paper in Appendix D). This population is likely to be comfortable with higher density housing and transit usage.

The literature indicates that simply building a rail system is not sufficient to induce land use intensification and higher density development. Other supportive policies include well designed and pleasant stations; convenient, attractive and safe pedestrian passageways from the rail stations to key points in the CBD; zoning policies that encourage transit supportive land development near the stations; and station area plans that create a strong sense of place.

Since the benefits of rail increases with system maturity and comprehensiveness, it may take 20 to 30 years or more for the benefits of the Auckland CBD Rail Link to be fully realised.

Based on the findings of the academic studies, it is reasonable to estimate that properties located within 400 metres of the proposed Auckland CBD Rail Link stations can achieve the following land value premiums as a result of project implementation (Table 5-6). The balance of the CBD will also benefit but perhaps to a lesser extent.

Table 5-6 Estimated Property Value Premiums within 400 Metres of Auckland Rail Link Stations

Property Type	Value Premium
Residential	10-25%
Office	25-60%, up to 120% within a CBD
Retail	30-50%

5.3.7 Transportation Capacity and CBD Employment Growth

Because the Auckland CBD is surrounded by a motorway loop and the harbour, there are a limited number of access points into the CBD consisting of roadways and one rail line into Britomart. As the New Zealand economy grows and pressure for CBD intensification mounts, the employment capacity of the CBD will be determined by transport capacity during the peak period. The North American Case Studies indicate that rail investment focused on the CBD will accelerate CBD development and employment growth. The transport demand analysis suggests that without the Rail Link Project CBD employment growth will be constrained due to increasing congestion on roadways leading into the CBD and lengthened travel times for commuters coming by car and bus.

5.3.8 Projected CBD Real Estate Market Demand and Construction with and without Rail Link

A real estate market analysis of expected future CBD development was undertaken, based upon the two growth scenarios. The analysis is rooted in local market conditions and development trends but takes full advantage of the global CBD regeneration experience of key team members. The analysis reviewed historical demographic trends in New Zealand and in the Auckland region. It then examined future demand for office space, retail/restaurant space, hotel room and housing units using the two forecasts as control parameters. The need to replace older obsolete space was taken into consideration. The full CBD Real Estate Market Demand with and without the CBD Rail Link is contained in Appendix K.

As shown in Table 5-7, the real estate market forecasts indicates that in the 30 year period from 2011 to 2041 commercial construction in the Auckland CBD, in addition to projects already in the development pipeline, will approximately double if the CBD Rail Link is built and opens by 2021. Since there are relatively few vacant and readily developable parcels in the CBD, buildings that are economically obsolete will be demolished for the construction of larger and higher quality new

buildings. The estimated total office, retail, housing and hotel building stock in the CBD is presented in Table 5-8. Given the additional commercial space demand caused by the CBD Rail Link and the fact that it will have one of the three stations, the Newton neighbourhood will likely transition from a CBD fringe area into an integral part of the new Auckland CBD.

Table 5-7 New Auckland CBD Construction 2011-2041 with and without CBD Rail Link

Supportable New Construction[1]	2010 to 2021	2021 to 2031	2031 to 2041	2010 to 41 Cumulative	Rail Link Premium
Office (m^2)					
CBD Rail Link	185,353	348,604	247,809	781,766	95%
No CBD Rail Link	0	194,395	207,287	401,683	
Retail (m^2)					
CBD Rail Link	36,774	43,746	31,231	111,750	74%
No CBD Rail Link	12,870	25,318	26,144	64,332	
Dwelling Units					
CBD Rail Link	17,781	7,566	5,790	31,137	44%
No CBD Rail Link	12,882	5,448	3,315	21,644	
Hotel Rooms					
CBD Rail Link	716	1,985	1,983	4,684	107%
No CBD Rail Link	149	1,125	989	2,263	

[1] In addition to projects currently in the development pipeline

Table 5-8 Estimated Total Building Stock in the Auckland CBD with & without CBD Rail Link

Total CBD Building Stock	2010	2021	2031	2041	Change 2010 to 2041	Rail Link Premium
Office (m^2)						
CBD Rail Link	1,344,714	1,608,385	1,854,026	1,987,047	642,333	18%
No CBD Rail Link	1,344,714	1,429,999	1,556,514	1,683,166	338,452	
Retail (m^2)						
CBD Rail Link	164,374	205,643	237,050	254,058	89,684	18%
No CBD Rail Link	164,374	182,835	199,011	215,205	50,831	
Dwelling Units						
CBD Rail Link	12,149	28,778	34,469	38,095	25,945	27%
No CBD Rail Link	12,149	24,101	28,253	30,113	17,964	
Hotel Rooms						
CBD Rail Link	5,058	5,774	7,759	9,742	4,684	33%
No CBD Rail Link	5,058	5,207	6,332	7,321	2,263	

Source: AECOM

Consistent with the case study findings, the local real estate market analysis suggests that investment in the CBD Rail Link will accelerate Auckland CBD employment growth and new real estate development will be required to accommodate and service that growth. While the primary impact of the CBD Rail Link will be to stimulate office development and office employment growth, retail development will keep pace to service this office employment growth. As the Auckland CBD becomes larger and more vibrant, the greater variety of shops, restaurants, cultural and entertainment venues will also allow Auckland to become a more desirable visitor destination. Tourists visiting New Zealand will likely increase their length of stay in Auckland.

Even a modest increase in visitor length of stay will increase local hotel demand noticeably. The real estate development implications of constrained CBD access will be the development of one or

more secondary centres of employment concentration. A single strong Auckland CBD provides New Zealand with a stronger competitive profile for the educated and highly skilled work force in the global market place as compared to two or three lower profile urban/suburban centres.

The case studies, the market analysis and the transport capacity evaluation all lead to the conclusion that the construction of the CBD Rail Link will accelerate office employment growth in the CBD. With supportive planning policies, increased retail, hotel and housing development will follow commercial office intensification into the CBD. While the RLTS forecast acknowledges the possibility of the CBD Rail Link, the timing of that forecast was well in advance of project certainty. The CBD land use intensification that would be expected from Rail Link implementation have not been reflected in these forecasts to any significant extent (see detailed review in Appendix K).

The two scenarios presented in Table 5-9 below can be thought of as two alternative futures for the Auckland CBD:

- ARC RLTS Scenario – Not substantially reflective of the land use changes that would be induced by the CBD Rail Link.
- ACC Medium Scenario – Reflects the CBD land use changes that would be induced by Rail Link assumed to open in 2021.

The difference in employment growth between the two scenarios can be attributed to the additional transport capacity provided by the CBD Rail Link and the economic stimulus that such a major public investment will provide to induce private investment in the Auckland CBD. As illustrated by the case studies, the acceleration effects start not with rail system completion but rather as soon as project certainly is reached and construction begins.

Table 5-9 CBD Employment Growth Forecast Scenarios

Scenario	2011	2021	2031	2041	2051
ARC RLTS Scenario	94,541	103,739	112,917	122,105	131,293
ACC Medium Scenario[1]	94,541	116,680	134,500	144,150	153,800
Difference	0	12,941	21,583	22,045	22,507

[1] adjusted to match RLTS for 2011

5.4 Benefits and Opportunities of Transit Oriented Development at CBD Stations

While a number of growth strategies currently exist for the Auckland Region, all essentially aim for a 'centres and corridors' approach, whereby emphasis is on the establishment of a city form based on higher density centres in conjunction with quality public transport to provide for sustainable economic, environmental, social and cultural wellbeing. Such a spatial strategy clearly points towards development of centres based on the principles of transit oriented development.

Through investigative modelling of typologies for development and gaining a thorough understanding of the existing and future growth restraints and opportunities around the proposed CBD Rail Link stations and a number of suburban stations, the potential for growth around the CBD Rail Link and suburban stations has been identified. The intention has been to highlight potential for growth in the context of sustainable 'place making' – attractive, memorable, human scale

environments that reinvigorate the culture of the local environment – while ensuring that such growth is achievable and fits with the physical context of the environment (for details see *Future Growth Opportunities (Urban Design)* report in Appendix H).

The literature review, including case studies, points towards a variety of benefits in relation to TOD. The benefits are wide ranging and have been identified as including:

- Increase ridership and fare revenues;
- Potential for joint venture development opportunities;
- Better places to live, work and play – TODs have the potential to result in revitalised neighbourhoods. Through a variety of catalyst projects, such as rail station development and public realm and/or facility upgrades, TODs have the potential to breath new life into areas that have seen little or no growth in recent years;
- Reduced crime and increased safety, through revitalisation of the TOD location (facilitated through greater passive surveillance);
- Greater mobility with ease of moving around and subsequent increase in transit ridership and decrease in congestion and private vehicle use;
- Higher, more stable property values (whilst providing for a variety of housing types and costs);
- Infill development reduces the need for green field development and associated costs, e.g road expenditure;
- Increased employment opportunities;
- Increased foot traffic and retail sales for local businesses;
- Increased access to labour pools through enhanced local and regional connectivity; and
- Increased physical activity (and subsequent health benefits) – recent studies show that public transport commuters walk up to five times the distance than that of private vehicle commuters.

These will be discussed in context with the proposed new stations in the CBD area.

5.4.1 Aotea Station Precinct

The proposed Aotea Station, with a primary entrance located on the corner of Mayoral Drive and Wellesley Street, provides for access to the heart of CBD and Auckland's commercial core. Shopping activities also remain a large draw card to the city with stores such as Smith and Caughey drawing up to 3 million people per year. Auckland City Council has also indicated the following visitor numbers to the CBD for non-residential and commercial activities within close vicinity of the proposed Aotea Station:

- Auckland Central Library – 1.2 million
- Auckland City Art Gallery – 450,000 (anticipated with redevelopment)
- The Edge (combined Aotea Centre, Town Hall, Civic theatre) – 1 million
- Sky City Cinema complex - 6.7 million
- Sky City (Sky Tower) - 1 million +

- University students at AUT University and University of Auckland campuses total approximately 50-60,000 per day. Significant campus redevelopment may see this grow by a further 10-20%.

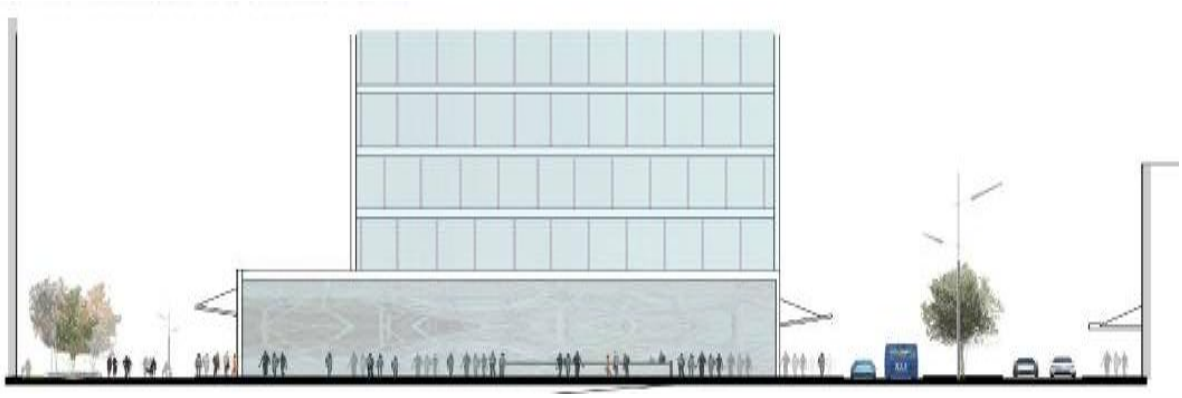
As has been evidenced by similar public transport developments in other cities around the world, the benefits of station development are accrued at their highest within a five minute walking distance and, to a lesser extent, within the five to ten minute walking distance from the station. In addition to including a number of significant attractors and existing commercial development, the Aotea Station walking catchment includes a number of vacant sites (including car parking sites at the corner of Victoria and Albert Streets, and Wellesley Street and Mayoral Drive), large sites in common ownership and buildings that have reached the extent of their valued life. A 'station premium' is likely to assist in facilitating the redevelopment of sites within walking distance of the station. Such sites offer the potential to maximise the relationship between future development and the proposed station location, either through public private partnerships or other initiatives.

A number of physical constraints currently have the potential to restrict the future attractiveness of the CBD to grow as an attractive pedestrian friendly city, including:

- Heavily trafficked roads
- Low amenity streets
- Areas of limited passive surveillance
- Areas of reduced pedestrian amenity

On-going improvements to the public realm will likely have the benefit of attracting people to use and invest in the area, and also have the potential to assist in increasing rent premiums.

Figure 5-8 Indicative section potential for a main Aotea Station entrance and commercial / civic tower above, at corner of Wellesley Street and Mayoral Drive. Such a development would have the potential to be integrated with high quality public realm, connecting between the station, Aotea Station and the Town Hall.



In particular, the following public realm potentials and opportunities have been identified within close vicinity to the proposed Aotea Station:

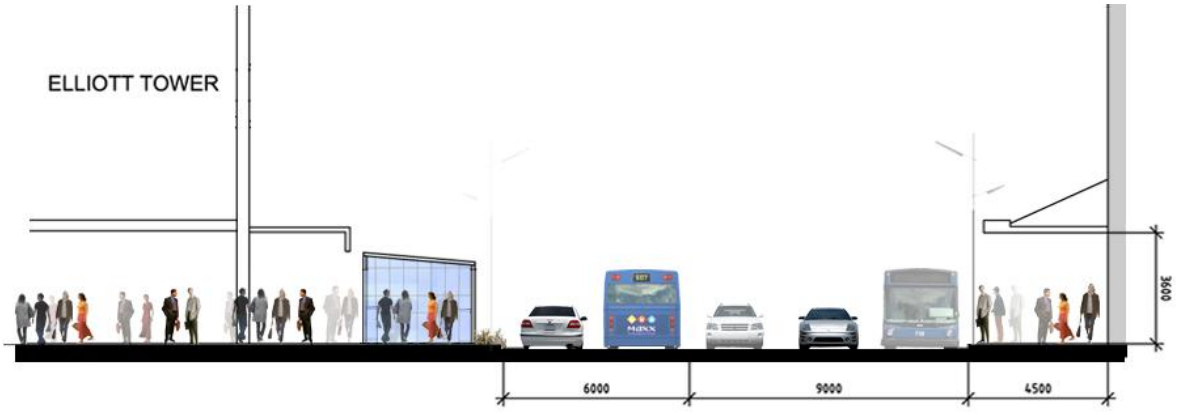
- Mayoral Drive: Currently there is little frontage onto this street, although the street does benefit from good sun and is relatively wide, enabling the opportunity for enhanced public realm. It is considered that the opportunity exists for buildings to front Mayoral Drive, engaging with a high amenity pedestrian friendly realm.

- Federal Street: The opportunity exists to enhance public realm and active facades along this north south desire line.
- Aotea Square: The provision of a station and/or other catalyst project on the periphery of Aotea Square has the potential to enhance access to the city's premier cultural and civic precinct.
- Albert and Victoria Streets: The width of Albert Street provides potential for pedestrian realm improvements. The street also provides for legible, quick connections with Victoria Street and existing bus routes. The potential exists to provide for good access down to Elliot, Darby and Queen Streets and, given the number of bus routes within the area, this area also has the potential to become a multi modal public transport interchange.
- Elliot and Darby Streets: These streets are to be pedestrianised and have the potential to become high amenity, vibrant pedestrian areas.
- Queen Street: Auckland's premier street has the potential to provide for safe, universal access throughout the day and evening and is continuing to undergo upgrades to enhance amenity values.

In addition to the aforementioned specific opportunities, the area also has the potential to provide for:

- Strong pedestrian, cycle and public transport connections with the wider environment.
- Pedestrian and cycle routes that respond to local desire lines.
- Enhanced public realm (streetscape and open space).
- Reduced crime and increased safety, through revitalisation and invigoration of the location (facilitated through greater passive surveillance).

Figure 5-9 Indicative section showing vision for integrated Aotea Station entrances on Victoria Street, adjoining future development over existing vacant land (corner of Albert and Victoria Streets).



In summary, it is considered that Auckland CBD, through the establishment of the CBD Rail Link and other catalyst projects in favour of the public, has the potential to provide for significant employment growth. In particular, it is considered that current employment densities within commercial blocks could realistically see up to a four-fold increase within the 1000m catchment of the proposed Aotea Station. Such growth would be subject to appropriate incentives which may include policy initiatives, public realm upgrades and/or other catalyst projects within the area.

5.4.2 Karangahape Road Station Precinct

The proposed K Road Station is located in an area defined by mixed use, commercial and intermittent residential land uses. The proposed K Road Station is well located, 30 metres from the corner of K Road and Pitt Street. K Road is a popular destination for shoppers during the day, and offers a range of pubs, cafes and nightclubs for evening goers. Auckland Hospital, the School of Medicine and southern parts of AUT and Auckland University are located to the east and northeast of the study area. While these areas are not within the immediate vicinity, they are within a 10-15 minute walking distance over relatively flat topography.

Myers Park, located to the north of K Road and accessible via St Kevin's Arcade, provides a significant amenity for local residents and employees in the area. As well as containing a playground and kindergarten, the park provides a 'backyard' for residents living in nearby apartments, and offers a 'green lung' in an otherwise urbanised area.

As has been described above, the benefits of station development are accrued at their highest within a five minute walking distance and, to a lesser extent, within the five to ten minute walking distance from the station. The K Road Station walking catchment includes a number of vacant sites, large sites in common ownership and buildings that have reached the extent of their valued life (refer Attachment C - Land Use and Height Studies for Newton and K Road Station Locations). In particular, land to the south of K Road, moving down towards the Central Motorway Junction (CMJ), is underutilised, restricted by planning regulations (e.g. height rules) and lacking quality public realm that could otherwise incentivise growth. A 'station premium' is likely to assist in facilitating the redevelopment of sites within walking distance of the station. Such sites offer the potential to maximise the relationship between future development and the proposed station location, either through public private partnerships or other initiatives.

Figure 5-10 Ten minute walking catchment from the proposed K Road Station

A number of physical constraints currently have the potential to restrict the future attractiveness of the CBD to grow as an attractive pedestrian friendly city, including:

- Heavily trafficked roads

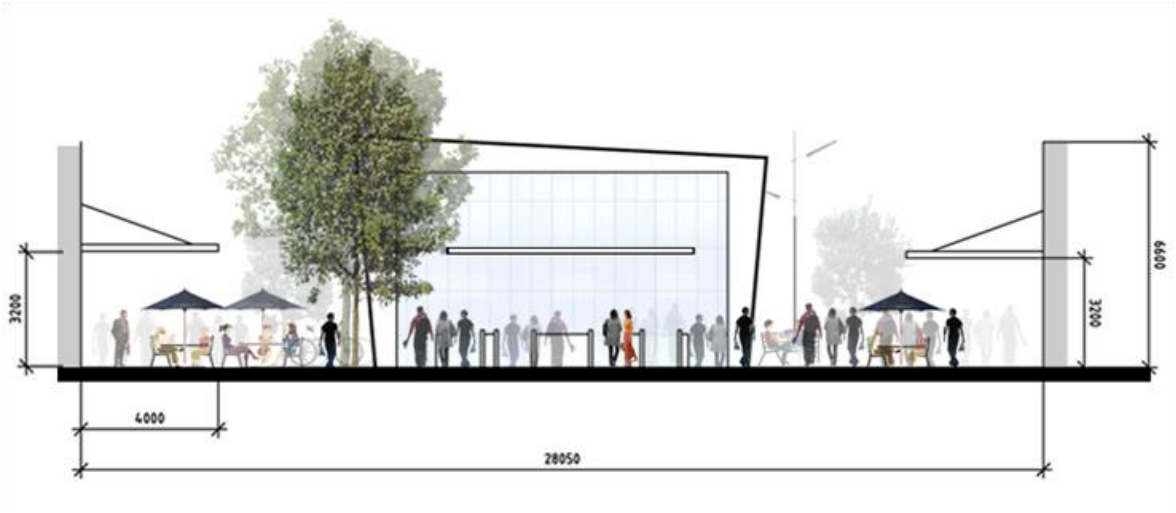
- The Central Motorway Junction (CMJ)
- Low amenity streets
- Areas of limited passive surveillance

Figure 5-11 Perspective aerial illustrating large areas of underutilised land to the south of K Road

On-going improvements to the public realm will likely have the benefit of attracting people to use and invest in the area, and also have the potential to assist in increasing rent premiums. In particular, the following public realm potentials and opportunities have been identified:

- K Road heritage buildings and high street character: K Road is currently a well utilised community precinct / centre, enjoyed by a variety of people throughout the day and night. The street provides for continuous active facades over the majority of its length. The flat topography and wide streets provide the potential for universal access and long views down the length of the street. Retention of the historic fabric and 'high street' character will preserve the areas unique character, which is likely to continue to grow as an attracting quality. Reinforcing existing attractors such as community amenities, local cafes, restaurants and bars will also act as an attractor for many people.
- Beresford Square: This small plaza has the potential to have strong connections with the surrounding environment, connecting with existing and future desire lines. This area is well located adjacent to K Road and still on the ridgeline. Beresford Square has been identified as an appropriate location for the K Road Station and offers excellent opportunities for the development of high quality public space, integrated with surrounding built fabric and existing and future land uses.

Figure 5-12 Indicative section showing vision for K Road station at Beresford Square



- Maximise development potential: As described in the following section, the K Road area has the potential to further maximise its development potential over and above that currently allowed for by the district plan, without compromising local or city wide amenity values.
- Myers Park: Myers Park is a 'green lung' in an otherwise urban area. Future development on the park periphery should seek to establish a greater relationship with the park by fronting on to the green space wherever possible.

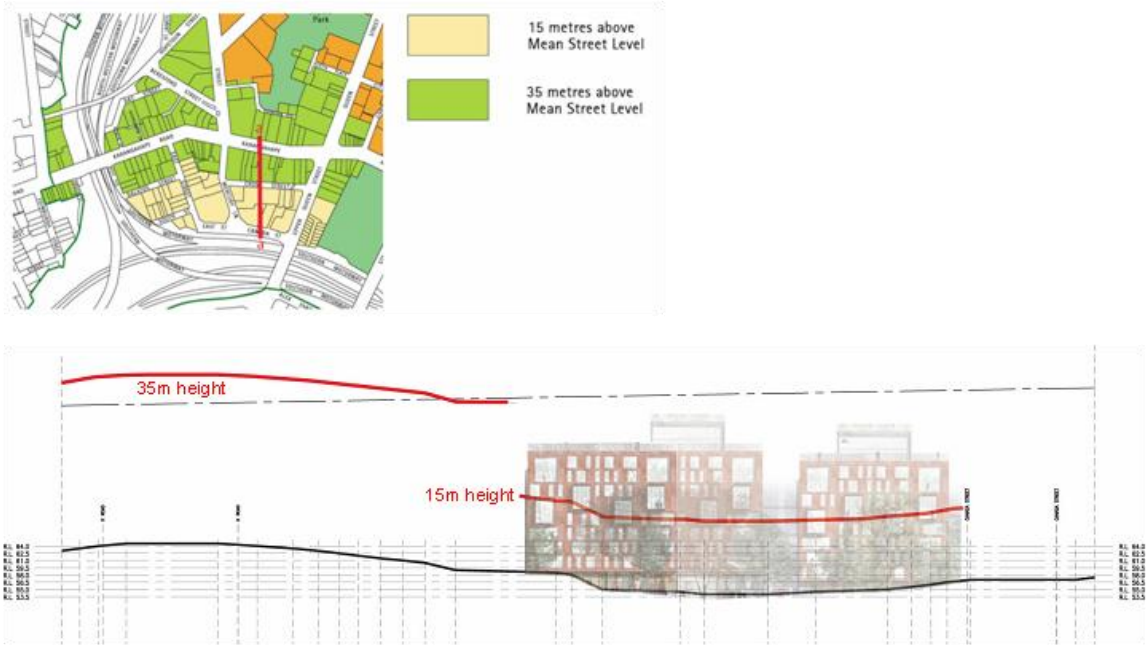
Figure 5-13 Indicative section showing potential infill development facing north onto Meyers Park (to the rear of K Road and in close vicinity to the proposed K Road Station location).

In addition to the aforementioned specific opportunities, the area also has the potential to provide for:

- Strong pedestrian, cycle and public transport connections with the wider environment;
- Internal pedestrian and cycle routes that respond to local desire lines;
- Capitalise on existing street vistas;
- Establish additional routes along desire lines (e.g. between Beresford Square and Queen Street along Poynton Terrace);
- Pedestrian and cycle routes that respond to local desire lines; and
- Enhanced public realm (streetscape and open space) and establish a pedestrian priority environment.

Currently, the Auckland City Council District Plan Central Area general and specific height controls provide limitations on the development potential of the area. In particular, the area located south of K Road and sloping towards the Central Motorway Junction is largely limited to 15m while still lying at least 30m below the view protection plane to Mount Eden. Potential exists to provide for increased height throughout this area, thus opening up development potential which, if undertaken in conjunction with ongoing public realm improvements, has the potential to increase the local employee and residential population and add positively to the amenity values of the area.

Figure 5-14 Indicative section indicating potential for increased height allowance for development on the southern slopes off K Road



In addition to the above, consideration needs to be given to incentives for future investment. In particular, consideration should be given to:

- Other zoning / plan changes to enable as of right development
- Incentives for amalgamations

- Incentives for infill development of small sites
- Tax / rates incentives
- Potential for mixed use development
- Establishment of catalyst projects (such as new public buildings) to attract further use of the area

Through the establishment of the CBD Rail Link and other catalyst projects in favour of the public, employment densities within 1000m catchment of the proposed K Road Station have the potential to realistically see a four-fold increase. Such growth would require significant incentives which may include policy initiatives, public realm upgrades and/or other catalyst projects within the area.

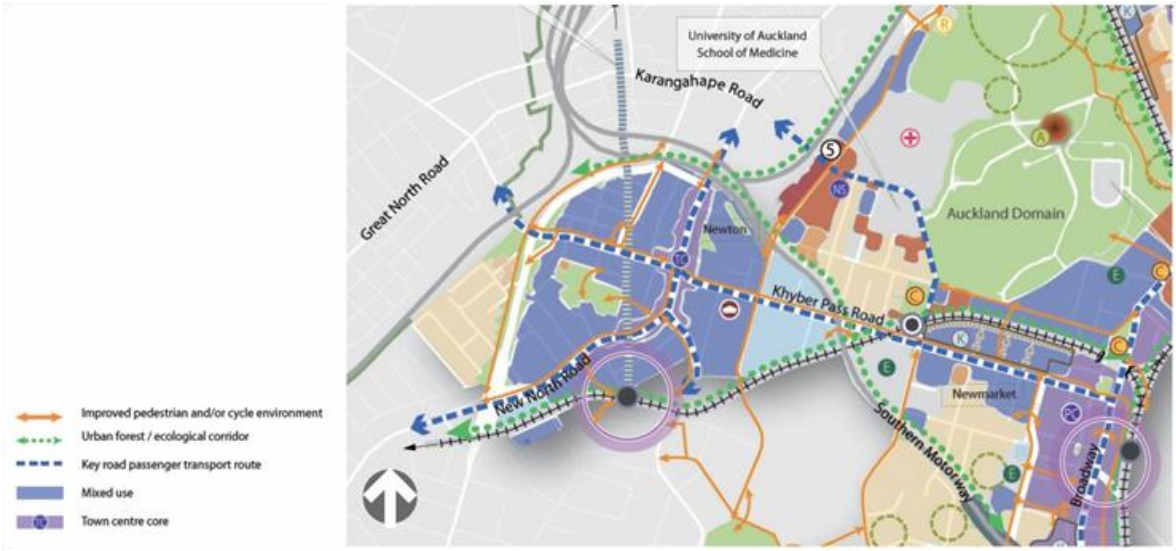
5.4.3 Newton Station Precinct

The proposed Newton Station is located in an area defined by commercial and residential (primarily apartment) land uses. Symonds Street, running north south along the ridge line, retains a high street character with potential to be enhanced and become an attractive destination for residents, works and visitors to the area.

Figure 5-15 Ten minute walking catchment from proposed Newton Station

Newton is also a destination for shoppers during the day, and offers a range of cafes and restaurants catering for the local resident and employee population. Symonds Street offers a number of speciality stores (such as cycling, skateboarding, kite flying and arts) and is currently perceived as a somewhat 'alternative' centre. The Auckland City Council has set out a strong vision for Newton within Auckland's Future Planning Framework. That vision will see the growth of Newton as a vibrant, high amenity mixed use town centre, with strong pedestrian, cycle and public transport connections to the CBD and wider environment.

Figure 5-16 Newton Study Area – Extract from Auckland City Council's Future Planning Framework (Newmarket/Parnell Area Outcomes 2030)



Auckland Hospital and the School of Medicine are located to the northeast of the study area. While these areas are not within the immediate vicinity, they are within a 10 -15 minute walking distance over relatively flat topography.

Basque Park sits at the centre of the study area and is a welcome respite from the otherwise urbanised area. It is well landscaped and includes a number of features including a water fountain and seating area. The park appears to be popular with locals; however, it is not well connected to the surrounding environment and remains somewhat hidden and underutilised.

Newton is served by a number of bus routes from all areas and is located on a steep ridgeline along Symonds Street which falls steeply to the west. The Newton Station is proposed at the junction of Symonds Street/New North Road/Mt Eden Road. This assessment is concerned primarily with that area of land within a ten minute walking catchment (approximately 800m – 1000m walking distance) of the proposed station location.

As has been described above, the benefits of station development are accrued at their highest within a five minute walking distance and, to a lesser extent, within the five to ten minute walking distance from the station. The Newton Station walking catchment includes a number of vacant sites and parking lots, large sites in common ownership and buildings that have reached the extent of their valued life (refer Attachment C - Land Use and Height Studies for Newton and K Road Station Locations). In particular, land to the northwest and south / southeast of the proposed station provides potential for intensification, currently underutilised, restricted by planning regulations (e.g. height rules) and lacking quality public realm that could otherwise incentivise growth. A 'station premium' is likely to assist in facilitating the redevelopment of sites within walking distance of the station.

Figure 5-17 Newton Study Area – opportunity sites

Figure 5-18 Existing opportunity sites – underutilised sites and existing car parking have the potential to be redeveloped

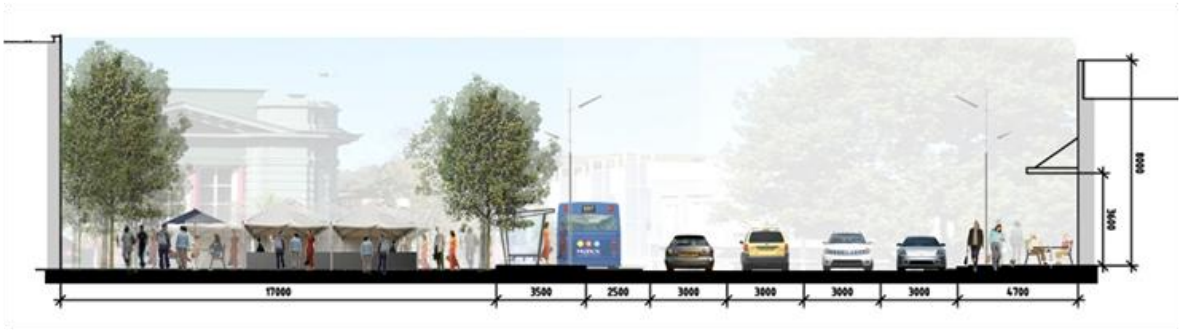
A number of physical constraints currently have the potential to restrict the future attractiveness of the CBD to grow as an attractive pedestrian friendly city, including:

- Mt Eden Station – currently provides a barrier between Mt Eden and Newton
- Steep topography to the west of the study area reduces the walkability of the area
- Heavily trafficked roads
- The Central Motorway Junction (CMJ)
- Low amenity streets
- Areas of limited passive surveillance

Within the Newton study area the following potentials and opportunities have been identified:

- Newton heritage buildings and high street character: Newton is currently a well utilised community precinct / centre. Retention of the historic fabric and 'high street' character will preserve the areas unique character, which is likely to continue to grow as an attracting quality. Reinforcing existing attractors such as community amenities, local cafes, restaurants and bars will also act as an attractor for many people.
- Respond to topography: The flat topography and width of Symonds Street provide the potential for universal access and long views down the length of the street.

Figure 5-19 Indicative section at the corner of Mt Eden Road and Symonds Street; indicating potential for public transport interchanges and amenity / community space integrated with existing environment and proposed Newton Station.



- Basque Park: Basque Park is an underutilised green open space. The potential exists for future land use to establish a strong relationship with the park, where commercial and residential uses face over the open space, enhancing passive surveillance of the area and benefiting from its openness and amenity.
- Establish internal open spaces: The study area currently lacks quality open space. Open space that adjoins Ian McKinnon Drive and faces the CMJ is of low amenity. Consideration should be given to land swaps to redistribute this land in a manner that will be more meaningful to future employees and residents within the area. Providing public parks 'within' the urban fabric would enhance urban amenity and provide employees and residents with quality recreation space.
- Maximise development potential: As described in the following section, the Newton area has the potential to further maximise its development potential over and above that currently allowed for by the district plan, without compromising local or city wide amenity values. In particular, regard needs to be given to protection of the views to Mt Eden, as

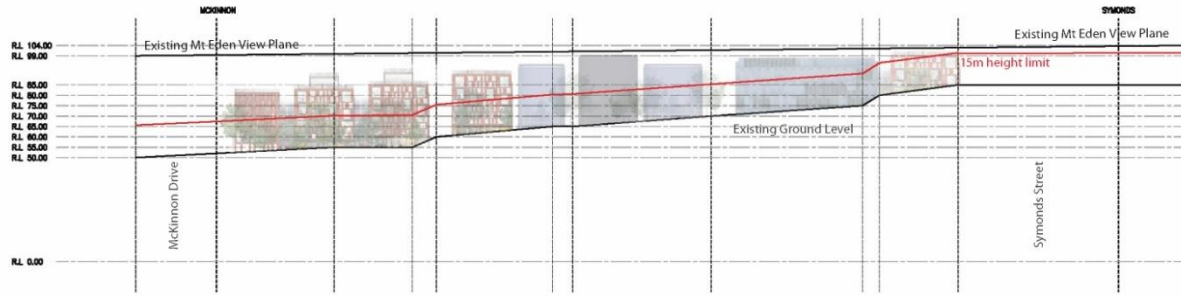
identified by the Auckland City District Plan's Isthmus Section (views E10 and E16). These views add significantly to the character of Auckland and are widely enjoyed from many areas. Achieving Auckland City Council's future vision of Newton as a mixed use town centre will require careful forward planning and investment to creating a quality environment that is attractive to future investors and employees.

In addition to the aforementioned specific opportunities, the study area also has the potential to provide for:

- Strong pedestrian, cycle and public transport connections with the wider environment.
- Internal pedestrian and cycle routes that respond to local desire lines.
- Enhanced public realm (streetscape and open space).
- Capitalise on existing street vistas along Symonds Street and Khyber Pass.
- Establish additional routes along desire lines that have the potential to 'open up' the back streets of the area (e.g. providing for additional east west access off each side of Symonds Street).
- Enhance and increase public realm and create a pedestrian priority environment.

Currently, the Auckland City Council District Plan Isthmus Section controls provide limitations on the development potential of the area; however, such restrictions can be alleviated without compromising the wider environment. In particular, potential exists to provide for increased height throughout this area (to approximately six stories), thus opening up development potential which, if undertaken in conjunction with development incentives and on-going public realm improvements, has the potential to add positively to the amenity value of the area and attract investment, employees and residents to the area.

Figure 5-20 Indicative section indicating potential for increased height allowance for development on the northwest slopes of Newton



In summary, it is considered that Newton, through the establishment of the CBD Rail Link and other catalyst projects in favour of the public, has the potential to provide for significant employment growth. Overall, it is considered that employment densities within the 1000m catchment of the proposed K Road Station could realistically see a fourfold, if not greater, increase within commercial blocks. Notwithstanding, such growth would require significant incentives which may include policy initiatives, public realm upgrades and/or other catalyst projects within the area.

5.5 CBD Real Estate Value Increases Due to Rail Link

In order to test the impact of the CBD Rail Link investment on both land values and the values of built real estate product, a "residual land value" analysis of three hypothetical development prototypes in the Auckland CBD was prepared. These projects are timed to open with completion of the CBD Rail Link project assumed to be in 2021. The prototypes were:

- A major office building located in the heart of the CBD in close proximity to the Aotea Station.
- A new mid-market hotel development in a secondary CBD location.
- A mixed use office over retail building at the fringe of the CBD.

Pro forma financial analysis was used to estimate the "residual land value" based upon the development economics of these three prototype development projects. Residual land value is what a developer would be willing to pay for land after all development cost and the required profit are covered. In preparing the development pro forma analyses to compute residual land value and to estimate project value, all of the following variables were incorporated into the pro forma:

- Parcel land area
- Development program in units and square metres
- Net rentable area
- Gross building area
- Average monthly rent per unit and per square metre
- Rate of rent increase
- Rate of project lease-up
- Direct construction cost for building area and parking spaces
- Indirect construction cost
- Construction financing
- Long-term financing
- Debt coverage ratio in year four (reflect project stabilisation)
- Project capitalisation rate
- Capitalised project value
- Operating cost and revenue
- Loan amortisation period

- Project terminal value
- Developer's internal rate of return – 18%

The analysis shows that even with a moderate increase in density and market rent rates facilitated by the CBD Rail Link investment, the landowners reap substantial gains from this public investment. If developed, the developer and/or building owner also gains substantial value. For example, for the high-rise office building in the prime location, an increase in height from 30 to 40 stories with no added parking and a 5% increase in per square metre construction cost and a 4% increase in per square metre rents will increase the land value supportable by 36% and the value of the development by 45%. Therefore, there are economic incentives for developers and building owners to increase building heights in developments because transport infrastructure investment, such as the CBD Rail Link, improves accessibility into an area that is already very productive, and therefore attractive as a location. The results of this residual value analysis for the three hypothetical projects are summarised in Table 5-10, and the detailed pro forma analyses are included in Appendix K.

Table 5-10 CBD Rail Link Impact on Real Estate Values in the CBD

	Without Rail	With Rail	Difference
HIGH RISE OFFICE IN PRIME CBD LOCATION			
Land Parcel Area in SM	4,000	4,000	0%
Building Size GSM	78,261	108,696	39%
Building Height in Floors	30	40	33%
Parking Spaces	200	200	0%
Building Construction Cost per SM	$2,800	$2,950	5%
Parking Construction Cost per Stall	$40,000	$40,000	0%
Total Project Cost	$268,013,913	$387,809,565	45%
Monthly Rent per SM - Initial Year	$35.00	$36.50	4%
Annual Rent per SM - Initial Year	$420.00	$438.00	4%
Year One Residual Land Value	$18,302,623	$24,810,079	36%
Year One Residual Land Value per SM	$4,576	$6,203	36%
Total Project Value Year Four of Operation	$398,355,410	$576,983,034	45%
MID MARKET HOTEL IN SECONDARY CBD LOCATION			
Land Parcel Area in SM	2,500	2,500	0%
Building Size GSM	16,009	18,010	13%
Building Height in Floors	8	9	13%
Parking Spaces	60	60	0%
Building Construction Cost per SM	$2,200	$2,250	2%
Parking Construction Cost per Stall	$40,000	$40,000	0%
Total Project Cost	$55,574,271	$64,688,161	16%
Effective Room Rate - Initial Year	$250.00	$264.00	6%
Stablized Occupancy Rate	67.0%	69%	3%
Year One Residual Land Value	$6,577,731	$9,530,269	45%
Year One Residual Land Value per SM	$2,631	$3,812	45%
Total Project Value Year Four of Operation	$80,361,805	$98,907,599	23%
OFFICE OVER RETAIL MIXED USE IN FRINGE CBD LOCATION			
Land Parcel Area in SM	5,297	5,297	0%
Building Size GSM	12,627	15,725	25%
Building Height in Floors	4	5	25%
Parking Spaces	30	30	0%
Building Construction Cost per SM	$2,250	$2,250	0%
Parking Construction Cost per Stall	$10,000	$10,000	0%
Total Project Cost	$33,878,721	$42,103,628	24%
Monthly Retail Rent per SM - Initial Year	$26.90	$27.00	0%
Monthly Office Rent per SM - Initial Year	$25.00	$26.00	4%
Year One Residual Land Value	$2,147,905	$3,486,644	62%
Year One Residual Land Value per SM	$405	$658	62%
Total Project Value Year Four of Operation	$42,834,324	$56,272,115	31%

5.6 Economic Value of a Stronger Auckland CBD

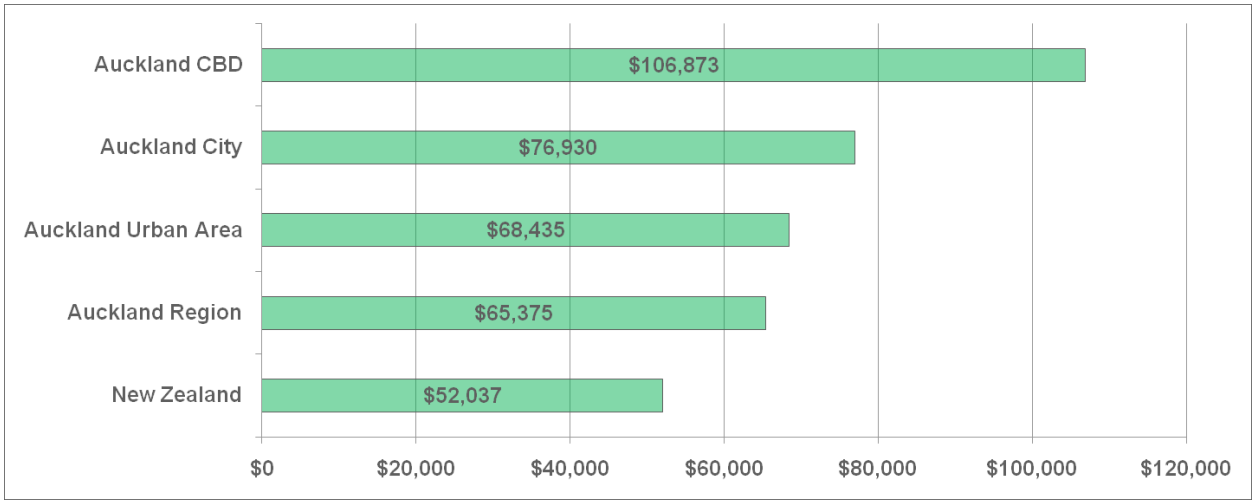
Both the secondary research and the local analysis indicate that investment in the CBD Rail Link will drive urban development and regeneration of the Auckland CBD. There is a substantial body of literature that addresses the topic of productivity premium of strong urban centres. For example, a 2007 UK Office of National Statistics Report indicates London's GDP per capita is 50% above the

rest of the United Kingdom and that the premium for Inner London is 140% above the rest of the UK.

In 2008, the Motu Economic and Public Policy Research Institute published a working paper on labour productivity in Auckland – *Working Paper 08-12 Labour Productivity in Auckland Firms by David C. Mare.* This research paper, funded by the Ministry of Economic Development and the Foundation for Research Science and Technology (FRST), details statistical evidence that employment in the Auckland CBD provides more value per worker than employment elsewhere in Auckland or outside of Auckland. This paper uses Statistics New Zealand's prototype Longitudinal Business Database, a unique firm-level dataset, to document the extent of Auckland and Auckland CBD's productivity premium as measured by value added per worker. Value added per worker is defined as the value of a firm's output less the value of non-durable intermediate inputs used in production divided by the number of workers. Compensation for employees, depreciation of capital assets and net indirect taxes are excluded from intermediate inputs.

The results of the Motu research are highlighted in the Figure 5-21 below.

Figure 5-21 Value Added per Worker in New Zealand by Geographic Area in 2006



Using Statistics New Zealand's Business Frame dataset which included all economically significant businesses in New Zealand, this research indicates that an additional employee in the Auckland CBD adds more value to the New Zealand economy than having that employee located elsewhere in Auckland City. The premium or difference was $29,943 per employee. However, since the Auckland City number includes the CBD, the actual premium was even greater.

The case studies, the local market analysis and the transport evaluation all indicate that the construction of the CBD Rail Link Project, assuming completion in 2021, will accelerate Auckland CBD employment growth and that growth will make a substantial net incremental contribution to the national economy. If the value added per CBD employee premium of $29,943 is applied to the net additional CBD employees induced and facilitated by the Rail Link Project, the impact on the New Zealand economy is very substantial. As shown in **Table 5-11** below, the net present value of the benefit stream from 2011 through 2051 is $3.3 billion if an 8% discount factor is used. If the discount rate drops to 6%, the present value of benefits is $4.7 billion. At a 4% discount rate, the present value of the benefit stream is $6.9 billion.

In qualitative terms, these benefits can be thought of in the following ways:

- CBD businesses with improved peak hour access to the regional labour market provided by the Rail Link have more personnel choice and therefore are able to be more selective in hiring. These businesses benefit by getting more output per unit of salary input.

- Having a larger concentration of employees in the CBD induces more of these employees to live in or near the CBD. The larger local market supports a greater variety of restaurants, shops, entertainment and cultural facilities.

- A city centre that has a greater variety of restaurants, shops entertainment and cultural facilities in a pedestrian friendly environment is likely to attract visitors to spend more time and money in Auckland.

- That same vibrant and exciting urban environment will allow New Zealand to improve its odds of retaining its own younger workers and attracting these workers from other countries.

Table 5-11 Benefit of Rail Link Induced CBD Employment to the National Economy

Year	No Rail Link (RLTS)	With Rail Link (ACC Medium)	Difference	Rail Link Added Value ($ M)
2011	94,541	94,541	0	0
2012	95,461	95,461	0	0
2013	96,381	96,381	0	0
2014	97,300	97,300	0	0
2015	98,220	100,069	1,849	$55
2016	99,140	102,837	3,697	111
2017	100,060	105,606	5,546	166
2018	100,980	108,374	7,395	221
2019	101,899	111,143	9,244	277
2020	102,819	113,911	11,092	332
2021	103,739	116,680	12,941	387
2022	104,657	118,462	13,805	413
2023	105,575	120,244	14,669	439
2024	106,492	122,026	15,534	465
2025	107,410	123,808	16,398	491
2026	108,328	125,590	17,262	517
2027	109,246	127,372	18,126	543
2028	110,164	129,154	18,990	569
2029	111,081	130,936	19,855	595
2030	111,999	132,718	20,719	620
2031	112,917	134,500	21,583	646
2032	113,836	135,465	21,629	648
2033	114,755	136,430	21,675	649
2034	115,673	137,395	21,722	650
2035	116,592	138,360	21,768	652
2036	117,511	139,325	21,814	653
2037	118,430	140,290	21,860	655
2038	119,349	141,255	21,906	656
2039	120,267	142,220	21,953	657
2040	121,186	143,185	21,999	659
2041	122,105	144,150	22,045	660
2042	123,024	145,115	22,091	661
2043	123,943	146,080	22,137	663
2044	124,861	147,045	22,184	664
2045	125,780	148,010	22,230	666
NPV@	**8.0%**			**$3,333**
NPV@	**6.0%**			**$4,720**
NPV@	**4.0%**			**$6,879**

As shown by Table 5-12 below, the ratio of Accelerated CBD Employment Growth benefits to cost exceeds one by a comfortable margin.

Table 5-12 CBD Rail Link BCR Based Upon Accelerated CBD Employment Growth

Discount Rate	NPV Benefit ($bn)	NPV Cost ($bn)	Ratio
8%	$3.33	$1.52	**2.2**
6%	$4.72	$1.74	**2.7**
4%	$6.88	$2.02	**3.4**

The benefits of the CBD Rail Link Project far exceed travel time savings due to enhanced transport efficiency. They also exceed what the UK school of economists call wider economic benefits (WEBs), which include the agglomeration effects. The essential long term benefit of the CBD Rail Link Project, which the traditional evaluation approach does not fully take into account, is a "place making" benefit. By facilitating peak hour commuter access into the CBD and increasing CBD employment by 20,000 to 25,000 without requiring additional road capacity or using scarce CBD land for additional parking, the CBD Rail Link enables the Auckland CBD to become a much more vibrant and exciting pedestrian environment.

The higher concentration of pedestrian activity stimulates the development of a wider range of restaurants and shops, a greater variety of cultural and entertainment facilities, and start-up businesses of all types. This more exciting and vibrant sense of place accomplishes regional planning objectives and enables Auckland to serve as New Zealand's outward facing global city for retaining and attracting the highly educated younger workforce of the future. As Auckland becomes more appealing for residents, its tourism appeal will also increase, since it is the international port of arrival for tourist visiting the spectacularly scenic New Zealand countryside.

The New Zealand Ministry of Economic Development indicated in 2008 that "international evidence highlights the importance of having at least one outward facing, global city to lead a nation's economic development. A globally competitive city attracts world-class firms and highly skilled workers, which have significant flow-on effects throughout the economy. The concentration of activity will allow both employers and employees to benefit from specialised labour markets, allow for greater tacit knowledge flows between and within firms and research organisations, and provide the right platform for growing a critical mass of innovation. Auckland doesn't yet play this role to the extent that major cities do in other economies."

The CBD Rail Link Project is not only an essential element in Auckland's transformation into that globally competitive urban centre. It may be the most critical element.

5.7 Influence of Rail Link outside CBD

The CBD Rail Link project will deliver direct rail access into the heart of the CBD and, in the long term, provide for higher rail service levels. In this respect, the completion of the CBD Rail Link could be seen as a transformational change and the catalyst for transit oriented development (TOD) on the existing rail network. The separate *Future Growth Opportunities (Urban Design) report* in Appendix H summarises the existing growth frameworks for the Auckland region, the TOD principles employed and the analysis work undertaken to identify potential TOD catalyst areas. The most significant benefits of the CBD Rail Link will be to the Western Line where more direct access to the CBD will be provided versus the current route via Newmarket. Existing demographics also indicate there is strong potential for a rail market to develop around Western Line stations particularly for CBD workers.

Figure 5-22 Review of the Auckland Rail Network

The separate *PT mode share benchmarking report* in Appendix G includes a review of other cities in the Australia / New Zealand region, showing the highest concentration of rail users is typically around stations that are about 20-30 minutes travel time from the CBD with good, direct, and frequent rail services into the CBD. These locations appear attractive by offering a mix of dwelling types at affordable rent or dwelling price – that is, they are far enough from the City to be affordable but have a frequent and reliable rail service.

In the context of the CBD Rail Link business case, there is an opportunity to identify locations on the wider rail network within a 20-30 minute travel time which could experience a TOD uplift as a result of the CBD Rail Link. This uplift is most likely to be residential-based rather than employment-based as it is residents working in the CBD that will receive the most benefit from the CBD Rail Link. However, it may be argued that the CBD Rail Link will provide a key link for business travel between the CBD and emerging employment precincts such as at Tamaki and New Lynn. A 20-30 minute rail travel time is generally still within the Auckland City Council boundaries, with the exception of New Lynn. For the purposes of this Business Case two potential TOD areas have been focused on

although it recognised that there are other potential TOD areas as well. The two areas selected have already had substantial policy changes implemented to assist in facilitating growth.

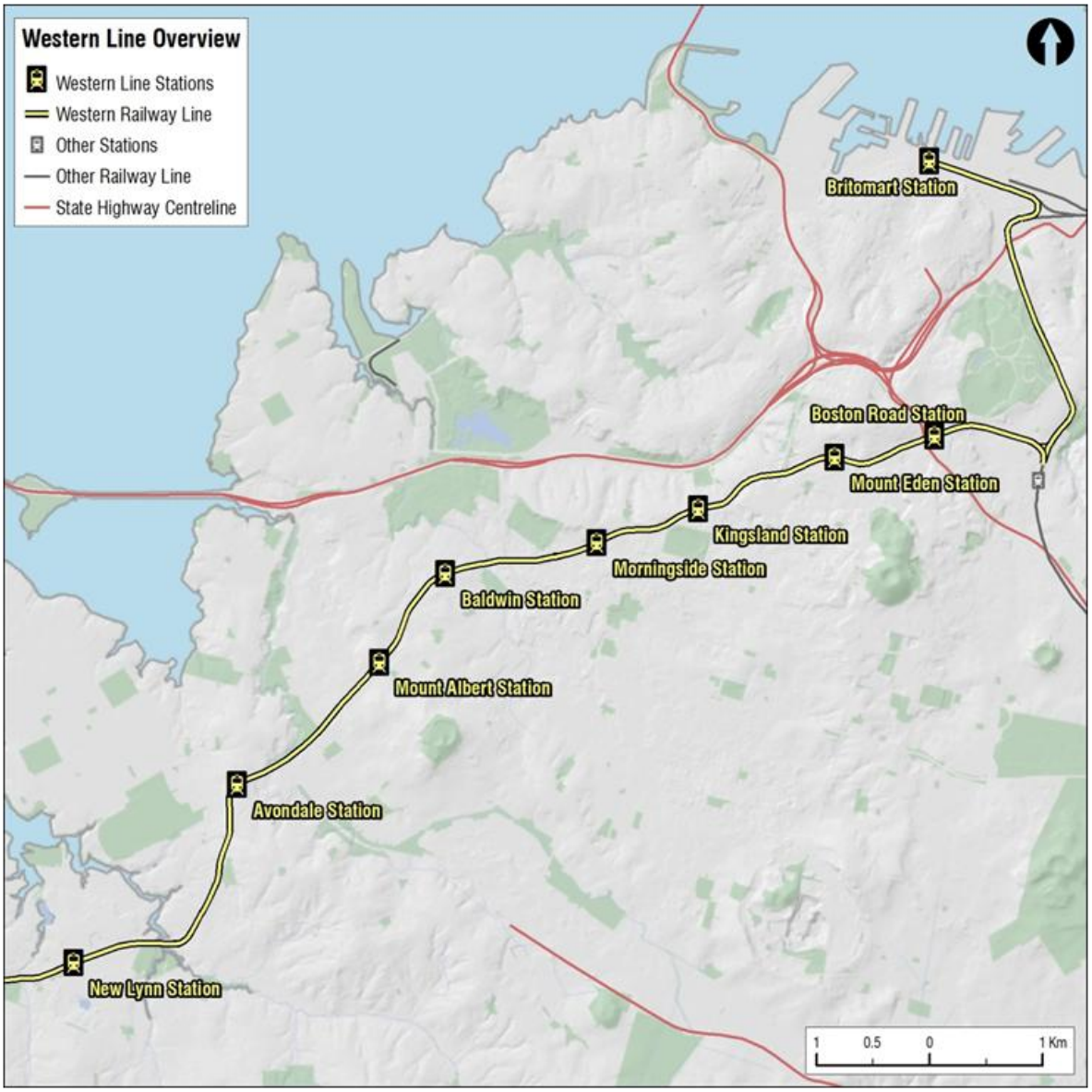
The TOD analysis undertaken[14] to select the two areas to focus on starts at Britomart and works out along each of the eastern, southern and western rail lines, considering each of the locations around major stations for absolute growth potential. That is the ability to generate and maximise new ridership through medium-high density residential development (particularly multi-unit residential activity such as apartments).

Station locations within established industrial or business areas that are considered unlikely to see residential development in the future have not been considered. The following sections provide an overview of the TOD analysis undertaken on the Western, Eastern and Southern rail lines, with an emphasis on the two focused areas. Reference is made in particular to the likely impact of the CBD Rail Link.

[14] See *Future Growth Opportunities (Urban Design) report* in Appendix H

5.7.1 Western Line

Figure 5-23 Overview of Western Line



New Lynn (focus area)

New Lynn is a key rail/bus interchange, currently an approximate 36 minute train ride from Britomart via Newmarket. The RGS identifies New Lynn as an existing residential/mixed use area and a future sub regional centre (which is defined to accommodate 60 dwellings/ha and 300 employees/ha).

Significant work has been undertaken by Waitakere City Council in recent years around the future planning and urban design of the area, including changes to the District Plan to provide for the intensification of commercial and residential land uses. Supporting the RGS, 'New Lynn – An Urban Regeneration Framework for New Lynn's Town Centre' (September 2008, Waitakere City Council) outlines the Council's vision for the TOD, with employment densities in the range of 300 employees per hectares and residential densities up to 60 dwellings per hectare. Significant investment has also been made in the upgrade of the rail station, adjoining bus interchange, and surrounding roading network to assist in facilitating and accommodating increased growth.

The Urban Regeneration Framework outlines a number of key interventions, many of which are underway or completed. Key interventions listed in the framework are:

- Reposition the New Lynn Bus Station onto a bus only street directly adjacent to the railway station entrance and exit point;
- Expand and enhance the existing social infrastructure provision within the town centre to support the increased population within New Lynn and surrounding catchment;
- Create an integrated mix in retail, commercial and residential land uses within the town centre linked through safe and legible pedestrian and cycle connections; and
- Intensify residential precincts within walking distance to the T.O.D. in particular the Living 5 and 6 precincts.

Key TOD principles that support the New Lynn area include:

- Auckland City Council classification under the FPF spatial framework as Principal Centre;
- Good provision of community amenities including library, open space, schools in close vicinity;
- Close proximity to retail and employment areas;
- Brownfield sites for potential (re)development;
- Large landholdings, including Waitakere City Council;
- Does not possesses a built character or heritage that would otherwise preclude redevelopment or higher densities; and
- Future planning for the area anticipates higher densities with good potential to be absorbed within the surrounding landscape (e.g. there are no limitations due to adjoining landscape or view shafts etc).

Avondale

Avondale is located to the east of New Lynn, separated by the Whau River. In the Avondale / Blockhouse Bay Area Plan of the FPF, Avondale is designated as a Town Centre with a desired outcome of focusing growth around Avondale town centre and railway station, for business, retail, residential, community and recreation activities. The Area Plan map shows a mixed use town centre to the west of the relocated rail station with a modest area of low rise apartments / terraces on the east side. Its proximity to New Lynn does not necessarily lend it to being a true TOD development area, though some intensified growth around the rail station and town centre would further support New Lynn TOD.

Mt Albert to Mt Eden

The area between Mt Albert and Mt Eden is in closer proximity to the CBD than the more western locations described above. The FPF shows limited potential for TOD growth along the Western Line between Mt Albert to Mt Eden, and places an emphasis on preserving existing character and heritage. Although TOD development could occur in this area, the following is noted:

- Mt Albert is designated as a local centre only with a small core area around the rail station and limited low rise apartments / terraces on the north side.

- Morningside / St Lukes is shown as a split town centre with only a small core commercial and industrial area around the rail station.
- The St Lukes commercial area is located beyond a 1000m catchment area.
- Kingsland is a local centre, located closest to the CBD. It is characterised by a “village” café/restaurant scene, residential dwellings with heritage character, and an industrial / commercial area to the east.

Summary

It appears that the two main locations for TOD growth potential associated with the CBD Rail Link on the Western Line are New Lynn and Avondale, with New Lynn being the most promising. Based on benchmarking of other cities, both of these locations are the right sort of distance from the CBD to generate high rail-based transit share and have the potential to develop as strong mixed-use centres.

Locations close to the City appear less attractive for TOD growth due to existing character and competing inner-city corridors such as Dominion Road.

Achieving good TOD-style growth and high future transit share in this corridor will be strongly linked to the completion of the CBD rail link – direct, high frequency services to the CBD will meet the conditions established in this study for strong TOD outcomes.

5.7.2 Eastern Line

Figure 5-24 Review of Eastern Line

Orakei, Meadowbank and St Johns

Orakei is located one stop east of Britomart (and currently is an approximate 8 minute rail journey). The rail station is located on a small isthmus. In recent years a plan change to the District Plan zoned a small area to the west of the rail station mixed use (which allows for intensified residential and commercial) and a small area to the east Business 4 (which does not allow as of right residential activity). This is reflected in the FPF, which shows Orakei as no more than neighbourhood shops with some mixed use development opportunities in the immediate vicinity of the rail station. This area has not been focused on for this reason. Additionally, the topography in this area (located at the bottom of the Remuera slopes in close proximity to Hobson Bay), the associated environmental constraints, the existing strong residential character of the area, and the close proximity to the CBD could limit the potential for a large TOD development.

Meadowbank contains a rail station located within an entirely residential valley area. There are small local shopping facilities located on the ridgeline above the station area, some distance away.

The character of the area and the separation between the rail line in the valley and the more intensive land uses on the ridgeline could limit support for TOD development.

St Johns is shown as a local centre with a small core area to the west of St Johns Road, on the ridgeline to the east of Meadowbank station. Although the FPF describes an opportunity for a future rail station in this area, the area is constrained by topography and the existing rail tunnel through the ridge to Glenn Innes in the east (potentially precluding good linkages between land use and a rail station).

Glen Innes, Tamaki and Panmure (focus area)

Glenn Innes, Tamaki and Panmure have been identified by Auckland City Council in a number of studies as an area to support the growth expected under the RGS. The Tamaki Area Plan under the FPF calls for the reopening of the Tamaki rail station to support the Tamaki Innovation Precinct. The CBD Rail Link could provide a key connection between this precinct and the CBD. The Tamaki Area Plan lists the following outcomes for the area:

- Focusing growth in and around the Glen Innes and Panmure town centres to make the most of the great access to rail and bus services, shops and community facilities and to act as a catalyst for rejuvenating these centres;
- Advocating for Tamaki Railway Station to be reopened, with an adjacent business node to support it;
- Developing the Tamaki Innovation Precinct and New Zealand Innovation Centre, as a hub for cutting edge technology focused businesses; and
- Making the most of the area's volcanic landscapes and waterways, promoting their ecological values and recreational use.

The Area Plan map shows the core town centre area for both Glen Innes and Panmure to the east of the rail line with business development to the west. The Glen Innes core area has good access to the rail station and is all within a good walk distance. The Panmure town centre core area stretches out along Queens Road and is less focussed around the station than Glen Innes, and it seems that there would need to be a more significant transformation here to develop a true TOD than at Glen Innes.

Key TOD principles that support the Tamaki area include:

- Auckland Regional Council and Auckland City Council classification as a Town Centre;
- Part of the overall area that will benefit from the Auckland Manukau Eastern Transport Initiative (AMETI) through a range of transport improvements in the future;
- Both Glen Innes and Panmure are key transport interchanges – the existing rail line goes direct into Britomart avoiding Newmarket;
- Very good provision of community amenities including open space, recreation (swimming pool, health centre) library, and schools in close vicinity;
- Close proximity to existing retail and business areas;
- Brownfield sites for potential (re)development;
- Large landholdings;

- Does not retain a built character or heritage that would otherwise preclude redevelopment or higher densities; and
- Future planning for the area anticipates higher densities with good potential to be absorbed within the surrounding landscape; however, there are height limitations over some of the area as a result of the proximity to Mt Wellington. These range from 12m-15m and cover only parts of the envisaged developable area.

Sylvia Park

The Otahuhu Area Plan under the FPF (which covers the Sylvia Park area) includes the following desired outcomes:

- focusing business and residential growth around Sylvia Park, so that the centre is supported and thrives

Sylvia Park is located to the west of Panmure and is predominantly a large shopping mall which is serviced by a rail station. Residential activity is found in the surrounding area to the west and north, and industrial activity and the southern motorway to the east and south. The size and extent of the Sylvia Park shopping centre, along with the physical separation provided by the adjoining roading system is a possible constraint for a TOD in this area. While this area has not been focused on in this Business Case, opportunities do exist to link the rail station with the Mt Wellington / Waipuna area (where intensified residential activity could potentially take place) and the existing industrial area.

Summary

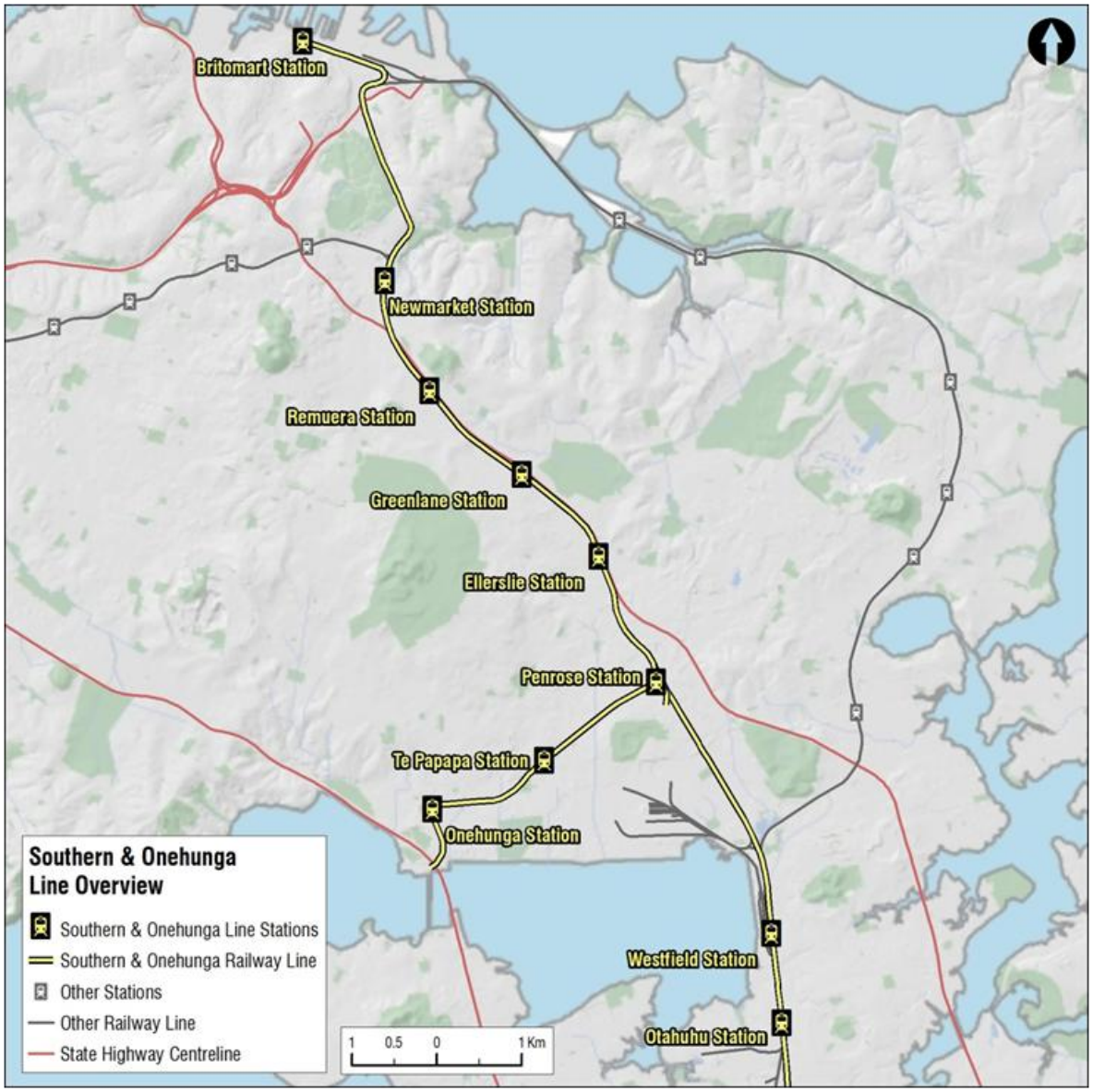
For the purposes of this Business Case, TOD growth along the Eastern Rail Line in the Tamaki area is focused around Glen Innes and Panmure given the TOD attributes that already exist in these areas.

The demographics around Glen Innes suggest that housing in the town centre could be affordable and provide opportunities for CBD workers to live around a station with good rail access into the City.

For the Eastern Line, the main benefits arising from the CBD Rail Link will be providing improved access into sections of the CBD beyond Britomart, particularly the Mid-City, Karangahape Road and Newton Road areas. For this reason, the TOD impacts of the CBD Rail Link are expected to be more modest than on the Western Line.

5.7.3 Southern Line

Figure 5-25 Review of Southern Line



Newmarket

Newmarket is designated as a Principal Centre under the FPF and has experienced strong recent residential and employment growth. It has strong links with the CBD and the CBD Rail Link may provide a more attractive, high frequency, reliable service between the two centres than the current transit options although not all of the area is within an easy walking distance of the rail station.

The FPF Area Plan for Newmarket shows a large mixed use area along Broadway with business nodes between Broadway and the Auckland Domain. There is an area of medium to high rise apartments along the east side of the rail corridor.

Given the strong growth already occurring in Newmarket, it is not clear to what extent there would be further growth due to the CBD Rail Link.

Remuera and Greenlane

The FPF designates Market Road as a small local centre close, but not around Remuera rail station. Greenlane appears as a larger local centre close to the rail station. Greenlane is currently a mix of residential and commercial, with the latter focused around Great South Road. The ability to provide strong linkages and connectivity between the existing Greenlane residential and commercial area and the rail station to the east is questionable given the location of the rail on the edge of the southern motorway. The southern motorway provides a physical barrier to those activities located to the east of the rail station. While a TOD may be a potential in this area, it has not been focused on for this Business Case.

Ellerslie, Penrose and Westfield

Ellerslie is designated as a town centre in the FPF Area Plan but with a strong focus on business development, rather than intensifying the existing residential. The area is split by the rail and motorway corridors, with large commercial offices found on the west (and in close proximity to the rail line) and the shopping precinct on the east of the motorway. Residential is found surrounding both these areas. The rail station is currently linked from both the western and eastern side. A recent plan change adopted by Auckland City Council allows for the intensification of a large business site located to the west of the rail but within walking distance. The focus of the intensification is on commercial activities. This area offers TOD opportunities, but would require further planning changes to implement intensified residential development.

Penrose and Westfield do not appear as centres and rather focus on business activity.

Otahuhu

Otahuhu offers potential for TOD. The FPF lists it as a centre area. Currently the town centre, located on Great South Road, is separated from the rail station, but within 800m. There is opportunity for growth between the town centre and the rail station, and in the large tracks of land around the existing station. Further implementation of growth policy would need to occur to assist in facilitating TOD.

Onehunga

Onehunga is designated as a Principal Centre within the FPF. It is located at the end of a spur line, which is considered to be a relatively indirect route for rail to the CBD. Currently the spur line is single tracked (with no set time for double tracking) with low service frequency (at no more than two per hour in the peak). Onehunga is a large bus interchange area, located in walking distance (but not immediately adjoining) the rail station. The future terminus of the rail in this area is still not confirmed (with potential links to the airport and along SH20 to the west not discounted), and this along with double tracking and further work around growth intensification, could make this a more attractive area for TOD in the future.

Summary

The sections of the Southern Rail Line within the preferred 20-30 minutes train travel distance south of Newmarket have a strong business focus and as yet have not been subjected to planning changes that would implement intensified residential and mixed-use growth.

For the Southern Line, the main benefits arising from the CBD Rail Link will be providing improved access into sections of the CBD beyond Britomart, particularly the Mid-City, K Road and Newton Road areas. For this reason, the TOD impacts of the CBD Rail Link are expected to be more modest than on the Western Line.

5.8 Project of National Strategic Importance

The Economic Evaluation Manual (EEM) specifically allows national strategic factors to be incorporated into the benefit cost evaluation. In order to be included in the benefits analysis, the regeneration benefits need to meet the following criteria:

- **Have a material impact on a project's importance or have a significant impact on the benefits of a project.** Clearly, the CBD regeneration benefits analysed above have a material impact on the Rail Link's importance and benefits.
- **Comprise national economic benefits and not transfers of benefits between different localities.** The CBD regeneration benefits are a net benefit to New Zealand and not transfer benefits from the surrounding region. It clearly meets this criterion.
- **Have not been counted in the core analysis.** The CBD regeneration benefits described above have not been counted in any other part of the benefit cost analysis.
- **Would be valued by the land transport users and the wider community and the users and wider community would be willing to pay for them.** It is the consultant team's view that future users of the Rail Link would be willing to pay through the fare box and the wider Auckland regional community would be willing to contribute tax revenue refer to Chapter 6. The exact share will be negotiated through a political process.

The CBD Rail Link, because it enhances the competitive position of Auckland and in turn New Zealand in the global context, is clearly a project of national strategic importance. The CBD regeneration benefits are national strategic factors.

5.9 Transport Benefits

This section presents an evaluation of the CBD Rail Link which is fully consistent with the Economic Evaluation Manual (EEM) produced by the NZTA. EEM benefits cover:

- Direct transport benefits such as time savings and decongestion; and
- Wider Economic Benefits (WEBs) such as agglomeration.

Both Transport Benefits and WEBs have been calculated in accordance with EEM and compared with the full costs of the scheme (capital and operating). The key outcome of the evaluation is the benefit: cost ratio to government (BCR (G)), defined as the ratio of the present value of benefits to the present value of costs, the latter taking into account any additional revenue resulting from the scheme. As usual in such evaluations, the benefits of the scheme are relative to a Do Minimum (DM) scenario, which in this case is to not build the Rail Link.

As discussed in Section 5.8, the CBD Rail Link also achieves EEM benefits as a result of National Strategic Factors.

5.9.1 Basis of the Evaluation

As required by EEM, costs and benefits have been calculated over a 30-year period and discounted at 8% p.a., with year zero taken as 2010/11. The first significant expenditure is in 2014/15, which is the starting point for the evaluation period. It has been assumed that the tunnel will open on July 1st 2021, so both benefits and operating costs begin in the year 2021/22.

Costs of the scheme are set out in Appendix F. Costs which are common to both the DM and the option, such as future rolling stock have been excluded. No account has been taken of the residual value of assets such as rolling stocks at the end of the evaluation period but, as this will be heavily discounted, the effect will be small; this is also consistent with the EEM.

Values for key variables used in calculating the direct transport benefits (see Section 5.9.8) have been taken from EEM. Of greatest importance are the values of time (VoT) for different types of transport users and decongestion benefits for Auckland.

While the values of time given in EEM are lower for passenger transport (PT) users than car users, the current version of EEM includes the "equity" VoT whereby, for schemes which are intended to encourage mode shift, passenger value of time is taken as the same as that for car users. This has been used here but it should be pointed out that many CBD jobs are high value (as discussed in Section 5.3), implying that passengers' actual value of time could well be higher than given in the EEM.

The EEM values for decongestion relate primarily to the travel time savings to remaining road users which result from a drop in traffic. However, they also include allowance for the resulting accident and environmental impacts. As with values of time, the EEM values are averaged across Auckland but for the CBD Rail Link decongestion on, for example, the North West Motorway, would be well above average.

The calculation of Wider Economic Benefits (WEBs) has also been fully consistent with EEM, as described in Section 5.9.9.

The calculation of transport benefits has made use of the available transport models of the Auckland region and their application in this context is described in the next section.

5.9.2 Transport Modelling

a. APT

The Auckland Passenger Transport (APT) Model is designed to assess the impacts of a wide range of schemes which improve the public transport system throughout the Auckland region. The model has, on a number of occasions, been satisfactorily peer reviewed (including for NZTA and its predecessors), and refined and updated since its initial development in 2001.

APT is designed to be sensitive to a range of transport system policies and characteristics, including the following:

- Passenger transport operational characteristics, e.g. routes and service frequencies;
- Passenger transport technology characteristics, e.g. different transit technologies and modes;
- Transport policy variables;
- Public transport fares, integrated ticketing etc;
- Integration between passenger transport services and facilities in the region, e.g. feeder buses and other network effects;
- The impacts on PT of roading projects and changing congestion.

The model is also designed to incorporate forecasts for, and be sensitive to, potential future changes (within the next 20 to 40 years) in:

- Land use, population and employment distribution;
- Other relevant socio-demographic and economic variables such as car ownership;
- Development patterns (e.g. intensification near stations, medium-density mixed developments).

The model is calibrated to match observed travel behaviour. The sub-mode split module allocates total public transport trips between bus, rail and ferry modes, according to measured traveller perception of the relative attractiveness and convenience of each mode. Mode split between car and PT is also calculated according to the relative generalised costs of the modes so that, for example, faster rail trips will attract some passengers from car. In the same way, increased road congestion will "push" more travellers to passenger transport.

For the Do Minimum and options being assessed, the model can be used to give outputs of:

- Public transport patronage at a range of levels, from individual stations to network-wide;
- Public transport fare revenues;
- Benefits to public transport users (e.g. time savings);
- Benefits to road users, i.e. relief of congestion through mode shift;
- Public transport operational requirements (e.g. bus kilometres) and operating costs.

b. ART 3

The Auckland Regional Council (ARC) has recently developed new regional transport and land use models. This is known as the Auckland Transport Models (ATM2) project, which started in 2005 and was completed in mid-2008.

The models are:

- The Auckland Strategic Planning Model (ASP), a strategic integrated land-use model, for medium and long term planning, scenario development and evaluation, and for providing the necessary land use inputs for transport modelling;
- The Auckland Regional Transport Model (ART), a conventional 4-stage and relatively detailed transport model for medium term project and policy planning and evaluation;
- The models produced by this project are known as ASP3_2 (run on DELTA software) and ART3 (run on EMME software) and replaced the previous versions of ASP and ART2 from late 2008 onward; and
- The ATM2 system incorporates the ASP3 model, the ART3 model and the interfaces between them. The base year of the system is 2006; ART3 was validated to year 2006 and this is the starting point for forecasting. The system is designed to forecast to year 2051, but theoretically this could be extended if the input data required for both models was prepared. These two models are run sequentially with information passed in both directions between them.

At a higher level there are also economic and demographic inputs to the ATM2 models. The demographic forecasts are obtained from the ARC's population projection model based on 2006

data. This model conforms to Statistics New Zealand projections for the region. This model provides forecast total population for the region.

The economic model produces forecast total employment (full time employment equivalents or FTE) for the region by industry type. The model that is used is the Economic Futures Model (EFM) now run and managed by the ARC. The current forecast is based on the “Business as Usual” scenario developed in September/October 2008.

ART3 has been fully re-calibrated and re-based using 2006 data, including Census 2006, household travel surveys conducted in 2006, passenger transport surveys, commercial vehicle surveys, traffic and passenger transport counts and other data.

The area modelled in ART is divided into 512 zones into which data is aggregated for representation in the model. Road and Passenger Transport networks are specified for each of the three times of day which are modelled - morning and evening peaks and inter-peak.

ART3 determines the total trips produced on a daily basis and these are then allocated to specific time periods. Trip purposes are retained throughout the process. The distribution of trips across the region and the allocation of trips to car or PT modes are simultaneous, taking into account the differences between travel costs by different modes and choice of destination.

5.9.3 Summary of Work Undertaken to Align ART3 and APT

APT was developed to interface with the Regional multi-modal model which was current at the time, namely ART2, the predecessor of ART3. For example, APT uses data from ART2 to calculate both road speeds for bus travel times and the generalised cost of car trips. Similarly, the zoning system in APT was designed to be consistent with ART2 but more detailed, with about five times as many zones.

The calculation of transport economic benefits requires models of both roading and PT networks, as described in section 5.9.2. This presents a dilemma since ART3 is the most up-to-date roading model but APT is largely designed to interact with ART2. At the basic level, for example, the zoning systems in ART2/APT and ART3 are not directly compatible, not least because some mesh block boundaries change with each census so the zoning system of a model reflects when it was developed.

The solution which was devised to address this was to use:

- APT for the transport benefits;
- ART3 and APT for the wider economic benefits.

In order that both models could be used simultaneously in a robust manner during the evaluation, a number of changes were made to bring them into line. These related specifically to three aspects:

- Land use;
- Fuel prices;
- Parking charges.

Land use is represented in the models by a number of factors, for example the number of residents, the number of employees and students, and the area given over to retailing. It is therefore a key driver of trip-making. Since ART3 has been developed more recently it can be considered to have more robust land use forecasts; the forecasts in APT were therefore adjusted to bring them into line with ART3, as far as this was possible taking into account the different zoning systems.

The price of fuel has risen considerably since APT was developed in 2001. As was shown in 2008, when extreme fuel price rises led to an increase in PT patronage, this is a key determinant of mode choice. APT has therefore been adjusted to represent a higher level of fuel prices in the 2041 model year. This was achieved by taking two ART3 2041 scenarios with medium and high fuel prices and using the ratio of generalised costs between those two scenarios to modify the car generalised costs in APT. This has the advantage of allowing fuel price impacts to be modelled in APT and also ensuring consistency between the two models.

Parking charges are an important factor in mode split but the way they are modelled in ART2 is not highly robust. Nonetheless, such charges should be included in the roading costs which APT uses in the main mode split (car v PT) model, particularly for trips into the CBD where parking is costly and the supply limited. To address this, the impact of parking charges on mode split was examined in ART3 and the resulting impact on PT trips was transferred to APT. The maximum CBD parking charge in 2041 has been taken as $30 for commuters, to reflect the scarcity of parking in an intensely developed CBD. Parking charges for non-commuters and for areas outside the CBD are proportionally less.

Overall, it is now several years since APT was developed and it has some shortcomings, especially in terms of the lack of a link with the current ART3 model. Nonetheless, the adjustments which have been made are considered appropriate and the outcome will be robust.

5.9.4 Rail Options Considered

A number of different rail service patterns (operating scenarios) which could be implemented once the CBD Rail Link is in place were drawn up and modelled with APT. However, these were intended to be indicative and were not modelled in detail in terms of their possible operation. The operating pattern which has been used retains the basic frequency of 6 trains per hour on all the main lines, increasing to 8 in the early 2030's. Refer to Appendix F *Evaluation Option Specifications* for more details.

5.9.5 Evaluation Methodology

A spreadsheet-based economic model has been specifically developed for the calculation of transport benefit and cost streams in order to determine the Benefit-Cost Ratio (BCR). The model is fully consistent with EEM as described above. It has been designed in such a way as to allow maximum flexibility, for example, by allowing key inputs to be adjusted. These include the scheme start date, capital and operating costs, discount rate and evaluation period.

The economic model makes use of the APT model to obtain the dollar benefits of the Rail Link relative to the DM. Model runs were carried out for the morning peak 2-hour period for the years 2016 and 2041. Results for the intervening years were obtained by interpolation and for subsequent years by extrapolation. Clearly, although 2016 is the first modelled year, for the link benefits do not actually come on stream until it is open.

In the evaluation of the rail options, the bus and ferry networks and other aspects such as the introduction of Travel Demand Management (TDM) and the road network, were kept constant in the APT model for the Do Minimum and all options. This ensured comparability between model runs, with any differences between runs being due entirely to changes to the rail network.

An annualisation factor is used to translate the APT model results, which relate to the am peak only, into an annual figure, consistent with standard modelling practice. The value of 800 for this factor was established when APT was built in 2001; this is lower than the corresponding figure for buses because the latter provide services at off-peak times which, until recently, rail did not. However, data from ARTA indicates that the annualisation factor for rail (taken as the ratio of total annual

patronage to peak) is growing through time as patronage grows and rail services are extended. The annualisation factor in the evaluation reflects this growth.

In addition to benefits, the APT model has been used to calculate the change in PT revenue between the DM and option, which is then netted off the cost in the BCR (G). It should be noted that while rail revenue will increase as a result of the CBD Rail Link, this may be partly offset by a drop in bus revenue.

5.9.6 Economic Do Minimum

a. Rail Operation

The economic evaluation requires a "Do Minimum" (DM) against which the benefits of the tunnel option can be assessed. This has been taken to be the "end state" from the Auckland Rail Development Plan, including:

- 10 minute peak headways on the three main routes (Southern, Eastern and Western);
- Electric traction, with a fleet comprising largely new EMUs (the acquisition of which is currently the subject of a separate KiwiRail procurement exercise);
- Improvements at many stations; and
- Reopening of Onehunga Branch and opening of the Manukau Rail Link.

This pattern of operation is expected to be in place by 2013/14.

Due to the nature of Britomart, its capacity is limited to being able to cope with no more than about 21 trains per hour entering and leaving during busy periods. This places a cap on the growth in peak patronage which can be achieved, since once that maximum is reached services cannot be further improved. Providing extra trains is not an option and trains cannot be made longer due to the constraints of platform length. Experience shows that the level of crowding passengers are prepared to tolerate is limited, after which they will shift to other modes. It follows that the constraint at Britomart prevents potential growth in rail patronage.

In the light of the above, the evaluation has assumed that due to the constrained capacity of Britomart, there would be no growth in peak rail patronage after 2024 in the Do Minimum. In the option, however, that constraint is removed and patronage can grow as forecast by the APT model.

The future year rolling stock requirements of the Do Minimum and both the options have been modelled and the capital and operating costs of any additional rolling stock in the options were included in the appropriate years (see Appendix F).

b. Land Use

In practice there is a close link between land use and transport - the land use at a site drives the demand for transport there but, on the other hand, the accessibility of a site will affect the extent to which it is developed. It would be completely contrary to experience if the land use patterns in Auckland CBD in 2041 were the same with and without the CBD Rail link. As discussed elsewhere in this chapter, the Link will be a powerful force in shaping the CBD.

Nonetheless, the usual approach for evaluating transport schemes in New Zealand is for the Do Minimum to assume the same land use pattern as the option, and for this reason that is the approach that has been adopted here. However, with the planned 2041 RLTS land use in the CBD and no rail link, there will be considerable pressure on the transport networks leading to the CBD, particularly road, bus and rail. The ability of ferry to carry many more passengers is limited and the

Busway caters for a specific geographical market. As discussed above, the capacity of rail to deliver passengers to the CBD is limited by the capacity of Britomart.

c. Disbenefits

In the Do Minimum, there will be:

- Disbenefits to car users which will largely comprise (a) delays from congestion caused by other cars and buses; and (b) travel time variability (unreliability).
- Disbenefits to bus users due to (a) travel time delays and variability and (b) crowding. (It is known that the value of travel time increases in crowded conditions, e.g. when standing rather than sitting on PT).

Accurately assessing the disbenefits of the Do Minimum would need a modelling tool to represent the congestion (delays and unreliability) expected. Any such model would need to explicitly model buses as part of the traffic stream but with different performance characteristics from cars, since the impacts of overall congestion on bus travel and of buses on general traffic are both key to the case.

Although they are multi-modal, regional models such as ART are generally not suitable for representing highly congested networks. APT does not have a roading component so, while it may be suitable to show the impact of congestion on buses, it could not be used for cars. A more detailed model using a package such as SATURN would be ideal but such a model with the correct geographical coverage does not currently exist.

In light of the above, the disbenefits of the Do Minimum have been estimated using forecasts of the number of cars and buses entering the CBD in the 2041 am peak and estimates of the expected delays.

Also, the large number of buses in the CBD under this scenario would have a serious impact on amenity; however, this has not been assigned a dollar value. Additionally, there will be delays to pedestrians trying to cross congested streets but these have not been quantified. Overall, the liveability of the CBD would be severely compromised in this scenario but this cannot be assigned a dollar value.

5.9.7 Costs in the Evaluation

Capital costs for building the scheme have been included in the appropriate years over the construction period, which has been assumed to start in 2015 with the scheme opening in mid-2021. The capital cost for the construction of the CBD Rail Link tunnels, stations and rail systems has been taken as $1.86b, which is considered to be the most likely cost, excluding property. A sensitivity test has also been done for the 95th percentile cost.

In the year before the CBD Rail Link is open a figure of $100 million has been included for “consequent costs”. These are the additional costs that would be incurred elsewhere on the rail network once the rail link is operational. This is intended to cover costs associated with an increased intensity of service such as stabling, level crossing improvements and capacity improvements.

Property costs have been included at the appropriate stage of scheme development, e.g. on designation or before construction. Once construction is complete, some of the property costs could be recovered and this has also been taken into account. Property costs used in the evaluation are as follows:

- A cost of $270 million on designation and at the start of construction; and

- Income from sale of land and buildings of $140 million around the time of completion.

For some operational options, additional rolling stock will be required and the capital cost of this is included in the year before opening, taking due account of any corresponding DM costs. Based on advice from ARTA, a capital cost of $10 million per 3-car EMU has been taken.

After opening of the CBD Rail Link there will be two additional items of operating cost:

- The costs required to maintain and operate the new section of track, tunnels, new stations etc, which has been taken as $7.5 million per annum.
- Any additional operating costs (drivers, fuel etc) resulting from a changed pattern of operation on the rail network, taken as $400,000 per annum per 3-car unit.

From about year 15 after the CBD Rail Link is open, there will be associated infrastructure renewal costs for items such as rail systems and station and tunnel electrical and mechanical equipment. These costs have been included in the appropriate years.

The total present value of costs for construction, property and operation of the tunnel and stations is in the region of $1.34 billion for the full scheme, based on a 30 year evaluation and 8% discount rate.

The considerable increase in rail passengers brought about by the CBD Rail Link results in some loss of ridership on buses. This will lead to a lower requirement for the number of peak buses operating the network. The cost saving from this has been estimated at $9 million per annum and this has been included in the evaluation.

5.9.8 Transport Benefits

The three sources of Transport Benefit from the CBD Rail Link which have been used in the evaluation are:

- Benefits to existing PT users, e.g. through faster trips or reduced waiting (note that these may be as a result of a switch from bus to rail);
- Benefits to new users of rail (who may have transferred from cars or not previously have made the trip);
- “Decongestion” benefits to those remaining on the road network arising from the trips that have transferred from car to rail.

The second of these, benefits to new PT users, is governed by the “rule of half” (RoH) since some new users will receive almost no benefit, while others will receive the full benefit, so on average each new user will receive half the benefit.

All benefits were monetised using the appropriate values from EEM.

The benefits relate to all modes, e.g. they look at changes in travel time and in mode share, so a model capable of representing all these impacts is required. The transport model which best addresses all these at a suitable level of detail is the Auckland Passenger Transport model (APT) which is owned and operated by ARC, as described in Section 5.9.2. The economic evaluation of the various stages and options in the CBD Rail Link relied extensively on the use of the APT model, as would be expected given that such applications were part of the reason for the development of APT.

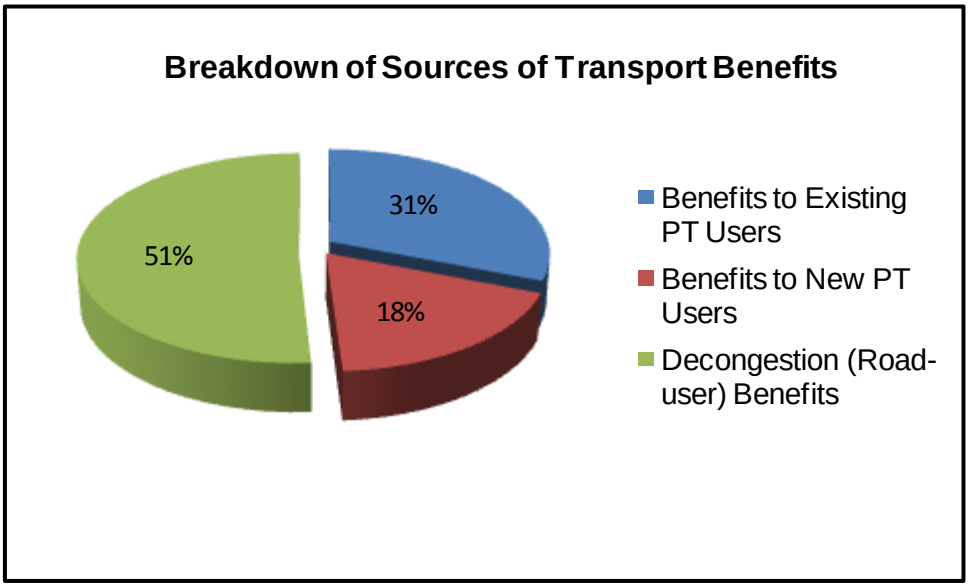
The results from the APT model show that in the first year of opening the direct transport benefits of the CBD Rail Link, to both PT users and road users, would be around $40 million. This would rise to $500 million in 2041. The present value of benefits for the scheme is in the region of $1.3 billion.

Total benefits are made up as follows:

- Benefits to existing PT users: 31%
- Benefits to new PT users: 18%
- Decongestion (road-user) benefits 51%.

This is shown in Figure 5-26 below. The fact that over half the benefits are due to decongestion of road traffic indicates that the scheme makes a significant contribution to the economic health of Auckland as a whole, not just PT users.

Figure 5-26 Breakdown of Sources of Transport Benefits



The model indicates that, with the CBD Rail Link in place, annual rail patronage in 2041 would be twice what it would be in the Do Minimum. These figures are consistent with the analysis in Section 2.3.1.

5.9.9 Wider Economic Benefits

Conventional project economic evaluation captures the 'welfare' benefits of transport investments and policy changes. These benefits refer to various aspects of travel, such as journey times, vehicle operating costs, accident reductions and environmental improvements which can be classified under the economic welfare category, as they largely measure the impacts on people. Other benefits accrue through the change in Gross Domestic Product (GDP) which examines the transport impacts on business activity in the study area, and is also known as wider economic benefits (WEBs).

Traditionally in transport project economic evaluation, only improvements to 'business user' trips and some components of 'private user' trips (reductions in vehicle operating costs and accident costs) come under the GDP side of the economy. However, this does not necessarily capture the whole benefit to GDP that investing in transport infrastructure can cause. Wider effects to GDP via increased efficiencies and improved competition could also be significant. If they cannot be

measured, as part of the scheme's cost/benefit assessment, then decisions may be based on an incomplete picture.

One of the deciding factors for locating businesses is access to the transport system. This brings them within quick and easy access to their customers and their market. This in turn will inevitably make the land with good access to the transport system more attractive and in turn more expensive. This raises the question of what benefits do firms and the wider economy gain from having access to a good transport system apart from shorter journey times.

Agglomeration economies describe the productive advantages arising from the close spatial concentration of economic activity; transport is a key factor in achieving this concentration. The resulting intensification of employment will bring "agglomeration" benefits such as:

- Deeper, more efficient labour markets;
- Greater specialisation;
- Greater competition; and
- Improved networking and knowledge transfer.

In simple terms, agglomeration benefits are why cities exist. There are three main potential sources of agglomeration benefits likely to follow from a transport scheme such as the CBD Rail Link:

- Additional jobs enabled;
- Increased efficiency for existing jobs; and
- All jobs benefit from an increase in the effective density of the central area.

The NZTA Economic Evaluation Manual (EEM) provides guidance and a methodology for calculating agglomeration benefits from transport investment and this method has been used in the CBD Rail Link Business Case.

The theory behind agglomeration is that clustering of firms can generate a positive externality, and a better transportation network can increase the accessibility of an area to a greater number of firms and workers. If an additional firm moves into an area or the transport links improve to bring more firms within a reasonable journey time, then benefits will accrue to all firms in the area because of the increasing concentration of economic activity over that area.

To quantify the benefits due to agglomeration, the change to the 'effective density' needs to be measured. This is defined as the change to the number of people and firms which can access an area within a specific time frame. A monetary value can be attached to this measure by calculating the weighted generalised cost of travel between the two transport scenarios under study, which in this case are the base case or Do Minimum (DM) scenario and the option (with CBD Rail Link) case. The difference in effective density between the two scenarios then generates the benefits attributable to the option transport scheme. The change in effective density is multiplied by the GDP per worker for each industry sector to generate the monetary impact of the transport investment. This method is the basis of the approach given in the NZTA *Economic Evaluation Manual (EEM).*

WEBs have been estimated in a way which is fully compliant with the guidance set out in the EEM and consistent with the assumptions used in the transport benefit appraisal. The process used ART3 outputs for highway generalised costs and APT outputs for PT generalised costs. The reason for using both models was to ensure that a full weighted average generalised cost of travel across all modes, time periods and users (business and commuters only) could be calculated, as required

by the EEM. The APT model was considered best to represent PT generalised cost changes but could not provide highway costs on an origin/destination basis. The process first aggregated the transport model zones up to 238 aggregation areas which matched other economic data, such as average wage levels by industry, which were also required in the calculation.

The results from the two models were also used to calculate transport benefits resulting only from changes in generalised cost of travel. This process concluded that the agglomeration benefits amount to 14% of transport (generalised cost) benefits. In other words, for every $100 of transport benefits there will be an additional $14 of WEBs if EEM is followed.

However, wider economic benefits as calculated above have been excluded in the combined evaluation (Section 5.10), to avoid possible double counting with the CBD regeneration benefits, described in Section 5.3. We believe the CBD regeneration benefits analysed above include benefits due to agglomeration, output increases and labour market effects. For this reason, we have not included the EEM calculation of WEBs in the combined economic evaluation.

5.9.10 Outcome

The EEM benefits, from both transport and WEBs, are summarised inTable 5-13 below.

Table 5-13 Benefit-Cost ratio – EEM benefits only ($ million Present Value)

Item	Reference	Estimated Benefit		
		8% Discount Rate	6% Discount Rate	4% Discount Rate
Capital Cost and Incremental O&M costs less revenue [1]	5.2	-$1,330	-$1,440	-$1,538
Transport Benefits	5.9.8	$1,319	$2,057	$3,277
Wider Economic Benefits (EEM)	5.9.9	$185	$288	$459
Net Benefit (Cost)		$173	$905	$2,197
Benefit Cost Ratio [2]		**1.1**	**1.6**	**2.4**

1. Full project over 30 years
2. Rounded to 1 decimal place as per NZTA EEM

5.9.11 Sensitivity Testing

Sensitivity testing is recommended by EEM and is a useful way of ensuring that the outcome of the evaluation is not especially sensitive to particular inputs. Table 5-14 reports sensitivity tests on the same basis, i.e. including all EEM benefits. Appendix F provides more details on these sensitivity tests.

The “Minimum Rolling Stock” test examines the impact of acquiring the minimum amount of rolling stock when the CBDRL is open. About five years later a significant tranche of rolling stock (RS) would be acquired to cater for additional demand, including allowing frequencies to rise from 6 to 8 trains per hour. It can be seen that the BCR is unchanged, showing that the case for the CBDRL is not sensitive to the exact details of how the network is operated. This can be viewed as a “cautious” scenario in that the initial investment in RS is small and the timing of further RS acquisition can be adjusted to match demand.

The “Faster Development of CBD” test assumes that the land use pattern in the CBD as forecast for 2041 would be brought forward to 2031, i.e. the introduction of the CBDRL allows the CBD to develop faster. This effectively doubles the BCR.

For a long-term investment with a long construction period such as the CBDRL, it could be argued that the standard 30-year evaluation period does not fully reflect the longer-term benefits. For this reason, a test has been done in which the 30-year period starts when the rail link is open, i.e. in 2021/22. It can be seen that this increases the BCR by 40% to 50%, reflecting the long-term nature of the benefits from the investment.

The patronage modelling has assumed that growth will continue in the longer term; however, if this is not the case and growth is curtailed in 2040, the effect on the BCR is minimal as the next test shows.

Finally, EEM requires that a test is done in which the 95th percentile cost, rather than the most likely value, is assumed. It can be seen that even in this case the rounded BCR at the 8% discount rate is 1.0.

Table 5-14 Sensitivity Tests on BCR (G), EEM benefits only

Test	8% discount rate	6% discount rate	4% discount rate
Base	1.13	1.63	2.43
Minimum Rolling Stock	1.13	1.63	2.43
Faster development of CBD (1)	2.27	3.45	5.70
Evaluation period starts on opening	1.52	2.41	4.13
No patronage growth after year 2040	1.10	1.57	2.33
Upper bound (95th percentile) costs	0.96	1.38	2.04

5.10 Combined Economic Evaluation

The combined economic evaluation takes into account all categories of costs and benefits discussed above and are presented in Table 5-15. Identified benefits have been added together, noting the following considerations:

- Transport benefits were calculated as the avoidance of the transport disbenefits associated with working and living in the CBD, under the No CBD Rail Link scenario e.g. congestion, longer journey time etc. This would underestimate the true economic cost if capacity constraints actually force workers to seek employment away from the CBD i.e. moving to lower value added jobs.
- The increase in CBD net value added was based on the *additional* employment generated in the CBD Rail Link scenario[15].
- An increase in real estate values was considered to represent a balance sheet change (appreciation of capital investment) and was not included.

After making allowance for the above issues, a benefit-cost ratio of **3.5** was calculated for the CBD Rail Link Project at the current Treasury discount rate of 8%. At reduced discount rates of 6% and 4%, the benefit-cost ratio increases to 4.7 and 6.6 respectively.

[15] There is no double counting with the direct transport benefits since they were calculated using the RLTS projections.

Table 5-15 Overall Costs and Benefits of CBD Rail Link Project ($ million Present Value)

Item	Reference	Estimated Benefit		
		8% Discount Rate	6% Discount Rate	4% Discount Rate
Capital Cost and Incremental O&M costs less revenue [1]	5.2	-$1,330	-$1,440	-$1,538
Transport Benefits	5.9.8	$1,319	$2,057	$3,277
Net Value Added from CBD Increased Productivity	5.6	$3,333	$4,720	$6,879
Net Benefit (Cost)		$3,322	$5,337	$8,618
Benefit Cost Ratio [2]		**3.5**	**4.7**	**6.6**

1. Full project over 30 years

2. Rounded to 1 decimal place as per NZTA EEM

5.11 Project Timing

This business case establishes a strong prima facie case for the CBD Rail Link as a viable and effective transport project with substantial benefits for Auckland. This is built around the following arguments:

- The strategic fit with key planning documents at national, regional and local levels;
- The standard benefit-cost ratio from the EEM is 1.13, including wider economic benefits, at an 8% discount rate;
- The benefit-cost ratio with the addition of urban development benefits (excluding wider economic benefits) increases to 3.5 at an 8% discount rate.

Bringing the project forward so that it is built by 2021 would enable Auckland to capitalise on the advantages that the project brings:

- Provides alternative complementary infrastructure to roads, thus broadening the region's transport infrastructure base. The support provided by the CBD Rail Link to relief of pressure on the road network is shown in Figure 5-26, which indicates that 51% of the benefits from the CBD Rail Link are decongestion benefits that flow to road users.
- Makes the best use of existing infrastructure by not only opening up capacity that exists in the rail network, but also by providing for ongoing development of the bus network (see Figure 2-6).
- Supports the delivery of the region's land use strategies for densification and urbanisation around key centres. Bringing the rail link forward helps to cement the objectives for land use and supports the ongoing development of the CBD as New Zealand's most productive business area.

The World Economic Forum established the correlation between infrastructure and competitiveness, citing extensive and efficient infrastructure as one of its twelve pillars of competitiveness. Countries with well developed infrastructure score more highly on competitiveness and therefore are more attractive to physical, financial and human capital. Because of the distance of New Zealand from its major trading partners and markets, transport within the country needs to be as internally efficient as possible to help counteract the issues associated with distance.

As illustrated in Section 5.6, the Auckland CBD has the highest value-added per employee of any area in New Zealand, which implies that opening up the already congested transport links into the city will help New Zealand's external competitiveness. Just as importantly, transport links are identified as opening internal opportunities up for a wider range of people across social and cultural classes by improving access to key economic areas.

Therefore, delivering the CBD Rail Link early (by 2021) creates a range of opportunities both for improving Auckland's external competitiveness and for improving access to internal markets to a wider range of the region's population.

5.12 Conclusions

The proposed CBD Rail Link aims to alleviate the transport constraints of the growing inner city, but will also unlock Auckland's strategic growth potential in many ways:

- Support agglomeration in the CBD areas;
- Stimulate additional employment growth in the CBD where higher productivity (both in levels and growth potential) is already being achieved compared to elsewhere in New Zealand;
- Provide a catalyst for land use intensification and regeneration of CBD areas, thus inducing capital investment in development of the city; and
- Support higher density development at suburban stations, which provides the region with environmental and land use benefits.

Auckland's strategic role in the national economy is intertwined with the CBD Rail Link; the City needs the Rail Link to support its current growth but also to stimulate its future growth along the lines described by the Regional Growth Strategy. Therefore, the CBD Rail Link Project is not just an essential element in Auckland's transformation into a globally competitive urban centre; it is perhaps the most critical. Bringing the Rail Link forward for completion by 2021 would exploit the benefits described in this section by making them available earlier and thus putting Auckland on the front foot for future growth.

6 Implementation

This chapter documents other issues associated with the Business Case for the CBD Rail Link project, including:

- the implementation programme assumptions;
- the commercial case (project funding requirements);
- the financial case (financing and capital contributions needed for the project); and
- the management case (establishment of project governance and procurement systems to undertake the project).

Since this Business Case assignment was well underway before the New Zealand Treasury released its CAM framework guidelines, it is not intended to fully conform to these recently released guidelines. This implementation discussion focuses on funding approaches, initially on funding to protect the corridor after lodging the Notice of Requirement (NOR) and then on construction funding.

6.1 Implementation Programme

The economic evaluation in Chapter 5 of this Business Case has assumed that the CBD Rail Link would be constructed and operational by mid 2021. An indicative time line for the project is shown in Figure 6-1, which is based on the following assumptions:

6.1.1 Route Designation and Environmental Consents

- Notice of Requirement (NOR) documentation completed in December 2010;
- Decision by KiwiRail on whether to seek designation of the CBD Rail Link Route and stations, including which method to be used for securing the designation (see below) January to June 2011;
- Lodgement of NOR in 1 July 2011;
- Estimated period for securing designation- 29 months;
- Secure environmental consents- 7 months; and
- Designation and Consents in place by mid 2014.

There are two possible methods available for progressing the NOR:

1) NORs served on Auckland Council and processed through “two tier” system:

- Council officers process NORs and Council Commissioners make recommendation to KiwiRail to confirm, confirm with conditions, modify or withdraw Notice, to which KiwiRail issues a decision on the NORs; and
- Appeal rights to the Environment Court on KiwiRail’s decision on the NORs, to which appeals either settled prior to or at an Environment Court Hearing, and Environment Court makes decision to confirm, confirm with conditions, modify or withdraw Notice.

2) NORs served on Environmental Protection Agency (EPA) and Minister for the Environment (the Minister) determines whether NORs heard by:

- Board of Inquiry (BOI)

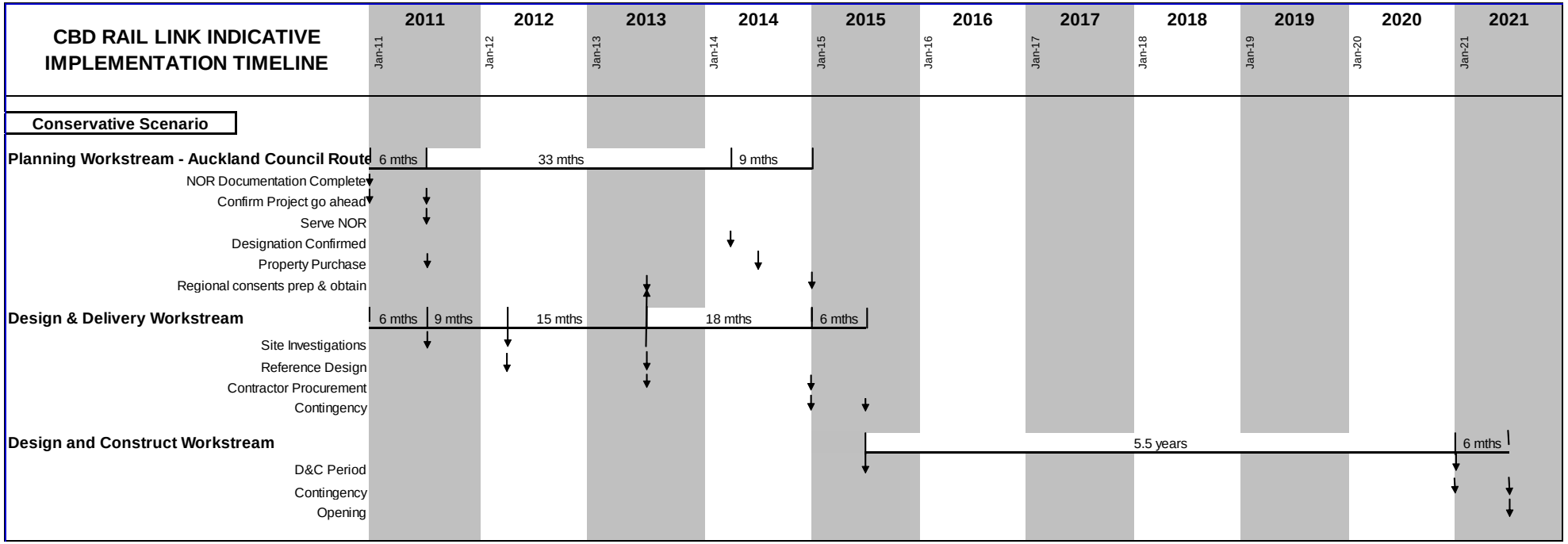
- Environment Court Referral
- Auckland Council (two tier process provided under 1 above)

The view of the Consultant Team is that the overall duration of either method is likely to be similar, in that although there is a legislated 9 month timeframe for the BOI method, more preparation is required than for the traditional Council method. This is because there is no right of negotiation or appeal under the BOI method, so more work will be needed in advance of lodgement of the NOR to ensure that it is robust and to minimise the risk of adverse conditions being imposed on the designation.

6.1.2 Project Implementation

- In parallel with the designation and consenting process the following activities would take place between mid 2011 and mid 2015
    - Site investigations
    - Property acquisition
    - Production of a reference design for procurement purposes
    - Selection of a organisation to design and build the project (refer to 6.8 for possible procurement options)
- 6 year detail design and construction period from mid 2015 to mid 2021

Figure 6-1 Indicative Project Implementation Timeline

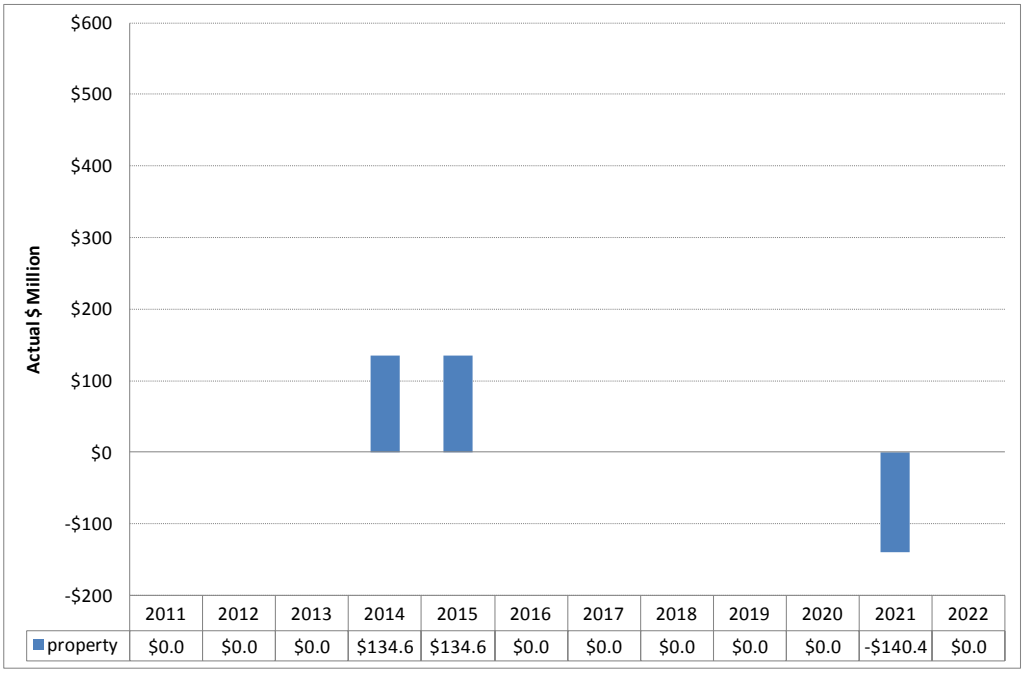


6.2 Real Estate Acquisition for Corridor Protection

The first major expenditure step after route designation will be property acquisition to protect the corridor. An agreement between Kiwi Rail and the new Auckland City likely will be required for property acquisition. KiwiRail as Requiring Authority would be obligated for any property purchase costs as soon as the NORs are served by the Auckland Council (or Environmental Protection Agency). Also, it will be KiwiRail who landowners would be seeking buy out from through the Environment Court process. However, because the new Auckland City will have planning and zoning control and likely be better structured to perform real estate development or redevelopment functions, there may be a rational for Auckland City to acquire the properties necessary for route protection. According to the literature review presented earlier, the land or air-rights in the vicinity of the Rail Link stations will in all likelihood gain value once project completion is determined to be imminent.

Designating the route implies that there will be costs associated with this activity through the compensation of property owners affected by the proposed infrastructure works. Compensation can be in the form of cash payments for disturbances or the outright purchase of the property affected at an agreed price. Figure 6-2 provides an indication of the size and timing of payments to designate the route, along with a likely recovery dollar amount for the sale of properties once the construction period is completed.

Figure 6-2 Profile of Costs and Recoveries Associated with Route Designation



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
property	$0.0	$0.0	$0.0	$134.6	$134.6	$0.0	$0.0	$0.0	$0.0	$0.0	-$140.4	$0.0

Extensive research has been carried out with property companies operating in the Auckland CBD to determine the likely impacts on the properties affected and therefore the overall cost compensation and acquisition. The original total compensation derived from the analysis was $230 million; however, the amounts used in the modelling included a 17% contingency to allow for unforeseen issues at the time of acquisition.

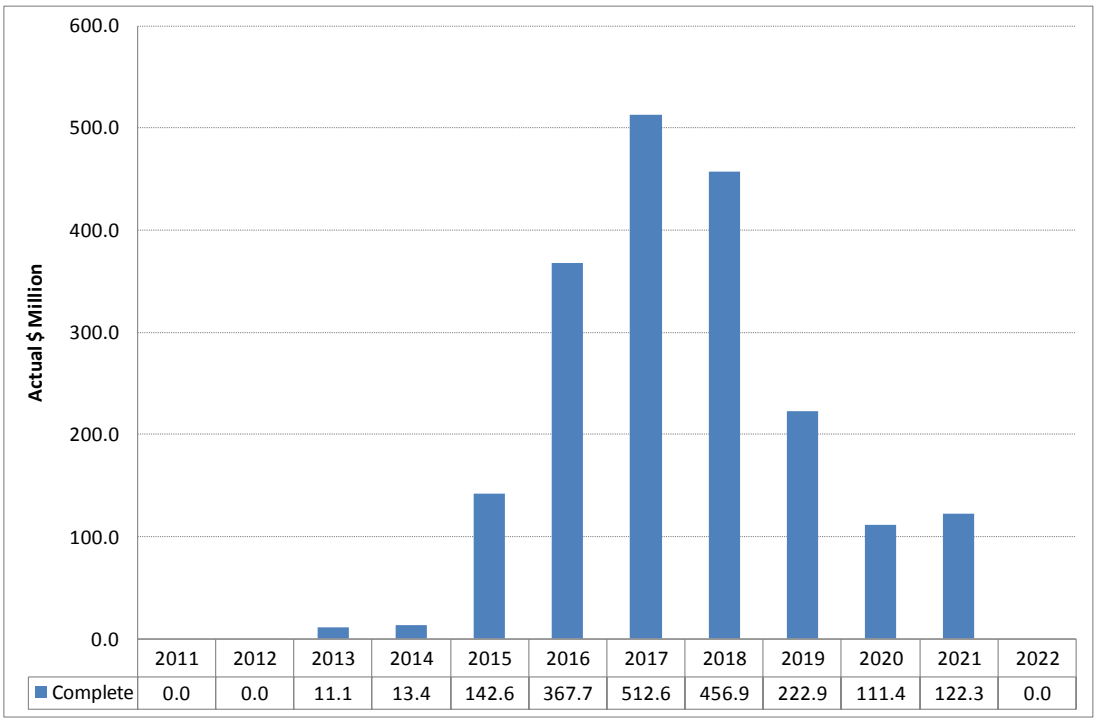
The recovery of $140 million in 2021 towards the end of the construction process will help to offset some of the capital costs incurred around that period and accounts for the dip in expenditure around that time. The $140 million assumes no upside impact from the CBD Rail Link and is therefore a

conservative estimate. Designation is a critical issue for this project. It is in the public interest to protect the route as quickly as possible. Without this protection the project economics are potentially threatened by future development along the route, which could increase property acquisition costs beyond what they are now, or by making construction unreasonably difficult and expensive.

6.3 Timing of Construction and Funding Requirement

Significant capital will be needed over the course of the initial 12 years, to cover the construction of tunnel (main peak), the purchase of the electric trains (secondary peak in 2021) and to cover initial operating deficits while capacity is built and patronage grows as services expand. Figure 6-3 illustrates the construction cost profile for the CBD Rail Link. Traditionally, the Central Government has born the heaviest part of the funding burden for capital intensive infrastructure projects.

Figure 6-3 Construction Cost Profile



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Complete	0.0	0.0	11.1	13.4	142.6	367.7	512.6	456.9	222.9	111.4	122.3	0.0

The mechanism for Central Government to provide funds is a Crown appropriation in the form of a loan to either the Auckland Council or to Auckland Transport or an allocation from the National Land Transport Fund. A Crown appropriation is the process by which Parliament authorises the government to spend funds. The expenditure is approved by means of an Appropriation Act passed in Parliament. The CBD Rail Link project would require a non-departmental appropriation and could take the form of a loan or a grant.

In the future, rail infrastructure will not be funded by the National Land Transport Fund but instead will be funded by Crown appropriations. Wellington rail projects will be funded by Crown appropriation and so it is assumed that the same approach will apply to Auckland rail projects. The National Land Transport Fund is managed by the New Zealand Transport Agency, with oversight from the Ministry of Transport. In order to obtain funds from the National Land Transport Fund (NLTF), the CBD Rail Link Project must be included in the Auckland Regional Land Transport Programme - this has already occurred. The project is marked as a Regional Priority.

The New Zealand Transport Authority forms a National Land Transport Programme (NLTP) every three years by assessing all eligible activities proposed by regional authorities and then prioritising and programming the activities according to the available funding.

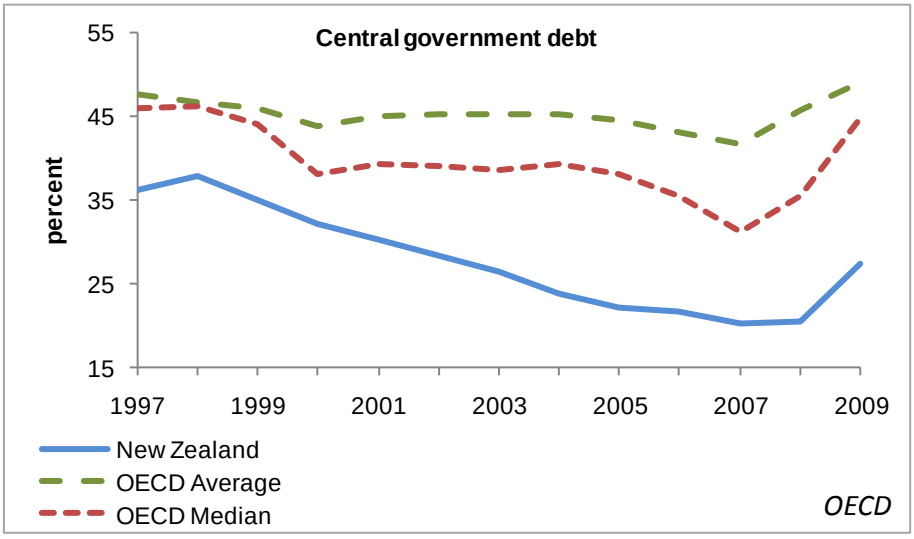
Land transport activities delivered by local government are part funded from the National Land Transport Fund according to the applicable funding assistance rate (FAR). The funding assistance rate for passenger rail projects is 60% (New Zealand Transport Agency Planning, Programming and Funding Manual, 2008). The remaining 40% must be raised from farebox revenues and local government sources. As an example, the NZTA approved capital funding for the Auckland Passenger Rail Station project (rail station upgrades) at an assistance rate of 60%.

Most rail capital expenditure in New Zealand is financed through borrowing. A key fiscal goal of the Central Government is to reduce Gross Sovereign Issued Debt less Core Crown Financial Assets ("net debt") to no more than 20%of Gross Domestic Product (GDP) by 2020. The long-term objective of reducing debt and improving net worth aims to better position New Zealand against economic shocks.

The Central Government is currently under the 20% threshold, with net debt of $26.6 billion at 30 June 2010 (14.1% of GDP). However, one implication of the global economic slowdown has been a surge in Government spending as a share of GDP. In the year to June 2011, net debt is expected to rise by 50%, to $40 billion (19.6 percent of GDP). By 2013, net debt is forecast to rise to over 25%.

As shown in Figure 6-4, New Zealand historically has had lower levels of Central Government debt (a slightly different measure to net debt) compared to other nations in the OECD.

Figure 6-4 Time Series of OECD Central Government Debt as a Percentage of GDP



In a global sense, the New Zealand Central Government is well-positioned, in comparison to other sovereign borrowers, to take on more debt. Moreover, New Zealand's comparatively high levels of interest paid on government stock, combined with transparent accounting practices and being seen traditionally as a "safe" government to invest in, does mean that New Zealand may be a comparatively attractive borrower as global investment funds recover.

In terms of the government's own fiscal management targets, its current level of borrowing (over $200 million per week) is presently not consistent with the principles of sound fiscal management as outlined in the Fiscal Responsibility Act 2010. Budget forecasts have indicated that the government will return to being consistent with these principles by 2014/15. Essentially, we can expect an option of Central Government borrowing to be feasible over the current timelines for the CBD Rail Link Project.

6.4 Benefits Based Funding Approach

The CBD Rail Link generates national, regional and Auckland CBD local benefits. These three different layers of benefits are summarised below:

- **National** – A stronger and more vibrant Auckland CBD, facilitated by the completion of the Rail Link, will enhance New Zealand's global competitive position. The additional earnings from that improved competitive position will not only accelerate growth of the Auckland regional economy, it will also accelerate national gross domestic product (GDP) growth, particularly when the multiplier effect is considered. There is a solid case for Central Government funding for this project.
- **Regional** – In addition to an acceleration of regional economic growth, residents of the new Auckland "Super City" will receive both travel time savings benefits and quality of life benefits. The travel time benefits accrue to rail users directly and to non-rail users in the form of reduced traffic congestion. The quality of life benefits includes higher paying jobs, improved air quality and greater choice of shops, restaurants, entertainment and cultural venues that can be expected from a larger and more varied CBD. There is a case for a layer of regional funding.
- **CBD and Newton** – The property owners and developers in the CBD and the Newton station vicinity receive yet another layer of benefit in the form of enhanced real estate values. The enhanced values accrue to both existing buildings in the form of higher rents and to future development because additional density can be achieved without the need to provide associated additional parking. The primary geographic beneficiaries of the CBD Rail Link, the properties in the CBD and the Newton area, should contribute an additional layer of funding.

Considering these three layers of benefits, the consultant team explored the combination of Super City general rates revenue and Auckland CBD targeted rates revenue or tax increment share that could fund a portion of this project. The remainder of capital funding would need to come from Central Government and operating funding from farebox revenue.

6.4.1 Regional and CBD/Newton contributions

The analysis begins by reviewing the historic general rates revenue generated by the eight jurisdictions that will constitute the new Auckland Council. This historic data is shown in both current dollars and is adjusted to constant 2010 dollars to understand both its real growth and the impact of inflation (Table 6-1). This historic information, which accounts for the fact that only 75% of the Franklin District will be included in the new Auckland Council, indicates average annual revenue growth of 6.4% over the past 17 years. Of this growth, 3.7% per year was real growth and 2.7% per year was due to inflation. The estimated 2010 total general rates revenue for the jurisdictions that will constitute the new Auckland is $1.34 billion.

Table 6-1 Historic Local Authority Rates Income for Jurisdictions that will Constitute the New Auckland Council ($000)

Year (Ending in June)	Auckland City Council	Auckland Regional Council	Franklin Dist Council	Manukau City Council	North Shore City Council	Papakura Dist Council	Rodney Dist Council	Waitakere City Council	Total Rates Income (Current Year Dollars)	Increase in Current Dollars	PPI Adjustment Index to 2010 Dollars	Total Rates Income (2010	Increase in Constant 2010
1993	151,581	53,806	8,988	96,042	63,357	13,650	26,471	55,385	469,280				
1994	162,517	55,869	10,013	98,617	68,203	14,032	29,482	62,827	501,560	6.88%	1.503	753,882	
1995	175,113	57,441	11,421	100,242	69,572	13,730	28,923	64,449	520,891	3.85%	1.494	778,154	3.22%
1996	181,701	59,901	12,009	89,086	73,520	14,208	30,748	68,446	529,619	1.68%	1.464	775,400	-0.35%
1997	205,713	61,693	14,314	96,325	80,917	14,482	34,258	76,672	584,374	10.34%	1.479	864,190	11.45%
1998	208,824	61,693	15,236	85,826	75,655	8,399	40,103	66,617	562,353	-3.77%	1.467	824,971	-4.54%
1999	216,035	61,819	16,166	89,915	82,918	8,121	40,015	70,742	585,731	4.16%	1.467	859,267	4.16%
2000	239,658	65,095	16,727	94,173	92,934	8,931	45,717	72,292	635,527	8.50%	1.416	899,920	4.73%
2001	251,106	69,000	18,456	98,575	99,716	10,313	48,640	72,710	668,516	5.19%	1.348	901,391	0.16%
2002	265,087	71,760	18,057	104,598	103,643	12,516	52,669	74,928	703,258	5.20%	1.326	932,802	3.48%
2003	275,003	77,682	19,877	113,066	108,378	14,219	56,199	83,290	747,714	6.32%	1.307	977,626	4.81%
2004	284,766	104,442	22,519	126,539	114,860	15,726	61,539	88,359	818,750	9.50%	1.258	1,030,108	5.37%
2005	304,462	109,185	24,703	132,331	122,417	17,323	66,171	92,605	869,197	6.16%	1.203	1,046,031	1.55%
2006	345,002	116,590	27,565	144,399	132,413	21,032	73,039	101,127	961,167	10.58%	1.145	1,100,727	5.23%
2007	371,458	124,525	30,320	153,922	147,044	21,902	81,762	110,579	1,041,512	8.36%	1.122	1,169,012	6.20%
2008	394,184	134,873	32,229	164,762	160,864	23,601	88,263	117,957	1,116,733	7.22%	1.020	1,139,254	-2.55%
2009	419,083	145,820	35,406	182,281	178,423	26,648	98,182	148,662	1,234,505	10.55%	1.013	1,250,704	9.78%
2010 est	453,867	157,923	38,345	197,410	193,232	28,860	106,331	161,001	1,336,969	8.30%	1.000	1,336,969	6.90%
Avg Annual Rate of Increase										**6.41%**			**3.73%**

Source: Statistics New Zealand

The rates revenue for the new Auckland was projected forward using a 3.9% annual real increase, a slight increase over the 3.73% rate achieved over the past 17 years, and an inflation rate of 2.6% For bonding purposes, the real interest rate was assumed to be 2.75%. In current dollar terms, the interest rate would be 5.35% (2.75% plus inflation). The analyses in both constant and current dollars (Table 6-2 and Table 6-3) suggest that, including an allowance of 30% for bond coverage, debt service reserve and bonding costs, a 1% allocation of this general rates revenue stream would provide $400 million for the CBD Rail Link Project. A higher percentage allocation would mean more revenue. This slice of future Auckland Council rates revenue can be viewed either as a rates increase or as funding achieved from the savings generated by the consolidation of eight smaller local governmental jurisdictions into one large and more efficient unit.

Table 6-2 Auckland Council Rates Revenue Forecast and Share for Rail Link ($1,000 constant dollars)

Rates Income Growth Rate in Constant 2010 Dollars =	3.90%
Bonding Rate in constant 2010 Dollars =	2.75%

Year	Auckland Council Rates Income	CBD Rail Link Take At 2.00%	1.50%	1.00%
2010	1,336,969	0	0	0
2011	1,389,111	0	0	0
2012	1,443,286	28,866	21,649	14,433
2013	1,499,574	29,991	22,494	14,996
2014	1,558,058	31,161	23,371	15,581
2015	1,618,822	32,376	24,282	16,188
2016	1,681,956	33,639	25,229	16,820
2017	1,747,552	34,951	26,213	17,476
2018	1,815,707	36,314	27,236	18,157
2019	1,886,519	37,730	28,298	18,865
2020	1,960,093	39,202	29,401	19,601
2021	2,036,537	40,731	30,548	20,365
2022	2,115,962	42,319	31,739	21,160
2023	2,198,485	43,970	32,977	21,985
2024	2,284,226	45,685	34,263	22,842
2025	2,373,310	47,466	35,600	23,733
2026	2,465,869	49,317	36,988	24,659
2027	2,562,038	51,241	38,431	25,620
2028	2,661,958	53,239	39,929	26,620
2029	2,765,774	55,315	41,487	27,658
2030	2,873,639	57,473	43,105	28,736
2031	2,985,711	59,714	44,786	29,857
2032	3,102,154	62,043	46,532	31,022
2033	3,223,138	64,463	48,347	32,231
2034	3,348,840	66,977	50,233	33,488
2035	3,479,445	69,589	52,192	34,794
2036	3,615,144	72,303	54,227	36,151
2037	3,756,134	75,123	56,342	37,561
2038	3,902,623	78,052	58,539	39,026
2039	4,054,826	81,097	60,822	40,548
2040	4,212,964	84,259	63,194	42,130
2041	4,377,269	87,545	65,659	43,773
2042	4,547,983	90,960	68,220	45,480
Present Value in 2011 at Bonding Rate		$1,034,232	$775,674	$517,116
Bond Coverage Ratio and Reserve		1.30	1.30	1.30
Amount Available for CBD Rail Link Funding		**$795,563**	**$596,672**	**$397,781**

Table 6-3 Auckland Council Rates Revenue Forecast and Share for CBD Rail Link ($1,000 current dollars)

Year	Auckland Council Rates Income	CBD Rail Link Take At 2.00%	1.50%	1.00%
2010	1,336,969	0	0	0
2011	1,423,872	0	0	0
2012	1,516,424	30,328	22,746	15,164
2013	1,614,991	32,300	24,225	16,150
2014	1,719,966	34,399	25,799	17,200
2015	1,831,763	36,635	27,476	18,318
2016	1,950,828	39,017	29,262	19,508
2017	2,077,632	41,553	31,164	20,776
2018	2,212,678	44,254	33,190	22,127
2019	2,356,502	47,130	35,348	23,565
2020	2,509,674	50,193	37,645	25,097
2021	2,672,803	53,456	40,092	26,728
2022	2,846,535	56,931	42,698	28,465
2023	3,031,560	60,631	45,473	30,316
2024	3,228,612	64,572	48,429	32,286
2025	3,438,471	68,769	51,577	34,385
2026	3,661,972	73,239	54,930	36,620
2027	3,900,000	78,000	58,500	39,000
2028	4,153,500	83,070	62,303	41,535
2029	4,423,478	88,470	66,352	44,235
2030	4,711,004	94,220	70,665	47,110
2031	5,017,219	100,344	75,258	50,172
2032	5,343,338	106,867	80,150	53,433
2033	5,690,655	113,813	85,360	56,907
2034	6,060,548	121,211	90,908	60,605
2035	6,454,484	129,090	96,817	64,545
2036	6,874,025	137,481	103,110	68,740
2037	7,320,837	146,417	109,813	73,208
2038	7,796,691	155,934	116,950	77,967
2039	8,303,476	166,070	124,552	83,035
2040	8,843,202	176,864	132,648	88,432
2041	9,418,010	188,360	141,270	94,180
2042	10,030,181	200,604	150,453	100,302
Present Value in 2011 at Bonding Rate		$1,055,235	$791,427	$527,618
Bond Coverage Ratio and Service		1.30	1.30	1.30
Amount Available for Rail Link Funding		**$811,720**	**$608,790**	**$405,860**

The analysis then explored both a targeted rates revenue stream and a tax increment approach for the CBD plus Newton area. These are the areas that will receive the greatest real estate appreciation benefits from the three CBD Rail Link stations.

The targeted rates analysis, displayed in **Table 6-4** and **Table 6-5**, indicates that an approximately 12.5 percent increase in rates revenue based upon the CBD and Newton Station Area would likely generate the $425 to $475 million needed for this benefitting area to contribute its share.

Table 6-4: CBD Targeted Rates Income Forecast for CBD Rail Link ($1,000 constant dollars)

Rates Income Growth Rate in Constant 2010 Dollars = 4.68%
Bonding Rate in Constant 2010 Dollars = 2.75%

Year	Auckland CBD Rates Income	CBD Rail Link Take At 15.00%	12.50%	10.00%
2010	99,851	0	0	0
2011	104,524	0	0	0
2012	109,415	16,412	13,677	10,942
2013	114,536	17,180	14,317	11,454
2014	119,896	17,984	14,987	11,990
2015	125,508	18,826	15,688	12,551
2016	131,381	19,707	16,423	13,138
2017	137,530	20,629	17,191	13,753
2018	143,966	21,595	17,996	14,397
2019	150,704	22,606	18,838	15,070
2020	157,757	23,664	19,720	15,776
2021	165,140	24,771	20,642	16,514
2022	172,868	25,930	21,609	17,287
2023	180,959	27,144	22,620	18,096
2024	189,428	28,414	23,678	18,943
2025	198,293	29,744	24,787	19,829
2026	207,573	31,136	25,947	20,757
2027	217,287	32,593	27,161	21,729
2028	227,456	34,118	28,432	22,746
2029	238,101	35,715	29,763	23,810
2030	249,244	37,387	31,156	24,924
2031	260,909	39,136	32,614	26,091
2032	273,120	40,968	34,140	27,312
2033	285,902	42,885	35,738	28,590
2034	299,282	44,892	37,410	29,928
2035	313,288	46,993	39,161	31,329
2036	327,950	49,193	40,994	32,795
2037	343,298	51,495	42,912	34,330
2038	359,364	53,905	44,921	35,936
2039	376,183	56,427	47,023	37,618
2040	393,788	59,068	49,224	39,379
2041	412,217	61,833	51,527	41,222
2042	431,509	64,726	53,939	43,151
Present Value in 2011 at Bonding Rate		$663,708	$553,090	$442,472
Bond Coverage Ratio and Service		1.30	1.30	1.30
Amount Available for Rail Link Funding		**$510,545**	**$425,454**	**$340,363**

Table 6-5: CBD Targeted Rates Income Forecast for CBD Rail Link ($1,000 constant 2010 dollars)

Rates Income Growth Rate in Current Year Dollars = 7.80%
Bonding Rate in Current Year Dollars = 5.35%

Year	Auckland CBD Rates Income	CBD Rail Link Take At 15.00%	12.50%	10.00%
2010	99,851	0	0	0
2011	107,639	0	0	0
2012	116,035	17,405	14,504	11,603
2013	125,086	18,763	15,636	12,509
2014	134,842	20,226	16,855	13,484
2015	145,360	21,804	18,170	14,536
2016	156,698	23,505	19,587	15,670
2017	168,921	25,338	21,115	16,892
2018	182,096	27,314	22,762	18,210
2019	196,300	29,445	24,537	19,630
2020	211,611	31,742	26,451	21,161
2021	228,117	34,218	28,515	22,812
2022	245,910	36,887	30,739	24,591
2023	265,091	39,764	33,136	26,509
2024	285,768	42,865	35,721	28,577
2025	308,058	46,209	38,507	30,806
2026	332,087	49,813	41,511	33,209
2027	357,989	53,698	44,749	35,799
2028	385,913	57,887	48,239	38,591
2029	416,014	62,402	52,002	41,601
2030	448,463	67,269	56,058	44,846
2031	483,443	72,516	60,430	48,344
2032	521,151	78,173	65,144	52,115
2033	561,801	84,270	70,225	56,180
2034	605,622	90,843	75,703	60,562
2035	652,860	97,929	81,608	65,286
2036	703,783	105,567	87,973	70,378
2037	758,678	113,802	94,835	75,868
2038	817,855	122,678	102,232	81,786
2039	881,648	132,247	110,206	88,165
2040	950,417	142,562	118,802	95,042
2041	1,024,549	153,682	128,069	102,455
2042	1,104,464	165,670	138,058	110,446
Present Value in 2011 at Bonding Rate		$738,436	$615,364	$492,291
Bond Coverage Ratio and Service		1.30	1.30	1.30
Amount Available for Rail Link Funding		**$568,028**	**$473,357**	**$378,685**

The alternative to a targeted rates increase in the CBD and Newton Station Area is to employ tax increment financing.

6.4.2 Tax increment financing

Tax increment financing is a new concept to New Zealand, but it has been used successfully for some 40 years in the United States. Basically, it dedicates a specific share of the future rates revenue from a formally designated "Project Area" to a specific agency or for a specific purpose. In the case of the Rail Link Project, the recommended Project Area is the Auckland CBD plus the Newton Station Area. Once a tax increment Project Area has been legally designated, a base year needs to be specified. All rates revenue collected in future years that exceed the base year amount would be allocated on an agreed percentage basis to funding the Rail Link Project and the balance would be devoted to its original purposes.

Once there is a demonstrated revenue stream, tax increment bonds can be sold against this future flow to fund project construction or to repay loans from the Central Government. The rational here is that the Rail Link accelerates real estate development and overall value increase in the Project Area, and a portion of the resulting additional or "incremental" rates revenue is channelled back to fund the Project.

The tax revenues generated by the additional real estate development and value increase contribute to the funding for the Project that stimulated the additional development and value increase. The agencies and government functions that are normally funded by the rates revenue from the Project Area should not suffer, because without the Rail Link the incremental revenue used to fund the Project would not have been generated. The primary advantage of tax increment financing is that property owners in the Project Area will not experience a tax rate increase, and this could represent a significant political advantage.

Without any history of performance, tax increment bonds will be difficult to sell until there is demonstrated revenue flow. Because the increment flow builds over a designated base amount, several layers of bonding will be required over time. Tax increment financing, while very attractive in concept, will have little ability to generate front end revenue for project construction. It is likely that the Rail Link implementing authority will need to borrow from another governmental entity and then use tax increment financing to repay these loans as increment revenue builds and the bonds become acceptable in the market place. The potential revenue for the Rail Link project from tax increment flow is shown in Table 6-6 and Table 6-7 for constant and current dollars. Because the concept of tax increment financing is to share in future revenue flow over a designated base amount, using a constant dollar forecast significantly understates the potential of this source.

The analysis shows that tax increment revenue represents a strong potential source of funding for the Rail Link Project. However, this potentially robust and politically attractive source also faces some risks due to the following considerations:

- Slow acceptance in the bond market because of the lack of history of this type of financing.
- Inability to generate substantial front end revenue until increment flow has been demonstrated.
- Financing is based upon future development that may be slow to materialise due to extended national or global economic recession.

Table 6-6: CBD Tax Increment Revenue Forecast and Share for CBD Rail Link ($1,000 constant dollars)

Rates Income Growth Rate in Constant 2010 Dollars =	4.68%
Bonding Rate in Constant 2010 Dollars =	2.75%

Year	Auckland CBD Incremental Rates Income	CBD Rail Link Take At 30.0%	25.0%	20.0%
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0
2013	12,383	3,715	3,096	2,477
2014	25,250	7,575	6,312	5,050
2015	38,618	11,585	9,654	7,724
2016	52,507	15,752	13,127	10,501
2017	66,939	20,082	16,735	13,388
2018	81,933	24,580	20,483	16,387
2019	97,511	29,253	24,378	19,502
2020	113,698	34,109	28,424	22,740
2021	130,515	39,155	32,629	26,103
2022	147,989	44,397	36,997	29,598
2023	166,144	49,843	41,536	33,229
2024	185,007	55,502	46,252	37,001
2025	204,605	61,382	51,151	40,921
2026	224,968	67,491	56,242	44,994
2027	246,126	73,838	61,531	49,225
2028	268,108	80,432	67,027	53,622
2029	290,947	87,284	72,737	58,189
2030	314,678	94,403	78,669	62,936
2031	339,334	101,800	84,833	67,867
2032	364,951	109,485	91,238	72,990
2033	391,567	117,470	97,892	78,313
2034	419,222	125,767	104,805	83,844
2035	447,955	134,387	111,989	89,591
2036	477,809	143,343	119,452	95,562
2037	508,827	152,648	127,207	101,765
2038	541,054	162,316	135,264	108,211
2039	574,539	172,362	143,635	114,908
2040	609,329	182,799	152,332	121,866
2041	645,476	193,643	161,369	129,095
2042	683,033	204,910	170,758	136,607
Present Value in 2011 at Bonding Rate		$1,442,997	$1,202,497	$961,998
Bond Coverage Ratio and Service		1.50	1.50	1.50
Amount Available for Rail Link Funding		**$961,998**	**$801,665**	**$641,332**

Table 6-7: CBD Tax Increment Revenue Forecast and Share for CBD Rail Link ($1,000 current dollars)

Rates Income Growth Rate in Current Year Dollars =	7.80%
Bonding Rate in Current Year Dollars =	5.35%

Year	Auckland CBD Incremental Rates Income	CBD Rail Link Take At 30.0%	25.0%	20.0%
2010	0	0	0	0
2011	0	0	0	0
2012	0	0	0	0
2013	21,685	6,505	5,421	4,337
2014	44,779	13,434	11,195	8,956
2015	69,375	20,812	17,344	13,875
2016	95,569	28,671	23,892	19,114
2017	123,466	37,040	30,866	24,693
2018	153,176	45,953	38,294	30,635
2019	184,817	55,445	46,204	36,963
2020	218,515	65,555	54,629	43,703
2021	254,404	76,321	63,601	50,881
2022	292,625	87,787	73,156	58,525
2023	333,330	99,999	83,333	66,666
2024	376,681	113,004	94,170	75,336
2025	422,851	126,855	105,713	84,570
2026	472,021	141,606	118,005	94,404
2027	524,387	157,316	131,097	104,877
2028	580,157	174,047	145,039	116,031
2029	639,552	191,866	159,888	127,910
2030	702,808	210,842	175,702	140,562
2031	770,175	231,053	192,544	154,035
2032	841,921	252,576	210,480	168,384
2033	918,331	275,499	229,583	183,666
2034	999,707	299,912	249,927	199,941
2035	1,086,373	325,912	271,593	217,275
2036	1,178,672	353,602	294,668	235,734
2037	1,276,971	383,091	319,243	255,394
2038	1,381,659	414,498	345,415	276,332
2039	1,493,152	447,945	373,288	298,630
2040	1,611,891	483,567	402,973	322,378
2041	1,738,349	521,505	434,587	347,670
2042	1,873,027	561,908	468,257	374,605
Present Value in 2011 at Bonding Rate		$1,983,375	$1,652,813	$1,322,250
Bond Coverage Ratio and Service		1.50	1.50	1.50
Amount Available for Rail Link Funding		**$1,322,250**	**$1,101,875**	**$881,500**

6.4.3 Conclusion

Considering the multi-layered benefits that will be generated by the Rail Link Project, the availability of existing funding vehicles, and the risk/reward of instituting a new robust funding vehicle that aligns well with the geographically targeted benefits generated, the following cost sharing approach and funding strategy is recommended:

- New Auckland Super City share of 40%, with this share divided approximately equally between future general rates revenue and either a targeted rate increase within the CBD plus Newton or tax increment revenue generated by the CBD plus the Newton Station Area. From preliminary calculations, the new Auckland Super City share will require a 1% allocation of its general rates revenue plus a 10% to 15% targeted rates revenue increase for the CBD and Newton Station Area or a 20% to 30% share of the future tax increment revenue collected from the Auckland CBD plus the Newton Station Area. The tax increment approach requires no tax increase, and that is its primary political advantage.
- Central Government share of 60%.

6.5 Farebox Recovery and Long Term Sustainability

Farebox recovery ratios for public transport services in the year 2007/8 were 44.4% across the nation as a whole and 43.6% in Auckland (Draft Farebox Recovery Policy, NZTA, 2008). In the 2008/09 year, farebox recovery on the Auckland commuter rail network was 36%, compared with 58% in Wellington. In May 2010, the NZTA released its Farebox Recovery Policy which intends to increase the efficiency of rail operations and achieve a minimum national farebox recovery ratio of 50% by 2016.

It is likely that during the initial post-construction period a significant operating subsidy will be required to support the establishment of a new service that expands capacity and builds patronage. As patronage demand grows, the CBD Rail Link project allows for improved overall rail system utilisation. The annual level of subsidy required in all likelihood drops away significantly once the commissioning of the rolling stock is completed and full service patterns are implemented. With this gain in overall operating efficiency, the national farebox recovery ratio of 50% is an achievable objective for this project.

6.6 Role of the Private Sector

The size of the project may warrant consideration of private sector involvement in some role, whether through a private financing initiative or via a full public private partnership. The scope exists to involve the private sector for discrete parts of the project, for example, around the development of the stations and surrounding properties. This could also be done on a franchise arrangement where a development consortium buys in to gain access to a station portal in order to take advantage of the property development opportunities with new stations. The value of this approach can be seen through this project's work on Transit Oriented Development and CBD regeneration, where the literature from the US suggests there is significant potential value locked up in property development around stations.

6.7 Management

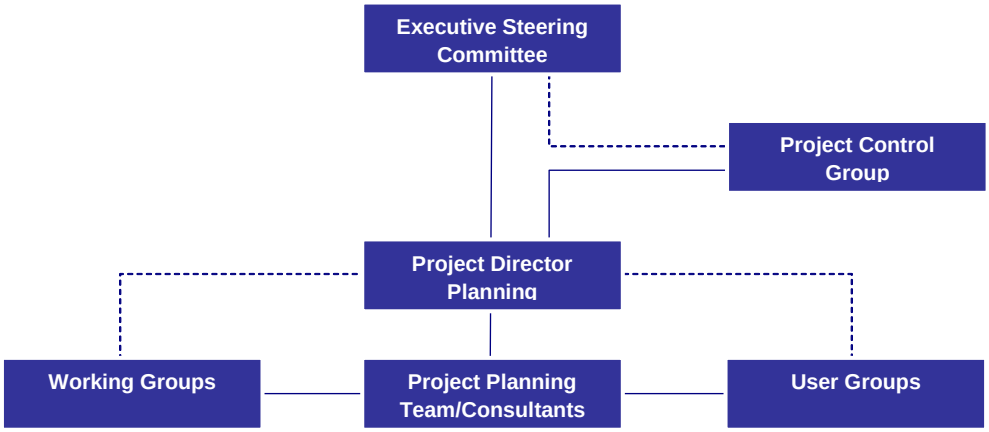
6.7.1 Planning and Development

A project this size, involving multiple stakeholders, multiple funding sources and a construction and implementation period that spans nearly 12 years (by the time all rolling stock is commissioned) is a complex operation. Strong management with clear lines of accountability for each party involved in the project is necessary to avoid significant transaction costs being introduced. Such transaction

costs include delays, cost over-runs, poor scheduling, safety issues and negative publicity. The establishment of sound governance processes within a New Zealand context will help the project avoid these issues.

Figure 6-5 shows a possible governance structure for the planning and development phase of the project premised on the establishment of a suitable corporate structure in the second half of 2011 and the recruitment of a core of executives to oversee and direct this phase.

Figure 6-5 - Project Planning and Implementation Structure



An Executive Steering Committee should be created to provide strategic direction and oversight of the development of the project. It could include representatives of:

- Auckland Council;
- Auckland Transport;
- KiwiRail;
- Ministry of Transport;
- Ministry of Economic Development; and
- Project Director Planning.

The voting weight of the committee membership will relate to the final funding plan. Other members may be involved, either on a permanent or temporary basis e.g. New Zealand Treasury. It will meet as required, but every two months throughout the planning and implementation phase of the project is likely. The Project Control Group should be the principal point of day-to-day contact between the client and the project director and the rest of the planning team.

Specialist consultants may be engaged and managed by the PD Planning to undertake detailed project planning. They will work with user groups to review and develop the design and construction planning associated with CBD Rail Link.

The working groups will deal with specific planning and implementation tasks, including:

- Operating policies and procedures;

- Communications;
- Change management;
- HR, recruitment and induction;
- Work flow methodologies and protocols;
- Information and communications technology brief and operation.

6.8 Procurement method

A detailed assessment of the procurement options is not required at this stage. This Business Case focuses on gaining in-principle agreement on the CBD Rail Link project from the Central Government, so that an early decision can be made to secure the protection of the required route.

6.8.1 New Zealand Procurement Environment

Any design of a procurement method will take into account the procurement environment in New Zealand, paying attention to statutory requirements from the Office of the Auditor General (through its good procurement practices guide) and through to central government procurement initiatives that are being led by the Ministry of Economic Development. Since this is a transport project and one that will require significant Central Government funding from both the Crown and the Crown's agents (NZTA), consistency with the NZTA's procurement guidelines should be the objective.

The NZTA procurement manual has the development of an appropriate procurement strategy as its starting point, before a procurement procedure is developed. A project the size of the CBD Rail Link may require its own procurement strategy, which is made more likely by the upcoming Auckland governance changes.

6.8.2 Procurement Options

The following procurement options might be considered for the CBD Rail Link project. However, as stated above, the detailed assessment of the procurement options is not required at this stage.

a. Procurement Option 1- Single Main Contracting Consortia

The first sub-option could be to procure based on the "Single Design and Construct Contracting Model".

A variant sub-option could be to scribe out the 'Rail Systems' (track, overhead, signalling and traction power components) and let separately, leaving the client to define and manage the interfaces.

b. Procurement Option 2 – Multi Packaged Model

- Package 1: (Civil, Structural & Building)
- Package 2: (NAL Corridor Works)
- Package 3: (QEII Square to Britomart Works)
- Package 4: Rail Systems fit out

c. Procurement Option 3 – Alliance

The above multi packaged approach still requires 70% of the value to be delivered in a single package which therefore only partial spreads the contracting risk at the expense of increasing the interface risks for the Client to manage. Another option is to use an Alliance - this is the main option beyond the single main contracting model described in Option 1. An alliance has the benefits of the multi packaged approach, in addition to ease of close client influence and integration of design, construction and operations and resultant reduction of the interface risks. It also has the benefit of being able to deal with unknowns and technical/construction difficulties without hard contract boundaries – this should yield efficiencies. However, there will be a premium for this model which needs to be carefully considered against the risks/benefits of this approach.

For the basis of the capital cost estimates used in this Business Case, Option 1 is assumed – this would hold true for Option 2 and needs further consideration for Option 3.

d. Procurement Option 4- Public Private Partnerships

Public Private Partnerships (PPPs) are widely used internationally to provide enhanced value for money and to advance delivery of essential infrastructure earlier than may be possible through other funding mechanisms. As of September 2010, there has not been any infrastructure PPPs in New Zealand. However, the National Infrastructure Plan released in March 2010 stated that the New Zealand Government intends to use PPPs where they represent value for money for tax-payers. Subsequently, the Government has recently announced its intention to commission a new prison through a PPP.

In broad terms, PPPs involve a degree of private sector financing continuing after infrastructure has been constructed. Procurement of infrastructure projects as PPPs therefore needs to assess the net cost to the public sector and any users during the lifetime of the project. This enables more flexibility in incentives for better procurement outcomes, such as lifetime costs rather than construction costs, although it introduces more risk of perverse outcomes, such as opaque disclosure of risk to investors.

PPPs in which all funding is provided by the public sector during the life of the infrastructure (in terms of availability payments) are easier to implement because risks are lower – both revenue risk (price and volume) and counterparty risk. It is therefore more likely that the CBD Rail Link Project, if procured as a PPP, would need to be a PPP with availability payments. Of course, the basis for availability payments would need to be clearly specified and ideally tied to infrastructure performance.

6.8.3 Next Steps

The proposed next steps for the CBD Rail Link Project are to:

- Proceed with lodgement of the Notice of Requirement documentation, once it has been completed at the end of 2010, in order to protect the route and station locations;
- Provide information for discussions between different levels of government in respect of funding arrangements for the project; and
- Begin preparation of a detailed Implementation Plan for the project in accordance with the Treasury Business Case Guidelines.

These activities should be undertaken in parallel, in order that completion of the CBD Rail Link Project can be achieved by 2021.

APPENDICES

A- Assumptions

B - Capital Asset Management Framework

C- Legislative and Policy Context

D- Alternatives Paper

E- Construction Costs Summary

F- Rail and Bus Operating Assumptions

G- Review of Land use and Transit Share impacts

H- Developments around Stations

I - NZTA Assessment

J- Literature Review

K- Real Estate Market and Financial Analysis