

# Auckland City Rail Link

## Updated Economic Evaluation

20 May 2011

## Auckland Transport and Auckland Council Advisors

This report has been prepared with international support of the following advisors :



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## 1 Executive Summary

Historically, a range of proposals have been developed for a rail tunnel through the Auckland city centre.

In 2010, a preferred route for a tunnel, the City Rail Link, was identified and work commenced on a concept design and Business Case to support designation of the route. In November 2010, Auckland Transport (AT) and Auckland Council (AC) in partnership with KiwiRail Group (KRG) presented the case for the City Rail Link to the government for its consideration.

The Minister of Transport (MoT) requested a review of the City Rail Link (or CBD Loop) proposal. That Review has been undertaken over the last 5 months and its report is expected to be released shortly.

The government led Review has provided AT and AC with an opportunity to further review the assumptions, refine the costs and benefits, and identify the further work needed to secure funding for the City Rail Link. All of this work has been made available to the government led Review team and the same material used to prepare this report.

A review of the costs of constructing and operating the City Rail Link has identified with a small increase in operating expenditure arising from new information which became available after the original Business Case was completed.

AT and AC consider that, taking into account the wider transport policy initiatives which are planned, the City Rail Link would deliver overall benefits exceeding overall costs, with the benefit cost ratio ranging from 1.1 to 2.3 (**BCR = 1.1 to 2.3**).

AT and AC and their advisors are strongly of the view that the overall evaluation results are sufficiently robust to justify the immediate commencement of the designation process, particularly as the CRL is economically justifiable in terms of its transport related benefits alone. This process needs to commence as soon as possible to minimise the potential for any development to increase costs, delay the project, or even prevent its implementation.

AT and AC acknowledge that, in line with all major project development programmes, more work needs to be done to further develop the case for funding of the City Rail Link. This work will take full account of central government's requirements for the development of public sector funding requests.

In addition to progressing with this work, **this report recommends that the Auckland Council resolve to immediately commence the process to secure and protect the route of the Auckland City Rail Link.**

This summary report presents AT and AC's key findings arising from participation in the government led Review of the City Rail Link project.

## 2 Background

In 2008, the then Minister of Finance, Hon Dr Michael Cullen, wrote to the Chair of the New Zealand Railways Corporation stating that it “was in the long term public interest to secure and protect the CBD tunnel route even though construction may not take place for many years” and advising that it was “appropriate for ONTRACK to assist in the protection of the CBD tunnel route by acting to protect the route at the earliest appropriate opportunity.”<sup>1</sup>

In 2009, the Auckland Regional Transport Authority (ARTA) and KRG (previously ONTRACK) commenced an investigation to designate a route for the City Rail Link (CRL) for inclusion in Auckland’s District Plans. A preferred option for the route was identified in early 2010 and approved by ARTA and KiwiRail. This preferred option was endorsed by the Auckland Regional Council, Auckland City Council, and the Auckland Regional Transport Committee.

In 2010, a consortium of AECOM, Parsons Brinckerhoff and Beca (APB&B) was appointed by KRG and ARTA to identify the preferred route, prepare the concept design for the preferred option together with the business case to support the Notice of Requirement (NOR), and prepare the NOR documentation. In November 2010, AT, AC and KRG released the findings of this work (the Business Case) and forwarded these findings to the Government for its consideration. The work undertaken by APB&B was reviewed and endorsed by PWC.

The Minister of Transport asked the MoT and Treasury, in conjunction with the New Zealand Transport Agency (NZTA), to review the Business Case (the Review). The purpose of the Review was to formally review the Business Case and provide advice on the merits of the CRL as a transport and economic investment, and when the project might be required. The Review was also intended to assist in determining if, how and when to progress with the CRL. Management from AT and AC assisted in the analysis undertaken for the Review, supported by APB&B and others.

AT/AC understand the Review was completed in May 2011 and a report setting out its findings is expected to be released by the Minister of Transport shortly.

## 3 Auckland Transport & Auckland Council Update

The government led Review process has provided AT and AC with an opportunity to further review the assumptions in the Business Case, to refine the costs and benefits of the CRL, and the transport measures which would be put in place to support its operation (AT/AC Update). It has also assisted in identifying the further work which will need to be undertaken to secure funding for the CRL.

AT and AC management and advisors have contributed to the Update in their specific areas of expertise. The opening page lists AT and AC advisors.

This summary report sets out the findings of the AT/AC Update. Further detailed information on the CRL can be found in the Business Case at [www.aucklandtransport.govt.nz/improving-transport/current-projects/rail/pages/cbdraillink.aspx](http://www.aucklandtransport.govt.nz/improving-transport/current-projects/rail/pages/cbdraillink.aspx).

<sup>1</sup> Letter from Minister of Finance to Chair NZRC dated 1 May 2008.

## 4 Strategic Context

Auckland is New Zealand's biggest city and its largest regional economy. It is home to more than 1.4 million people, one third of New Zealand's population. It contributes 35 per cent of New Zealand's gross domestic product (GDP) and provides 32 per cent of employment. It plays a fundamental role in ensuring the economic success of New Zealand as a whole and will continue to do so.

Over the next 30 years, Auckland's population and its importance to New Zealand are projected to increase. Over that period, 75 per cent of New Zealand's population growth is expected to occur in Auckland. By 2040, 2.1 million people are expected to live in Auckland, an estimated 42 per cent of New Zealand's population.

Auckland's city centre plays a pivotal role. Of the 611,000 jobs in the region, 13 per cent are located in the CBD. The Auckland city centre provides the location for many of New Zealand's corporate head offices and employment in many high-value industries. These include 22 per cent of New Zealand's financial and services employees (11,300 employees), 17 per cent of information, media and communication services employees (6,500 employees), and 12 per cent of the professional, scientific and technical services employees (16,440 employees)<sup>2</sup>.

Auckland's city centre is also a centre for culture, recreation and leisure and a focus for international tourism, with 30 per cent of all bed nights in New Zealand spent in Auckland city centre accommodation<sup>3</sup>. It is also an education centre providing for the majority of Auckland's tertiary students, and contains New Zealand's largest container port.

Auckland's city centre relies heavily on its accessibility and quality of life for its continued prosperity and future development. Currently, around 20,000 people live in the city centre and there are some 90,000 employees and 50,000 tertiary students. Land use projections indicate that the usually resident population of the city centre will increase by 80,000 people by 2041, and employment by 60,000.

The ability of private transport to meet this growth will be severely limited by the capacity of streets in the city centre, parking constraints, and demands from buses and pedestrians. There are already significant constraints in the existing transport network, for example, within the roading network most approaches to the city centre are at or near capacity in peak periods. The bus network is already under pressure with significant constraints projected to occur in Symonds Street from 2014, Albert Street in 2016 to 2020, and Fanshawe Street by 2019.

The rail system also faces capacity constraints, primarily as a result of the limited capacity of the Britomart terminus. Once electrification is completed and the 10 minute peak timetable put in place, Britomart's practical capacity of 21 trains per hour in each direction will be reached. Patronage growth is expected to continue after electrification resulting in trains becoming progressively fuller, and placing stress on the Britomart station facilities. However, the ability of rail system to handle significant growth in patronage demand will be constrained by the limitations of Britomart's terminus configuration.

A further increase in demand for travel will impose critical pressure on the transport network serving the city centre and, without further investment, will result in worsening congestion, unreliability and delay.

<sup>2</sup> Statistics NZ Business Demography dataset 2010

<sup>3</sup> NZ Hotel Council

Investment in the transport network to cater for increased travel demand will be essential if Auckland is to achieve its goal of a thriving regional economy and becoming the world's most liveable city.

The Business Case considered a range of transport solutions to meet the future growth needs of the city centre.

Three options were identified and developed as part of the analysis. These were:

- On surface bus capacity improvements
- Central area bus tunnel with three stations
- City centre rail tunnel with three stations (CRL).

The CRL was assessed to provide the most cost effective means of meeting the projected growth in transport demand to the city centre as it provides a dedicated rapid transit corridor through the city centre unaffected by traffic congestion. It unlocks latent capacity within the existing rail network that cannot currently be exploited due to the constraints of Britomart.

The CRL also provides the greatest opportunity to address the risks associated with Britomart as a terminus station with fixed capacity, and to improve its resilience. As the number of trains increases and patronage rises following the introduction of new electric trains, the risk of delay at Britomart increases with a consequential impact on reliability across the rail network.

Investment in upgrading Auckland's rail system over the last 10 years has demonstrated the willingness of Aucklanders to change their travel habits and use rail, with patronage increasing from 2.2 million trips million per annum to 9.5 million, a growth of 332 per cent.

## 5 City Rail Link – Project Description

The CRL provides for a 3.5 kilometre double track underground electrified rail line running under the Auckland city centre from Britomart to the Western Line near the existing Mt Eden station. Britomart would become a through station and three intermediate stations would be provided:

**Aotea** – under Albert Street between Wellesley and Victoria Streets

**Karangahape Road** – under the intersection of Pitt Street and Karangahape Road

**Newton** – under Symonds Street between the intersections with Khyber Pass/Newton Road and Mt Eden and New North Roads.

A map of the proposed CRL route and stations is attached as Annex 1.

The CRL would have the potential to provide up to 30 trains per hour with enhanced signalling. This would provide for between 30 and 60 services per hour through the CRL stations, compared with the maximum 21 trains per hour which will be able to operate into Britomart after electrification.

The cost of building the CRL, including property acquisition costs, is estimated to be in the range of \$2 billion to \$2.38 billion (at 2010 prices). In addition, operation of more rail services enabled by the CRL will require additional rail network capital investment of \$120 million to \$130 million, and \$240 million for more electric trains during the first 10 years following the opening of the CRL. Additional operating and maintenance costs of \$18.1 million per annum will also be incurred.

## 6 Transport Benefits of City Rail Link

This section describes the transport benefits which would result from implementation of the CRL.

Rail will benefit the users of the rail system, bus users, and those who continue to drive. Rail has the ability to move more people more efficiently than other modes during peak traffic periods when congestion is at its highest, freeing up Auckland's congested motorways and arterials for freight, commercial, and other trips that cannot use public transport but are vital to economic development. Auckland's rail network closely parallels the southern and north western motorways, maximising the decongestion benefits.

More passengers boarding and alighting from trains at Britomart is likely to increase the potential for delays to services as the station facilities come under increased stress. Delays to trains at Britomart frequently result in knock-on delays across the network. Passengers are generally intolerant of unpredictable delays to services, so increasing reliability problems at Britomart could be expected to result in passengers choosing other modes rather than rail or choosing not to work in the city centre, reducing the benefits from having a large concentration of employment.

Changing Britomart station from a terminus station into a through station will also enable significantly increased train frequencies which will:

- Address the problems expected to arise following electrification when patronage will continue to rise and trains will get progressively fuller
- Provide for improvements in accessibility for both the city centre and the rail network as a whole
- Increase the effectiveness and longevity of the Northern Busway reducing the need for suburban bus services from the south, west and east out of Britomart and the congested Albert Street bus corridor
- Enable the rail network to be extended further and more efficiently due to the cheaper per kilometre operational cost of electric trains compared to diesels. The additional patronage opportunities as well as the benefits and costs of any future extensions are not included in the AT/AC Update
- Expand the number of stations accessible by a single trip.



Table 1 below illustrates the journey time improvements which would result from the implementation of the CRL and illustrates the network wide impact of the project.

**Table 1 : Estimated PT Journey Times to CBD Stations**

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

Notes:

- (1) Rail plus walking time
- (2) Average Bus journey time
- (3) Walking time only
- (4) Via Newtown and Eastern connection with Western line
- (5) Bus plus walk
- (6) Train plus bus plus walk
- (7) Includes changing trains at Newmarket

- Does not provide for any improvements for electrification over diesel

Providing three additional city centre stations also creates excellent direct access to city centre commercial, employment, shopping, tourist and cultural activities unaffected by road congestion. It gives commuters, shoppers and tourists a demonstrably cost and time effective alternative to using a motor vehicle. Further, it significantly expands the viable city centre area as journey times are reduced and accessibility is improved. Annex 2 illustrates the significant improvement in city centre accessibility which would result from the CRL.

Implementation of the CRL would be supported by a range of policies and external trends including:

- Improved bus rail feeder services
- Wider park and ride provision
- Increased city centre parking charges
- Rising fuel prices.

Taken together, the transport outcomes delivered by the CRL during the congested morning peak traffic period by 2041 are projected to be:

- Between 25,000 and 31,000 people will travel to the city centre by train i.e. at least 20,000 more people will use rail to get to the city centre than at present.

- Reduction of around 8,600 car trips in the city centre in congested peak traffic periods.
- Public transport mode share into the city centre will be around 69 per cent of trips, up from its current level of 46 per cent. Of this, the rail mode share will be 25 per cent, bus 39 per cent and car 31 per cent.

The Auckland rail network will attract between 23,000 and 29,000 more boardings each morning peak period than if there were no CRL, because of the higher frequencies across the entire network resulting from removing the constraint of the Britomart terminus. There will also be 14,000 to 19,000 more people using rail to get to the city centre than if the CRL is not built.

When travel distance is taken into account, rail becomes the dominant mode of travel to the city centre in the congested morning peak traffic period. The key economic driver of the transport benefits of the CRL for the regional transport system is that rail is more effective than any other mode in reducing congestion. This is because people who use rail travel longer distances than those using other modes, including buses and cars. As a result, rail is the most effective in removing long distance car trips from congested motorways and arterials.

Taking the travel distances by mode into account, mode shares for travel into the city centre during the congested morning peak traffic period change dramatically. With the CRL in place, rail accounts for 38 per cent of passenger kilometres compared to 30 per cent for bus and 27 per cent for car.

Figure 1 below illustrates the projected mode share of passenger kilometres in 2041.

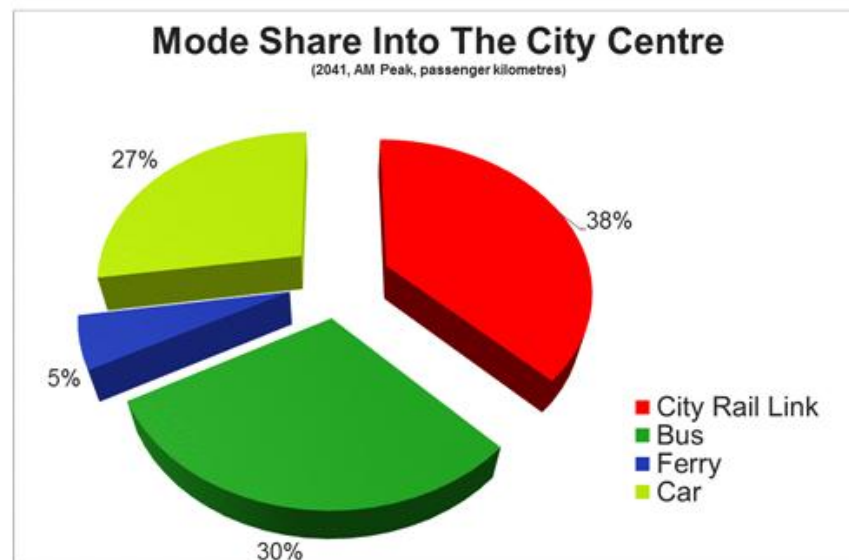


Table 2 below illustrates the overall transport benefits of the Business Case and the AT/AC Update. The table shows the Present Values over 30 years at discount rate of 8 per cent.

**Table 2 : Overall Result - Transport Benefits**

	Original Business Case (\$M)		AT / AC Update (\$M)	
	Additional	Cumulative	Additional	Cumulative
Patronage Demand Impacts	230	230	548	548
Application of revised annualisation factors	285	515	112	660
Application of capacity constraints	455	970	203	863
Application of CBD congestion assumptions	349	1,319	94	957
Extra CBD employment – low			62	1,019
Extra CBD employment – high			249	1,206
Benefits from reduced unreliability as a result of overcrowding			173	
<b>Total Benefits (Low to High)</b>		<b>1,319</b>	<b>1,192 / 1,379</b>	

The AT/AC Update suggests that the potential transport benefits of the CRL are between \$1.2 billion and \$1.4 billion.

## 7 Economic Benefits Of City Rail Link

This section provides a summary of the transformational benefits that are likely to arise from the implementation of the CRL and the conventional assessment of the wider economic benefits (WEBs).

The CRL is considered to be a transformational project as it will cause structural change to the determinants of travel (land use, population and economic activity) across Auckland. By contrast, conventional benefit cost analysis (including conventional WEBs) requires no change in these factors. Benefits that come about from a transformational project are therefore distinct from the conventional definition of WEBs, meaning the scope of conventional assessment is limited.

Conventional WEBs are direct and subsequent flow-on benefits for an economy that are created by new transport infrastructure. These benefits arise as the economy as a whole adjusts and responds to the changes in transport efficiency, and are over and above those direct effects identified for users of the transport network.

The CRL performs very well in terms of conventional WEBs, highlighting a project which will enhance the economic potential of Auckland's city centre in particular, and the Auckland economy in general. This occurs by increasing the efficiency of New Zealand's largest and most productive economy, increasing accessibility and

reducing transport costs for firms and consumers in the first instance, and enhancing Auckland firms' competitiveness.

The WEBs for the CRL were originally calculated as part of the Business Case. A peer review of the WEBs by Professor Robert Cervero<sup>4</sup>, commissioned by APB&B, reinforced that "on balance ... the APB&B analysis is thoughtful, well grounded, objective, reasonably transparent, and appropriately measured in its interpretations, assumptions, and forecasts"<sup>5</sup>.

MoT engaged Steer Davies Gleave (SDG) to assist with its Review. Steer Davies Gleave (SDG) recalculated conventional WEBs, incorporating several new categories and improving on the accuracy of the Business Case calculations. APB&B then recalculated the agglomeration effects taking into account SDG's review and other technical concerns. Due to data and time limitations, the WEBs were largely calculated as a proportion of conventional direct transport benefits.

Table 3 summarises the range of WEB estimates for the CRL.

**Table 3: Wider Economic Benefits<sup>2</sup>**

	Original Business Case Estimate (\$m)	AT/AC Update Estimate (\$m)		Per cent of conventional transport benefits
Transport benefits	1,319	1,192	1,379	-
Agglomeration	185	393	455	33
Imperfect competition	-	30	34	2.5
Labour supply	-	57	66	4.8
Productivity gains from job relocation <sup>1</sup>	3,333 <sup>2</sup>	147	591	12-43
<b>Total WEBs</b>	<b>185<sup>3/</sup> 3,333</b>	<b>627</b>	<b>1,146</b>	<b>53-82</b>
Increase in the size of the regional economy		0-1,300		
<b>Total including regional growth<sup>4</sup></b>		<b>627-2,446</b>		

<sup>1</sup> These figures differ in their assumption on the number of employees who will be relocated into the CBD. APB&B assumed 22,000 employees would relocate into the CBD, while Auckland Council has used a range between 5,000 and 20,000.

<sup>2</sup> Termed 'urban regeneration effects' in the Business Case.

<sup>3</sup> APB&B conducted two pieces of analysis to avoid double counting.

<sup>4</sup> By 2021, the Auckland economy would be around 71Bn. If a project of this nature generated an increase of 0.36% in the Auckland economy (an indicative figure calculated by NZIER in the AWHC study, indicating the effect of a second harbour crossing on the Auckland economy), this would amount to 1.3Bn in net present value terms. This is not necessarily additive, as some of these benefits will have been captured in other categories. However, leading economic agencies support that a component of this effect is additional to the benefits already calculated (note: not all this effect would equate to a net benefit).

Note – all figures Net Present Value applying 8% discount rate for 30 year period.

<sup>4</sup> Robert Cervero is Director, University of California, Berkeley, Transportation Centre, and Director, Institute of Urban & Regional Development.

<sup>5</sup> Cervero, R., 2011, 'Peer Review for Auckland CBD Rail Link Urban Regeneration Benefits'

Conventional WEBs are expected to generate an additional 53 per cent to 82 per cent of total conventional transport benefits or between \$627 million and \$1.146 billion over a 30 year appraisal period (at an 8% discount rate). When compared to other urban rail projects and measured as a proportion of conventional transport benefits, each category of WEB falls within previously established ranges<sup>6</sup>.

The CRL performs very well in terms of conventional WEBs. This is not surprising given the urban spatial structure of Auckland's economy. The relatively high additional effect of conventional WEBs is explained by the concentration of sectors in the city centre that benefit from co-location, together with the anticipated centralisation of high-value employment activity into the city centre. The latter effect is significant because of the substantial productivity differential between the city centre and the rest of Auckland, reflecting the role of the city centre as a key driver of growth for Auckland and New Zealand.

This assessment has not considered the transformational benefits which are likely to arise from the implementation of the CRL. The project is intended to increase land use intensity around the city centre, to increase net inward migration and to increase economic activity. The assessment of conventional WEBs holds each of these factors constant and does not in AT and AC's view provide a full assessment of the CRL's value.

## 8 Summary Evaluation

The AT/AC Update has identified that the costs of constructing and operating the CRL may increase up to 8 per cent, due mainly to operational expenditure increases arising from new information becoming available after the Business Case was completed.

The benefits and costs of the CRL are set out in Table 4 below comparing the Business Case and the AT/AC Update.

Table 4 shows that the CRL has a transport related benefit to cost ratio ranging between 1.0 and 1.1 and is a viable transport project in its own right. When WEBs are added, the BCR increases to between 1.1 and 2.3.

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<sup>6</sup> The exception to this is net job relocation benefits where only three projects have been assessed. As such, no meaningful comparison could be made.

Benefit Category	Original Business Case			AT / AC Update		
	Benefits \$m NPV	Costs \$m NPV	Benefit to cost ratio	Benefits \$m NPV	Costs \$m NPV	Benefit to cost ratio
Transport benefits	1,319			1,192 to 1,379		
Bus cost savings	43			43		
Agglomeration benefits	185			393 to 455		
<b>Combined total (consistent with EEM and comparable with other transport projects)</b>	<b>1,547</b>	<b>1,569</b>	<b>1.0</b>	<b>1,628 to 1,877</b>	<b>1,699</b>	<b>1.0 to 1.1</b>
Imperfect competition				30 to 34		
Labour supply				57 to 66		
Productivity gains from job relocation	3,333			147 to 591		
<b>Total including wider economic benefits outside of the EEM</b>	<b>4,695<sup>2</sup></b>	<b>1,569</b>	<b>3.0</b>	<b>1,862 to 2,568</b>	<b>1,699</b>	<b>1.1 to 1.5</b>
Increase in the size of the regional economy				0 to 1,300		
<b>Total including regional growth<sup>1</sup></b>				<b>1,862 to 3,868</b>	<b>1,699</b>	<b>1.1 to 2.3</b>

1. By 2021, the Auckland economy would be around 71Bn. If the project of this nature generated an increase of 0.36% in the Auckland economy (an indicative figure calculated by NZIER in the AWHC study, indicating the effect of a second harbour crossing on the Auckland economy), this would amount to 1.3Bn in net present value terms. This is not necessarily additive, as some of these benefits will have been captured in other categories. However, leading economic agencies support the view that a component of this effect is additional to the benefits already calculated (note: not all this effect would equate to a net benefit).
2. Total excludes agglomeration benefits.

Note – all figures Net Present Value applying 8% discount rate for 30 year period.

## 9 CRL Project Timing

It is estimated that the CRL can be completed within 7.5 to 10 years, depending upon the procurement method chosen. The design and consent phase is estimated to take between 2.5 and 4 years, while the design, construction and commissioning phase is estimated to take between 5 and 6 years.

Assuming the project proceeds by July 2011, the CRL could be constructed and commissioned by 2019 at the earliest or, taking a more conservative approach, by mid-2021.

## 10 Conclusion

The updated evaluation undertaken by AT and AC concludes that the benefit to cost ratio of the City Rail Link ranges from 1.1 to 2.3, clearly demonstrating that benefits outweigh costs.

AT and AC and their advisors are strongly of the view that the overall evaluation results are sufficiently robust to justify the immediate commencement of the designation process, particularly as the CRL is economically justifiable in terms of its transport related benefits alone.

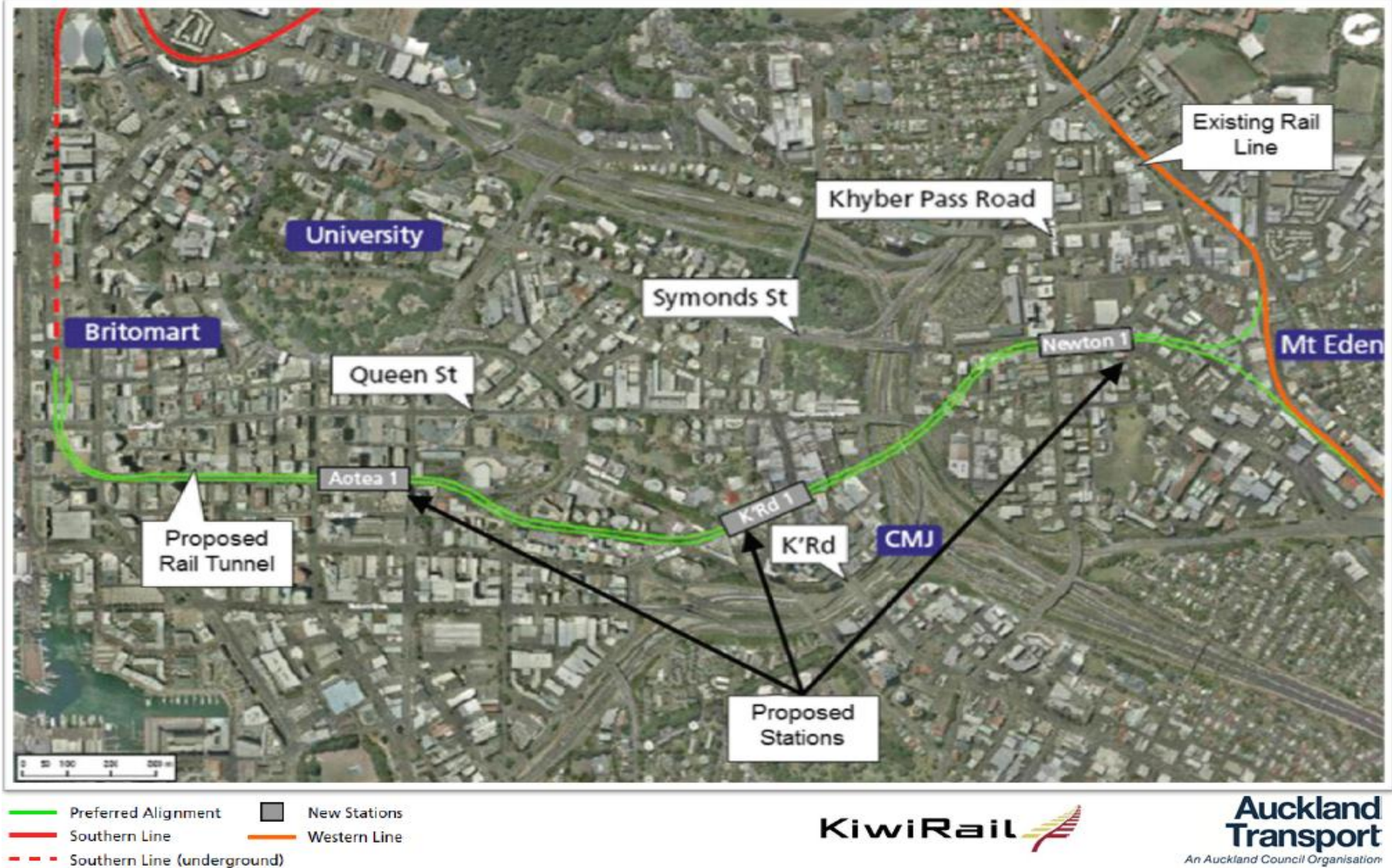
It is essential this process commences as soon as possible. Delay could result in significant difficulties, including the potential for development to increase costs, delay the CRL Project or even prevent its implementation.

AT and AC acknowledge that work needs to be done to further develop the case for funding. This work will be needed to support the AT and AC's own requirements to ensure value for money, and any bids for funding from central government and the private sector. This work will take full account of central government's requirements for the development of funding requests.

## 11 Annexes

- Annex 1** City Rail Link proposed route and station location
- Annex 2** City Rail Link – existing and proposed station catchments
- Annex 3** City Rail Link Wider Economic Benefits, Executive Summary

# ANNEX 1 - City Rail Link Proposed Route and Station Location





**ANNEX 2 - City Rail Link – Existing Station Catchments**



## ANNEX 2 - City Centre Rail Link – Proposed Station Catchments



## ANNEX 3 - Assessment of Wider Economic Benefits for CRL

(Co-authored by Auckland Council's Economic Development Group, Market Economics and NZIER)

### Executive Summary

#### Scope

The objective of this report is to consider an appropriate basis for evaluating the City Rail Loop (CRL), which is believed to be a transformational project. It also summarises the wider economic benefits (WEBs) as calculated under a conventional analysis. This is supported by an upcoming background document titled '*Assessment of Wider Economic Benefits for the Auckland City Rail Loop*', co-authored by Auckland Council's Economic Development Group<sup>1</sup>, Market Economics Ltd and NZIER.

#### Key Issues

Auckland Council officers view the CRL as a transformational project as it is likely to cause structural change to the determinants of travel (land use, population and economic activity) across Auckland.

The evaluation to date is based on conventional appraisal, which does not capture many of the benefits of transformational projects. Auckland Council officers support WEBs in principle, but demonstrate how transformational project benefits are distinct from WEBs.

As the CRL is a transformational project, its benefits cannot be captured by conventional appraisal and therefore, a BCR does not fairly reflect the value for money of the project. Specifically, it cannot take account of potentially large benefits arising from changes to the urban spatial structure, land use intensification, increased inward migration and a larger economy.

Auckland Council officers seek to ensure that the CRL evaluation is appropriate and comprehensive, and able to provide a robust basis for future decisions – including route protection. The assessment scope is limited, as the analysis to date has proceeded on the basis that the CRL is a conventional (ie non-transformational) transport project. The Mayor has reiterated that the project is likely to be transformational. Auckland Council officers need to do further work to develop the case for this.

The size of the Auckland economy and rapid growth rate mean other projects may also be considered 'transformational', and it is important that robust methodologies for such projects are developed and applied on a consistent basis nationally.

### 1. Background

The CRL WEBs were originally calculated in the Business Case by APB&B. The WEBs were recalculated by Steer Davies Gleave (SDG), incorporating several new categories and improving the accuracy of the Business Case calculations. SDG noted "the methodology employed [by APB&B] is broadly fit for purpose." A further review of the WEBs by Professor Robert Cervero<sup>2</sup>, after seeing the SDG comments,

<sup>1</sup> With assistance from the Research, Investigations & Monitoring Unit

<sup>2</sup> Robert Cervero is Professor of City & Regional Planning at UC Berkeley as well as Director, University of California Transportation Centre; and Director, Institute of Urban & Regional Development. Robert Cervero works in the area of sustainable transportation policy and planning, focusing on the nexus between urban transportation and land-use systems

reinforced that “on balance ... the APB&B analysis is thoughtful, well grounded, objective, reasonably transparent, and appropriately measured in its interpretations, assumptions, and forecasts<sup>3</sup>”. However, SDG noted a range of errors, omissions and questions of interpretation needed to be addressed to provide a correct representation of the likely wider benefits of the project<sup>4</sup>.

Three additional WEBs were calculated to include with agglomeration benefits in the analysis - labour supply, job relocation and imperfect competition effects. APB&B recalculated agglomeration effects taking into account SDG’s review, and other technical concerns with the original calculations. Data and time limitations resulted in WEBs were being largely calculated as a proportion of conventional direct transport benefits<sup>5</sup>.

Table 3 illustrates the absolute WEB estimates to date as applied to the conventional transport benefits.

**Table 1: Wider Economic Benefit as calculated to date<sup>2</sup>**

Benefit Category	APB&B Business Case (\$m)	Auckland Council figures (\$m)		As a proportion of conventional transport benefits (%)
Transport	1,319	1,192	1,379	-
Agglomeration	185	393	455	33
Imperfect competition	-	30	34	2.5
Labour supply	-	57	66	4.8
Productivity gains from job relocation <sup>1</sup>	3,333 <sup>2</sup>	147	591	12-43
Total WEBs	185-3,333 <sup>3</sup>	627	1,146	53-83
Increase in the size of the regional economy		0-1,300		
Total including regional growth <sup>4</sup> .		627 – 2,446		

<sup>1</sup> These figures differ in their assumption on the number of employees who will be relocated into the CBD. APB&B assumed 22,000 employees would relocate into the CBD, while Auckland Council has used a range between 5,000 and 20,000.

<sup>2</sup> Termed 'urban regeneration effects' in the Business Case.

<sup>3</sup> APB&B conducted two pieces of analysis to avoid double counting.

<sup>4</sup> By 2021, the Auckland economy would be around 71Bn. If a project of this nature generated an increase of 0.36% in the Auckland economy (an indicative figure calculated by NZIER in the AWHC study, indicating the effect of a second harbour crossing on the Auckland economy), this would amount to 1.3Bn in net present value terms. This is not necessarily additive, as some of these benefits will have been captured in other categories. However, leading economic agencies support that a component of this effect is additional to the benefits already calculated (note: not all this effect would equate to a net benefit).

Note – all figures Net Present Value applying 8% discount rate for 30 year period.

<sup>3</sup> Cervero, R, 2011, 'Peer Review for Auckland CBD Rail Link Urban Regeneration Benefits'

<sup>4</sup> SDG, 'Auckland CBD Rail Link: Peer review of wider economic benefits assessment', February 2011, para 22.

<sup>5</sup> Sensitivity testing was completed on a range of employment figures for job relocation benefits.

## 2. Wider economic benefit calculations and comparisons

WEBs are expected to generate an additional 53% to 83% of total conventional transport benefits (\$627-\$1,146 million over a 30 year appraisal period at 8% discount rate). All WEB categories fall within previously established ranges<sup>6</sup> (of conventional transport benefits) of other international urban rail projects.

The CRL comprise a high proportion of WEBs, reflecting a project that will enhance Auckland CBD's economic potential in particular, and the Auckland and national economies in general. This occurs by increasing the efficiency of New Zealand's largest and most productive economy. High WEBs are explained by Auckland's urban spatial economic structure - a concentration of sectors in the CBD that benefit from co-location of firms, together with the anticipated centralisation of high-value employment activity into the CBD. The latter effect is significant due to the substantial productivity differential between the CBD and the rest of Auckland, reflecting the CBD's role as a key driver of growth for Auckland and New Zealand.

## 3. Transformational benefits

The core concern of Auckland Council officers throughout the CRL Business Case development has been to consider its potential to affect the size of the regional economy, to affect land uses, and its effect on sustaining Auckland's population growth. These are the core determinants of the demand for travel.

Auckland Council officers acknowledge the particular method used to incorporate these 'regeneration benefits' in the first cost-benefit appraisal (CBA) could be improved on. However, it is firmly believed that the CRL will cause major changes to determinants of travel, and that this must be a core element of a fit-for-purpose economic appraisal. Conventional transport appraisal methodology that has been imposed upon this project that requires to entirely rule out any such transformational effects. Auckland Council officers want central and local government to work together to appraise potentially transformational projects differently. This section briefly explains the essence of this issue.

### i) *Regional economic growth*

A strong interrelationship exists between transport provision and regional economic activity. Large improvements in transport efficiency and firm productivity will likely generate changes in the size, nature and rate of growth in the economy overall. Improved economic growth can be expected in such a case because transport infrastructure is pervasive, affecting all sectors of the economy and society, resulting in a more efficient and competitive regional and national economy.

However, conventional transport CBA treats economic activity as exogenous (imposed from outside the system). Although current CBA methods can take account of marginal effects to the economy<sup>7</sup>, it cannot take account of any structural effects to the economy that change the quantity of transport demanded for any given cost of travel<sup>8</sup>. This is potentially a major source of benefit that has been excluded from the evaluation to date.

<sup>6</sup> As analysed by SDG. Net job relocation benefits is the exception where only three projects have been assessed. As such, no meaningful comparison can be made.

<sup>7</sup> Via inducing the quantity of transport demanded because of downward sloping demand curves.

<sup>8</sup> That is, the entire demand schedule for travel may further to the right in the long-term if the project had have been done than if it had not. This increases the willingness to pay for travel for any given level of travel relative to the business as usual (BAU) scenario.

ii) *Employment reallocation*

Although it may have fallen short of proving the *likelihood*, the original Business Case work effectively demonstrated the *feasibility* and *credibility* of projects like the CRL to cause major changes in land use intensification and job location. These are structural changes that take time to occur, and can substantially affect travel demand. A project that induces such changes may cause a greater willingness to pay for travel at all levels of travel than would have occurred in the business as usual scenario.

iii) *Changes to regional migration and even national population*

As highlighted in modern literature, population moves across localities in response to: (a) amenity benefits of a locality; and (b) productive opportunities in a locality. A change to either of these may cause a population and employment inflow. A regional population increase can affect the demand for travel in the option scenario entirely differently to the BAU scenario. Again, this potentially leads to a new set of 'transformational benefits'.

In summary, there are projects that make major changes to the determinants of travel, and as such, there is potentially an entire class of benefits that will occur in actuality. Depending on the project, such benefits can be substantial. Appraisal methods need to be improved to take account of such benefits. Auckland Council officers believe the CRL is such a project, but that more work is required to demonstrate the likelihood of this.

#### 4. Valuing the future appropriately

The Business Case uses an appraisal period of 30 years and a base social discount rate of 8% with sensitivity testing at 6% and 4%, consistent with NZTA EEM methodology. The 8% real social discount rate follows the Treasury's default guidance. Auckland Council officers do not support the basis for this high discount rate, nor an arbitrary 30-year cap on the length of the project appraisal period.

The current 8% social discount rate is a pure 'social opportunity cost' (SOC) rate (the social return on private investment). While the SOC rate is an important economic concept in isolation, using a pure SOC rate for the social discount rate is not well grounded in modern economic theory. The social discount rate should appropriately reflect society's preference for trading off costs and benefits sooner against costs and benefits later. The current discount rate is too high to achieve this purpose and creates a bias against projects that are in the country's long-term interest. The social rate of time preference (approximately 3%-4%<sup>9</sup>) is the only appropriate social discount rate, and the effects on private capital displaced and augmented need to be explicitly considered<sup>10</sup>. For instance, using the UK methodology would see net present value benefits increase by some 4.5 times, while construction costs would only increase by around 75%.

The CRL benefits will extend well beyond the 30 year appraisal cut-off date. Even at the high 8% rate, the present value benefits are substantially greater (by 25%-100%) at longer appraisal periods, for a wide range of benefit growth scenarios.

<sup>9</sup> The UK uses a non-uniform discount rate starting at 3.5% for the first 30 years and 3% for years 31-60, and an appraisal period of 60 years for transport projects.

<sup>10</sup> This latter feature is called the 'shadow price of capital' and is the approach recommended in leading textbooks (eg Boardman, A, Greenberg D, Vining A, Weimer D (2006) *Cost Benefit Analysis; Concepts and Practice*. Pearson Prentice Hall, New Jersey).

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Best practice cost-benefit analysis<sup>11</sup> is to extend the appraisal period over the useful life of the project or to include a residual value that achieves the same purpose. NZTA uses the 30-year cut-off to treat all projects equally, which is acceptable within the context of NZTA's own budget routine funding allocations. However, the CRL is not competing for the same funds from, say, a rural road realignment, and is fundamentally different to routine road projects for many reasons. Auckland Council officers insist that an appropriate appraisal period for the CRL itself must be used.

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<sup>11</sup> Boardman, A, Greenberg D, Vining A, Weimer D (2006) *Cost Benefit Analysis; Concepts and Practice*. Pearson Prentice Hall, New Jersey. Chapter 6.