Auckland Transport
An Auckland Council Organisation

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3 February 2016

Ben Ross
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Dear Mr Ross

Local Government Official Information and Meetings Act 1987

CAS-182275-F3V8L2

Thank you for contacting Auckland Transport on 2 January 2016 requesting information that relates to studies into rail options to the airport.

Herewith please find documents containing information to the five questions in your request:

1. Please find attached a memorandum from our consultants (Jacobs) dated 20 January 2016 explaining the Heavy Rail and Light Rail travel time calculation.
2. Please find attached two summary tables breaking down high level costs for heavy and light rail options.
3. The high level route option assessment is summarised in the "Phase 1 Summary Report September 2011" attached to this letter.
4. The video has been released on our website and is available at the following link:
    a. https://at.govt.nz/projects-roadworks/airport-and-mangere-rail/

We trust this information has addressed the matters raised however you have the right in accordance with section 27(3) of the Local Government Official Information and Meetings Act 1987 (LGOIMA) to make a complaint to the Office of the Ombudsman if you are not satisfied with our response.

If you have any further queries, please contact Theunis VanSchalkwyk on (09) 447 4522, quoting Official Information Request No. CAS – 182275-F3V8L2.

Kind regards

Peter Clark
Chief Strategy Officer

www.aucklandtransport.govt.nz

ATTACHMENT 1

JACOBS

Memorandum

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Date 20 January 2016

To Theunis van Schalkwyk

Subject **Heavy Rail and Light Rail travel time calculation**

1. Introduction

This memo outlines the methodology used to estimate travel times between the city centre and the airport for light rail and heavy rail alignments. A spreadsheet model was developed in order to test the travel time of both alignments.

Heavy rail travel time between Britomart and Onehunga was assumed consistent with the existing timetable. Travel time from Onehunga to the airport was estimated using the spreadsheet model.

Light rail travel time from Britomart to the airport was estimated completely using the spreadsheet model.

2. Travel time calculation

2.1 General Methodology

The methodology for calculating travel time over the new routes involved separating the alignment into sections of constant track geometry, namely curve radii and gradient. Each section was analysed in order to calculate a maximum operational speed that the rail vehicle could travel at, based on available power and performance data. This maximum speed is governed by the LRT vehicle performance, track geometry, the preceding and proceeding track segments, and limited by the available distance with which to accelerate or decelerate. This methodology is commonly used for rail track analysis at a planning stage.

Acceleration and deceleration rates for each track segment were calculated using track resistance (friction) values, train traction effort and train braking effort. Traction and braking effort data were taken from a current LRT vehicle for a train manufacturer for which Jacobs has undertaken detailed design (detailed vehicle specifications are commercial in confidence). Performance data for heavy rail was taken from typical industry values for electric motor unit (EMU) passenger trains commonly employed in Australia, there being no certainty that a future airport heavy rail line would operate the same rolling stock as at present. (Heavy rail passenger train performance tends to be fairly similar, and primarily controlled by line operating rules).

Total train resistance is the sum of running resistance, curve resistance and gradient resistance.

Acceleration = (Traction effort – Total train resistance) / Mass of vehicle

Deceleration = (Braking effort + Total train resistance) / Mass of vehicle

2.2 Maximum speed assumptions

For LRT, maximum speed on straight sections of off-street track is assumed limited to 80km/h. A speed limit of 50km/h has been assumed for all on-street running.

For heavy rail, maximum speed was taken as 100km/h.

The maximum speed of each track section is adjusted if it involves a curve or uphill grade as outlined above.

The model also checks to ensure that the allowable maximum speed can be reached. This can be affected if:

- Upstream segments have a lower maximum speed and the length of segment is not long enough to accelerate to full speed
- Downstream segments have a lower maximum speed so deceleration is required prior to maximum speed being reached

This check yields a final max speed as well as a start and end speed for each segment. A relationship between these parameters and time has been derived which is used to calculate the travel time taken on each segment of track.

2.3 Stations and intersection stop time assumptions

Delays due to deceleration, dwell time and acceleration at stations have been included. Dwell times have been assumed to be:

- 35 seconds for heavy rail
- 30 seconds for light rail

Light rail station locations on Queen Street/Dominion Road have not been finalised however this assessment assumed 11 stations on this section of the alignment. For the remainder of the route, from the southern end of Dominion Road to the airport, station locations were assumed to be at:

- Three Kings
- Onehunga
- Mangere Bridge
- Favona
- Mangere Town Centre
- Ascot
- Airport Business District
- Airport terminal

Light rail travel time will be impacted by potential delays at intersections along the on-street sections of the alignment. Signal pre-emption will provide priority for light rail vehicles however the details around the level of such priority have not yet been determined. Therefore, this assessment has conservatively assumed that light rail vehicles will experience an average of 30 seconds of delay (comprised of deceleration, waiting and acceleration) - compared to travelling at 50km/h through each intersection unobstructed - at each signalised intersection along Queen Street and Dominion Road.

More detailed traffic simulation modelling is currently underway to further investigate the interaction between light rail vehicles and general traffic on Dominion Road. This modelling is likely to show that the assumed 30 seconds is an over-estimation of stop delay and hence light rail travel times in practice are likely to be faster than estimated at the time the video was produced.

The model assumes full pre-emption and priority, and hence no delays at intersections along the on-street running sections of the route south of Dominion Road i.e:

- Princes St/Beachcroft Ave
- Selwyn Street / Princes Street
- Onehunga Mall / Princes Street
- George Bolt/Landing Drive
- George Bolt /Manu Tapu
- George Bolt /Tom Pearce

New heavy rail stations are proposed at:

- Mangere Bridge
- Mangere Town Centre
- Airport Terminal

It is noted that heavy rail and light rail airport stations may have different locations. Hence walking times from the station to the terminal building may differ between light and heavy rail options. However, since exact station locations have not been determined, this walk time has not been included in the travel time calculation.

3. Results

Travel time results are shown below. Note that these results differ slightly to the time presented in the Auckland Transport video due to refinements to station locations and vehicle specifications in subsequent work since the video was made.

Section	Travel time	
	Light rail	Heavy rail
Britomart to Onehunga	30 min	27 min
Aotea to Onehunga	26 min	29 min
Onehunga to Airport	13 min	11 min

As stated, it should be appreciated that estimates of travel time for the LRT airport option have evolved over time, as more detailed information about the possible LRT option is developed. Initial assumptions were based on simple average travel speeds and were deliberately conservative.

The traction power spreadsheet model described above and used to analyse the travel time in more detail resulted in a more accurate, and lower travel time for LRT to the airport, confirming that initial assumptions were in fact conservative. As further analysis of the project proceeds, a more detailed simulation model of the LRT corridor will be developed. This will enable investigation of more sophisticated strategies to give the LRT priority over traffic in the Dominion Road corridor, which should further improve travel times. LRT travel time in the SH20 corridor from the end of Dominion Road to the airport is unlikely to greatly alter, unless the number of stops is changed.

ATTACHMENT 2

Light Rail To Airport **24/02/2015**

Level 1-Project Stage	level 1 Cost Asset	Level3 Cost Sub Asset	Level 4 Cost Activity	Dominion road to Airport
Length				15,426
1. Land and Property	1. Land and Property	1. Land Acquisitions		**$ 61,309,635**
		2.Relocations		
		3. Alterations /Refurbishments/ Demolitions		**$ 125,000**
		4. Legal and other Fees	2%	**$ 2,500**
Sub Total Land and Property				**$ 61,437,135**
2. Investigation and Reporting	1.Planning	1.Route development costs	2.5%	**$ 18,274,824**
		2. Consultation		
	2.Approvals	1.Designations costs		
		2. Legigslive approvals costs		
	3.Funding	1.Outline buiness case		
		2. Full business case		
Sub Total Investigation and Reporting				**$ 18,274,824**
3. Developed design reporting including D&C Contract monitoring	1.Preliminary Deisign		3%	**$ 21,929,789**
	2.Reference Design			
	3. Detailed Design			
	4. Procurement			
	5.Programme and Project Management	1.Internal management costs	2.5%	**$ 18,274,824**
		2.External management support	1.0%	**$ 7,309,930**
		3.D&C Contract Monitoring	0.5%	**$ 3,654,965**
		4.Stakeholder& Publicity	0.50%	**$ 3,654,965**
Sub Total Developed design and D&C monitoring				**$ 54,824,473**
4. Detailed design and Construction	1.Track	1.Trackbed and rail		**$ 83,030,683**
		2.Bridges and support structures		**$ 210,535,446**
		3.Portals or underpasses		**$ -**
		4.Public realm		**Excluded**
		5. Public Art		**Excluded**
		6. Track drainage		**$ 528,800**
		6. Track attenuation		**$ 8,295,280**
	2. Power	1.Supply		**Excluded**
		2.Sub-Stations		**$ 22,000,000**
		3. OLE		**$ 14,927,729**
		4. Underground		**Not Required**
	3. Systems	1. Signalling		**$ 1,760,000**
		2. Telecoms		**$ 2,712,377**
	2.Statutory undertakers Equipment	1.Diversions		**$ 12,120,900**
		2.Upgrades		**Excluded**
	3.Highway costs	1.Highway changes		**$ 22,778,325**
		2.Park and ride		**$ 11,681,203**
		3. Cycle facilities		**$ 10,496,500**
	4. Stops	1. Civil Works		**$ 20,600,610**
		2. Shelters and furniture		
		3. Bus Interchange		**Excluded**
	5.Support Facilities	1. Administration building/Control centre		**N/A**
		2.Control centre		**$ 1,000,000**
		3.Maintenance sheds		
		4.Storage sheds		
		5. Storage Yards		**$ 50,000,000**
	6. Design	1. Detailed design		
		2.MSQA	8%	**$ 33,797,428**
	6.Programme and Project Management	1.Temporary traffic Management	4.50%	**$ 19,011,053**
		2.Preliminaries and General	25%	**$ 110,369,727**
Sub Total Base D&C				**$ 635,646,061**
Off site Overheads and			15%	**$ 95,346,909**
Sub Total D&C				**$ 730,992,970**
Total excluding Risk				**$ 804,092,267**
	Contingency (P50)	Estimating Risk	5.00%	**$ 40,204,613**
		Scope Risk	6.00%	**$ 48,245,536**
		Specific Risk	19%	**$ 152,777,531**
Sub Total Contingency				**$ 241,227,680**
Total expected cost				**$ 1,106,757,082**
Cost per m				**$ 71,746**

Heavy Rail To Airport **Updated October 2015** **12/05/2015**

Level 1-Project Stage	level 1 Cost Asset	Level3 Cost Sub Asset	Level 4 Cost Activity	Onehunga Branch line des ext A102	Onehunga to Bridge	Manakau Crossing	VEN 7 Option Crossing to Landings	VEN 8 Option Crossing to Landings	Landings to terminal
Length				**3,000**	**1,000**	**850**	**6,122**	**6,122**	**3,400**
1. Land and Property	1. Land and Property	1. Land Acquisitions		**Excluded**					
		2.Relocations							
		3. Alterations /Refurbishments/ Demolitions		$ -					**Excluded**
		4. Legal and other Fees	2%	$ -					
Sub Total Land and Property				$ -					
2. Investigation and Reporting	1.Planning	1.Route development costs	2.5%	$ 9,084,732	$ 2,392,167	$ 2,125,337	$ 17,356,640	$ 16,997,239	$ 8,589,831
		2. Consultation							
	2.Approvals	1.Designations costs							
		2. Legigslive approvals costs							
	3.Funding	1.Outline buiness case							
		2. Full business case							
Sub Total Investigation and Reporting				$ 9,084,732	$ 2,392,167	$ 2,125,337	$ 17,356,640	$ 16,997,239	$ 8,589,831
3. Developed design reporting including D&C Contract monitoring	1.Preliminary Deisign		3%	$ 10,901,679	$ 2,870,600	$ 2,550,404	$ 20,827,968	$ 20,396,686	$ 10,307,797
	2.Reference Design								
	3. Detailed Design								
	4. Procurement								
	5.Programme and Project Management	1.Internal management costs	2.5%	$ 9,084,732	$ 2,392,167	$ 2,125,337	$ 17,356,640	$ 16,997,239	$ 8,589,831
		2.External management support	1.0%	$ 3,633,893	$ 956,867	$ 850,135	$ 6,942,656	$ 6,798,895	$ 3,435,932
		3.D&C Contract Monitoring	0.5%	$ 1,816,946	$ 478,433	$ 425,067	$ 3,471,328	$ 3,399,448	$ 1,717,966
		4.Stakeholder& Publicity	0.50%	$ 1,816,946	$ 478,433	$ 425,067	$ 3,471,328	$ 3,399,448	$ 1,717,966
Sub Total Developed design and D&C monitoring				$ 27,254,196	$ 7,176,500	$ 6,376,010	$ 52,069,920	$ 50,991,716	$ 25,769,492
4. Detailed design and Construction	1.Track	1.Trackbed and rail		$ 12,856,280	$ 3,378,000	$ 3,834,928	$ 20,694,453	$ 20,694,453	$ 12,779,175
		2.Bridges and support structures		$ -	$ 45,544,654	$ 44,592,844	$ 220,641,100	$ 214,181,935	$ 48,595,750
		3.Tunnels		$ -	$ -				$ 66,504,046
		4. Open cut trenches		$ 126,088,668	$ -		$ 85,294,549	$ 83,893,592	
		4.Public realm		**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**
		5. Public Art		**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**
		6. Track drainage		$ 1,800,000	$ 68,000	$ 54,400	$ 95,200	$ 95,200	$ 84,800
		6. Track attenuation			$ 560,000	**Excluded**	$ 8,981,900	$ 8,981,900	**Excluded**
	2. Power	1.Supply		**Excluded**		**Excluded**	**Excluded**	**Excluded**	**Excluded**
		2.Sub-Stations		$ 22,000,000	$ 2,000,000	$ 2,000,000	$ 22,000,000	$ 22,000,000	$ 6,000,000
		3. OLE		$ 14,927,729	$ 975,750	$ 835,775	$ 5,937,461	$ 5,937,461	$ 3,815,475
		4. Underground		**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**
	3. Systems	1. Signalling		$ 3,900,000	$ 1,300,000	$ 1,105,000	$ 7,958,600	$ 7,958,600	$ 4,420,000
		2. Telecoms		$ 576,348	$ 232,548	$ 145,775	$ 1,112,934	$ 1,112,934	$ 645,108
	2.Statutory undertakers Equipment	1.Diversions		$ 3,000,000	$ 2,000,000	**Not Required**	$ 7,500,000	$ 7,500,000	$ 10,000,000
		2.Upgrades		**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Not Required**
	3.Highway costs	1.Highway changes		$ 23,055,460	$ 3,109,625	**Not Required**	$ 16,942,000	$ 16,942,000	$ 1,750,000
		2.Park and ride		$ -	**Not Required**	**Not Required**	$ 3,776,985	$ 3,776,985	**Excluded**
		3. Cycle facilities		**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Excluded**
	4. Stops	1. Civil Works		$ 16,500,000	**Not Required**	**Not Required**	$ 28,369,144	$ 27,339,730	$ 57,869,100
		2. Shelters and furniture			**Not Required**	**Not Required**			
		3. Bus Interchange		**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**	**Excluded**
	5.Support Facilities	1. Administration building/Control centre		**N/A**	**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**
		2.Control centre		**Excluded**	**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**
		3.Maintenance sheds			**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**
		4.Storage sheds		**Excluded**	**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**
		5. Storage Yards			**Not Required**	**Not Required**	**Not Required**	**Not Required**	**Not Required**
	6. Design	1. Detailed design							
		2.MSQA	8%	$ 17,976,359	$ 4,733,486	$ 4,205,498	$ 34,344,346	$ 33,633,183	$ 16,997,076
	6.Programme and Project Management	1.Temporary traffic Management	4.50%	$ 10,111,702	$ 2,662,586	$ 2,365,592	$ 19,318,695	$ 18,918,666	$ 9,560,855
		2.Preliminaries and General	25%	$ 63,198,137	$ 16,641,162	$ 14,784,953	$ 120,741,842	$ 118,241,660	$ 59,755,346
Sub Total Base D&C				$ 315,990,683	$ 83,205,811	$ 73,924,765	$ 603,709,209	$ 591,208,299	$ 298,776,731
Off site Overheads and			15%	$ 47,398,602	$ 12,480,872	$ 11,088,715	$ 90,556,381	$ 88,681,245	$ 44,816,510
Sub Total D&C				$ 363,389,285	$ 95,686,683	$ 85,013,480	$ 694,265,590	$ 679,889,544	$ 343,593,241
Total excluding Risk				$ 399,728,213	$ 105,255,350	$ 93,514,827	$ 763,692,150	$ 747,878,499	$ 377,952,564
	Contingency (P50)	Estimating Risk	5.00%	$ 19,986,411	$ 5,262,768	$ 4,675,741	$ 38,184,608	$ 37,393,925	$ 18,897,628
		Scope Risk	6.00%	$ 23,983,693	$ 6,315,321	$ 5,610,890	$ 45,821,529	$ 44,872,710	$ 22,677,154
		Specific Risk	19%	$ 75,948,360	$ 19,998,517	$ 17,767,817	$ 145,101,509	$ 142,096,915	$ 71,810,987
Sub Total Contingency				$ 119,918,464	$ 31,576,606	$ 28,054,448	$ 229,107,646	$ 224,363,550	$ 113,385,769
Total expected cost				$ 519,646,677	$ 136,831,956	$ 121,569,275	$ 992,799,796	$ 972,242,049	$ 491,338,333
Post per m				$ 173,216	$ 136,832				

to do

LRT	Costs
Mt Roskill to Airport	$1.04 billion
Land costs	$60 million
Rolling stock – 7 LRVs @ $6.8 million	$48 million
Total	$1.15 billion

Heavy Rail	Costs
Onehunga Branch Line double tracking + level crossing removal	$520 million
Onehunga to Airport	$1.7 billion
Land costs	$77 million
Rolling stock – 4 EMUs @ $13.2 million	$53 million
Total	$2.35 billion

Note that rolling stock costs for both LRT and Heavy Rail only includes up front fleet requirements. Further purchases necessary after approx. 15 years.

ATTACHMENT 3

KiwiRail

NZ TRANSPORT AGENCY
WAKA KOTAHI

Auckland Airport

Auckland Council
Te Kaunihera o Tāmaki Makaurau

Auckland Transport
An Auckland Council Organisation

Auckland Transport and the New Zealand Transport Agency

South-Western Airport Multi-Modal Corridor Project

GHD

Phase 1 Summary Report

September 2011

ATTACHMENT 1

Auckland Transport and the New Zealand Transport Agency

South-Western Airport Multi-Modal Corridor Project

Phase 1 Summary Report

16 September 2011

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Key findings of Phase 1

Context of the study

The Auckland Council is focused on turning Auckland into the world's most liveable city and the economic powerhouse of the nation. The council is currently consulting on the first 'Auckland Plan' that will deliver that vision over the next 30 years.

The south-west Auckland sub-region has the potential to play a very important role in delivering this plan because:

- The airport is the gateway for the majority of New Zealand's 7.5 million international visitors, and plays a vital economic role, not only for the Auckland region, but also for the wider Auckland-Hamilton-Tauranga 'Golden Triangle' region and for the nation as a whole.
- The area around the airport is an important industrial area with the potential for further development especially for those industries that require relatively large sites for their activities.
- The study area is a key catchment for airport and local employment. There is an opportunity to develop attractive, well-connected locations where people can live and work in the future without having to commute long distances.

A key issue that threatens the ability of the south-west Auckland to realise its full potential is growing road congestion, driven particularly by air passenger and freight growth. It is forecast that air passengers through the airport could grow from the current level of 13 million passengers per year to some 40 million passengers by 2041. There are constraints on the wider road network which will make it difficult to expand capacity to meet this level of demand.

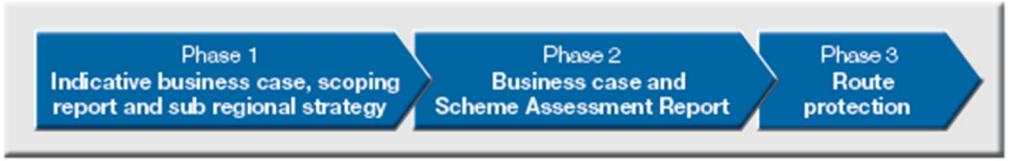
In addition to this core problem, for a city competing on the global stage, the range of quality transport alternatives for visitors arriving or departing from the airport is limited and detracts from their first and last experience of the country during their visit, and therefore from the attractiveness of Auckland as a world city.

There is also a lack of connectivity between local communities, labour markets and land uses. In particular the transport options for people and freight needing to access the airport and surrounding industrial areas are limited. These transport constraints will be worsened by the growing congestion problems that are likely to progressively affect the road network over the next 30 years. Unless this is addressed the development opportunities in the corridor are unlikely to be realised.

Outcome sought from the study

The South-Western Airport Multi-Modal Corridor Project was commissioned to build confidence around an effective and efficient response to these issues over a 30-year period. The outcome sought from the study is the identification of appropriate multi-modal transport connections to and from the airport that will be well integrated with land use development in the area and make best use of the investments already made or planned for the existing transport networks.

The study is being carried out in three phases. Each phase is separated by a 'Hold Point' when the project partners decide whether the deliverables produced justify moving to the next phase of the work.



Summary of Phase 1 analysis

- Multi-modal transport investment is the appropriate strategic response to the issues facing the movement of people and freight in this part of Auckland. This investment needs to be planned and integrated with land use development and investment in the wider transport networks in Auckland
- Assuming growth continues at the airport, investment in high capacity public transport services will be needed as part of the investment strategy, in combination with state highway and local transport improvements
- Packages incorporating rail connections[1] in the airport corridor will be the most effective in delivering the project objectives in the long term. The Rail Loop package would provide the best network resilience and highest benefits, while the package associated with a rail connection to the South would be the most economically efficient
- The rail options would be expensive compared to a package incorporating bus services operating mainly on the existing state highway network, however the latter option is likely to be less effective in the long run
- The way forward will be a progressive investment approach, allowing different elements of the multi-modal investment package to be implemented as demand for the movement of people and freight grows, wider network improvements are implemented, and funding becomes available.

Recommendations for Phase 2

- The corridor for scheme assessment in Phase 2 should have the flexibility to accommodate the progressive development of attractive, high capacity public transport services up to and including the provision of a rail loop connection
- Phase 2 should further develop the economic case for progressive investment in the transport system for moving people and freight against a range of growth assumptions, as well as the feasibility of financing, building and operating the improved system in a way that integrates well with wider road and rail networks
- In accordance with NZTA and Treasury guidelines, Phase 2 should also further investigate a realistic alternative package. This would involve increased use of bus services – in conjunction with appropriate improvements to the road network – to accommodate traffic growth as far as practicable in the absence of right-of-way public transport connections to the airport or widespread enhancement of road networks.

[1] This refers to rail connections that would be compatible with the existing conventional rail network across Auckland

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1. Introduction

1.1 Purpose of this paper

This paper summarises the work carried out in the first phase of the South Western Airport Multi-Modal Corridor Project, and makes recommendations to the project partners for moving forward to the next phase of the study.

1.2 Project to identify multi-modal transport corridor

In 2010 a Memorandum of Understanding was developed by Auckland Transport and NZ Transport Agency (NZTA) together with Auckland Council, KiwiRail and Auckland International Airport Ltd to undertake the South-Western Airport Multi-Modal Corridor Project ('the project'). The study area is shown in Figure 1.

In January 2011, the project partners commissioned GHD to undertake the project under the co-management of Auckland Transport and NZTA. The purpose of the project is to identify the preferred route(s) and configuration of multi-modal transport connections to and from the airport and agree the best manner in which such routes can be protected.

1.3 Need for early clarification of the way forward

There is an urgent need to clarify the way forward and protect possible transport routes because of the pace of land development in the area. A preferred multimodal transport alignment needs to be 'future proofed' early to protect against further land development and encroachment. In particular:

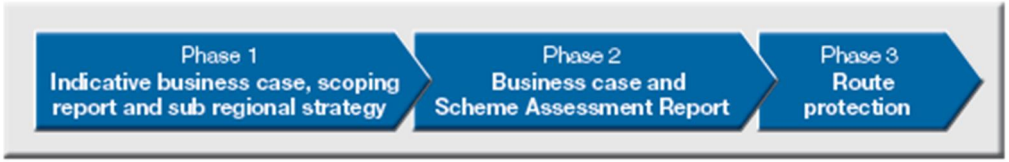
- There are currently several private and public proposed plan changes for land use development within the study area which are currently going through the statutory planning processes.
- The development of the airport master plan provides an opportunity to integrate land use and transport planning, and realise efficiencies in the transport network and economic agglomeration benefits.
- There is an opportunity for continued integration of the South Western Corridor Multi Modal Project with the broader work being undertaken in Auckland's Spatial Plan.

1.4 Project development

The project has been developed with input and direction from the key stakeholders that formed the governance partnership. An Implementation Executive Group provided a forum where discussions could be held and consensus reached on critical issues. A wider Stakeholder Steering Group was also established which provided guidance throughout the project and acted as a sounding board for the project team with regard to key findings.

The project is being undertaken in three phases, as summarised in Figure 1.

Figure 1 Project phases

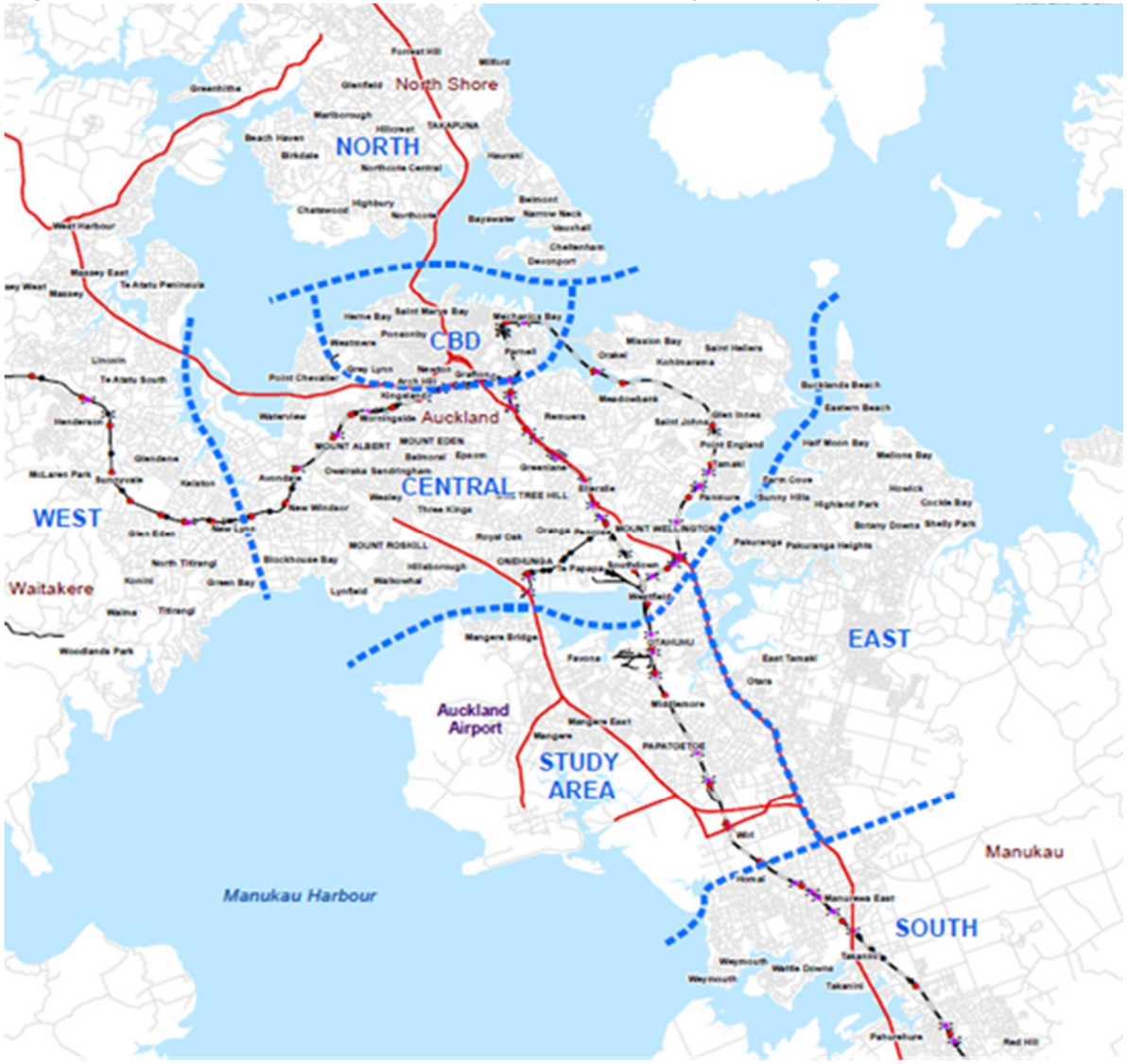


Each phase is separated by a 'hold point' when the project partners decide whether the deliverables produced justify moving to the next phase of the work. The deliverables in Phase 1 include an Indicative Business Case, Scoping Report, and Sub Regional Strategy.

1.5 Outcome from Phase 1 of the project

The key outcome sought from Phase 1 is agreement from the project partners that the analysis supports moving to a scheme assessment in Phase 2 that will be sufficient for route protection of a multi-modal transport corridor.

Figure 2 South-Western Multi-Modal Corridor Project study area



2. Strategic challenge

2.1 Policy context

The recently released Government Policy Statement on land transport funding reinforces the Government's focus on increasing economic growth and productivity as the primary objective for land transport expenditure. The expectation is that land transport funding will be directed towards high-quality projects and activities that will support improved productivity and economic growth, particularly in the export sector. A focus on long term value for money is critical to this, as it will determine the level of benefits realised from land transport investment more widely.

Pending the completion of the Auckland Spatial Plan, officers from Auckland Council, Auckland Transport, NZTA and the Ministry of Transport have developed the following principles to guide the four organisations on transport matters in Auckland:

- Take a one system approach to the planning, management and development of the transport system
- Achieve an appropriate balance between movement and place
- Ensure long term land use and activities drive long term transport functionality
- Take advantage of the opportunities to use transport to assist in place shaping
- Ensure that future transport investment is aligned with growth envisaged in the Auckland Plan and that this growth optimises existing and proposed transport investment
- Recognise and accommodate different circumstances, by area, time and transport need (corridor management plans)
- Recognise existing community investment and the need to enable connectivity between and within communities
- Align community expectations in urban areas with urban levels of service particularly with realistic expectations around levels of congestion
- Align community expectations in rural areas with rural levels of service particularly acknowledging limited opportunities for alternatives to motor vehicle travel in rural areas
- Ensure that the transport system is safe and facilitates the efficient movement of people and goods
- Ensure that transport is sustainable in the long term and minimises negative impacts on the built and natural environments.

2.2 Development and growth opportunities

The South-West Auckland sub-region offers a major contribution to national economic growth and productivity. It is a gateway for the majority of New Zealand's 7.5 million international visitors, and plays a vital economic role, not only for the Auckland region, but also for the wider Auckland-Hamilton-Tauranga 'Golden Triangle' region and for the nation as a whole.

In addition, the area round the airport provides an opportunity for development especially for those industries that require relatively large sites for their activities. The areas further north and east of the industrial area represent an opportunity for regeneration and development to provide space for increased residential and commercial development.

It is important these opportunities are pursued, not only to help to meet the needs of the growing population in Auckland but also to provide attractive, well-connected locations where people can live and work in the future without having to commute long distances.

2.3 Existing transport constraints

The airport is constrained in terms of connections to the wider transport network. While there are several minor roads currently accessing the airport and its environs, access is dominated by two state highway (SH) connections, SH20A and SH20B. These in turn are linked to the same motorway, SH20, as shown in Figure 3.

Public transport services, particularly to the airport and environs are also limited, encouraging a high degree of car dependence. The closest rail facilities are located on the North Island Main Trunk Line, located several kilometres to the east of the airport, and the Onehunga Branch Line that currently terminates in Onehunga, located immediately to the north of the recently completed Manukau Harbour Bridge. Dedicated bus facilities available in the study area are limited to bus lanes on some arterial roads. There is a lack of connectivity and, in some areas, an absence of walking and cycling facilities.

The area has been faced with increasing traffic congestion as the airport and environs have continued to grow. Improvements to the motorway network have improved reliability somewhat and there are further improvements planned, including grade separation of SH20A at Kirkbride Road and the completion of the Western Ring Route, SH20.

Figure 3 Existing transport infrastructure

2.4 Future trends

It is forecast that air passengers through the airport could grow from the current level of 13 million passengers per year to some 40 million passengers by 2041.

There is also strong growth in the surrounding industrial area, supported in part by growth in the population further east, particularly in the central parts of Manukau and to the east of Manukau.

Transport modelling carried out in Phase 1 assessed the implications of this growth on land transport networks serving the area. This has confirmed the findings of previous studies that airport passenger growth is the key driver of land transport demand. The modelling indicates that the demand for vehicle travel to the airport is expected to increase significantly over the next 30 years. In particular:

- The current capacity of SH20A as a 4-lane expressway will be exceeded around 2015 and, after upgrading to a 4-lane motorway, its capacity will be exceeded by approximately 2025
- SH20B carries less traffic and is expected to grow at a slightly lower rate; however it is currently reaching its capacity as a 2-lane expressway.

It is assumed additional capacity will be provided on SH20A and SH20B as traffic grows. However, the Phase 1 modelling suggests congestion on SH20 and the wider network has the potential to negate any potential road capacity improvements beyond improving a four-lane SH20A to motorway standard.

2.5 Issues to be addressed

The emerging imbalance between transport demand and the capacity of the road network will be difficult to manage. The road traffic generated by the flight-related peaks coincides with the commuter peaks, resulting in high demand for substantial periods of the day, particularly on state highways. While there will some scope to manage peak demand – for example through the use of workplace travel plans – the ability to manage peak international and domestic air travel is limited.

Failure to address this issue will potentially compromise the future role of the airport and its economic contribution to Auckland and New Zealand generally. It could lead to pressure for a second Auckland airport which would introduce major inefficiencies into the operations of New Zealand's aviation industry.

In addition to this core problem, for a city competing on the global stage, the range of quality transport alternatives for visitors arriving or departing from the airport is limited and detracts from their first and last experience of the country during their visit, and therefore from the attractiveness of Auckland as a world city.

There is also a lack of connectivity between local communities, labour markets and land uses. In particular the transport options for people and freight needing to access the airport and surrounding industrial areas are limited. These transport constraints will be worsened by the growing congestion problems that are likely to progressively affect the road network over the next 30 years. Unless this is addressed the development opportunities in the corridor are unlikely to be realised.

2.6 Section summary

On the basis of the work carried out in Phase 1 of the project, the following conclusions are recommended for adoption by project partners:

- Substantial improvements will be needed to the land transport system serving Auckland Airport and the surrounding area to facilitate economic growth over the next 30 years and beyond. Failure to address this issue would lead to deteriorating levels of service for people and freight using the transport networks in the area, compromising the ability of the airport to contribute to the local, regional and national economies.
- While planned improvements to the existing state highway connections to the airport will be able to handle a large amount of the expected traffic growth in the immediate vicinity of the airport, there are capacity constraints on the wider road network which will be more difficult to resolve. A planned approach will be needed to build confidence around a long term strategic response to this problem that is well integrated with land use plans and the development of wider transport networks in the region.
- As part of this planned approach there is some urgency in identifying and protecting a preferred transport corridor under the Resource Management Act so that the public and private sectors can plan their transport and land use investment decisions without incurring unnecessary costs later, such as retrofitting transport improvements after land use development has occurred.

3. Criteria for success

3.1 What would success look like?

Phase 1 carried out a series of workshops and technical focus group meetings to develop objectives that take into account not only the specific issues identified above, but also the broader objectives contained within national, regional and district policy documents.

The agreed objectives are to:

- Increase the capacity and efficiency of the transportation network to accommodate demand
- Improve journey time reliability for freight and airport related traffic
- Improve the visitor experience in order to enhance the reputation of Auckland and New Zealand within the global market
- Broaden and enhance transport choices within the study area and the region to improve connectivity
- Improve connectivity and access within the study area for local communities and facilities
- Enable growth and development aspirations within an integrated and sustainable transport system
- Capture economic benefits associated with the airport corridor and its role as a global gateway
- Support the health and vibrancy of communities within the study area, by providing acceptable levels of access to employment, community facilities and recreational assets.

3.2 Vision for the project

It was agreed by project partners that achieving these objectives would facilitate, if combined with complementary land use changes, the realisation of a broad vision…

To improve Auckland's ranking as an international city capitalising on the airport as a gateway to Auckland and New Zealand, whilst enhancing connectivity and the liveability and viability of communities in the study area.

3.3 Section summary

On the basis of the work carried out in Phase 1 of the project, the conclusions below are recommended for adoption by project partners.

- The objectives to be achieved by the transport investment in addressing the strategic issues have been agreed by the stakeholders and are in line with the statutory requirements and government policy
- Achieving these objectives would facilitate, in combination with complementary land use changes, the realisation of a broad vision to improve Auckland's ranking as an international city capitalising on the airport as a gateway to Auckland and New Zealand while enhancing connectivity and the liveability and viability of communities in the study area.

4. Development of the strategic response

4.1 Need for a strategic response

Many different public and private sector organisations will be involved in addressing the strategic challenge facing the transport system in this part of Auckland. A further complication is that the options for the transport system in the study area need to be carefully integrated with decisions on the wider network, for example in relation to the capacity of SH20 and the Britomart rail terminal.

Given the scale and long term nature of the investment decisions, and the number of parties involved, coordination will be required to build confidence around a long term strategic response. This will reduce investment risk for all parties and help to ensure optimal timing as traffic growth takes place.

Addressing this complex situation will involve long term spatial planning, backed up by the necessary transport corridor designations under the Resource Management Act. However, it will be important to ensure that sufficient flexibility is built into both the Auckland Plan and the Unitary Plan to allow the parties to react tactically to emerging circumstances.

4.2 Key transport outcomes sought

Phase 1 developed an 'investment logic map' to identify the relationship between the needs of the area (the investment objectives), the transport issues (opportunities and problems) and the outcomes that would represent an appropriate response. The results are summarised in Figure 4.

Figure 4 Linking transport issues, objectives and outcomes

Issues	Objectives	Outcomes sought
Insufficient capacity	To increase the capacity and efficiency of the transportation network to accommodate demand	• Increased person capacity to meet demand for travel • Increased efficiency within transport networks
	To improve journey times and reliability for freight and airport related traffic	• Increased travel time reliability particularly for freight and airport related traffic • Reduction in travel time delay for people and freight within the corridor
Quality	To improve the visitor experience in order to enhance the reputation of Auckland and New Zealand within the global market.	• Improved visual amenity of the route to and from the airport • Improved quality (frequency, time and experience) of public transport services
	To broaden and enhance transport choices within the study area and the region to improve connectivity.	• Improved public transport links between key centres • Increased travel time reliability • Modal shift towards public transport and rail freight
Local connectivity	To improve connectivity and access within the study area for local communities and facilities.	• Improved public transport access to areas of employment particularly for local communities typified by high levels of social deprivation.

Issues	Objectives	Outcomes sought
		• Local road and street networks assist internal connectivity, manages traffic volumes and reduces accident rates • Increased walking and cycling opportunities.
Regional growth opportunities	To enable growth and development aspirations within an integrated and sustainable transport system.	• Higher density nodes supported by transport investment • High levels of growth and development accommodated.
Airport economic potential	To capture economic benefits associated with the airport Corridor and its role as a Global Gateway	• Economic potential of the airport business district unlocked. Increased contribution to regional and national GDP and employment generation.
Liveable communities	To support the health and vibrancy of communities within the study area, by providing acceptable levels of access to employment, community facilities and recreational assets.	• Improved access to employment opportunities • Improved access to social infrastructure.

4.3 Need for a multimodal response

To successfully deliver these outcomes, Phase 1 identified the following specific impacts on the transport system that would address the transport issues facing the area:

- Provide affordable, direct, and reliable journeys between the airport and key centres
- Maintain and enhance the journey experience to and from the airport
- Reduce the impact of commuting trips for the benefit of the wider network
- Improve connectivity to support communities and freight movements in the study area
- Improve connectivity between the airport and the key growth areas identified in the Spatial Plan
- Facilitate integrated development along airport transport corridors.

Improvements to the state highway and arterial road networks will have an important part to play in the strategic response to the issues summarised above. However road improvements alone will not be an adequate response to the strategic challenge. This is because large scale road network improvements beyond the study area would be needed to meet demand in the long term and these would impose significant social and environmental costs, and entrench high levels of expenditure to manage on-going congestion

Improved local bus services and better provision for walking and cycling will have an important part to play in the strategic response, especially in improving travel choice and connectivity for local communities. However these local transport improvements alone will not provide an adequate response to the strategic challenge.

This is because much of the growth in demand will be for regional trips from the airport, requiring journey times that are comparable to those achieved currently by car or taxi.

It follows, therefore, that high capacity public transport services linking the airport to the key origins and destinations of its users and workforce will be an essential element of the strategic response. This will relieve pressure on the road network for freight and other users for whom there is no realistic alternative by providing improved transport choices for those who are able to use a different mode. Further, it will potentially stimulate economic development through generally improving accessibility in this part of Auckland.

The timing of the various elements of the multimodal package would be triggered by the rate of growth in air passengers and freight, the rate of land use development in the study area, and the completion of other related improvements in the wider transport network.

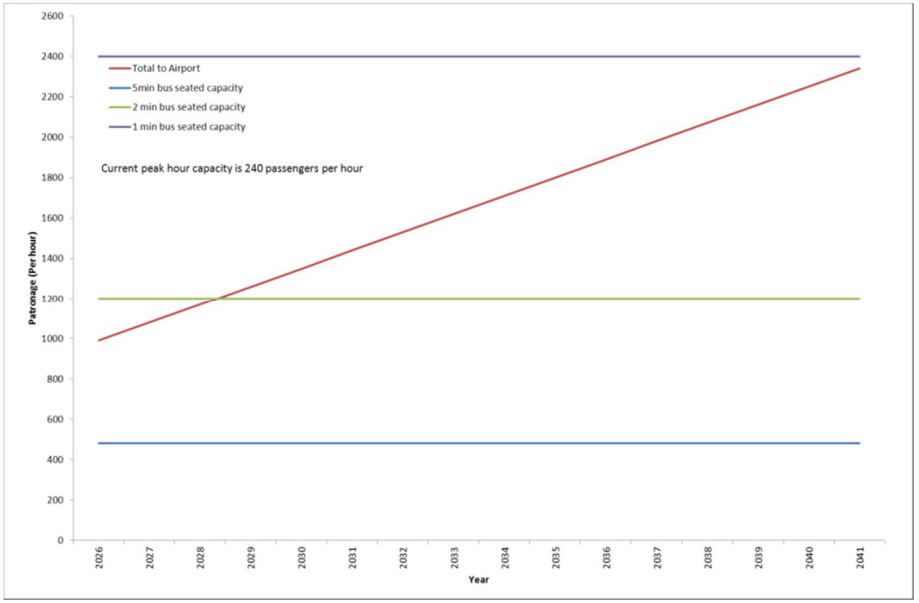
4.4 Need for right-of-way public transport connections

Phase 1 also modelled growth in demand for public transport. As congestion on the road network increases the level of public transport patronage is forecast to grow strongly. Figure 5 shows the forecast patronage on various assumptions and how this demand might be catered for by bus services (at the lower levels of patronage up to 2026) and bus or rail services (at the higher levels of patronage after 2026).

The modelling indicates that approximately 30-50 buses per hour would be required to service the peak demand at the airport, equivalent to between a 1 minute and 2 minute frequency by 2026. At these levels, internationally accepted transport planning practice suggests that consideration should be given to providing rail or dedicated busway services to ensure reliability and to avoid bunching.

A dedicated busway option, at this level of frequency, would require substantial investment in bus facilities at and approaching the airport for this to be an attractive, reliable option in the long term option.

Figure 5 Forecast public transport patronage (AM – peak direction)



Growing road congestion and increasing parking costs would make such right-of-way public transport an increasingly attractive mode of travel, particularly in peak periods, as has been the experience with the Northern Express Service.

4.5 Section summary

The following conclusions are recommended for adoption by project partners:

- To be successful the strategic approach would need to impact positively on the movement of people and freight in the following ways:
  - Provide affordable, direct, and reliable journeys between the airport and key centres
  - Maintain and enhance the journey experience to and from the airport
  - Reduce the impact of commuting trips for the benefit of the wider network
  - Improve connectivity to support communities and freight movements in the study area
  - Improve connectivity between the airport and the key growth areas identified in the Spatial Plan
  - Facilitate integrated development along airport transport corridors.
- To achieve these impacts, the strategic approach would need to incorporate a multimodal package of transport improvements, comprising state highway improvements, local transport improvements and high capacity public transport services from the airport to the key origins and destinations of its users and workforce
- The high capacity public transport services would relieve pressure on the road network for freight and other users for whom there is no realistic alternative, by providing improved transport choices for those who are able to use a different mode
- The timing of the various elements of the package would be triggered by the rate of growth in air passengers and freight, the rate of land use development in the study area, and the growth in transport demand generally in the surrounding transport system

5. Development of strategic options

5.1 Option development

An initial assessment of a long list of improvement options was undertaken to narrow down the list and remove options deemed not worthy of further evaluation. This assessment aimed to identify a short list of possible improvements that would best address the strategic themes identified in the overall strategic approach above.

5.2 Transport corridors

The corridors, as used in this chapter, are geographically distinct strips of land to accommodate connections with the wider transport network. Four corridors connecting key markets to the airport were identified to accommodate new transport infrastructure, as illustrated in Figure 6.

A: Northern corridor linking the airport to the Onehunga area.

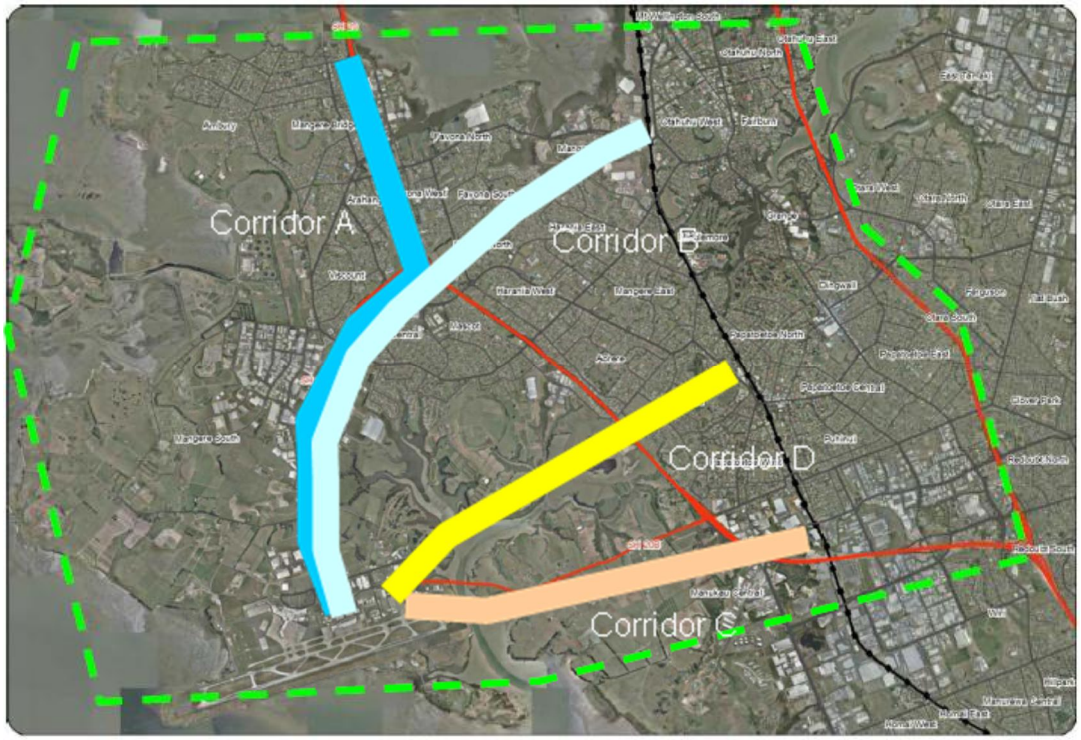
B: North-eastern corridor linking the airport to Otahuhu area and beyond.

C: South-eastern corridor linking the airport to the area around Papatoetoe and Manukau.

D: An eastern corridor crossing the Pukaki inlet and linking the airport precinct to the area around Papatoetoe.

These were then narrowed down to the three most feasible corridors – A, B, and C. Corridor D was discarded because it would provide limited additional land use and transport benefits over the north-eastern and south-eastern corridors, and would necessitate crossing a wide expanse of the Pukaki Inlet which has environmental and heritage sensitivities.

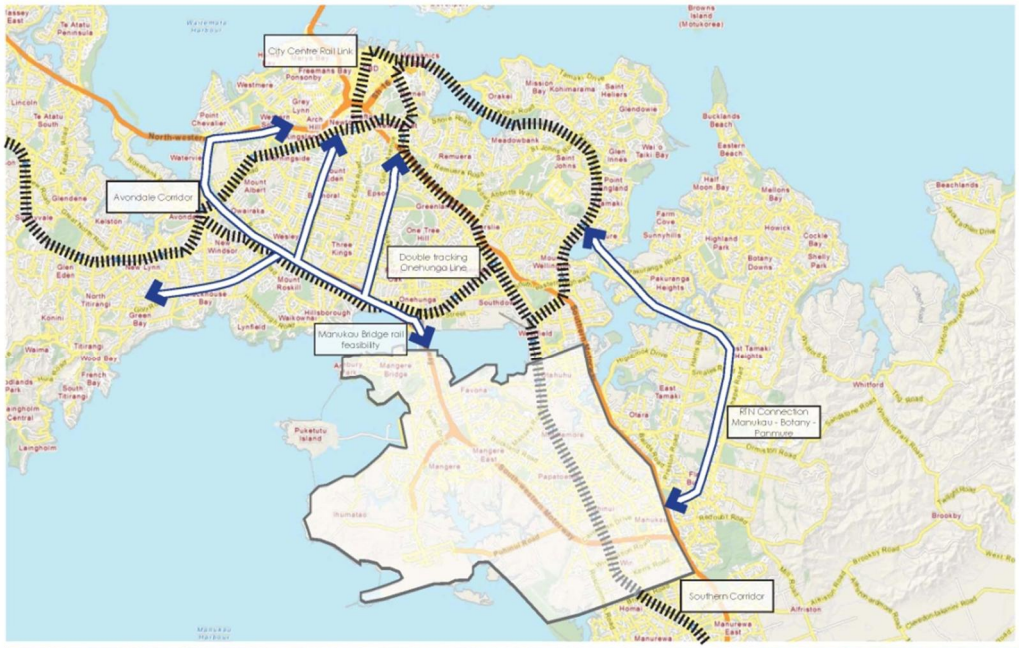
Figure 6 Local corridors



An important outcome from the strategy will be to provide good connections with the wider network as shown in Figure 7. Auckland operates two main rapid transit networks - rail and bus - and any new system in the study area would need to be integrated with these networks, minimising the negative impact of transfers as far as possible.

New rail services at the airport would have operationally impacts on existing passenger and rail freight system, for example the Britomart rail terminal would need the capacity to handle the additional passenger rail services. Similarly, additional express bus services from the airport to the city would raise issues, for example whether the CBD road network and Britomart bus terminus could accommodate the additional bus movements involved.

Figure 7 Strategic corridors



Strategic fit with the wider network

5.3 Packages

The long list of options was developed into multi-modal packages representative of the corridors and wider network connections. The packages consisted of several 'layers':

- State highway upgrades
- Local road improvements
- Land use changes that will be facilitated by the improved accessibility
- High capacity public transport connections to the airport
- Complementary local bus service improvements
- Walking and cycling improvements.

All the shortlisted geographical corridors were used to accommodate the high capacity public transport elements in building up the packages. Combinations of corridor and public transport modes were selected to provide a diverse range of packages appropriate for testing.

Seven packages were agreed for assessment purposes. All included a set of common elements, plus a high capacity public transport element (conventional rail, light rail or express bus) connecting the airport to key centres.

The common elements reflected the other layers and comprised planned and suggested improvements to the existing state highways, arterial roads, and local transport networks, including: Waterview Connection (State Highway 20); Manukau Rail Link; grade separation of State Highway 20A at Kirkbride Road[2]; Neilson Street improvements; double-tracking of the Onehunga rail branch line.

[2] Six lanes on SH20A was also tested in the modelling work

Other common elements included:

- Local bus improvements
- Walking and cycling improvements - including a segregated corridor along the high capacity public transport corridor.

Common growth assumptions were used for modelling purposes within phase 1 of the study. The potential to influence land use was highlighted within the assessment process.

The seven packages are summarised below.

- **Package 1 – Rail loop.** This would comprise rail links from the airport through the northern corridor and southern corridor (connecting to the existing passenger rail network at Puhinui and Onehunga), plus the common elements (state highway, arterial road and local transport improvements)
- **Package 2 – Light rail to north.** This would comprise dedicated light rail link from the airport through the northern corridor to Onehunga (connecting to a light rail network running into the CBD or to a rail station at Onehunga), plus the common elements (state highway, arterial road and local transport improvements)
- **Package 3 – Busway to north or south**. This would comprise dedicated busway from the airport through the northern and southern corridor connecting to the existing bus and rail networks through interchanges, plus state highway, arterial road, and local transport improvements.
- **Package 4 –Rail connection to the south**. This would comprise a rail link from the airport through the southern corridor connecting to the existing passenger rail network, plus State highway, arterial road, and local transport improvements.
- **Package 5 –Rail connection to the north**. This would comprise a rail link from the airport through the northern corridor connecting to the existing passenger rail network, plus State highway, arterial road, and local transport improvements.
- **Package 6 – Bus lanes on the motorway shoulder**. This would comprise express bus services from the Airport through the northern corridor and southern corridor using motorway hard shoulders, plus state highway, arterial road, and local transport improvements.
- **Package 7 – Rail or dedicated busway through Otahuhu**. This would comprise rail or busway links from the Airport through the eastern corridor, plus state highway, arterial road, and local transport improvements.

5.4 Section summary

On the basis of the work carried out in Phase 1 of the project, the following conclusions are recommended for adoption by project partners:

- Phase 1 developed an appropriate set of geographically feasible corridors to accommodate high capacity public transport services for delivering the strategic approach. A collaborative approach was used in narrowing down the options to the practicable set of corridors, taking into account environmental and social adverse effects.
- Phase 1 also developed an appropriate range of multimodal transport packages associated with the identified transport corridors, to allow a comprehensive assessment of the range of practicable options for delivering the strategic approach.

6. Assessment of strategic options

6.1 Methodology used

Transport modelling was carried out on the seven strategic packages on the basis of two land use scenarios for the years 2016, 2026 and 2041:

- NZTA assumptions used to support highway schemes in the region
- Regional Land Transport Strategy 2010 assumptions.

Using the modelling data together with qualitative analysis, the seven options were then assessed for their impacts on:

- Land Transport Management Act objectives
- Government Policy Statement requirements
- Regional Land Transport Strategy requirements
- Project outcomes and success criteria: demand, choice, connectivity
- Feasibility.

An economic evaluation of each package was carried out in accordance with NZTA's Economic Evaluation Manual. The evaluation was independently peer reviewed.

From these assessments, recommendations were then made on which options should be taken forward to Phase 2 for detailed investigation.

6.2 Qualitative assessment of multi-modal packages

The relative ranking of the packages on the qualitative assessment is summarised in Figure 8 which represents an abridgment of the detailed evaluation carried out[3]. Rating is on a five-point scale ranging from very positive to very negative.

Figure 8 Qualitative assessment summary

	Pckg 1 Rail loop	Pckg 2 Light rail to the north	Pckg 3 Busway to the north	Pckg 4 Rail via SH20B	Pckg 5 Rail to Onehunga	Pckg 6 Bus on-shoulder	Pckg 7 RTN to Otahuhu
Capacity	Very Positive	Positive	Positive	Very Positive	Very Positive	Average	Very Positive
Quality	Very Positive	Positive	Positive	Positive	Positive	Average	Positive
Connectivity	Very Positive	Positive	Positive	Very Positive	Positive	Positive	Positive
Land use	Very Positive	Positive	Positive	Positive	Positive	Average	Very Positive

Key: Effectiveness - Impact of option against problems and opportunities on the following scale

Very positive	Positive	Average or Neutral

[3] Note the assessment focused on the impacts of the high capacity public transport elements of the packages as the state highway, arterial road and local transport elements were common to all the packages.

The main points to emerge from the qualitative assessment were:

- **Packages 1, 4, 5 and 7** were assessed highest in responding to the growth in travel demand. Their impact was scored as 'very positive'. Packages 3 and 4 were assessed as 'positive' except package 6 which was scored as 'average'
- **Package 1** was assessed as 'very positive' in relation to impact on the quality of journey. All the packages were assessed as 'positive' except Package 6 which scored 'average'.
- **Packages 1 and 4** was scored highest on addressing connectivity in the local transport network. Their impacts were assessed as 'very positive'. All the other packages scored 'positive'
- **Packages 1 and 7** scored 'very positive' on their impacts on integrated land use development. All the other packages were assessed as 'positive' except Package 6 which scored 'average'.
- **All packages, except 6**, have a positive effect on congestion in peak periods by providing an alternative transport choice and increasing network resilience.

6.3 Economic assessment

The relative ranking of the packages on the economic assessment is summarised in Figure 9.

Figure 9 Economic assessment summary

	Pckg 1 Rail loop	Pckg 2 Light rail to the north	Pckg 3 Busway to the north	Pckg 4 Rail via SH20B	Pckg 5 Rail to Onehunga	Pckg 6 Bus on-shoulder	Pckg 7 RTN to Otahuhu
Benefits	High	Medium	Medium	Medium	Medium	Low	Medium
Costs	High	High	High	Medium	High	Low	Medium

The key points to emerge from the economic assessment were[4]:

- Package 1 would be the most effective response to the strategic issues and would produce the most benefits
- Packages 4, 6 and 7 would have lower costs than the other packages. All the other packages were assessed as having medium or high costs
- All the packages were assessed as having low efficiency. However this was on the basis of assessing standalone packages without programming the timing of the various elements to optimise the economic efficiency of the investment
- All the assessments excluded wider economic benefits, other than agglomeration. These wider benefits are likely to be lower for Packages 7 than for packages that link to the north and the south.

[4] The analysis was at a scoping level evaluating the packages on a standalone basis. The analysis excluded the costs and benefits of the common elements and also wider economic benefits other than agglomeration. It is proposed that Phase 2 will look at a progressive package, combining elements of the packages to optimise timing. It is also proposed that wider economic benefits will be assessed as will the benefits and costs of the common elements.

6.4 Progressive implementation

The above analysis is on the basis of a standalone assessment of each package. However in reality the way forward will need to be considered over a thirty year time frame against three time horizons reflecting different levels of activity:

Horizon One Minimal change in land use

Horizon Two Substantial development and implementation of airport master plan

Horizon Three Provision for on-going growth.

A progressive approach to investment is recommended, recognising opportunities for land use integration and affordability constraints, given the investment needs across New Zealand and other parts of the network. In Horizon One there will continue to be a reliance on private vehicles and taxis, however some increase in local buses will be desirable. In Horizon Two there will be a period of significant growth in public transport patronage. The increase in trips between Horizon 2 and 3 is envisaged to be accommodated through a step change in public transport capacity.

The investment triggers for the progression plan are expected to contain (but not be limited to) the following:

- Capacity thresholds
- Airport passenger growth rates
- Rate of land use change / uptake of land within the airport environs
- Population and employment growth rates
- Individual project time frames and dependencies
- Funding justification and priorities.

Because of the uncertainty around these factors and their interactions, it is premature to chart a definitive implementation programme; however the likely horizons are used as an indication to support the development of a funding plan.

6.5 Assessment recommendations

The assessment recommendations are set out in Figure 10.

Figure 10 Assessment recommendations

Package	Decision	Rationale
1. Rail loop	Take forward to Phase 2 as part of a progression plan	• Connects with existing rail network • Connects with key growth areas and development potential • Forecast demand would justify a 15 min frequency in 2041 • Would have the highest benefits and offer the best network resilience • Would provide opportunities to develop rail freight consolidation facilities in the airport corridor

Package	Decision	Rationale
2. Light rail to the north	Do not take forward to Phase 2	• Does not provide a "single seat" connection with established public transport network e.g. bus or conventional rail • Could be reconsidered if other corridors are developed as light rail and combined light /conventional rail running used on the Onehunga line in the future
3. Dedicated busway to the north	Do not take forward to Phase 2 as a separate package but ensure a multi-modal corridor is protected that can accommodate a dedicated busway if it is needed in the future	• Does not provide a "single seat" connection with the existing conventional rail network but could provide a solution to bus corridors e.g. Dominion Road, Manukau Road etc. • Possible operational constraints (within airport environs and in the CBD) in dealing with high frequency of bus movements
4. Rail to the south	Take forward To Phase 2 as part of a progression plan	• Could be a viable first step as it provides access to North Island Main Trunk Line north and south • Should be considered as part of a southern growth strategy • Provides a direct connection to Manukau • Would provide opportunities to develop rail freight consolidation facilities in the airport corridor
5. Rail to the north	Take forward as part of progression plan	• Could be a step towards full rail loop by extending the Onehunga line • Would provide opportunities to develop rail freight consolidation facilities in the airport corridor
6. Bus shoulders on the motorway	Take forward as part of progression plan	• Would service different corridors • May not support all development aspirations and therefore not an alternative to rail long term • Could be considered as complementary to the rail options and also as part of a transition while traffic levels build up to a level that would justify a rail option.
7. Rail or dedicated busway connection to the east	Do not take forward to Phase 2	• Potential benefit in providing improved connections to the east • Would miss the development opportunities at Onehunga and to the north of the study area • An additional rail corridor not considered the solution due to additional severance for the community, opportunity to connect with wider bus rapid transit network

6.6 Section summary

On the basis of the work carried out in Phase 1 of the project, the following conclusions are recommended for adoption by project partners:

- To successfully address the transport issues facing the area, the multi-modal packages would need to include the following elements:
  - State highway upgrades
  - Local road improvements
  - Land use changes that will be facilitated by the improved accessibility
  - High capacity public transport connections to the airport
  - Complementary local bus service improvements
  - Walking and cycling improvements.
- The assessment in Phase 1 of the multimodal packages on a standalone basis suggests:
  - Packages incorporating rail connections in the airport corridor will be the most effective in delivering the project objectives in the long term
  - The Rail Loop package would provide the best network resilience and highest benefits, while the package associated with a rail connection to the South is the most economically efficient
  - The rail options would be expensive compared to a package incorporating bus services operating mainly on the existing state highway network; however the latter option is likely to be less effective in the long run.
- However, the packages are not mutually exclusive and the way forward will be a progressive investment approach, allowing different elements of the multi-modal investment package to be implemented as demand for the movement of people and freight grows, wider network improvements are implemented, and funding becomes available. For example, the improved public transport services might initially be started using buses on the existing state highway network, with a rail connection to the South or North being added later, ultimately leading to the completion of the rail loop as demand continues to grow.
- Successfully implementing the strategic response to the transport issues in this part of Auckland will be challenging from engineering, operational and financial perspectives. The feasibility of overcoming these challenges will require detailed investigation in Phase 2 before an application for route protection under the Resource Management Act can be prepared.

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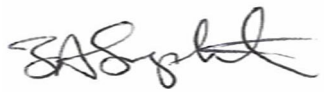
Document status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	Simon Whiteley	Jim Sephton		Gary Payne		16 September 2011