INDICATIVE BUSINESS CASE

East West Connections

12 December 2014

NZ TRANSPORT AGENCY WAKA KOTAHI / AT

New Zealand Government

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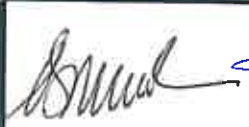
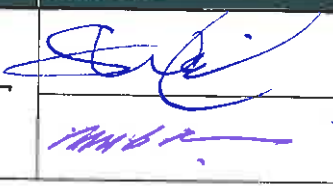
Signed			

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Version 1 - 18 /06/2015
Change of Auckland Transport Owner/Interface Manager
Updated - Section 7.1
Added - Section 8.2.5
Added - Section 8.2.6

EXECUTIVE SUMMARY

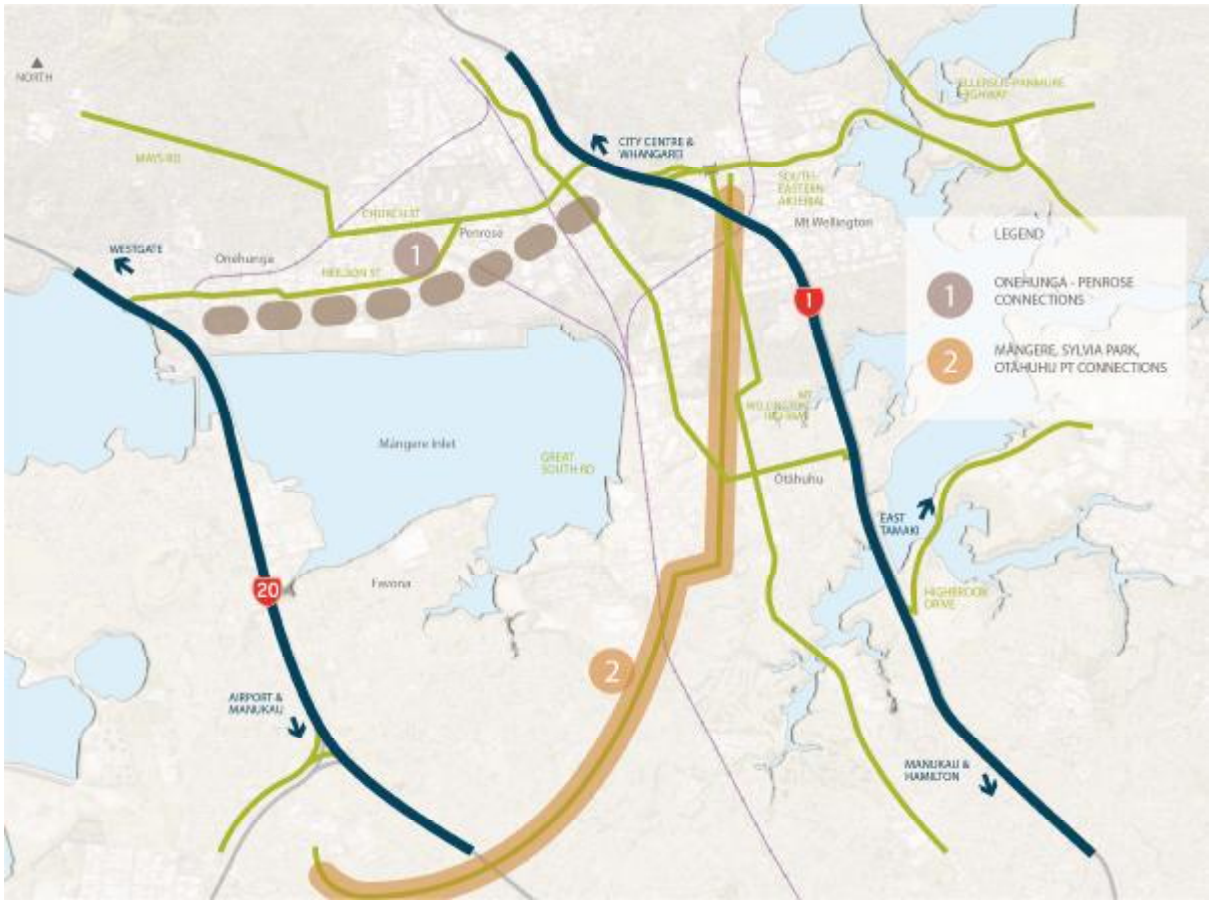
PURPOSE

This East West Connections (EWC) Indicative Business Case (IBC) is the next stage in a process of investigation into transport problems and opportunities in the area of Penrose, Onehunga, Auckland Airport and East Tamaki, to support national economic development and local growth.

The IBC focuses on the two priority activities identified in the Programme Business Case (PBC) for further investigation:

- Onehunga-Penrose Connections and
- Māngere, Sylvia Park, Ōtāhuhu Passenger Transport (PT) Connections.

FIGURE E1: MAP OF IBC ACTIVITIES



The IBC provides a summary of the technical analysis undertaken to:

- Substantiate the problems and benefits (and measures to assess them) building on the analysis already undertaken in the Strategic Case and PBC;
- Develop a long and short list of options to address the problems and deliver the benefits identified;

- Assess the transport performance of the options and analyse the wider social and environmental impacts and implementation risks of the short and long list of options;
- Identify the recommended option/s to proceed to further analysis at the Detailed Business Case (DBC) Stage;
- Assess a range of procurement and delivery models and recommend the option/s for further development in the DBC;
- Assess the affordability and funding options for the recommended option/s and
- Set out the next steps for the investigation through the DBC.

CONTEXT

The Auckland Plan identifies the East West Link (now EWC), along with AMETI, as one of the top three priority transport project for the Auckland region. The East West Connections has also been included in central government's Accelerate Auckland package of accelerated transport projects, with specific recognition of EWC as one of the government's top priority transport projects beyond the RoNS. Being located in the geographic centre of Auckland, with the nation's busiest and most productive inland port at its heart, the benefits that could be achieved through improving connections to the state highway network in the study area are of high value to Auckland Transport (AT) and the NZ Transport Agency (the Transport Agency).

The Transport Agency and AT completed a joint PBC in May 2014 which recommended the development of an IBC for two projects within the wider three-decade programme which would:

- Respond to the immediate and growing freight access issues at either end of the Neilson Street/Church Street corridor caused by inefficient transport connections and a lack of response to changes in industry's supply chain strategies; and
- Address the inadequate quality of transport choices between Māngere, Ōtāhuhu and Sylvia Park.

THE CASE FOR INVESTMENT

The IBC builds on the Strategic Case and PBC analysis by refining it to an activity level, based on a further understanding of corridor issues, constraints and opportunities. The focus of analysis is on the core benefits that can be achieved and how the outcomes to be achieved through this investment link back to the overall outcomes sought from the PBC.

ONEHUNGA-PENROSE CONNECTIONS

Table E1 summarises the understanding of the problems in the Onehunga-Penrose area and the benefits that could be delivered if these problems are successfully addressed.

TABLE E1: UNDERSTANDING OF PROBLEMS AND BENEFITS – ONEHUNGA-PENROSE CONNECTIONS

Problems *Strategic Case*	Causes of Problems (Activity Level) *IBC*	Benefits of Addressing the Problem *IBC*
Problem 1: Inefficient transport connections increase travel times and constrain the productive potential of Auckland and the upper North Island (45%) Problem 2: A lack of response to changes in the industry's supply chain strategies contributes to greater network congestion, unpredictable travel times and increased costs (30%)	• Congestion occurs at the state highway connections – namely, Onehunga Mall / Neilson St intersection, Great South Rd / Church St intersection, and Mt Wellington Interchange are all either at or near capacity. • There is conflict between different transport users and traffic demands • Increasing volume of freight journeys in the Neilson St / Church St corridor • State Highways 1 and 20 are near capacity • Travel demands do not support provision of viable public transport services	1. An improvement in travel times and travel time reliability between businesses in the Onehunga-Penrose industrial area and State Highways 1 and 20 (75%)
Problem 3: The quality of transport choices is inadequate and hinders the development of liveable communities (25%)	• Congestion along key public transport corridors is resulting in poor journey time reliability for buses • High traffic volumes along key arterials, including a relatively high percentage of heavy vehicles, is resulting in perceived safety concerns for pedestrians and cyclists • A range of barriers to safe and accessible cycling and pedestrian access exist	2. An improvement in safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park (12.5%) 3. An improvement in journey time reliability for buses between SH20 and Onehunga Town Centre. (12.5%)

The scale of these problems is significant, as demonstrated by some of the following key statistics of the current situation:

- Journey times can vary from 5.8 to 30 minutes at different times of the day on parts of the network;
- GPS surveys carried out in 2012 indicate average speeds for vehicles accessing SH20 can drop to 14 km/h in the interpeak;

- Freight volumes are significant with Church Street (west of Great South Rd) experiencing on average of 6,200 heavy vehicles per 12 hour period (or 16% of all movements) and Neilson Street (east of Victoria St) experiencing on average 4,100 heavy vehicle movements per 12 hour period (or 18% of all movements);
- Freight volumes are continuing to increase as a result of the increasing commercial viability of rail based freight – for example, MetroPort opened on the Southdown facilityin 1999 and by 2012 was generating between 2,000 and 2,500 heavy vehicle trips per day and over 200,000 TEU movements per year.

MĀNGERE, ŌTĀHUHU, SYLVIA PARK PT CONNECTIONS

The evidence base developed for the PBC was also used as the starting point to understand the activity-context specific issues on the Future Network Route 32 (FN32) between Māngere, Ōtāhuhu and Sylvia Park. The problems along the route all relate to Problem 3 of the Strategic Case (poor quality of transport choices). The specific issues identified are:

- Travel times are unreliable and typically exceed the scheduled times, especially during peak times due to traffic congestion. For example, the route is timetabled to take approximately ten minutes, but on average takes 20 minutes, with times as slow as 40 minutes recorded.
- Conflicting demands in the FN32 corridor create safety issues for pedestrians and cyclists as the corridor tries to accommodate high volumes of traffic, including heavy vehicles, while also providing for local access to both residential and commercial uses along the corridor.

OPTIONS IDENTIFICATION AND LONG LIST ASSESSMENT

For the IBC, a long list of options was developed and assessed separately for the Onehunga-Penrose Connections and for the Māngere, Sylvia Park, Ōtāhuhu PT Connections. A full spectrum of options was built up to progressively deliver increased transport benefits. The options represent a range of intervention from low levels of new investment to options which involved much greater intervention and investment. The options were compared to a Do Minimum. [1]

A set of project specific performance measures was developed for each of the two projects, focused on how best to measure the performance of the options against the benefits identified. The separate assessments reflect the different problems and benefits that the investment addresses in the two areas and the different nature of the options that were being considered.

Where possible, performance measures that could be quantitatively assessed were identified. The same measures and descriptions were used to assess the long list and short list of options to identify the recommended option/s. A higher degree of quantification and specific measurement of performance was undertaken at the short list stage, reflecting the greater level of design detail that had been undertaken and the need for finer comparison between options at that stage of analysis.

ONEHUNGA-PENROSE CONNECTIONS

A range of options was developed to respond to the transport problems in the Onehunga-Penrose area. The key problems to be addressed are the bottleneck at the intersection of Onehunga Mall and

[1] The Do Minimum scenario represents the expected baseline if none of the options were implemented in this study area. It does not represent the existing 'current day' situation, as it includes significant land use growth and significant investment in the transport system across the Auckland region.

Neilson Street at the State Highway 20 end, and the indirect route to State Highway 1 for vehicles travelling to or from the south. In developing the short-list options, it was recognised that all options must have the potential to contribute to completing the cycleway network through the area to Sylvia Park. Concepts for the cycle link were identified for all options (commensurate with the scale of the option being considered). In addition, the potential for opportunities to deliver benefits to public transport users, while addressing the needs of freight users, has also been considered, at a high level.

Six options were short listed, and included a range of upgrades to existing corridors, new local roads, and new state highways. Indicative cost ranges were developed for each of the options and are shown below in Table E2.

TABLE E2: INDICATVIE COSTS OF OPTIONS

	Option A	Option B	Option C	Option D	Option E	Option F
Costs $M P50[2]	$150M	$430M	$650M	$730M	$840M	$800M
Costs $M P95[3]	$220M	$630M	$910M	$1010M	$1200M	$110M

In identifying a preferred option, transport performance as well as social and community issues and natural environment issues were assessed for the options, with a more detailed analysis carried out on the short listed options. Key risks, such as consenting and constructability were also assessed.

A new complete link between State Highway 1 and State Highway 20 (Option F) is considered to be the most appropriate long-term response to the problems in the Onehunga-Penrose area for the following reasons:

- The full connection provides the most enduring response among the options, with a sustained reduction in traffic along both Neilson St and Church St. By providing an entirely new corridor between SH1 and SH20, traffic is diverted to the new corridor, removing pressure along the existing corridor. Modelling results indicate the western section of Neilson St for Option C reaches capacity in 10-15 years, with access to driveways and side roads extremely compromised. Option F on the other hand results in up to 10,000 vehicles removed from this section of Neilson St. The ability of Option F to respond directly to the transport problems in an enduring and sustainable manner is the primary reason for supporting this option over Option C.
- The provision of an alternate corridor via Option F also results in a reduction of general traffic and heavy vehicles from other key arterials and local roads in the Onehunga area, including Church St and Mt Smart Rd. These areas are predominantly residential in nature and as such, reduction in traffic volumes is likely to have a positive impact on safety and amenity. From a whole of network perspective, Option F is the least disruptive and provides the greatest network-wide benefits.
- Option F has the least impact of all options from a social, cultural, and heritage impact perspective given the location of the majority of the corridor completely removed from existing land uses.
- While the consideration of foreshore reclamation as part of Option F presents a significant consenting risk given the existing policy framework, reclamation also presents a potentially

[2] Costs rounded to the nearest $10M
[3] Costs rounded to the nearest $10M

significant environmental opportunity to stem the flow of contamination from historic landfills along the northern shore of the Māngere Inlet. In addition to the environmental outcomes that could be achieved, foreshore reclamation also avoids the need to encroach on heavy industrial land, which is in extremely short supply in the Auckland region.

Table E3 summarises the extent to which the problems, as assessed by the measures are addressed by the respective option. The BCRs do not necessarily strongly correlate with the performance of the options against the outcomes identified in the EWC Programme ILM, so some options with comparatively lower BCRs but strong performance against the criteria have proceeded to the short list.

TABLE E3: TRANSPORT PERFORMANCE OF OPTIONS

		Option A	Option B	Option C	Option D	Option E	Option F
	BCR (P50-P95 costs)	4.9-3.3	3.4-2.3	2.2-1.6	1.7-1.2	1.9-1.4	1.9-1.4
Measures	Reliable freight connections	0	60-80%	20-40%	40-60%	40-60%	60-80%
	Efficiency of freight connections to strategic network	20-40%	60-80%	60-80%	60-80%	60-80%	60-80%
	Efficiency of accessing freight network	Problem deteriorates by 40-60%	Problem deteriorates by 80-100%	20-40%	20-40%	80-100%	80-100%
	Efficiency of strategic network	20-40%	20-40%	20-40%	20-40%	20-40%	20-40%
	Efficiency of access to strategic network	0-20%	60-80%	60-80%	60-80%	60-80%	60-80%
	Enduring benefits	0-20%	0	20-40%	20-40%	60-80%	60-80%
	Integration of rail and road freight	Used at long list stage. Was not considered a differentiator at short list.					
	Resilient network	0	0-20%	40-60%	20-40%	60-80%	60-80%
	Improved safety and accessibility	0	0	60-80%	80-100%	20-40%	40-60%
	Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park (directness of route)	0-20%	0-20%	60-80%	60-80%	40-60%	60-80%

	Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park (traffic volume)	-60-80% (i.e. situation worsens significantly)	-60-80% (i.e. situation worsens significantly)	40-60%	80-100%	20-40%	20-40%
	Improved journey time and reliability of buses accessing Onehunga	20-40%	20-40%	60-80%	20-40%	40-60%	40-60%
	Improved safety and accessibility	0-20%	0-20%	0	0	0	20-40%

Due to affordability and the potential lead-in times required for delivering a full connection, it is recommended that a staged approach and consenting strategy be further developed. This will consider how earlier delivery of access improvements at State Highway 1 and State Highway 20 might best be delivered while the longer term planning and consenting for the full connection is progressed. Releasing these benefits early will have a significant impact on the freight operation on this area. This approach will be considered in more detail through the DBC. Other issues to be considered in the DBC include:

- Considering design optimisation to manage any impacts and increase the benefits of the preferred option
- confirming the appropriate staging and cost and programme implications of a staged approach
- more consultation on the preferred approach, particularly with key stakeholders and affected property owners, to further refine the project scope and associated costs
- more detailed investigations into key risk elements, such as geotechnical work, to further reduce the cost risks.

The proposed approach responds particularly well to the immediate issues in the Onehunga-Penrose area, providing an enduring solution for Auckland and the Upper North Island freight network. However, considering the projected growth rates of Auckland Airport and East Tamaki/Botany, there is expected to be increasing demand for east-west connectivity which will continue to put the current and planned network under further stress. Further work will be required in the longer term to understand the scale and timing of any future responses necessary to meet the growing demands on Auckland's strategic transport network.

MĀNGERE, ŌTĀHUHU, SYLVIA PARK PT CONNECTIONS

The focus of the initial PT option assessment was to challenge and confirm that the on-road bus option identified in the draft Corridor Management Plan (CMP) is the correct starting point for future work.

Only one option proceeded to the short list for the Māngere, Sylvia Park, Ōtāhuhu PT Connections, with three design variants being considered. All variants covered the same route, but provided different levels of bus and cycle priority. Each design variant is listed below and has an approximate

cost of $22M. This option confirms the approach adopted in the draft Corridor Management Plan (CMP).

Variant B was identified as the preferred design concept. Modelling analysis suggested this variant provided the greatest transport benefits to PT users, with minimal disadvantage to cars and freight and some advantages to freight, within the projected funding envelope.

TABLE E4: MĀNGERE, SYLVIA PARK, ŌTĀHUHU PT CONNECTIONS VARIANTS

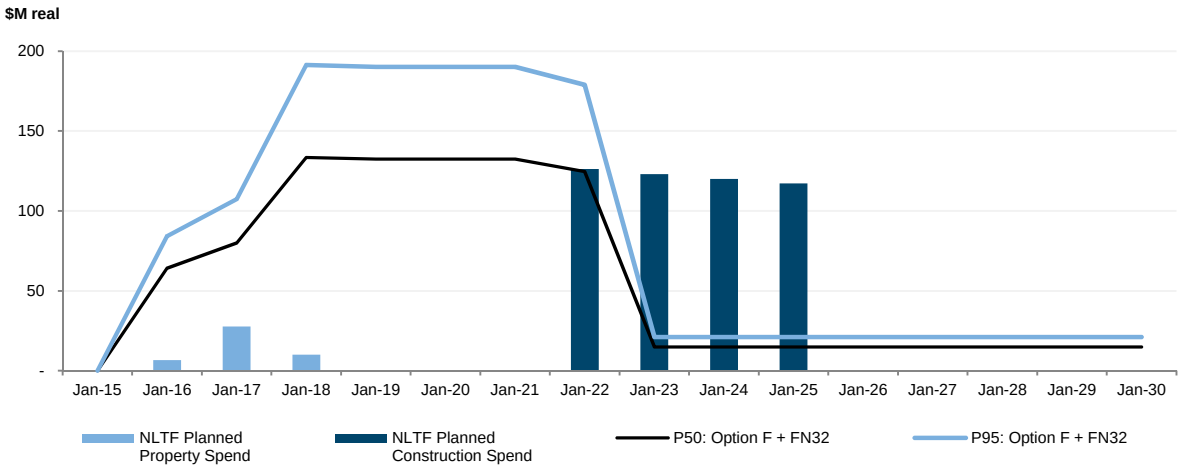
		Variant A	Variant B	Variant C
	P50-P90 costs			
Measures	Benefit 1: An improvement in travel times and journey time reliability	Negative contribution	Moderate contribution	Minor contribution
	Benefit 2: An improvement in safety and accessibility for cycling and walking	Moderate contribution	Moderate contribution	Moderate contribution
	Benefit 3: An improvement in safety and accessibility for passenger transport users	Minor contribution	Moderate contribution	Moderate contribution

PRELIMINARY ASSESSMENT OF AFFORDABILITY

The IBC has carried out preliminary financial analysis of the preferred options to investigate the affordability of the preferred options from a Transport Agency and AT perspective and assesses the extent of any additional funding required to accelerate delivery.

If the preferred option is delivered on a 2016/2017 construction start date, additional funding of c$800M would be required because of a misalignment of timing with National Land Transport Fund (NLTF) allocations.

FIGURE E2: NLTF INFLOWS VS. ESTIMATED TOTAL NZTA COSTS (REAL)



RECOMMENDATIONS AND NEXT STEPS

The IBC recommends that the preferred options for the two activities

- Onehunga-Penrose Connections: Option F
- Māngere, Ōtāhuhu, Sylvia Park PT Connections: Variant B

proceed to DBC assessment and that further public engagement should be undertaken. The DBC will develop the preferred options for the activities by:

- Developing more detailed design specifications for the options, including the design provisions for freight, public transport, walking and cycling access, to allow a more comprehensive assessment of the costs, benefits, opportunities and risks;
- Considering the potential for tolling and other alternatives to optimise the benefits achievable;
- Considering the optimal staging of implementation to optimise benefit realisation and to address the risks identified with the recommended option/s;
- Considering the impact of different growth and transport demand scenarios on the performance of the options and alternatives, as well as wider network impacts;
- Developing an implementation strategy for the project, including considering options for procurement, consenting and property acquisition;
- Identifying a funding strategy for the project, including the respective allocations to the Transport Agency and AT; and
- Developing a management case to move the project through to pre-implementation.

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Appendix D: Multi Criteria Analysis – Key Result Areas and Criteria for Assessment

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Appendix I: Māngere, Sylvia Park, Ōtāhuhu PT Connections Route Variants

Appendix J: Onehunga-Penrose Connections Options – Long List Assessment Summary

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Appendix L: Onehunga-Penrose Connections Options – Long List Multi Criteria Analysis Summary

Appendix M: Onehunga-Penrose Connections Options – Short List Transport Performance

Appendix N: Onehunga-Penrose Connections Options – Short List MCA Summary

Appendix O: Onehunga-Penrose Connections Options – Short List Individual Option Assessment

Appendix P: Economic Analysis Approach and Assumptions

Appendix Q: Commercial Case Framework

Appendix R: Financial Case - Assumptions/Methodology

Appendix S: Governance Plan

Glossary of Terms

Abbreviation	Term
AC	Auckland Council
AMETI	Auckland Manukau Eastern Transport Initiative
AT	Auckland Transport
BCR	Benefit Cost Ratio
Components	Specific infrastructure investments within the respective Segments
CMP	Corridor Management Plan
CRC	Capital Review Committee
DBC	Detailed Business Case
EEM	Economic Evaluation Methodology
EWC	East West Connections
FAR	Funding Assistance Rate
FN	Frequent Network
GDP	Gross Domestic Product
GPS	Government's Policy Statement on Land Transport Funding
HCV	Heavy Commercial Vehicles
HOV	High Occupancy Vehicles
IBD	Investigation by Design
IBC	Indicative Business Case
ILM	Investment Logic Map
IRS	Investment Revenue Strategy
ITP	Integrated Transport Programme (V1)
ITS	Intelligent Transport System
KPI	Key Performance Indicator
KRA	Key Result Area
LB	Local Board
LTMA	Land Transport Management Act
LTP	Long Term Plan
MCA	Multi-Criteria Analysis
MMEWS	Multi Modal East West Solution
Option	A full East to West route made up of components across different Segments

ONF	Outstanding Natural Feature
ONL	Outstanding Natural Landscape
NIMT	North Island Main Trunk
NRC	National Road Carriers
NZCPS	New Zealand Coastal Policy Statement 2010
The Transport Agency	NZ Transport Agency
OBL	Onehunga Branch Line
PAUP	Proposed Auckland Unitary Plan
PBC	Programme Business Case
PGG	Project Governance Group
PT	Public Transport
PTNP	Public Transport Network Plan
RLTP	Regional Land Transport Programme
RLTS	Regional Land Transport Strategy
RMA	Resource Management Act 1991
RPTP	Regional Public Transport Plan
RTN	Rapid Transit Network
Segment	Sections of the Onehunga-Penrose Connections area
SH(#)	State Highway (#)
SEART	South Eastern Arterial
SMART	South Western Multimodal Airport Rapid Transit project
TDM	Travel Demand Management
TEU	Twenty-Foot Equivalent Unit
VAC	Value Assurance Committee
Vpd	Vehicles per day
WEB	Wider Economic Benefit
$x M	$ Million

1. INTRODUCTION AND PURPOSE OF DOCUMENT

1.1. Background

The IBC is the next stage in a process of investigation into transport problems in a relatively wide geographical area to support national economic development and local growth levels, anticipated through the Auckland Plan.

The programme area (see Figure 2.1) is identified as a priority area within the Auckland Plan for investment for transport infrastructure and is the second highest priority for transport infrastructure in the Auckland Plan. The area that is the focus of investigation is located between Penrose, Onehunga, the Airport and East Tamaki. It is a mix of established residential communities together with established industrial and commercial development. The investigation process has focused on issues and investment opportunities over 30 years to meet the horizon of the Auckland Plan.

The IBC builds on analysis and decisions that have already been undertaken by the Transport Agency and AT. Table 1.1 below summarises the scope of these documents.

TABLE 1.1: CORE DOCUMENTS FOR THE EAST WEST CONNECTIONS PROGRAMME

Milestone	Date completed	Scope of document
Strategic Case	March 2013:	*Multi Modal East West Solutions Strategic Case (MMEWS)* • Identifies problems within the programme study area, the relative priority of the problems, and the scale of benefit that could be delivered if the problems were to be addressed • The Strategic Case confirms that there is a case for investment, which needed to be further analysed and assessed in terms of scale and significance through a Programme Business Case
Programme Business Case	May 2014	*East West Link Programme Business Case* • Further validated the problems at a programme level identified in the Strategic Case and confirmed there is a case for investment • Identified a preferred 30 year programme of works • Identified priority activities (Onehunga-Penrose industrial area and Māngere, Ōtāhuhu and Sylvia Park Public Transport Connections) to be further analysed and assessed through an Indicative Business Case, including

Milestone	Date completed	Scope of document
		the potential for investment to be brought forward
Indicative Business Case	December 2014	*East West Connections Indicative Business Case* • This document focuses on the priority activities identified in the PBC for further investigation (Onehunga-Penrose industrial area and Māngere, Ōtāhuhu and Sylvia Park Public Transport Connections) • Investigates the evidence of problems at the activity level and the benefits that will be achieved if the problems are addressed and the measures to assess them. • Identifies and assesses a range of options to address the problems identified in the two project areas • Identifies a recommended option/s and a delivery model • Preliminary financial analysis of the recommended option/s to assess affordability and funding options
Detailed Business Case	April 2015 (forthcoming)	*East West Connections Detailed Business Case* • Subject to approval of the IBC • Will carry out further analysis of the recommended option/s from the IBC; and consider delivery issues such as strategies for procurement, consenting and property acquisition. • Funding sources to be identified and confirmed.

1.2. Purpose of Indicative Business Case

The IBC focuses on the priority activities identified in the PBC for further investigation

- Onehunga-Penrose industrial area; and
- Māngere Town Centre, Ōtāhuhu Town Centre and Sylvia Park.

The purpose of the document is to provide a summary of the technical analysis that has been undertaken that identifies a recommended option for each activity area to proceed to further analysis in the DBC.

- Summarises the analysis of problems and benefits undertaken in the Strategic Case and Programme Business Case (see Chapter 2 – Strategic Case and Chapter 3 EWC Programme)
- Substantiates the problems and benefits identified in the Strategic Case and PBC at an activity level (Onehunga-Penrose industrial area and Māngere, Ōtāhuhu, and Sylvia Park town centres) and the social and environmental context in which transport activity takes places and identifies measures to assess the delivery of benefits (see Chapter 4 East West Connections Activities)

- Summarises the process of stakeholder engagement, the key messages received and how they were incorporated into the IBC analysis (see Chapter 5 Stakeholders)
- Develops a long list of options to address the problems identified and to deliver the desired benefits. Assesses the performance of the options using a Multi Criteria Analysis (MCA) to assess the transport performance of the options and to understand the wider social and environmental impacts and implementation risks. A recommended option is identified for each activity area to proceed to further analysis to the Detailed Business Case (DBC) (see Chapter 6 – Māngere, Ōtāhuhu, Sylvia Park PT Connections, Chapter 7 – Activity Development and Long List Assessment: Onehunga-Penrose Connections; and Chapter 8 – Short List Assessment: Onehunga-Penrose Connections)
- Assesses the economic benefits and costs of the shortlisted options for each of the projects, including sensitivity analysis. This will be revisited in the DBC (Chapter 9 – Economic Assessment)
- Assesses a range of delivery models for the recommended option/s and identifies a recommended delivery option/s for further development in the DBC (see Chapter 10 – Commercial Case)
- Provides preliminary financial analysis of the affordability and funding options for the recommended option/s. This will be revisited in the DBC (see Chapter 11 – Financial Case)
- Sets out the next steps to move the investigation through to the DBC (see Chapter 12 – Management Case)

1.3. Related and Technical Documents

A summary of key technical information is annexed to the body of this IBC report. In addition, further key documents include:

1. Strategic Case – Multi Modal East West Solution, March 2013 – Auckland Transport, Auckland Council and the NZ Transport Agency.
2. Programme Business Case, May 2014 – the Transport Agency and Auckland Transport. This document is supported by the following key documents:
    - 2.1. An Economic Assessment of the East West Link Study Area, 25 October 2013 – Ascari, BERL and Richard Paling Consulting
    - 2.2. East West Link Transport Options Report, March 2013 – Options for inclusion in the PBC – Auckland Transport and the NZ Transport Agency
    - 2.3. Inquiry by Design (IBD) Workshop Outcomes Report, December 2013 – Urbanism+
    - 2.4. Post IBD Workshop Traffic Modelling and Economic Evaluation Report, March 2014 – Beca Ltd
3. IBC Technical Documents:
    - 3.1. East West Connections Project: Heritage Assessment to Support Option Selection, 15 October 2014 – Beca Ltd
    - 3.2. East West Connections Project: Landscape, Natural Character, Amenity and Urban Form Assessment to Support Option Selection, 16 October 2014 – Beca Ltd
    - 3.3. East West Connections Route Evaluations and Assessments, 15 October 2014 – Marshall Day Acoustics

3.4. East West Connections Project: Air Quality Impact Assessment to Inform Option Selection, 16 October 2014 – Beca Ltd

3.5. East West Connections: Preliminary Social Impact Assessment to inform Option Selection, 13 November 2014 – Beca Ltd

3.6. East West Connections Report - Options Shortlisting – Preliminary Groundwater Assessment, 21 October 2014 - Beca Ltd

3.7. East West Connections Contaminated Land Assessment to Support Option Selection, October 2014 – GHD

3.8. East West Connections Construction Erosion and Sediment Management Assessment to Support Option Selection, November 2014 – Beca Ltd

3.9. East West Connection High Level Assessment of Environmental Effects – Stormwater, November 2014 – GHD

3.10. East West Connections Project: Ecological Assessment to Support Option Selection, November 2014 – GHD

3.11. East West Connections Coastal Process Assessment to Support Option Selection, 15 October 2014 – Beca Ltd

3.12. East West Connections Constructability Assessment to Inform Preferred Option Selection, 21 October 2014 – Beca Ltd

3.13. East West Connections Consentability Assessment to Inform Preferred Option Selection, 2 November 2014 – Beca Ltd

3.14. East West Connections Project Assessment of Statutory Considerations for Reclamation, 31 October 2014 – Beca Ltd

3.15. East West Connections Geotechnical Factual Report, 23 October 2014 – Beca Ltd

3.16. Design Philosophy Statement, December 2014 – Project Team

3.17. Design Options Report, December 2014 - Project Team

3.18. Consultation and Engagement Report, December 2014 – Beca

3.19. Māori Economic Assessment, November 2014 – Project Team

3.20. Technical Financial Report, December 2014 - Project Team

3.21. Summary of Outcomes of MCA for the Short List of Options, November 2014 - Beca Ltd

2. STRATEGIC CASE

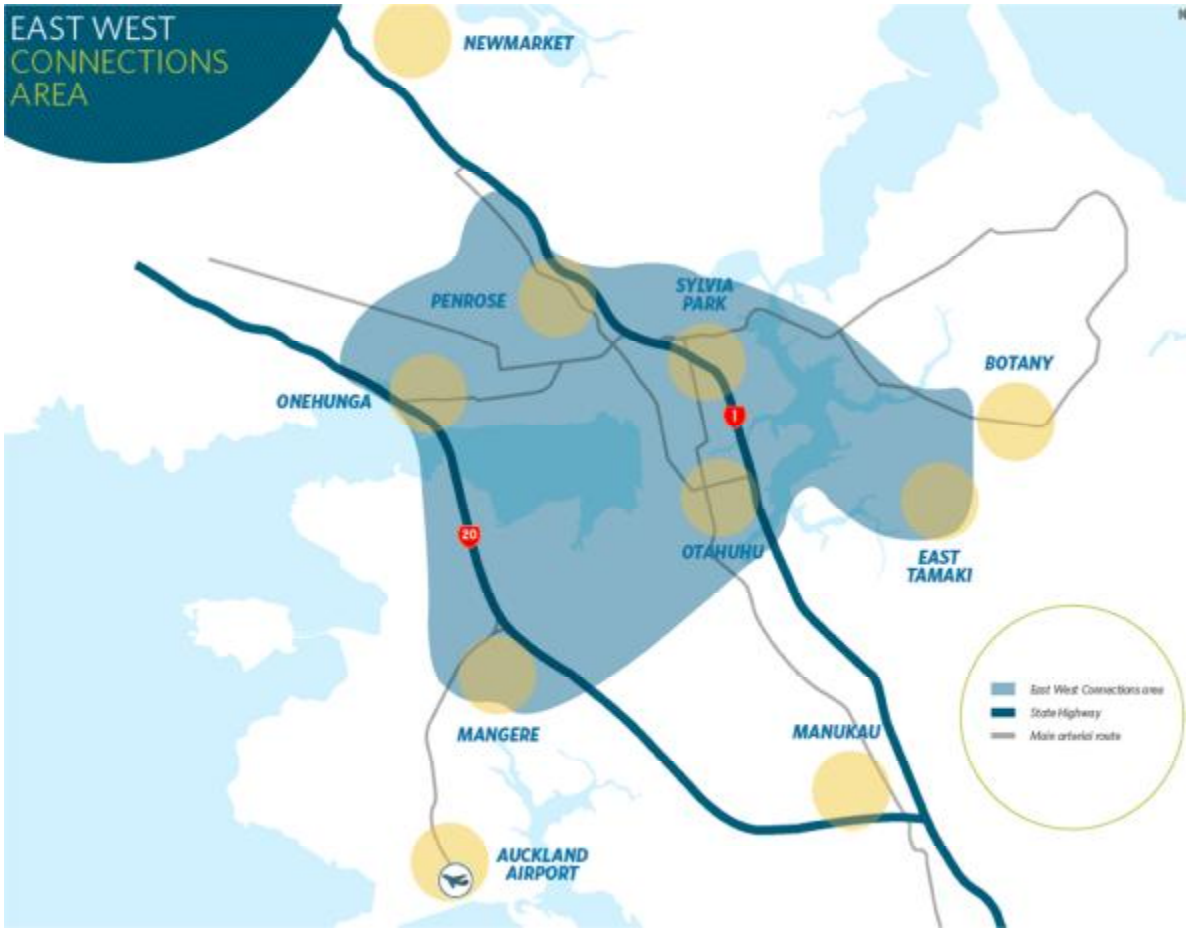
- The Strategic Case identifies problems within the programme study area, the relative priority of the problems, and the scale of benefit that could be delivered if the problems were to be addressed
- The Strategic Case confirms that there is a case for investment, which needed to be further analysed and assessed in terms of scale and significance through a Programme Business Case

2.1. Background and Strategic Context

The Auckland Plan provides a vision for management of Auckland's growth to 2040 and includes a framework to guide investment, development, socio-economic and environmental management decisions towards realisation of that vision. The Auckland Plan was adopted in March 2012.

The EWC (or East West Link as it is referred to in the Auckland Plan) is identified as a priority area for investment for transport infrastructure. The EWC area is located between Penrose, Onehunga, the Airport and East Tamaki. The area is a mix of established residential communities together with established industrial and commercial development.

FIGURE 2.1: EWC PROGRAMME AREA



The Auckland Plan identifies the area as a key employment area with future growth potential. It identifies that East Auckland's growth in business, employment and residential activities have created 'pressing demand for transport investment'. The Auckland Plan refers to the East West Connections and includes a directive 13.5 to jointly progress the planning for EWC for implementation by 2021. EWC is identified in the Auckland Plan as necessary to improve access to Southdown rail hub and major employment areas in the locality. Issues identified included congested local roads, inefficient and high volume freight movements, inefficient logistics connections for services and goods to other economic activity hubs at the airport and the port.

Apart from SH1 and SH20, the area is largely served by a local road network which has had incremental improvements made to it over time. The continued growth of industrial activity and the recent expansion of rail-based freight and distribution centres have resulted in growth of freight traffic in the area which now account for up to 20% of all traffic on some major roads[4]. The local road network is inadequate to meet the demands of businesses and residents and this has created recognisable issues with traffic congestion and safety.

The EWC project was identified as a priority by the government in the Prime Minister's address to the Auckland Chamber of Commerce on 23 June 2013 in which he identified the importance of the economic contribution to the Auckland and national economy made by industrial and transport/logistics businesses within Onehunga, Mt Wellington and East Tamaki areas. He re-iterated the conclusion of the Auckland Plan that there was a need for investment in transport solutions for the area to support the area's economic functions.

2.2. Area Context

The EWC area is Auckland's main manufacturing location, containing almost 40% of Auckland's manufacturing employment. It is a regional hub for transport and distribution activity, containing the MetroPort inland port, Southdown KiwiRail and Toll Freight terminals and a large number of other major distribution and logistics firms, taking advantage of the area's proximity to key markets and the strategic road and rail network. The area contributes $10Billion in GDP annually to the New Zealand economy and is therefore both regionally and nationally significant and supports the employment of over 100,000 employees, second only in size to Auckland's city centre. Supporting these activities is fundamental to the economic prosperity and wellbeing of Auckland and New Zealand. This is recognised by the Auckland Plan.

Statistics New Zealand and BERL projections indicate strong population and employment growth within, and around the EWC area, as illustrated in Figures 2.2 and 2.3 below.

[4] Heavy vehicle proportion at Neilson Street East of Angle Street, November 2012 surveys.

FIGURE 2.2: PREDICTED EMPLOYMENT GROWTH MAP FROM 2011-2041

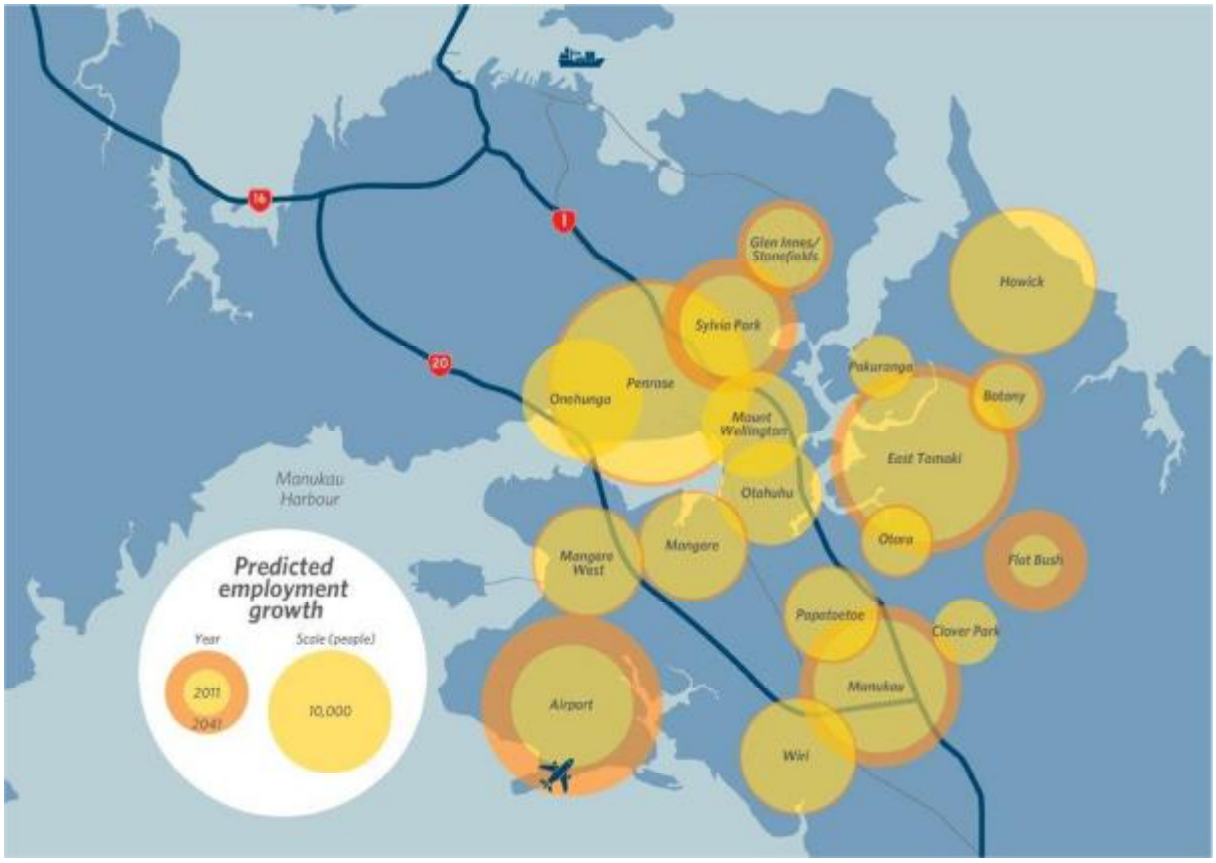
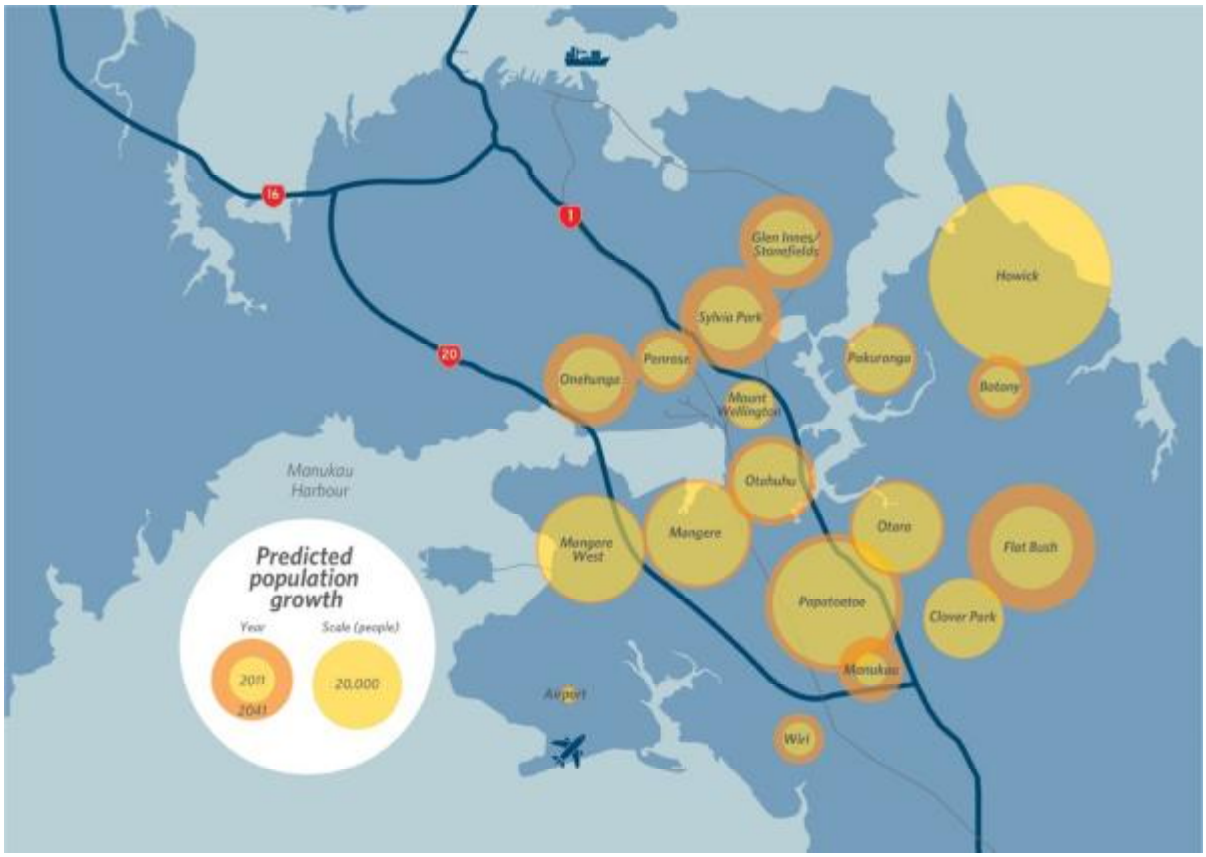


FIGURE 2.3: PREDICTED POPULATION GROWTH MAP FROM 2011-2041



Source: Statistics NZ and BERL

Because the area acts as a regional hub for transport and logistics, regional population and economic growth will lead to an increase in transport activity, as Aucklanders' demand for consumables increases, many of which will pass through this area on their journey from producer to consumer. Therefore, although employment growth in Penrose is low, freight movements can be expected to increase more rapidly – freight volumes are not proportionately linked to employment levels in this area. New logistics centres will use advanced handling systems, have high throughputs and generate high freight volumes with relatively low staffing levels. This underlines the fact that the area's economic activity is highly transport intensive and is closely linked to regional and inter-regional (Upper North Island) growth rather than more localised growth patterns.

A simple analysis of the employment figures may therefore underestimate the level of freight movements.

The area is home to a number of established communities with approximately 102,500 residents. The residential areas and supporting services such as shopping and retail areas, community facilities and schools are discrete from the industrial areas rather than interspersed through these. The communities of the study area experience some of the greatest deprivation in New Zealand. In particular, the areas of Māngere and Ōtāhuhu, where the deprivation index of Census Area Units is 10, reflects that they represent the most deprived 10% of areas in New Zealand. The area is in proximity to major regional facilities such as Middlemore Hospital and Mt Smart Stadium and Auckland International Airport.

2.3. Transport Problems

The Neilson/Church St corridor connects SH20 and SH1 and links with the South Eastern highway (SEART) in the east. The corridor carries high traffic volumes for an arterial road, with average flows of around 22,000 vehicles over 12 hours near Onehunga Mall and Church Street carrying 38,000 vehicles in a similar 12 hour period.

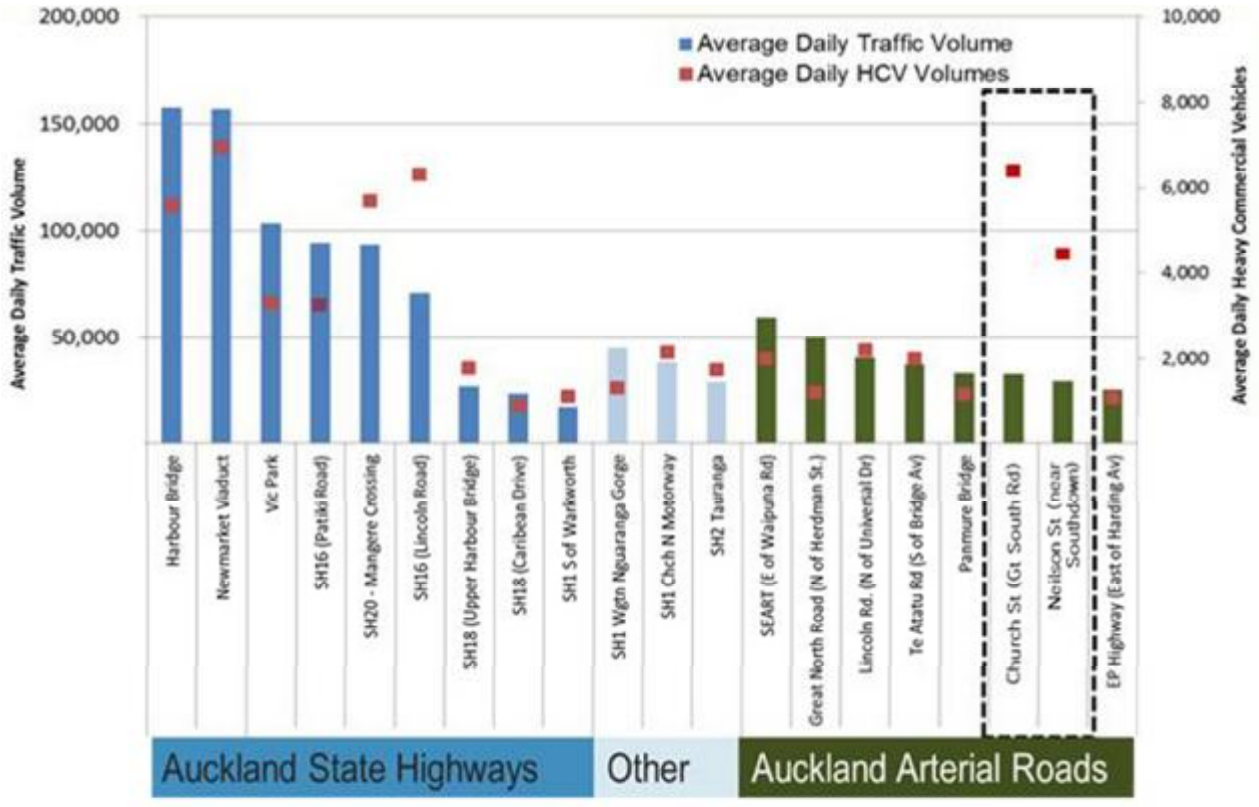
TABLE 2.1: TRAFFIC COUNTS AT SELECTED LOCATIONS NOVEMBER 2012 (12 HOUR (6AM-6PM) COUNTS):

Location	Heavy Vehicles	Total Vehicles	Heavy Vehicle Proportion
Neilson Street East of Victoria Street	4,100	22,900	18%
Neilson Street East of Angle Street	3,700	18,200	20%
Church Street West of Great South Road	6,200	38,500	16%

Source November 2012 Surveys

Traffic flows along the corridor include a very high proportion of heavy commercial. Surveys observed approximately 4,000 heavy vehicles (18-20% of all traffic) at the western (SH20) end and 6,200 (16% of all traffic) at the eastern (SH1) end over a 12 hour period (6am-6pm). The average proportion of heavy vehicles for the Auckland network as a whole is 6%, confirming the importance of freight in the core EWC area.

FIGURE 2.4: HEAVY COMMERCIAL VEHICLE VOLUMES ON NEILSON/CHURCH STREETS IN RELATION TO OTHER ROADS



The corridor primarily serves the local access needs of the industries located within it. However, approximately 20-30% of movements on the corridor are through traffic.

There are significant congestion problems at the eastern and western ends of the corridor. Average vehicle speed can slow down to 7km/hour and travel time variability can be up to 20 minutes. Travel time variability is a problem throughout much of the day for eastbound traffic and in the later part of the day for westbound movements. This problem is compounded for traffic travelling to and from SH1 south due to a convoluted route and a number of traffic signals. In addition, the high traffic flows on Neilson St make turning movements across the corridor difficult and create delays for traffic turning in and out of major access points, including Southdown.

Recent changes in freight strategies are exacerbating transport issues in the Onehunga-Penrose area. These include the increasing use of road and rail interfaces at the inland port; the trend towards increased agglomeration of distribution activities, including utilising larger containers and national warehousing/distribution centres. These trends are, in part, responding to increasing consumer and retail demands for just-in-time delivery and allow for greater productivity of supply chains.

2.3.1. Strategic Case- Problems and Benefits

A facilitated investment logic mapping workshop was held with key stakeholders to develop understanding of current transport issues and needs in the East West programme area. The workshop participants identified three key problems and the relative significance of the problems (represented as a percentage).

TABLE 2.2: EVOLUTION OF UNDERSTANDING OF PROGRAMME PROBLEMS AND BENEFITS THROUGH STRATEGIC CASE

Problems *Strategic Case*	Benefits of Addressing the Problem *Strategic Case*	Measures *Strategic Case*
Problem 1: Inefficient transport connections increase travel times and constrain the productive potential of Auckland and the upper North Island (45%)	Greater business connectivity (20%)	*KPI 1: Increased number and types of businesses* *KPI 2: Increased value of businesses*
	Greater economic throughput in and out of the area (20%)	*KPI 1: Increased rate of growth in freight* *KPI 2: Increased freight throughput 7am-7pm*
Problem 2: A lack of response to changes in the industry's supply chain strategies contributes to greater network congestion, unpredictable travel times and increased costs (30%)	Greater control over congestion (20%)	*KPI 1: Lower peak period congestion* *KPI 2: More efficient asset use*
	More predictable travel times and lower average travel times (15%)	*KPI 1: Lower average travel times between key destinations* *KPI 2: Greater travel time predictability*
Problem 3: The quality of transport choices is inadequate and hinders the development of liveable communities (25%)	Improved safety (10%)	*KPI 1: Fewer deaths/serious injury*
	Improved accessibility (10%)	*KPI 1: Increased mode utilisation*

The Strategic Case identified the case for investment and the need for the investigation to move to further analysis in a PBC.

2.4. Partner Organisations and Key Stakeholders

The EWC project is a joint Transport Agency and AT project, with shared funding and joint governance. A range of partner organisations and key stakeholder groups have been identified.

Partner organisations for the project include:

- Auckland Council and Local Boards
- Mana Whenua
- Kiwirail
- Transpower
- Vector
- Department of Conservation

Key stakeholders include:

- Port of Auckland
- Port of Tauranga
- Auckland Business Forum
- National Road Carriers
- Heritage New Zealand
- Landowners
- Business Groups and Associations (including Onehunga Business Association and Penrose Business Association and other business interests)
- Community Groups and Associations
- Wider Community, including Mataawaka

3. EAST WEST CONNECTIONS PROGRAMME

- The PBC validated the problems identified in the Strategic Case at a programme level and confirmed there is a case for investment
- It identified a preferred 30 year programme of works across the study area, north and south of the Māngere inlet
- The Transport Agency and AT agreed that priority activities in the Onehunga-Penrose industrial area and Māngere, Ōtāhuhu and Sylvia Park town centres should proceed to further analysis and assessment in an Indicative Business Case, and that the potential for investment to be brought forward should also be considered

3.1. East West Connections Programme Business Case

The PBC explored the evidence base of the problems further with the purpose to:

- Confirm the problems and benefits identified in the Strategic Case;
- Deepen the understanding of the causes of the problems;
- Develop and assess a range of investment programmes to tackle the causes of the problems. This would mean the problems themselves were addressed and, in turn, the desired benefits delivered; and
- Recommend a preferred programme and identify next steps to progress the investigation through an IBC.

3.2. Scale of Transport Problems – PBC Evidence

The PBC presents the context and transport movements across the programme area. The IBC provides a summary of this analysis. The PBC provided the opportunity to understand the causes and scale of the problems identified in the Strategic Case. It focuses on measures of the network performance such as journey time and reliability, as indicators of performance problems. Overall, the detailed problem analysis supports and confirms the validity of the three ILM problem statements but provides more analysis of the *causes* of the problems.

Problem statement 1: Inefficient transport connections increase travel times and constrain the productive potential of Auckland and the upper North Island (45%)

There are congestion problems at both the eastern and western ends of the Neilson Church Street corridor now, particularly on the approaches to State Highway 1 and State Highway 20.

This problem is compounded for traffic travelling to and from SH1 south due to a convoluted route and a number of traffic signals. Firms interviewed generally felt that east-west connections through the area are limited and do not provide particularly high quality routes.

GPS surveys carried out during 2012 illustrate significant delays for westbound vehicles passing through the Onehunga Mall intersection. This intersection could add an additional 10 minutes to the journey time for vehicles accessing SH20 over a relative short distance (3.7km). The average speed slows down to 14 km/h in the interpeak. The GPS data also shows the convoluted route between Southdown and SH1 to slow speeds down to 22 km/h over this 4 km length.

To the south of the Māngere Inlet there are also congestion problems and/or convoluted routes for getting between SH1 and SH20. Firms interviewed generally used either Massey Road or Favona Road or the SH1/SH20 connection to get between the airport and East Tamaki and Mount Wellington:

- SH1/SH20 connection: generally perceived to be the more reliable choice. However, traffic surveys identified the SH1/SH20 connection at Manukau as a pinch point in the network which is often congested in the afternoon peak[5]. Around 65% of heavy vehicles travelling between SH20 and SH1 turned north at this junction. In its current configuration this is an inefficient connection for traffic (including the 35% of heavy vehicles) wishing to head from SH20 to SH1 southbound. The interchange experiences congestion (especially during the afternoon peak). Travel times can slow down to 7 km/h.
- Favona Road: the section between Tui Street/James Fletcher intersection and SH20 is contributing the most to unpredictability along this route. Travel times[6] are well below 20 km/h over this 3.6 km section.
- Massey Road: the section between Great South Road and SH20 is contributing the most to the unpredictability along this route. Travel times[7] are also well below 20 km/h over this 5.8 km section.

Transport pressures are likely to increase with continuing economic growth in the area. These pressures will come from businesses (freight), commuters and increasing numbers of air passengers.

Problem statement 2: A lack of response to changes in industry's supply chain strategies contributes to greater network congestion, unpredictable travel times and increased costs (30%)

A general observation within the area is that the way in which goods are moved has evolved and the transport infrastructure has not kept pace with the changes in the industry's supply chain strategies and the changing land uses in the area.

Long-distance rail has become more economically viable and this has resulted in a growing attractiveness of the road rail interchange at the Southdown area. This is a practical example of the changing nature of the logistical supply chain, with some specialisation now emerging around road/rail freight.

The needs of the growing traffic to and from the Southdown area have not been recognised. The heavy flows into Southdown for example have no signalised access to enter or exit into the heavy flows on Neilson Street. The growth in many of these operations has compounded the problem. For example, MetroPort opened in 1999 and by 2012 generated 2000-2500 heavy vehicle trips per day and around

[5] Second GPS Survey – Nov 2012 – p47
[6] Third GPS Survey – April 2013 – P25
[7] Third GPS Survey – April 2013 – P41

200,000 TEU movements per year. Network development has clearly not kept pace with developments like these and this is impacting the entire freight supply chain.

The lack of infrastructure response has not only resulted in slow travel times but also variable travel times. As shown in Figure 3.1, travel time variability is particularly high in the evening peak in both directions. Westbound movements are also affected by the congestion on the approaches to Onehunga Mall from the west which often starts in the early afternoon and continues well into the evening peak period. This variability makes logistics planning very difficult for freight operators and hinders the efficient use of transport resources.

FIGURE 3.1: TRAVEL TIME VARIABILITY ON NEILSON STREET

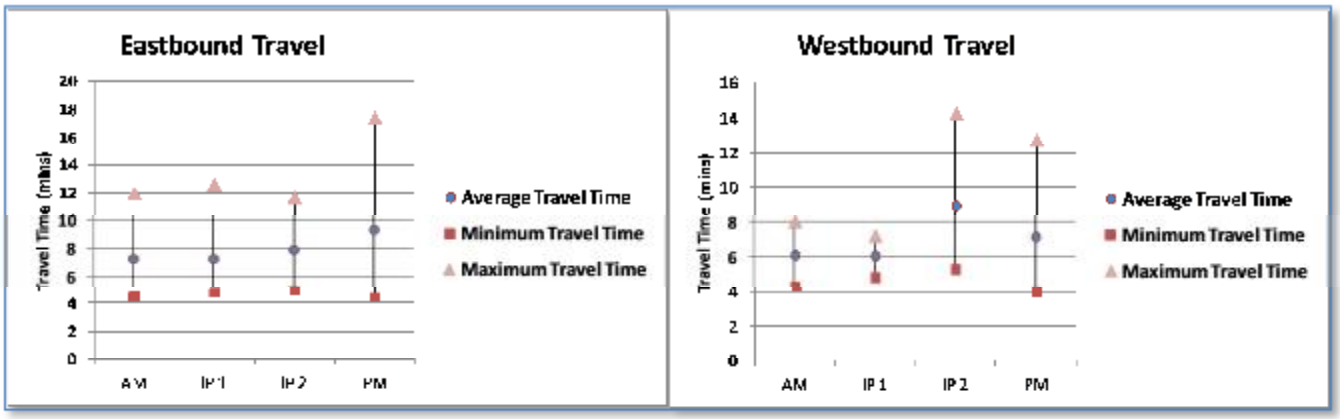
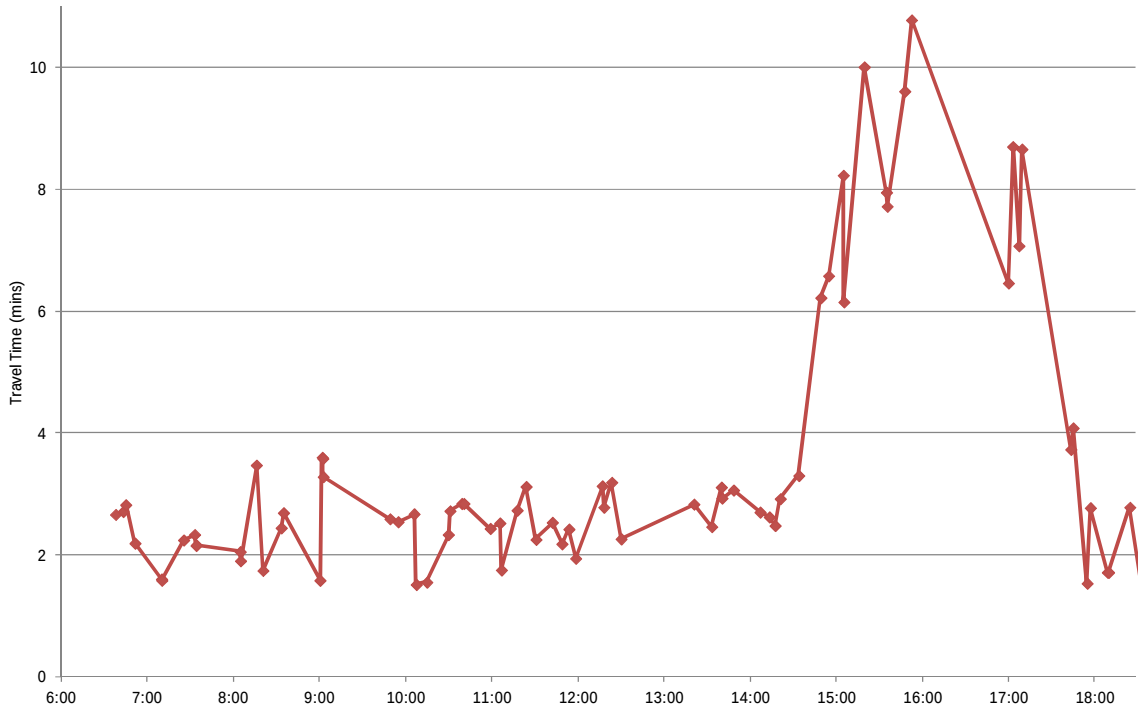


Figure 3.2 captures the variability of travel times across the day, Westbound at Onehunga Mall.

FIGURE 3.2: TRAVEL TIMES ACROSS THE DAY AT ONEHUNGA MALL WESTBOUND



For the southern area, the growth of the wholesale, storage and transport sectors is clearly reshaping the economic and spatial structure.

The growth of these sectors is not evenly distributed across the southern area, with East Tamaki and the Airport having increased the scale of distribution and logistics activities in their local areas, which also serve the rest of Auckland. The volume of freight travelling through this area is expected to increase over time due to the business growth on either end at the Airport Business District and in East Tamaki. This is in line with the projections from the Upper North Island Freight Story (2010) which predicts freight movements in the upper North Island to double, from 126 million tonnes in 2006 to 252 million tonnes by 2035.

Travel time variability is also a problem on all East-West routes south of the Māngere Inlet:

- SH1/SH20 connection: Travel time variability of 20 minutes within the same peak was recorded for journeys using the SH1/SH20 connection.
- Favona Rd: Approximately 4,000 HCV's per day use the local road network through Favona and Manukau with 2,100 of these movements being on Favona Rd[8], travel time variances within the inter-peak are up to 20 minutes for routes through this corridor.
- Massey Rd: Approximately 1,900 use the Massey Road corridor, and travel time variances of 20 minutes are observed within the inter-peak.

Problem statement 3: The quality of transport choices is inadequate and hinders the development of liveable communities (25%)

The nature of the workplaces in the EWC area, the sparse public transport offering and the lack of availability of personal, health and education services in proximity to employment is such that a very high proportion of workers (78%) drive private cars or company cars, vans or trucks to work. This compares with the Auckland average of 63% to 65%.

Although considerable focus is placed on freight movements in the area, commuting traffic impacts on the capacity of the transport corridors into and out of the area. This is exasperated by the geographical centrality of the study area insofar as all movements between South Auckland and the isthmus must go through the study area using one of four corridors. Overall, because of the high volumes of commuter traffic, providing good public transport links along the routes connecting these areas may help to increase the effective capacity of these routes and would provide better access to the employment opportunities available.

Firms interviewed in the EWC area generally felt public transport was unreliable, expensive, time-consuming and inflexible. As a consequence of this perception, employers indicated that the majority of their employees drive to work.

Another factor that contributes to the high use of private cars is the nature of employment. Shift work, including 24-hour business operations, often means one leg of most trips occurs either late at night or early morning, particularly in sectors such as transport and logistics, storage, hospitality and manufacturing. This makes it difficult for employees as public transport as often not available in these

[8] Sources: NZTA Annual Traffic Counts, AT ATC data, Counts undertaken as part of the ANPR surveys

hours and there are safety concerns for active modes. It was felt by respondents that public transport would need to be cheap, easily available and convenient for people in the study area to use if it was to become a viable alternative to the private car.

AT has consulted on, and will implement a 'New Network' for this area to address some of these issues. The network will provide more frequent services between the main town centres (at least 15 mins 7AM – 7PM). However, some of the routes run along corridors already experiencing congestion issues (e.g. Massey Road) and this will hinder the ability to provide reliable services on these corridors.

3.2.1. Benefits of Investment

The Benefits and KPIs identified at the Strategic Case phase were high level and not specifically attributable to EWC responses. As more evidence was developed around the programme level transport problems, a deeper understanding of what benefits could be delivered emerged. The PBC confirmed the benefits of investment identified in the Strategic Case, namely:

- Greater business connectivity;
- Greater economic throughput in and out of the area;
- Greater control over congestion;
- More predictable travel times and lower average travel times;
- Improved safety; and
- Improved accessibility.

Targeted measures were identified that would be SMART (specific, measurable, attributable, realistic, and time-based) in principle and allow for a more qualitative assessment to be made as to the relative performance of the various programmes and their respective abilities to respond to the problems and deliver the desired outcomes.

Table 3.1 below summarises the progression of the understanding of the problems, the benefits that could be achieved through investment and the measures that will be used to assess the performance of options.

TABLE 3.1: EVOLUTION OF UNDERSTANDING OF PROGRAMME PROBLEMS AND BENEFITS THROUGH PBC

Problems *Strategic Case*	Causes of problem *PBC analysis*	Benefits of Addressing the Problem *PBC*	Measures *PBC*
Problem 1: Inefficient transport connections increase travel times and constrain the productive potential of Auckland and the upper North Island (45%)	• Neilson/Church Street – serves local access needs, as well as 20-30% through traffic • Neilson/Church Street – insufficient capacity to meet demand at eastern and western ends, particularly SH1 and SH20, causes congestion • Neilson/Church Street – convoluted route from multiple traffic signals for traffic connecting to/from SH1 • Neilson Street – high volumes make turning movements difficult; creates delays for traffic flows in/out of major access points e.g. Southdown • South of Manukau inlet – congestion problems and/or convoluted routes between SH1 and SH20. SH1/SH20 connection at Manukau is a pinch point	Greater business connectivity (20%)	Target 1a: Increase in freight volumes entering SH20 from Onehunga/Penrose Target 1b: Increase in freight volumes entering SH1 from Onehunga/Penrose Target 2a: Average vehicle delay in the interpeak (IP2) from Southdown to SH20 northbound at Queenstown Road Target 2b: Average vehicle delay in the interpeak (IP2) from Southdown to SH1 southbound at Highbrook Drive Target 3: Improve travel time reliability between SH20 Queenstown Rd and SH1 Highbrook Drive
		Greater economic throughput in and out of the area (20%)	
Problem 2: A lack of response to changes in the industry's supply chain strategies contributes to greater network congestion, unpredictable travel times and increased costs (30%)	• Growth in operations has compounded the problem e.g. heavy vehicle trips per day and TEU movements • Lack of appropriate rail freight capacity increases costs of freight movements	Greater control over congestion (20%)	
		More predictable travel times and lower average travel times (15%)	Target 4a: Improve travel time for buses between Royal Oak and Sylvia Park Target 4b:Improve travel time for buses between Māngere Town Centre and Sylvia Park
Problem 3: The quality of transport choices is inadequate and hinders the development of liveable communities (25%)	• Sparse public transport offering • Very high proportion of workers use private or company vehicles for commuting • PT felt to be unreliable, expensive, time-consuming and inflexible • Shift work, including 24 hour business operations, make it difficult for employees to use PT and active modes.	Improved safety (10%)	
		Improved accessibility (10%)	

3.3. East West Connections Programme Investment (PBC)

3.3.1. Alternatives

The alternatives examined in the PBC ranged from optimising existing infrastructure through to high investment options such as expanding the strategic road network. Three alternative approaches were considered in addition to the do minimum scenario. These were:

- Shift the demand to Public Transport (Programme B and C1 and C2)
- Improve connections to the Strategic Network (D1 and D2 and D3)
- Expand the strategic Network (E1 and E2)

Optimising existing investment is the expected starting point for all Programme Business Cases. In line with this, the EWC PBC confirmed that optimising use of the existing transport network and managing demand in the area more efficiently would be necessary. However, it concluded that this would be insufficient to address the problems and achieve the desired outcomes. As set out in Section 3.2, the problems in the study area are of such a magnitude that a higher level of direct intervention will be required.

The alternative options considered in the PBC included optimised use of existing corridors, reconfiguration of existing roads, closure of some links and creation of new roads. In terms of optimising existing roads, alternatives included:

- Upgraded intersections, use of motorway shoulder running or reallocated priorities, such as freight-only lanes;
- Alternatives involving reconfigured corridors included provision of road links within existing rail corridors, use of existing local roads for more strategic/arterial functions (e.g. use of Galway and Angle Streets, or the use of Church Street as a strategic arterial); and
- Alternatives involving closing existing links included options that closed Queenstown Road motorway ramps, as an alternative to providing extra lanes on SH20.

Intelligent transport system (ITS) technologies will be included to assist managing the priorities and traveller information systems (e.g. ramp signals, variable speed limits, bus pre-emption, improved traveller information). However, as these could be added to most options they were not seen as a significant differentiator for options at this stage of investigation. There were some exceptions to this, such as consideration of components using tidal-flow (moveable barrier) lanes or managed shoulder-running on SH20. Further consideration will be given to operations and management options at the DBC stage, particularly to optimise the preferred option.

Policy initiatives (such as significantly improved regional public transport and enhanced travel demand management (TDM)) were included at a regional level in the Do Minimum scenario (that is, the benefits of those region-wide policies were already included in the Do Minimum, and hence also in all options). The assumptions on TDM are those developed through the Auckland Plan modelling process and agreed for use in forecasting on all large projects in Auckland. Those assumptions relate to estimated effects of initiatives such as company and education travel plans, enhanced working from home and higher public transport and active mode share in purpose-design mixed-use areas. Based on

information provided by Auckland Council those TDM assumptions are expected to remove approximately 9% of private vehicle trips in the year 2041.

A number of alternatives were considered and discarded at the PBC stage:

- Regulations requiring trucks to move outside of peak travel periods – there are much wider implications than the movement of vehicle fleets, restrictive driving hours, resource consent conditions on commercial operations in residential areas, and end receiver operating hours. This is seen to be difficult to monitor and is unlikely to provide a sustainable solution in the face of growing freight transport needs in the area;
- Shifting more freight by rail - the study area is home to the most important road-rail interchange in Auckland. Rail freight is dependent on road transport for collection and delivery. Increasing reliance on rail freight is one of the factors leading to the increase in freight vehicle movements throughout the study area; and
- Move the inland port –given the status of the Auckland Plan as a regionally adopted strategic vision for Auckland's growth and the confirmation within the Auckland Plan of the continued role of the inland port in achieving the Auckland Plan's goals, the relocation of the inland port has not been taken further.

3.3.2. PBC Recommended Package

The PBC project team developed a series of programmes that were targeted at responding to the identified problems. The project team then assessed each programme against the problem and benefit statements from the ILM. The assessment indicated that the programme options that expand the strategic road network have the ability to deliver a higher proportion of the benefits sought through the ILM than those that only seek to improve connectivity to the area. As such, the PBC recommended a long term strategic response that focused on strengthening access from both SH1 and SH20 to the Onehunga-Penrose industrial area, providing additional network capacity to divert through movements away from Neilson St, while also improving the connectivity between key regional activity generators, such as Auckland Airport, Middlemore Hospital, and East Tamaki Business Park.

On 28 June 2013, midway through the development of the PBC, the Prime Minister delivered his Backing Auckland speech to the Auckland Chamber of Commerce. In this speech, the PM signalled the government's desire to accelerate a package of transport infrastructure improvements for Auckland which would be focused on providing congestion relief, supporting economic growth and improving safety outcomes. In response, the PBC focused its attention on those items that would enable earlier delivery of benefits to existing transport conditions in the Onehunga-Penrose area. The recommended strategy that was ultimately supported by the Transport Agency board included the following projects which are now being progressed as part of the current IBC:

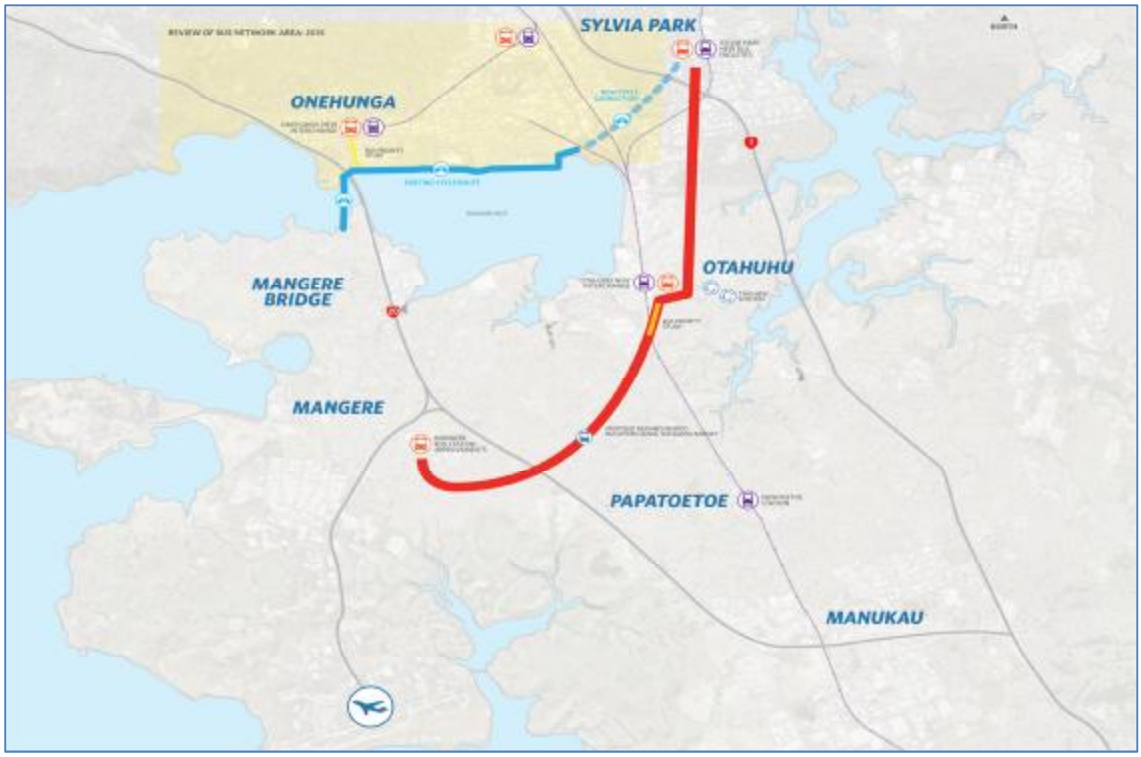
1. Onehunga-Penrose Connections: Improving the connections in and out of Onehunga-Penrose[9], including the cycling and pedestrian network (Figure 3.3)

[9] The PBC also recognised that freight to the Onehunga-Penrose area is also transported by the North Island Main Trunk rail line which is controlled by KiwiRail. The PBC noted that a total freight solution should also consider upgrades to this track. Timing and funding of these upgrades is beyond the scope of the IBC and advancement of the analysis of upgrade options would need to involve KiwiRail.

1. Māngere, Ōtāhuhu, Sylvia Park PT Connections: Improving public transport connections between Māngere Town Centre and Sylvia Park (via Ōtāhuhu) including improving accessibility for cyclists and pedestrians (Figure 3.4)

FIGURE 3.3: IMPROVED FREIGHT CONNECTIONS IN AND OUT OF ONEHUNGA-PENROSE INDUSTRIAL AREA

FIGURE 3.4: IMPROVED PUBLIC TRANSPORT INFRASTRUCTURE BETWEEN MĀNGERE TOWN CENTRE AND SYLVIA PARK



The projects consist of the programme elements shown in Table 3.2.

TABLE 3.2: PBC PROGRAMME ELEMENTS

Programme element	Onehunga-Penrose Connections	Māngere, Ōtāhuhu, Sylvia Park PT Connections
SH20 Improvements Gloucester Park Interchange to Queenstown Rd	√	
Onehunga Mall intersection improvement	√	
SH1 Mt Wellington interchange access improvements	√	
Southdown Link to SH1	√	
Neilson St upgrade	√	
New local roads south of Neilson Street	√	
Māngere Town Centre to Sylvia Park Frequent Network upgrade		√

The Transport Agency further recognised that the remaining elements of the recommended programme, intended to address longer-term deficiencies in the transport network hierarchy in the area and the need for further east-west connectivity to address growing conflicts between through and local traffic, are strategic nature and require further evidence and assessment before any investment decisions can be made. This includes further investigation to determine the nature and scale of anticipated residual transport problems following implementation of the project options being progressed through this current IBC.

3.4. Partner Organisation and Stakeholder Agreement

The Transport Agency Board supported the PBC in part and endorsed the strategy of focusing immediate attention on improving access to the state highways to and from the Onehunga-Penrose area and improving public transport between Māngere, Ōtāhuhu and Sylvia Park.

The Board of Auckland Transport also approved this strategy and endorsed the approach to progress a DBC for the activities with this strategy.

Auckland Council

Auckland Council considered the EWC programme in a meeting of the Infrastructure Committee on 4 December 2013. The Committee supported continued investigation of EWC options and supported the programme being developed in the context of AMETI and other related projects including rail. The Committee also noted:

- The need for AT and the Transport Agency to consider the wider outcomes sought in the Auckland Plan (rather than just transport outcomes) in the evaluation of options;
- Its expectation that AT and the Transport Agency would engage thoroughly with the general public prior to a decision on a preferred option and to consult with local communities and stakeholders to find feasible options to alleviate congestion that does not involve a new motorway; and
- Its expectation that the level of investment is commensurate with the scale of the problem and the net benefits.

The Mayor's Proposed Long-Term Plan 2015-25 (LTP) identified transport as the single biggest challenge facing Auckland. Improved public transport between Māngere, Ōtāhuhu and Sylvia Park, as is proposed within the East West Connections project, was identified as an example of a capital project that will unlock the potential for business and community development in the Council's priority areas.

KiwiRail

Engagement with KiwiRail has also indicated their general support for the accelerated projects. They have confirmed that the connections will complement their plans to increase productivity and capacity of the Southdown facility.

Auckland Business Forum

The Auckland Business Forum strongly endorses the focus of the project on improved connections for freight in Auckland's industrial hub of Onehunga, Penrose and Southdown to support planned investment by freight companies in the area. They seek a solution that provides an efficient and safe new road between SH1 and SH20 that eliminates traffic lights and intersections for trucks, avoids community severance and has a minimal impact on the industrial zoned land in the area.

4. EAST WEST CONNECTIONS ACTIVITIES

- The IBC focuses on the priority activities identified in the PBC for further investigation (Onehunga-Penrose industrial area and Māngere, Ōtāhuhu and Sylvia Park Public Transport Connections)
- Chapter 4 sets out the characteristics of the area that influence transport activity and provide the context in which options will need to function. The environmental and social context informed the development of the MCA measures.
- It investigates the evidence of problems at the activity level and the benefits that will be achieved if the problems are addressed and the measures to assess them. This analysis drew on the previous work carried out at in the PBC and further refined the understanding of the problems.
- It confirms that the scale of the problems is sufficient to develop options to address them (see Chapter 7)

4.1. Overview

The purpose of the IBC is to:

- Investigate the evidence of problems at the activity level and the benefits that will be achieved if the problems are addressed and the measures to assess them.
- Identify and assess a range of options to address the problems identified in the two identified project areas (see Chapters 6-8)
- Identify a recommended option/s
- Identify an indicative preferred delivery model (see Chapter 10)
- Preliminary financial analysis of the recommended option/s to assess affordability and funding options (see Chapters 11)

4.2. Changes to Strategic Context Since the Strategic Case and PBC Were Undertaken

Since the completion of the Strategic Case and PBC in March 2014, three key initiatives have occurred which could influence strategic land use and infrastructure decisions in the EWC area and potentially impact on the robustness of the scenarios identified in the PBC.

- Auckland Housing Accord
- Proposed Auckland Unitary Plan and
- Proposed Long Term Plan

These were assessed to determine if they alter any of the assumptions which underpinned the PBC and consequently should alter the content or direction of the IBC. This assessment concluded that neither provides any conflicting or contradictory information to that presented in the PBC. These plans

continue to support and reinforce the assumptions and assessment of the PBC and these can therefore carry forward to the IBC analysis. Further detail on these initiatives is set out below.

Housing Accord

The Auckland Housing Accord aims to accelerate delivery of housing across Auckland from when the Auckland Unitary Plan was notified on 30 September 2013 to when it becomes operative in about 2016. It is expected that around 39,000 new homes and sections will be consented throughout Auckland during this three year period.

A number of Special Housing Accord (SHA) areas were identified within, or close to, the study area for residential intensification, supporting an increase in population for the locality. These SHAs reinforce the intention to implement the growth management vision of the Auckland Plan and the intentions of the proposed Auckland Unitary Plan. As such, this supports the land use and transport assumptions identified in the PBC. However, the accelerated delivery may result in increased local traffic volumes sooner than anticipated, and subsequently impact on required timing for delivery.

FIGURE 4.1: SPECIAL HOUSING AREAS IN THE EWC PROGRAMME AREA

Proposed Auckland Unitary Plan (PAUP)

The PAUP was published during 2013 with a submission period running from 30 September 2013 to 28 February 2014. The Auckland Unitary Plan is a statutory plan under the *Resource Management Act* which seeks to deliver on the vision of the Auckland Plan. The PAUP sets out land use patterns and

policies to guide the City's development and growth whilst maintaining and enhancing key natural and physical resources to ensure that Auckland is a livable city. Matters considered in the PAUP include:

- What can be built and where;
- How to create a higher quality and more compact Auckland;
- How to provide for rural activities; and
- How to maintain the marine environment.

The PAUP has been notified for submissions and these are currently undergoing hearings. Details of the Unitary Plan may change as a result of these hearings. However, the strategic direction of the Unitary Plan is unlikely to change significantly as it is based upon the adopted Auckland Plan. The provisions of the PAUP do not conflict with the assumptions and assessment undertaken as part of the PBC.

Draft Long Term Plan

The Mayor of Auckland proposed a Long Term Plan (LTP) in August 2014. Auckland Council is due to consider its adoption as a Draft Plan in December 2014. The LTP sets out the budget for Auckland for 2015-2025 and it will be reviewed within three years.

The previous LTP 2012-2022 was largely based on inherited budgets and projects from the former eight councils. This next LTP is Auckland's first opportunity to develop a programme of work based on the priorities of the Auckland Plan.

The final long-term plan will include:

- council's proposed levels of service and activities and their costs
- financial information, policies and fees
- local board information and agreements
- infrastructure strategy.

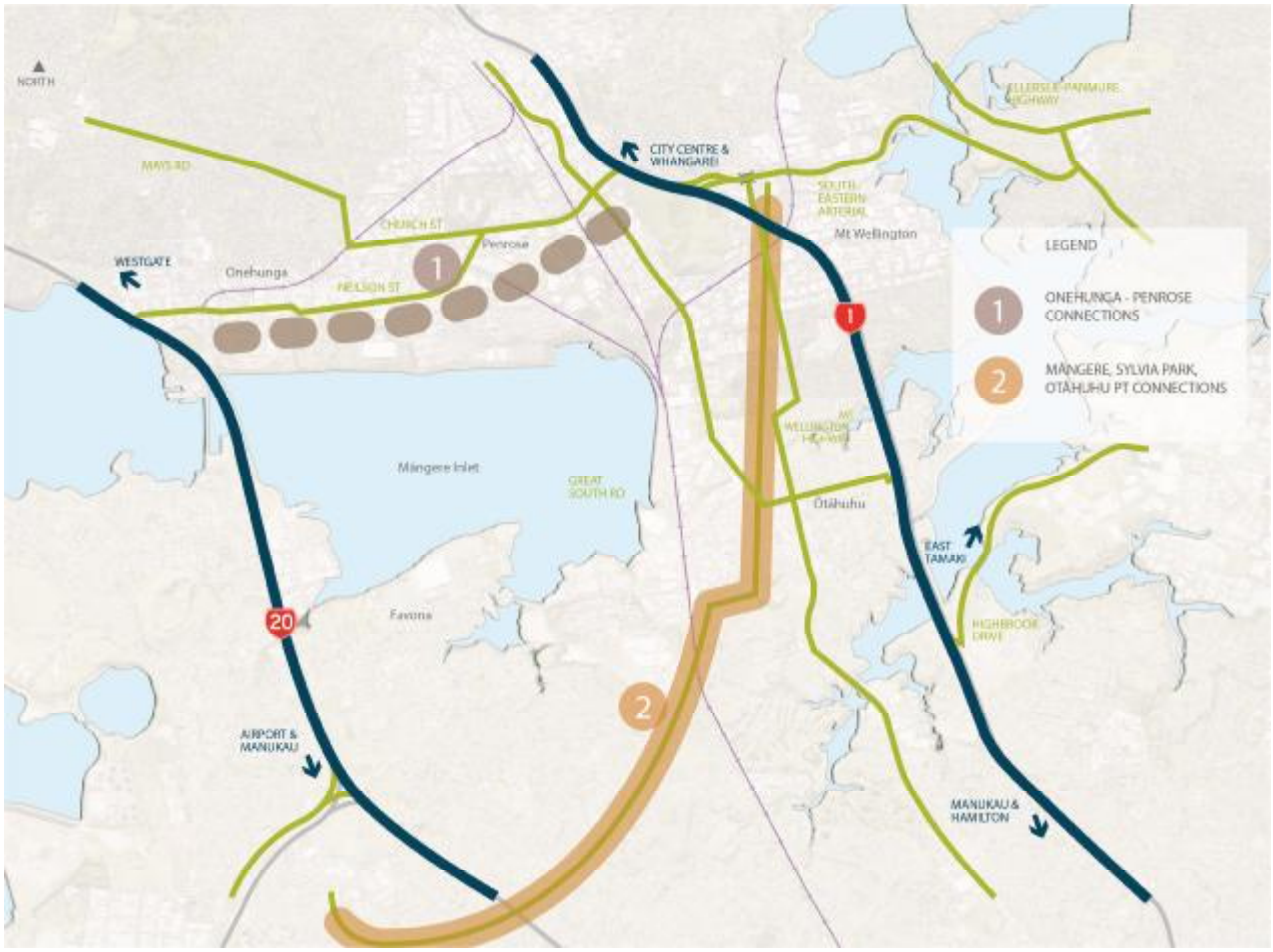
Given the implications of the LTP on public transport funding, and subsequently service levels, the contents of the plan could potentially influence the level of public transport provisions considered within the EWC programme. As it presently stands, the draft LTP does not conflict with the assumptions and assessment undertaken as part of the PBC.

4.3. EWC Activity Context

For the purposes of the IBC, the programme elements identified in the PBC were grouped into two projects:

1. Onehunga-Penrose Connections
2. Māngere, Ōtāhuhu, Sylvia Park PT Connections.

FIGURE 4.2: MAP OF ACTIVITY CONTEXT



Understanding the wider context of the activity area is essential to understand the drivers and constraints of the transport activity within the area and to inform the development of options to address problems and deliver benefits. The issues summarised below and described in more detail in Appendix B helped deepen the understanding of the problems and benefits within the activity area, the development of options, and also informed the development of measures for the MCA.

4.3.1. Transport context

For the IBC, more focused network analysis has been undertaken which confirms the transport patterns and issues identified in the PBC. These are explained in Section 4.4.

4.3.2. Economic context

The IBC project area is Auckland's main manufacturing location, containing almost 40 per cent of Auckland's manufacturing employment. Supporting these activities is important to the economic prosperity of the region.

A survey of firms carried out to inform the PBC highlighted a number of advantages of this area to firms including:

- A recognised industrial hub with well-established industrial land use activity developed over the last forty to fifty years;

- Close proximity and access to strategic road and rail transport corridors and networks;
- Close proximity and access to ports – Ports of Auckland Ltd, Southdown and Auckland International Airport Ltd;
- Agglomeration and co-location of similar or complementary industries in the one area creates market opportunities and further supports functioning of the industrial hub;
- Central location in relation to the main industrial areas of Auckland; and
- Proximity to customers, suppliers and employees.

These advantages continue and were reinforced through feedback received during stakeholder engagement.

Transport Agency work on the Upper North Island Freight Story has highlighted the importance of the East West Connections study area in the Upper North Island context. Delays experienced getting in and out of the Onehunga-Penrose area are felt widely across the Upper North Island supply chain, through such impacts as missed trips due to driver stand down times. As a result, and given the growing importance of intermodal interchanges (such as Southdown) in the interregional movement of freight, the connections in and out of Onehunga-Penrose has been identified by the Upper North Island Strategic Alliance as critical infrastructure in need of investment.

The number and nature of businesses within the Onehunga-Penrose area has grown and freight demands from growth in the wider NZ economy have increased over time. Combined with the presence of a road-rail interface, this has enhanced the comparative advantage of the Onehunga – Penrose area as a major freight and logistics hub, leading to growing specialisation. This has encouraged significant private sector investment in freight and logistics facilities within the area and has supported the increasing concentration of these activities. This investment continues with Toll Holdings, Ports of Tauranga, Ports of Auckland and other firms indicating major investment plans for the area around Southdown. This is leading to an increase in commercial transport activity within the study area and underlines the fact that the area's highly transport intensive economy is being driven by regional rather than local growth patterns.

Research carried out for the IBC investigated the economic opportunities for Māori in the EWC area and identified an employment focus in the industries of *Manufacturing*, *Construction* and *Transport, Postal & Storage* for Māori in the area.

4.3.3. Environmental context

The IBC study area is located on the narrowest part of the Auckland Isthmus, in an area with a long history of development and land use both from pre-European times and by early European settlers on both sides of the Māngere Inlet. This history of development means there is a complex array of social, cultural and environmental issues that need to be considered as part of the selection and assessment of any transport solution. The Transport Agency's Environmental and Social Responsibility Screen has been used to inform the collection and collation of background information to support the assessment of options. This process is complemented by an extensive Mana Whenua, key stakeholder and wider public engagement process which has come together with the technical assessments to identify key social, cultural and environmental issues that impact on each of the options in different ways. This process represents a risk based approach to assessing and identifying issues that might represent

risks and barriers for options, and a more detailed social and environmental assessment will be carried out in future (e.g. for preparation of consenting documents) for the chosen option. Some of the key features that have impacted on option assessments are identified in Figure 4.3 below. Further detail on these points can be found in Appendix D.

- Manukau Harbour: One of the largest inlets on the west coast of New Zealand (after the Kaipara Harbour). While a highly modified coastal environment, the Māngere Inlet arm of the Harbour retains some elements of natural form and character within its inner reaches.
- Volcanic Heritage: Volcanic features include the Hopua Tuff Ring-Gloucester Park (which is a modified explosion crater that has been filled over time, having once been open to the sea), Māngere Mountain, Mount Richmond (Ōtāhuhu) and Mount Smart (Rarotonga). This volcanic heritage is a significant natural feature of Auckland. Lava caves are known to exist in the wider area – including within close proximity to Maungakiekie – One Tree Hill. Discoveries of new caves were made during construction of the AMETI project in recent years.
- Mutukaroa -Hamlins Hill: A naturally formed, non-volcanic hill. It is a regional park identified by Auckland Council as a key recreation / open space asset. The area is also of cultural significance (see Section 4.2.5) and has extensive archaeological evidence of early occupation.
- Anns Creek: While highly modified by rail infrastructure and historic land uses, this area is identified as having significant ecological value for its salt marsh communities and numerous plant and animal species around the volcanic coastal fringe. Volcanic lava flow remnants are noted in the planning framework as an outstanding feature.
- Onehunga Lagoon: This land-locked lagoon (Onehunga Bay Reserve) created by the construction of the SH20 causeway is used as a public reserve and stormwater management area. It contains play areas, walking tracks and informal recreation opportunities.
- Onehunga Aquifer: Charged from rainfall soaking through the lava flows of the area and is a drinking water source for the City. There are also a number of industrial users with permits to take water for use.

FIGURE 4.3: ENVIRONMENTAL AND BUILT FORM FEATURES WITHIN THE PROJECT AREA

4.3.4. Built form and heritage context

The area north of the Manukau Harbour has the following built form and heritage features and values:

- Onehunga Town Centre: The town centre includes a number of heritage buildings and features including churches, public buildings, war memorial features and a treatment plant for the Onehunga Aquifer water supply (Watercare).
- Port of Onehunga: A historic port dating back to the 19th century, with current uses including providing a port terminal for cement shipments and the fishing industry.
- Aotea Sea Scouts: located to the west of the Onehunga Port, in an historic timber building extending out over the coastal marine area that has recently celebrated its 100th birthday.
- Old Māngere Bridge: Constructed in 1914, the bridge used to provide vehicle access across the harbour. It was replaced by a new bridge in the early 1980's and now provides pedestrian connection between Māngere Bridge and Onehunga town centre and a recreational facility popular for fishing.
- Penrose: An industrial suburb that is typified by large lots, large buildings and wide arterial streets.
- State Highways: State Highway 20 was built in the 1970's and is continuing to be developed as the Western Ring Route is constructed. State Highway 1 is the key north-south route through Auckland and extends the length of the country.
- Rail: The main trunk line runs parallel to SH1. The recently re-opened Onehunga passenger line has involved construction of new station infrastructure including station buildings and access ramps, which provide good pedestrian linkages into Onehunga Mall. The Anns Creek area is where lines intersect, with the Southdown freight line, main trunk line and eastern passenger line (from Glen Innes-Panmure-Sylvia Park) meeting in this area.
- Waikaraka Park and Cemetery: Waikaraka Park is a stock and saloon car racetrack located on Neilson Street, historic stone walls and stone gates are part of the complex. To the rear (south) of the stock car track is the Waikaraka Cemetery which has graves dating back to the early 1900's.
- Transpower Lines: The narrow isthmus of this area has resulted in a confluence of infrastructure. The area includes both 220kV and 110kV overhead lines. The Co-Generation Plant on Hugo Johnston Drive connects to this transmission network. The Māngere – Roskill Transmission Line also provides 110kV lines through the southern part of the study area.
- Māngere Town Centre: Māngere is one of the largest suburbs in Auckland, comprising the Māngere Bridge, Māngere Central, Māngere East and Favona areas. The historic Metro Theatre on Massey Road (Māngere East) is one heritage building within the project area.
- Sylvia Park: The area has developed as a key business and retail hub, serving the wider eastern and southern suburbs of Auckland. The Auckland Plan identifies this area as a future Metropolitan Centre (alongside Newmarket, Albany and Manukau).
- Ōtāhuhu: Middlemore Hospital is located in Ōtāhuhu and is a significant medical facility for the whole Auckland region.
- Auckland International Airport: The airport precinct is a major development area to the south west of the study area. The study area serves as a through route to and from the airport. The airport is becoming highly diversified with major industrial and commercial development occurring rapidly as it is a highly accessible greenfield location.

4.3.5. Cultural context

When European visitors arrived in the Auckland Isthmus late in the 18th and early in the 19th century there were a large number of Māori settlements around the Manukau Harbour and on the inner reaches of the harbour and Tamaki River. Much like the later European settlements, these settlements would have made use of the rich volcanic soils, the opportunities for defensive positions on the cones and the rich marine resources of the harbour and waterways. Key cultural features, issues and values include:

- Onehunga Area and Onehunga Bay coastal edge: Archaeological sites are dispersed from the shoreline and up onto the volcanic cones which surround Onehunga. There is substantial archaeological evidence of Māori occupation of the area including extensive midden along the coastal edges.
- Mutukaroa-Hamlins Hill: This settlement is a unique example of an undefended habitation area dated between 1400 and 1700. This area is identified as part of the cultural redress being sought by Ngai Tai Ki Tamaki (Waitangi Tribunal Claim). The site has a rich archaeological record and is covered with archaeological sites and evidence of habitation.
- Volcanic Field: The Maunga of Auckland form the base of the Ngā Mana Whenua o Tāmaki Makaurau Collective (representing the historical Treaty claims in Tāmaki Makaurau of 13 iwi and hapu). The result of the Collective is the legislative recognition of shared interest in the maunga of Auckland reflected in shared management.
- Portages: There are three portages for moving waka between Tamaki River and the Māngere Inlet (Anns Creek) located in the vicinity of Onehunga and Māngere. These are:
    - The Karetu Portage - linking Anns Creek with Karetu, south of Panmure Basin.
    - The Ōtāhuhu portage was the most important in the Tamaki makaurau area because of its central position, and easy gradient. Today it is symbolized by Portage Road which is roughly where it was located.
    - The Pukaki Portage existed to the south of Ōtāhuhu, from the location of the Middlemore-Grange Golf Course, along Portage Road, Papatoetoe, to the eastern arm of Waokauri Creek.

4.3.6. Social context

The IBC study area is home to a number of established residential communities. To the north of Māngere Inlet these include Onehunga, Oranga, Royal Oak, and Penrose (west of SH1) and Mt Wellington, Sylvia Park and Riverside (east of SH1). To the south of Māngere Inlet, residential communities include Māngere and Māngere Bridge (west of SH20), and Ōtāhuhu, Māngere East and Favona (east of SH20) as well as significant business and industrial land uses. Notable characteristics of the study area, particularly the area that would that would be serviced by the Māngere, Ōtāhuhu and Sylvia Park PT Connections include:

- Demographics: The area comprises a relatively youthful population[10] (particularly to the south of Māngere Inlet), a relatively high level of ethnic diversity relative to Auckland as a whole, a relatively low level of prosperity including lower incomes, lower car ownership and higher rates of occupants

[10] 43% of EWC programme area residents are under the age of 25, compared to 37% for Auckland Region residents. age (2006 Census data, Statistics New Zealand).

per household (again, to the south of Māngere Inlet). Māori are disproportionately represented in the EWC area, compared to the Auckland average[11],

- Employment and training: Relative to Auckland averages, EWC programme area residents are disproportionately unqualified[12]. Despite the proximity to large industrial areas around the fringe of the Māngere Inlet extending eastwards through Penrose and Mt Wellington to East Tamaki, and therefore large employment hubs, there is a relatively low labour force participation rate and high rate of unemployment within the EWC programme area[13]. The three largest industries by employee numbers are Manufacturing (21%), Wholesale Trade (15%) and Transport, Postal & Warehousing (16%)[14].
- Community facilities: The significant parks of Rarotonga (Mt Smart), Mutukaroa and Ambury Park, along with the cones of Ōtāhuhu and Māngere Mountain are located within the study area. There are two golf courses adjacent to Middlemore Hospital. The area is served by a number of local primary schools and major public colleges/secondary schools. Middlemore Hospital is a major healthcare precinct on the eastern fringe of the study area and is a training hospital as part of the Auckland University Medical School.

4.4. EWC Transport Problems and Benefits – Activity Level

The following sections set out the causes and scale of problems identified for the two activity areas, and the benefits that will be achieved if those problems are addressed. This analysis builds on the Strategic Case and PBC analysis by refining it on an activity level, based on a further understanding of corridor issues, constraints and opportunities. The focus of analysis is on the core benefits that have been agreed; however the investor may choose to invest to deliver additional benefits.

4.4.1. Causes and Scale of Problems Identified: Onehunga-Penrose Connections

A series of Network Operation Performance workshops were undertaken with specialist stakeholder inputs. These workshops were used to better understand the causes of the current network operational problems within the activity area, using the PBC problem causes as the starting point for analysis.

The key findings from these workshops further validated the causes of the problem identified in the PBC and also provided a greater focus to the causes of the problems that needed to be addressed in the activity area. The findings also directly informed the benefits that could be achieved and the measures that were used in the Multi-Criteria Analysis (MCA) evaluation.

Figure 4.4 summarises the current transport challenges facing freight traffic and the future trends expected in key corridors in the study area. Description of the problems can be found below the figure.

[11] For example, 14.1% of all EWC Area residents are Māori compared to 10.7% of Auckland residents
[12] 26% of EWC residents over the age of 15 have no formal qualification compared to 17% of all Auckland residents. (2013 Census data, Statistics New Zealand)
[13] For the EWC Area, the labour force participation rate of 62% and an unemployment rate of 12%. At an Auckland level, these are 67% and 8% respectively. Māori unemployment levels are extremely high within the EWC Area, with 2013 census data estimating an unemployment rate as high as 19.4%, (2013 Census data, Statistics New Zealand)
[14] Business Demography Statistics 2012, Statistics New Zealand

FIGURE 4.4: CURRENT PROBLEMS AND FUTURE TRENDS FOR FREIGHT TRAFFIC IN ONEHUNGA-PENROSE AREA

FIGURE 4.5: JOURNEY TIME VARIABILITY TO THE "FOUR CORNERS" OF THE EWC PROGRAMME AREA

The key project-area specific problems and their causes that were identified were:

- Congestion occurs at the state highway connections, not through the corridor. The central sections of the Neilson/Church corridor generally operate below capacity but the state highway connections at each end are significantly congested through much of the day. These congested connections create queues entering, and exiting the corridor. So while extensive queues and delays are observed in the corridor, the underlying causes are mostly due to constraints at the State Highway connections. The mid-sections of Neilson Street are, however, approaching the maximum throughput of a 2-lane arterial with current flows at some 26,000 vpd and up to 20% truck volumes;
    - The congestion at the SH20 connection is primarily due to insufficient capacity at the local road receiving network. This is especially at the Neilson Street/Onehunga Mall intersection, where queues block back more than 1.5km onto the SH20 Māngere Bridge throughout much of the working day.
    - At the SH1 connection, much of the congestion is caused by queues on SH1, which block back through the corridor. This is exacerbated by high demands from the east (via SEART) and from traffic destined for SH1 south also having to pass through the Church/Great South Road intersection. Over 80,000 vehicles per day pass through the Church/Great South Road intersection.
    - The high levels of congestion on SH1 are believed to result in some freight vehicles accessing the Neilson/Church corridor from SH20 rather than SH1. This in turn results increases the congestion on the SH20 access at Onehunga.
- There is conflict between different transport users and traffic demands. The corridor serves a dual function, providing access to local businesses while also serving as a through route for traffic traversing between SH20 and SH1 and/or SEART. While the through movement is currently limited to 20-30% of all movements, this is largely a result of congestion at either end, which restricts the ability of traffic to get in and out of the area efficiently. There is conflict between industrial/freight traffic and local movements (including buses, cyclists, pedestrian and cars) around the Neilson Street/Onehunga Mall intersection and approaches. Freight movements into and out of industrial premises are in conflict with the desire for efficient and reliable movement along the corridor.
- High volume of freight journeys but unreliable freight travel times. There are significant short-haul interactions between the Southdown/rail interface area and the surrounding distribution centres, as well as long-haul movements using the strategic road network. Unreliable freight travel times constrain efficient logistics planning for longer-haul vehicles and hinders the more productive and efficient use of transport. For example, there are eight sets of traffic lights between Southdown and SH1 south, six of which are highly congested. Figure 4.5 shows the high levels of unreliability from Captain Springs Road (as a central point on the Neilson Street corridor) to and from the State Highway on and off-ramps.
- There is existing and growing demand for East-West travel between SH20 and SH1 and/or SEART. Much of this demand currently avoids the corridor due to the significant congestion at the connections to the strategic network. Improving only the connections is therefore expected to result in a significant increase in the current 20% through traffic, leading to increased conflicts between through traffic and property access movements
    - Congestion now occurs in peak directions on SH20 between Neilson Street and Queenstown Road. This is caused by the rapidly increasing traffic flows on the Western Ring Route (traffic flows here grew by 26,000 vpd (37%) between 2009 and 2013. This congestion is expected to increase significantly with growth and the opening of the Waterview connection in 2017,

with an expected increase of another 72,000 vpd by 2036, reaching a total of over 160,000 vpd. Congestion from this bottleneck will further constrain access to/from the Neilson Street corridor from SH20.

- Congestion accessing and on the Neilson/Church Corridor encourages "rat-running" of general traffic and freight vehicles in residential streets and retail/commercial precincts.

- There is poor network resilience leading to unreliable conditions. This is a function of multiple strategic and local movements having to pass through single locations. This includes the confluence of SH1, SEART, Church Street and Great South Road in the east and the mix of local and strategic movements all passing through the Neilson Street/Onehunga Mall intersection in the west
- Buses experience the same congestion at Onehunga as freight and general traffic. There are bus lanes on the SH20 Māngere Bridge and transit lanes on the southbound access to SH20. However, the northbound buses experience unreliable and congested travel times from the northbound off-ramp due to queues generated from the Onehunga Mall/Neilson St intersection. On average these buses are delayed by some 6 minutes in the morning peak, which is expected to increase to 8 minutes in 2026 without intervention
- Travel demands do not support provision of viable public transport services - Industries in the Onehunga-Penrose area typically have low employment density, a high proportion of shift-work to support 24 hour operations and generally unconstrained parking. These factors limit the likely viability and suitability of a public transport service from a PT operations perspective.
- A range of barriers to safe and accessible cycling and pedestrian access exist - There are significant pedestrian and cycle movements over the Manukau Harbour, via the Old Māngere Bridge, and a desire to improve the connections from the Old Bridge through to the Onehunga Town Centre. There is currently some 38,000 vpd passing through this intersection, including 4,500 heavy vehicles. Conflict with general traffic, congestion, buses and high-density property access are barriers to safe cycle movements between Sylvia Park and Māngere. There is a strong desire for the pedestrian and cycling route along the Waikaraka foreshore to be connected through to Sylvia Park. That will also reduce conflict between cyclists and trucks on Neilson Street.

Many of these problems are continuing to increase in severity with continued growth in industrial, freight and logistics activity. Traffic from Southdown and adjacent areas is growing as rail freight increases. MetroPort is reported to be planning for a four-fold increase in TEU container movements into Penrose in the next five years. The capacity of the rail network for additional freight movements to/from Southdown is an issue that requires further investigation as part of an integrated rail development plan for Auckland. This is supported by current work looking at the Upper North Island freight response. Improved access to the state highways to and from Southdown represents a significant opportunity for KiwiRail to continue to grow the commercial viability of rail based freight. Investment in the third rail line has the potential to unlock further benefits for the Upper North Island supply chain while also providing relief to the state highway network

- Port of Tauranga's MetroPort is New Zealand's third largest container port, generating over 600,000 HCV trips per annum.
- Pikes Point recycling plant generates over 20,000 HCV trips per annum
- Food and beverage generates over 30,000 HCV trips per annum
- NZ Bus Depot generates over 120,000 bus movements per annum

Increasing distribution activity is a function of both economic and population growth within the Auckland and Upper North Island regions and will continue to lead to greater movements of heavy vehicles through the area. In addition, transport and distribution companies report that in response to increasing congestion they are likely to employ more hub and spoke operations with shuttle vehicles. Growth in transport and distribution activity is expected to more than offset any reduction in transport demand if manufacturing continues to steadily decline.

4.4.2. Benefits: Onehunga-Penrose Connections

Benefits have been identified at an activity level. These benefits would be delivered, if the causes of the problems are addressed by the proposed investment.

These benefits can also be considered as objectives to support the preparation of applications under the Resource Management Act 1991 (RMA) and to ensure that the investment represented by the ILM is given effect to through the Transport Agency's and AT's planning processes.

Benefits:

1. An improvement in travel times and travel time reliability between businesses in the Onehunga–Penrose industrial area and State Highways 1 and 20.
2. An improvement in safety and accessibility for cycling and walking between Māngere Bridge, Onehunga, and Sylvia Park.
3. An improvement in journey time reliability for buses between SH20 and Onehunga town centre.

The works, as part of the project, will contribute to those benefits by:

- Limiting land take from industrial activities where such take would adversely impact on the viability of such areas;
- Limiting effects on the safe and efficient access to businesses along the Church–Neilson Streets corridor;
- Providing Transport outcomes that will not compromise the land use plans of Auckland Council;
- Limiting conflicts between freight vehicles and buses;
- Limiting impact on travel times for through traffic on SH1 and SH20; and
- Providing appropriate social, cultural and environmental outcomes.

As noted at the start of this section, a set of project specific performance measures was developed, focused on how best to measure the performance of the options against the benefits identified. Where possible, performance measures that could be quantitatively assessed were identified.

Table 4.1 sets out the measure, description, source information/metric and the rationale for selection of the metric.

The same measures and descriptions were used to assess the long list of options and to assess the short list of options to identify the recommended option/s. A higher degree of quantification and specific measurement of performance was undertaken at the short list stage, reflecting the greater level of design detail that had been undertaken and the need for finer comparison between options at that stage of analysis.

Table 4.2 and Figure 4.6 below summarise the progression of the understanding of the problems at each activity level. Benefits at the activity level were also identified and measures developed to assess performance of options. The measures adopted were chosen to ensure that:

- they related specifically to the problems and benefits identified
- they were measurable with the information and analytical tools available to the project team
- they were cost-effective to assess and proportionate to the level of analysis considered appropriate at this stage of the business case process

The measures adopted are based on the Transport Agency guidance *Investment performance measurement: list of measures*. This provides three options for the development of appropriate measures, including the option to develop assessment specific measures where there are no suitable measures in the list provided by the Transport Agency. This was considered to be the appropriate approach for the EWC, given the high level of understanding and specificity of the identified problems and benefits.

Note that because of the different problem causes that were identified and, consequently, the different benefits that were being sought for the two activity areas, different measures were identified for the Onehunga-Penrose Connections and the Māngere, Ōtāhuhu, Sylvia Park PT Connections activities.

TABLE 4.1: TRANSPORT PERFORMANCE BENEFITS AND MEASURES OF PERFORMANCE FOR ONEHUNGA-PENROSE CONNECTIONS

Benefit	Measure	Description	Source Information / Metric	Rationale
Benefit 1: An improvement in travel times and travel time reliability between businesses in the Onehunga–Penrose industrial area and State Highways 1 and 20.	1. Reliable freight connections	Number of controlled stops between Neilson/Captain Springs and the 'four corners' (SH1 north south and SH20 north south).	Number of signals, weighted by size/likely congestion	This is a simple proxy for reliability as it is very hard to predict (models predict only averages). Instead this counts the number of sources of variability. This measure also addresses stop/start conditions which was identified as a major issue for freight users
	2. Efficiency of freight connections to strategic network	Truck travel times between Neilson/Captain Springs and the 'four corners' (SH1 north south and SH20 north south).	Traffic model average travel time for year 2026. Results considered for three peaks and both directions. Performance assessed relative to the 2026 Do Minimum travel times	Direct measure of efficiency of connection to the Strategic network
	3. Efficiency of accessing freight network	Daily Volume of vehicles in Neilson St and Church St	Traffic model daily traffic flows for year 2026. Performance assessed relative to reduction in traffic, relative to to 2026 Do Minimum.	This is a proxy measure of difficulty getting to/from the network from driveways/side roads if through traffic increases. Very high volumes of traffic will make accessing this corridor from driveways and side roads very difficult, possibly requiring extra traffic signals to manage.
	4. Efficiency of strategic network	Minimise impact on travel time on SH1 and SH20 for through traffic	Modelled 2026 travel times relative to Do Minimum.	Desired outcome is to avoid new/improved connections to the state highways adversely affecting existing highway performance
	5. Efficiency of access to strategic network	General vehicle travel times between Neilson/Captain Springs and the 'four corners' (SH1 north south and SH20 north south). Similar to criteria 2 but for general traffic.	Traffic model average travel time for year 2026. Results considered for three peaks and both directions. Performance assessed relative to the 2026 Do Minimum travel times	Direct measure of efficiency of connection to the Strategic network. This measure reflects business access for general traffic rather than specifically for freight vehicles.

Benefit	Measure	Description	Source Information / Metric	Rationale
	6. Enduring benefits	The extent to which travel time savings and traffic flow reductions on Church/Neilson Street are retained between 2026 and 2036	Model outputs for 2026 and 2036: - general traffic access (Measure 5) - traffic flow reductions (Measure 3) - Increase in average network $/km	The rate of deterioration in the key benefits was used as a measure for enduring benefits. The change in travel times, average travel costs was used, along with the extent to which flows on Neilson/Church Streets were maintained below a broad daily capacity threshold
	7. Integration of rail and road freight	This criteria was used for the long list of options but was not considered to be a differentiator of the shortlisted options. .		
	8. Resilient Network	The extent to which options provide network alternatives to points of vulnerability.	Qualitative assessment of network choices added	The existence of choices in the network provides a greater ability to absorb incidents (and general congestion at bottlenecks).
Benefit 2: An improvement in safety and accessibility for cycling and walking between Māngere Bridge, Onehunga, and Sylvia Park	9. Improved safety and accessibility	Change in trucks on key sensitive areas near residential areas, schools and bus routes	Modelled daily truck flows in 2026, relative to 2026 Do Minimum.	Desired outcome is minimising trucks on residential (and retail) streets.
	10. Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park	% completion of quality strategic link Hillsborough to Onehunga to Sylvia Park	Qualitative assessment of the quality of connection provided between Onehunga and Sylvia park. All options assumed to retain the existing cycleway between Onehunga and Hugo Johnston Drive	Some options provide more direct, higher-quality linkage than others.
	11. Improved safety and accessibility for cycling and walking	Reduction in vehicle flow at the Neilson/Onehunga Mall intersection	Modelled daily flow at Neilson/Onehunga Mall, relative to the 2026 Do	Heavy flows at this location provide a barrier to better cycle facilities between Onehunga and the Old Māngere Bridge. Reducing traffic flows would allow

Benefit	Measure	Description	Source Information / Metric	Rationale
	between Māngere Bridge, Onehunga and Sylvia Park		Minimum	re-prioritisation of traffic signal times and road narrowing to provide wider cycle paths and narrower crossings.
Benefit 3: An improvement in journey time reliability for buses between SH20 and Onehunga town centre	12. Improved journey time and reliability of buses accessing Onehunga	Bus travel times between SH20/Rimu Rd and Onehunga Mall/Princes Street.	Qualitative assessment of the extent to which the options address the existing congestion and sources of unreliability	Current congestion at Onehunga also impacts buses and hence reduces accessibility and reliability of other modes.
	13. Improved safety and accessibility	Change in total traffic flows on key sensitive areas near residential areas, schools and bus routes	Modelled daily traffic flows in 2026, relative to 2026 Do Minimum.	Desired outcome is minimising traffic flows on residential (and retail) streets, to improve safety/amenity, especially for vulnerable road users.

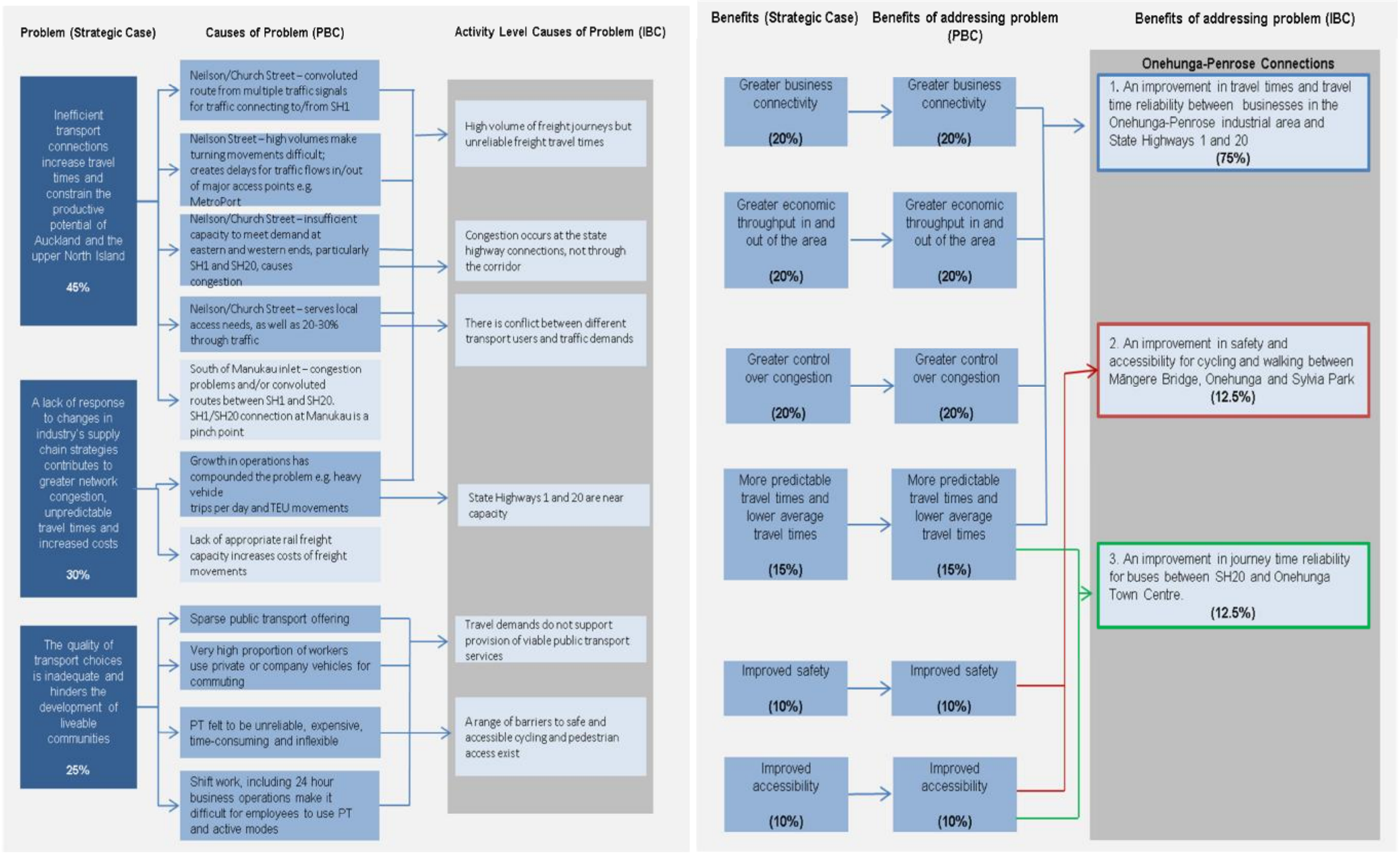
4.4.3. Onehunga-Penrose Connections Problems and Benefits

TABLE 4.2: IBC EVOLUTION OF UNDERSTANDING OF ACTIVITY-LEVEL PROBLEMS AND BENEFITS – ONEHUNGA-PENROSE CONNECTIONS

Problems *Strategic Case*	Causes of Problem (Programme Level) *PBC analysis*	Causes of Problem (Activity Level) *IBC analysis*	Benefits of Addressing the Problem *IBC*[15]	Measures *IBC*
Problem 1: Inefficient transport connections increase travel times and constrain the productive potential of Auckland and the upper North Island (45%)	• Neilson/Church Street – serves local access needs, as well as 20-30% through traffic • Neilson/Church Street – congestion at eastern and western ends, particularly SH1 and SH20 • Neilson/Church Street – convoluted route from multiple traffic signals for traffic connecting to/from SH1 • Neilson Street – high volumes make turning movements difficult; creates delays for traffic flows in/out of major access points e.g. Southdown • South of Manukau inlet – congestion problems and/or convoluted routes between SH1 and SH20. SH1/SH20 connection at Manukau is a pinch point	• Congestion occurs at the state highway connections, not through the corridor • There is conflict between different transport users and traffic demands • High volume of freight journeys but unreliable freight travel times • State Highways 1 and 20 are near capacity • Travel demands do not support provision of viable public transport services	4. An improvement in travel times and travel time reliability between businesses in the Onehunga-Penrose industrial area and State Highways 1 and 20 (75%)	1. Reliable freight connections 2. Efficiency of freight connections to strategic network 3. Efficiency of accessing freight network 4. Efficiency of strategic network 5. Efficiency of access to strategic network 6. Enduring benefits 7. Integration of rail and road freight 8. Resilient Network
Problem 2: A lack of response to changes in the industry's supply chain strategies contributes to greater network congestion, unpredictable travel times and increased costs (30%)	• Growth in operations has compounded the problem e.g. heavy vehicle trips per day and TEU movements • Lack of appropriate rail freight capacity increases costs of freight movements			
Problem 3: The quality of transport choices is inadequate and hinders the development of liveable communities (25%)	• Sparse public transport offering • Very high proportion of workers use private or company vehicles for commuting • PT felt to be unreliable, expensive, time-consuming and inflexible • Shift work, including 24 hour business operations make it difficult for employees to use PT and active modes.	• A range of barriers to safe and accessible cycling and pedestrian access exist	5. An improvement in safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park (12.5%)	9. Improved safety and accessibility 10. Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park 11. Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park
			6. An improvement in journey time reliability for buses between SH20 and Onehunga Town Centre. (12.5%)	12. Improved journey time and reliability of buses accessing Onehunga 13. Improved safety and accessibility

FIGURE 4.6: IBC EVOLUTION OF UNDERSTANDING OF PROBLEMS AND BENEFITS– ONEHUNGA-PENROSE CONNECTIONS

This figure shows the progression of understanding of problems and benefits from the Strategic Case through the PBC to the deeper understanding at the activity level in the IBC.

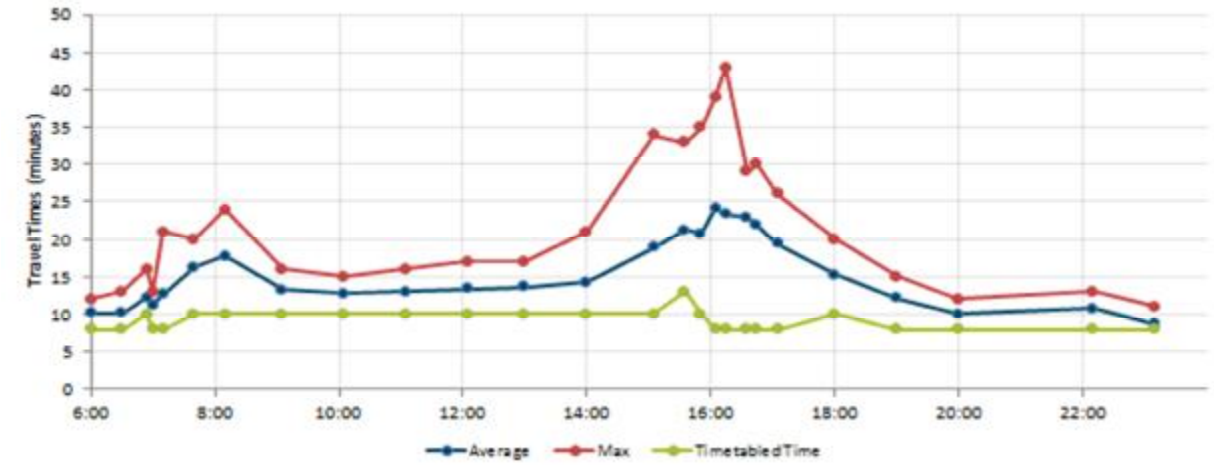


4.4.4. Causes and Scale of Problems identified: Māngere, Ōtāhuhu, Sylvia Park PT Connections

The evidence base developed for the PBC was used as the starting point to understand the project-specific issues on the FN32 between Māngere, Ōtāhuhu and Sylvia Park. FN32 is a key east-west public transport route in the project area, which has been confirmed as part of the new South Auckland frequent bus network. As indicated in Section 4.3.6, the route serves an area of low car ownership and high social deprivation. Key problems identified are:

- The FN32 route is congested at peak times, with unreliable travel times, due to a lack of separation of buses from traffic congestion.: Analysis of the GPS data for the current bus route between Māngere and Ōtāhuhu (see the Figure 4.7 below) obtained from buses running along this corridor at the moment reveal significant variances in travel time – especially during the afternoon peak period on Mondays to Fridays. The route is timetabled to take approximately ten minutes, but on average achieve 20 minutes in the peak with times as slow as 40 minutes recorded. The timetabled time appears to be slightly optimistic with interpeaks appearing to operate at or near the 30 km/h level. The peaks, and especially the afternoon peak, would require intervention if an average speed of 30 km/h is to be maintained.
    - Analysis of current travel time indicates that buses experience delays between Māngere and Ōtāhuhu and between Ōtāhuhu and Sylvia Park due to traffic congestion at a number of key intersections on the route, notably those on Māngere Road (East of SH20) and Walmsley Road, and the lack of priority measures for buses. This has the effect of resulting in the "bunching" of bus services.

FIGURE 4.7: BUS SERVICE TRAVEL TIMES FROM ŌTĀHUHU TO MĀNGERE, MAY 2013[16]



- A range of barriers to safe and accessible cycling and pedestrian access exist. Conflict with general traffic, congestion, buses and high-density property access are observed to be barriers to safe cycle and pedestrian movements between Sylvia Park and Māngere. Along the route, concerns include the lack of cycle lanes, poor quality pavements, the lack of adequate pedestrian crossing facilities and interchanges, and the existence of a large number of direct property accesses.
- Congestion on the route impacts other road users, including freight. The congestion also affects the large number of truck movements on Massey Road (up to 1,500 of the 21,000 vehicles per day

[16] Data collected for bus services from Ōtāhuhu (Bus stop 5391) to Māngere (Bus stop 746), over the month of May 2013. In total, this provides 496 observed travel times on the route.

using the road). Route 32 is an important freight connection to the Favona Road/Saville Drive areas.

4.4.5. Benefits: Māngere, Ōtāhuhu, Sylvia Park PT Connections

Benefits have been identified at an activity level. These benefits would be delivered, if the problem causes are addressed by the proposed investment.

These benefits can also be understood as objectives to support the preparation of applications under the Resource Management Act 1991 (RMA) and to ensure that the investment represented by the ILM is given effect to through the Transport Agency's and AT's planning processes.

Benefits:

1. An improvement in travel times and journey time reliability for FN32 services between Māngere Town Centre, Ōtāhuhu Interchange, and Sylvia Park.
2. An improvement in safety and accessibility for cycling and walking between Māngere Town Centre, Ōtāhuhu and Sylvia Park;
3. An improvement in safety and accessibility for passenger transport users along this corridor.

The works, as part of the project, will contribute to these benefits by:

- Providing transport outcomes that will not compromise the land use plans of Auckland Council;
- Limiting conflicts between freight vehicles and buses; and
- Providing appropriate social, cultural and environmental outcomes.

The following measures were developed to gauge the success of the project in delivering the benefits

Measures for Benefit 1:

- Buses to be faster than cars;
- Bus travel time improvement: Māngere Town Centre – Ōtāhuhu Interchange;
- Bus travel time improvement: Ōtāhuhu Town Centre – Sylvia Park;
- Minimise bus journey time variability;
- Freight travel times not adversely affected; and
- Car travel times impact minimal.

Measures for Benefit 2:

- Cycling facilities to favour new cyclists; and
- Reduction in fatal pedestrian and cycle crashes.

Measures for Benefit 3:

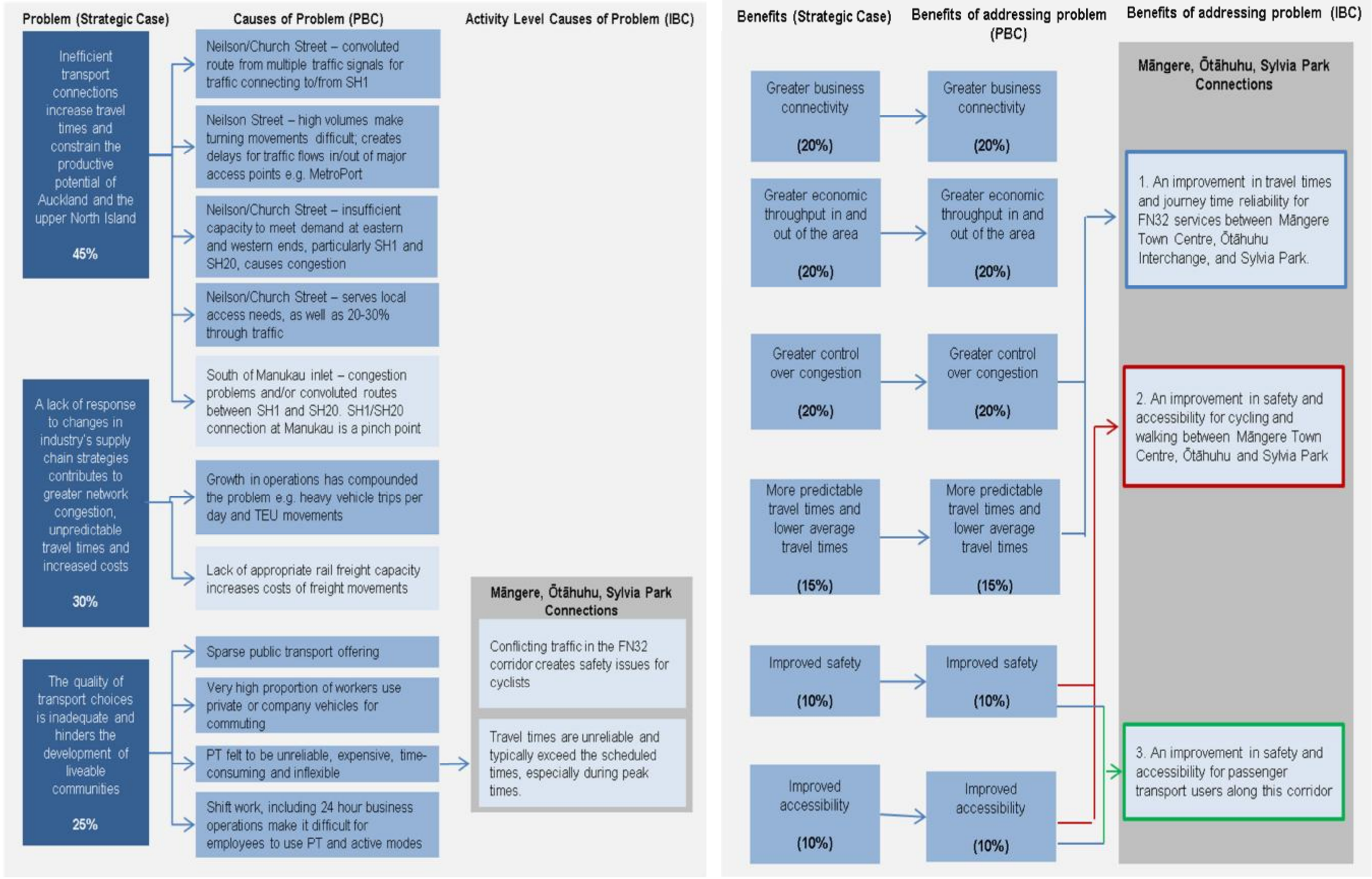
- Safely accessible bus stops; and
- Increase PT patronage.

4.4.6. Māngere, Ōtāhuhu, Sylvia Park PT Connections Problems and Benefits

TABLE 4.3: IBC EVOLUTION OF UNDERSTANDING OF ACTIVITY-LEVEL PROBLEMS AND BENEFITS – MĀNGERE, ŌTĀHUHU, SYLVIA PARK PUBLIC TRANSPORT CONNECTIONS

Problems *Strategic Case*	Causes of Problem (Programme Level) *PBC analysis*	Causes of Problem (Activity Level) *IBC analysis*	Benefits of Addressing the Problem *IBC*	Measures (applied to Design Variants) *IBC*
Problem 1: Inefficient transport connections increase travel times and constrain the productive potential of Auckland and the upper North Island (45%)	n/a	n/a	n/a	n/a
Problem 2: A lack of response to changes in the industry's supply chain strategies contributes to greater network congestion, unpredictable travel times and increased costs (30%)	n/a	n/a	n/a	n/a
Problem 3: The quality of transport choices is inadequate and hinders the development of liveable communities (25%)	• Sparse public transport offering • Very high proportion of workers use private or company vehicles for commuting • PT felt to be unreliable, expensive, time-consuming and inflexible • Shift work, including 24 hour business operations, make it difficult for employees to use PT and active modes.	• Travel times are unreliable and typically exceed the scheduled times, especially during peak times due to traffic congestion • Conflicting traffic in the FN32 corridor create safety issues for cyclists.	1. An improvement in travel times and journey time reliability for FN32 services between Māngere Town Centre, Ōtāhuhu Interchange, and Sylvia Park.	• Buses to be faster than cars. • Bus travel time improvement: Māngere Town Centre – Ōtāhuhu Interchange • Bus travel time improvement: Ōtāhuhu Town Centre – Sylvia Park • Minimise bus journey time variability • Freight travel times not adversely affected • Car travel times impact minimal
			2. An improvement in safety and accessibility for cycling and walking between Māngere Town Centre, Ōtāhuhu and Sylvia Park.	• Cycling facilities to favour new cyclists • Reduction in fatal pedestrian and cycle crashes
			3. An improvement in safety and accessibility for passenger transport users along this corridor	• Safely accessible bus stops • Increase PT patronage

FIGURE 4.8: IBC EVOLUTION OF UNDERSTANDING OF PROBLEMS AND BENEFITS – MĀNGERE, ŌTĀHUHU, SYLVIA PARK PUBLIC TRANSPORT CONNECTIONS



5. STAKEHOLDERS

- Chapter 5 summarises the consultation and engagement process undertaken during the IBC phase of the project; the key messages received and how these influenced the development of the IBC
- Feedback was generally supportive of the project and its objectives and influenced the understanding of the problems, the design of options and the development of measures for the MCA.

5.1. Consultation Goals and Approach

Following the development of the shortlisted options, extensive stakeholder consultation has been undertaken to:

- Inform stakeholders and the community on the short list of options being considered and more specifically, why these options were being taken forward for further consideration;
- Consult with stakeholders and the community to better understand how the options should be 'measured' or assessed, in terms of issues of importance to the community and specific groups within the community (e.g. business community, Mana Whenua etc); and
- Identify and better understand stakeholders' views on the cultural, social and environmental issues, opportunities and potential constraints of the shortlisted options; and
- Improve the project teams understanding of stakeholders' views on how the shortlisted options respond to existing transport problems in the EWC area; and to what degree the shortlisted options will require further transport investment.

5.1.1. Process

The public engagement period was undertaken over a period of four weeks from 29th September to 31st October 2014. A variety of advertising methods were used to lift the profile of the Project and make the public aware of the opportunity to provide feedback (including advertisements, website information, newsletters and letters to landowners / stakeholders).

Feedback was collected from engagement events, feedback forms (both in hardcopy and online), letters, emails and phone calls

In this phase of engagement, key parties involved included: Auckland Council, Mana Whenua, landowners (residential and business), business, community and environmental representative groups, utility providers, other transport agencies (KiwiRail), other government agencies and the wider public (including Mataawaka).

A range of engagement activities were under taken during the engagement period. These included public open days in local areas of the Project area (4), a business focused stakeholder workshop, community workshops (4), Hui with Mana Whenua and Mataawaka, individual and collective landowner meetings, other individual meetings with key stakeholders (including Council, utility provides and others) and presentations to advisory panels (3).

5.2. Stakeholder Views

Alongside direct feedback received at the engagement events, approximately 170 written feedback responses were received. The following provides a summary of the key or overarching themes identified in the consultation and engagement process. More detail on feedback from specific stakeholders is provided in the report: Consultation Summary Report – Engagement on the Shortlisted Options (August-November 2014), December 2014.

5.2.1. Transport Performance

Transport performance was a key theme throughout the engagement. Particular areas of importance included: traffic/congestion, providing for freight, multi-modal and public transport, rail and general transport performance.

Existing congestion was highlighted as being a significant issue, including there being difficulties with trucks turning in and out of a business's forecourt and onto the road. For freight movement, the revenue and time lost from unpredictable congestion was highlighted as being an issue. As a consequence of these issues, many stakeholders and participants in the engagement process identified concern that the lower investment options (e.g. Options A and B) would not provide sufficient improvement to transport performance in the project area. Most of those consulted, agreed that the higher investment options (E and F) would provide greater levels of improvement for transport in the area.

There was general support that freight is a key priority for the project. In particular, stakeholders identified that a dedicated freight lane along a new foreshore option (E or F) would deliver the priority to freight, as well as improving opportunities for other transport modes along the existing road network (for example improved cycle or passenger transport provision on the existing Neilson Street / Church Street corridor). Several people commented on the importance of a functional freight network in Auckland as affecting the functioning of the wider North Island freight network. Southdown was highlighted as an area which is anticipated to grow as a freight centre.

Public transport was generally supported. In particular, there was support for opportunities to reduce reliance and use of private vehicles in the project area. A recurring comment was that public transport journey times must out-perform private vehicle journey times in order to be effective.

5.2.2. Cost and Affordability

Several stakeholders were very interested in the cost of each option and its overall affordability. Mixed responses to the information on the costs of options were received. Some stakeholders commented that the options were likely too expensive; particularly Options E and F. However, a number of other submitters identified that funding concerns should be considered once the 'best option' had been identified; given that the project would be of national significance and the benefits to the economy would outweigh the initial cost of the project. The majority of feedback recognised the importance of value for money on the project.

5.2.3. Environmental / Community Impacts

There were concerns identified in the engagement process in regard to both the loss of residential and business land. These concerns were specifically raised in respect of Option E (and the residential area at Panama Road) and in the Southdown area (for Options E and F). Conversely, the feedback received also identified concerns of community severance impacts; due to the increase in traffic volumes from the proposed upgrades to Neilson Street with those options that use the existing road network (in part or full).

The proposed foreshore routes (Options E and F) were identified as having potentially significant impacts, cutting off access to the foreshore for the surrounding community and potentially resulting in adverse impacts on the Māngere Inlet (due to reclamation). The Waikaraka cycleway was generally identified as an important part of the community and there were strong views that it should be retained. In addition to the potential impacts of the Project, a number of submitters (including key stakeholders such as Mana Whenua, the Department of Conservation and others) identified the opportunity that the Project may provide for improvement of environmental and social outcomes in the area as a result of a more comprehensively designed foreshore reclamation option. For example, the opportunity for the design of the project to respond to existing contaminant leachate issues from Penrose into the Māngere Inlet.

A number of the respondents also highlighted important environmental features that they considered should be protected. In particular, these features and areas included Gloucester Park and the Hopua Tuff Ring, Anns Creek and Mutukaroa-Hamlins Hill. The latter of these, in particular, was identified as particularly significant for historic heritage, open space and cultural / Mana Whenua values.

5.2.4. Business Impacts

The efficient and safe movement of freight, including vehicle access into and out of businesses on Neilson / Church streets was also identified as important. Again, issues of the impact of traffic congestion on the areas businesses were identified by a number of people. While the project was supported by these businesses and business representatives, concerns were raised for those options that require business land (as industrial land is identified as a scarce resource that needs to be protected). Disruption of businesses during project construction was also raised as a significant issue in this area given the importance of industrial and business activity to the wider economy.

5.2.5. Multi-modal transport solutions

There was general support in the engagement, that all shortlisted options include proposals for roading, cycling and walking infrastructure improvements (not solely provision for freight). There was strong support for further consideration of other transport modes including provision of physically separated cycle ways, development of bus priority and provision of improved pedestrian corridors.

5.3. Conclusion

Overall the stakeholder consultation and engagement feedback generally encouraged an appropriately high level of investment in order to deliver an effective transport solution such that improvements to the transport network would be material and enduring. There was general concern that upgrades to

existing roads would not do enough to solve the transport problems in the area, particularly from business and freight groups. People also emphasised that the EWC projects should not preclude other development projects within the local area such as rail to the Auckland Airport, a connection to Highbrook or the development of Onehunga Wharf.

Much of the feedback (particularly from the local community) identified the importance of maintaining access to the foreshore of the Māngere Inlet and other features and areas that are of social, environmental or cultural significance. Ongoing engagement with iwi, the community and others will be a critical in developing any preferred option (development of the DBC).

6. MĀNGERE, ŌTĀHUHU, SYLVIA PARK PUBLIC TRANSPORT CONNECTIONS

- Chapter 6 sets out the long list of options that were developed for the Māngere, Ōtāhuhu, Sylvia Park PT Connections.
- The long list tested the assumptions behind AT's draft CMP and confirmed that the direction set by the CMP for the Route 32 frequent bus route of on-road bus lanes on the majority of the route, with a short section of combined bus/truck lane on Walmsley Road, is appropriate to progress to further analysis
- The further analysis considered 3 design variants developed in the context of design principles and assessed the transport performance of the variants to understand the scale of benefits that each variant would deliver.
- Variant B (bus lanes along the route with the exception of Massey Road (East of Grey Avenue) and provision for cycleways) was identified as the recommended design concept to proceed to further analysis in the DBC. This design variant provides the greatest transport benefits to PT users, with an acceptable level of disadvantage to cars and freight. The improvements recommended will be able to deliver a journey time that reduce the travel time variability and it will make the bus rail integration at Ōtāhuhu train/bus interchange achieve its objectives

6.1. Activity Development and Long List Assessment

The new Public Transport Network Plan (PTNP) sets out the guiding framework for the delivery of improved public transport services in Auckland. The PTNP places much more emphasis on the simplification of public transport (PT) services (i.e. bus, ferry and rail) on key corridors which provide frequent services, and the integration of these services with connector and local 'feeder' bus services. Under the new PTNP, bus and rail capacity enhancements combined with a new integrated and complementary PT network, act as the backbone of the PT network to provide a more efficient and less duplicative network. Bus services feed rail services at Ōtāhuhu and Sylvia Park Interchange. This is the future of passenger transport in Auckland.

The current scope of the EWC project includes implementation of the FN32. AT has recently prepared a draft CMP for Route 32 which outlines a strategy for improvements to all modes of transport on this corridor (including a recommendation to provide on-road bus lanes on the majority of the route, with a short section of combined bus/truck lane on Walmsley Road).

The direction set by the CMP therefore forms the 'blue-print' for the detailed options assessment for that element to be carried forward to the DBC stage. However, it was considered appropriate that the IBC phase consider different conceptual options to confirm that the CMP is the correct starting point for future work.

The following option dimensions for the corridor were initially identified by the Project Team (with greatest focus on the first two dimensions):

1. Route: This is considered fixed on the defined route (except for consideration of minor diversions if significant constraints are identified).
2. Main Mode: bus, light rail, heavy rail or bus transitioning to light rail.
3. Main Cross Section: on-road, central (median), off-line.
4. Space Allocation: reallocate, add road space.
5. Intersections: re-allocate lanes, add lanes, bus detection.
6. Operational: time of day, truck, HOV and cycle access.
7. Access: (pedestrian/cycle): crossings, parallel paths, connections.

The following long list was identified for consideration:

TABLE 6.1: MĀNGERE, ŌTĀHUHU, SYLVIA PARK PT CONNECTIONS LONG LIST

Option Number	Description
Option PT1	On-road; Light rail
Option PT2	On-road; Bus
Option PT3	Centre of road; Light rail
Option PT4	Centre of road; Bus
Option PT5	New Corridor: Light Rail
Option PT6	New Corridor; Bus
Option PT7	New Corridor; Rail

It should be noted that the centre of road and new corridor options would need to adopt on-road alignments in the vicinity of Māngere, Ōtāhuhu and Sylvia Park town centres. They would therefore only be different to the on-road options on Massey Road and on Atkinson Road/Mount Wellington Highway.

A high level assessment of these options was undertaken and the results are shown in Appendices G and H. The following key points influenced option selection:

- Light rail options are generally significantly more expensive to construct than any of the bus options;
- New corridor options are expensive and are expected to have lower net benefits than options which use the existing corridor;
- The centre of road options are more expensive, and are expected to have lower net benefits than on road options;
- Consenting is expected to be easiest for on road options, more difficult for centre of road options and most difficult and time consuming for new corridor options;

- Contaminated land has not been assessed, but there is more risk of encountering this with new corridor options, particularly in the Mt Wellington area; and
- New corridor and centre of road options are likely to create more severance than the on road options.

The assessment confirmed that the direction set by the CMP for the Route 32 frequent bus route of on-road bus lanes on the majority of the route, with a short section of combined bus/truck lane on Walmsley Road, is appropriate to progress to further analysis.

6.2. Short List Assessment

In Section 6.1, an on-road bus priority option (Option PT2) was determined to be the appropriate form for delivering an improved PT connection between Māngere, Ōtāhuhu and Sylvia Park.

For the purposes of developing a design for the on-road bus route that is consistent with the project scope, a number of guiding principles were established in a workshop with key stakeholders. These provide a framework for the scope of the emerging concept design. Foremost, the principles take the form of the following design aspirations:

- Capital cost must deliver good value for money and be proportional to the likely scale of benefits;
- Kerbside bus lanes should generally be provided, though median bus lanes may be appropriate in some circumstances;
- No land take should take place outside road reserve, wherever possible;
- Bus lanes should only be provided where queues exist (or are predicted to by 2026);
- Intersection capacity should be generally maintained to reduce bus delay and disbenefits to other road users;
- Bus stops should be provided every 400-500m;
- Improve pedestrian facilities and crossing provision.

It was acknowledged that there is potential for conflict between several of these design aspirations, and subsequently the following principles for managing conflicts were agreed:

- Capital cost in excess of approximately $20M is unlikely to be justified;
- Bus/cycle facilities should generally be provided at the expense of parking;
- When road widening is proposed, the preference is to also provide segregated cycle facilities at these locations;
- If the cost of providing segregated cycleways are excessive, or cause safety issues, then painted on road facilities are to be considered;
- Shared bus and cycle lanes may be appropriate in some locations;
- Priority should be given to improving infrastructure for buses over cycles if hard choices have to be made.

Design development was undertaken with knowledge of the social, cultural and environmental context of the local area, taking into account the following considerations:

- Extent of the existing road reserve (designated as road)

- Sensitive receptors for air quality
- Connections to key community facilities
- Parking and access for adjacent residents, schools, sports facilities, businesses
- Built heritage features, specifically in Ōtāhuhu Town Centre
- Construction impacts (temporary effects).

Based on these guiding principles and key social, cultural and environmental considerations, several design variants were developed. Each variant is listed below and had an approximate cost of $18M. Diagrams showing each of the three variants are included in Appendix I.

TABLE 6.1: ROUTE VARIANTS FOR MĀNGERE, ŌTĀHUHU, SYLVIA PARK ON-ROAD BUS CONNECTION

Variant A	• Bus priority lanes on the approach to key intersections where delay is predicted on: o Massey Road o Station Road (westbound only) o Atkinson Road o Mount Wellington Highway • A combined bus/truck lane on Walmsley Road • Traffic signal control introduced at the Massey Road/Orly Avenue intersection • Localised road widening on (generally) short sections Massey Road, Atkinson Road and Mount Wellington Highway to achieve the above • Segregated (i.e. physically protected) cycle lanes on the majority of Massey Road and Mount Wellington Highway • Shared path on Walmsley Road and on short sections of Massey Road and Mount Wellington Highway • Unsegregated cycle paths on Thomas Road, Orly Avenue and Station Road • Advanced areas for cyclists at intersections. Additional pedestrian crossing refuges on Massey Road, Atkinson Road and Mount Wellington Highway
Variant B	As Variant A but with no bus lanes on Massey Road (East of Grey Avenue)
Variant C	As Variant A but with no bus lanes on Massey Road (East of Grey Avenue) and on Walmsley Road (between Massey Road and Station Road)

Using the project benefits and guiding principles, a number of measures ("success measures") were agreed with stakeholders (as reported in Section 4.4.1). Where possible, descriptions were provided to allow the quantification of the success of achieving each of the measures. The measures and descriptions are shown in Table 6.2 alongside the assessment of each variant.

TABLE 6.2: ASSESSMENT OF VARIANTS AGAINST MEASURES

Measure	Description	Variant A	Variant B	Variant C
Buses to be faster than cars.	End-to-end (Māngere to	5-19	4-9	4-8 minutes

Measure	Description	Variant A	Variant B	Variant C
	Sylvia Park) bus travel times (excluding dwell times) to be faster than car travel times (peak and off-peak)	minutes faster	minutes faster	faster
Bus travel time improvement: Māngere Town Centre – Ōtāhuhu Interchange	13 minutes maximum at peak times (excluding dwell times)	13-17 minutes	13-14 minutes	12-14 minutes
Bus travel time improvement: Ōtāhuhu Town Centre – Sylvia Park	7 minutes maximum at peak times (excluding dwell times)	6-9 minutes	6-9 minutes	6-9 minutes
Minimise bus journey time variability	Not yet quantified	*Not yet quantified*		
Freight travel times not adversely affected	End-to-end, to be no worse than without the project (at 2026)	Up to 8 mins worse	Up to 2 mins worse	Up to 4 mins worse
Car travel times impact minimal	End-to-end travel times increased by no more than 25% than without the project (at 2026)	Up to 50% worse	Increase by no more than 18%	Increase by no more than 16%
Cycling facilities to favour new cyclists	Improved cycling facilities	Yes	Yes	Yes
Reduction in fatal pedestrian and cycle crashes	No fatal pedestrian or cycle crashes over the five year period post opening	*Not yet quantified*		
Safely accessible bus stops	Safe pedestrian crossings within 100m of key destinations and bus stops	Achieved at roughly 80% of locations	Achieved at roughly 80% of locations	Achieved at roughly 80% of locations
Increase PT patronage	100% increase	*Not yet quantified*		

Given measures were developed based around the project benefits, this assessment provides an indication as to the success of design variants in achieving key transport benefits. The contribution of each variant toward addressing the transport benefits is summarised below:

TABLE 6.3: ASSESSMENT OF VARIANTS AGAINST TRANSPORT BENEFITS

Transport Benefit	Variant A	Variant B	Variant C
Benefit 1: An improvement in travel times and journey time reliability for FN32 services between Māngere Town Centre, Ōtāhuhu Interchange, and Sylvia Park.	Negative contribution	Moderate contribution	Minor contribution
Benefit 2: An improvement in safety and accessibility for cycling and walking between Māngere Town Centre, Ōtāhuhu and Sylvia Park.	Moderate contribution	Moderate contribution	Moderate contribution
Benefit 3: An improvement in safety and accessibility for passenger transport users along this corridor.	Minor contribution	Moderate contribution	Moderate contribution

It was determined the scope of the project under the guiding principles and existing social, cultural and environmental considerations that the similarity of proposed variants implied the social and environmental impacts of the project would be insufficient to substantially impact the design variant selection. Similarly, given the three variants are likely to be constructed within the existing designation, the consenting strategy will be confirmed at the DBC stage.

6.3. Recommended Option Identification

From the assessment of the design variants against project objectives, Variant B was identified as the recommended design concept. Modelling outcomes suggested the design variant provided the greatest transport benefits to PT users, with an acceptable level of disadvantage to cars and freight. We note that the provision of Transit Lanes on Māngere Road is recommended for this variant, in order to provide some form of bus priority and some priority for high occupancy vehicles.

The improvements recommended will be able to deliver a journey time that reduces the travel time variability and will make the bus rail integration at Ōtāhuhu train/bus interchange achieve its objectives.

- Detailed design to be undertaken including:
    - Hours of operation of bus/transit/truck lanes
    - Location and design of bus stops.
    - Consideration of pre-emption at signals / bus activated signals
- Detailed assessment of the social and environmental impacts factors, to the extent they are present.
- Improved quantification of impact on other transport users, including potential car disbenefits and benefits to pedestrian, cyclists and high occupancy vehicles.
- Value engineering to ensure cost optimisation.

7. ACTIVITY DEVELOPMENT AND LONG LIST ASSESSMENT: ONEHUNGA–PENROSE CONNECTIONS

- Chapter 7 identifies and assesses a long list of 16 options for the Onehunga-Penrose industrial area
- A Multi-Criteria Analysis (MCA) was used to assess the effectiveness of the options in delivering the benefits
- A short list of 6 options was identified for further, more detailed, consideration based on the scale of transport benefits delivered, the social and environmental impact, cost and the scale of risks (e.g. consenting and construction risks). See Chapter 8 for the more detailed consideration of the shortlisted options

7.1. Options Development (including Economic Case)

Option development was primarily focused on addressing issues of freight access along the Neilson-Church Street corridor and onto SH20 and SH1. In developing the options, it was recognised that all options must have the potential to contribute to completing the cycleway network through the area to Sylvia Park. Concepts for the cycle link have been identified for all options (commensurate with the scale of the option being considered). In addition, the potential for opportunities to deliver benefits to public transport users, while addressing the needs of freight users, has also been considered, at a high level consistent with the level undertaken for an indicative business case.

Figure 7.1 below sets out the overall process that was undertaken. The long list of options was developed in a 2-stage process. Each of these stages is discussed in more detail below.

Segments and components to Options

Initially the study area was separated into segments and a workshop was held (with the Transport Agency, AT and project team representatives) to identify potential component options within each segment. The purpose of using segments was to capture the distinct issues in each area, and ensure a broad range of alternative solutions were considered along the route.

FIGURE 7.1: MAP AND DESCRIPTION OF AREA SEGMENTS

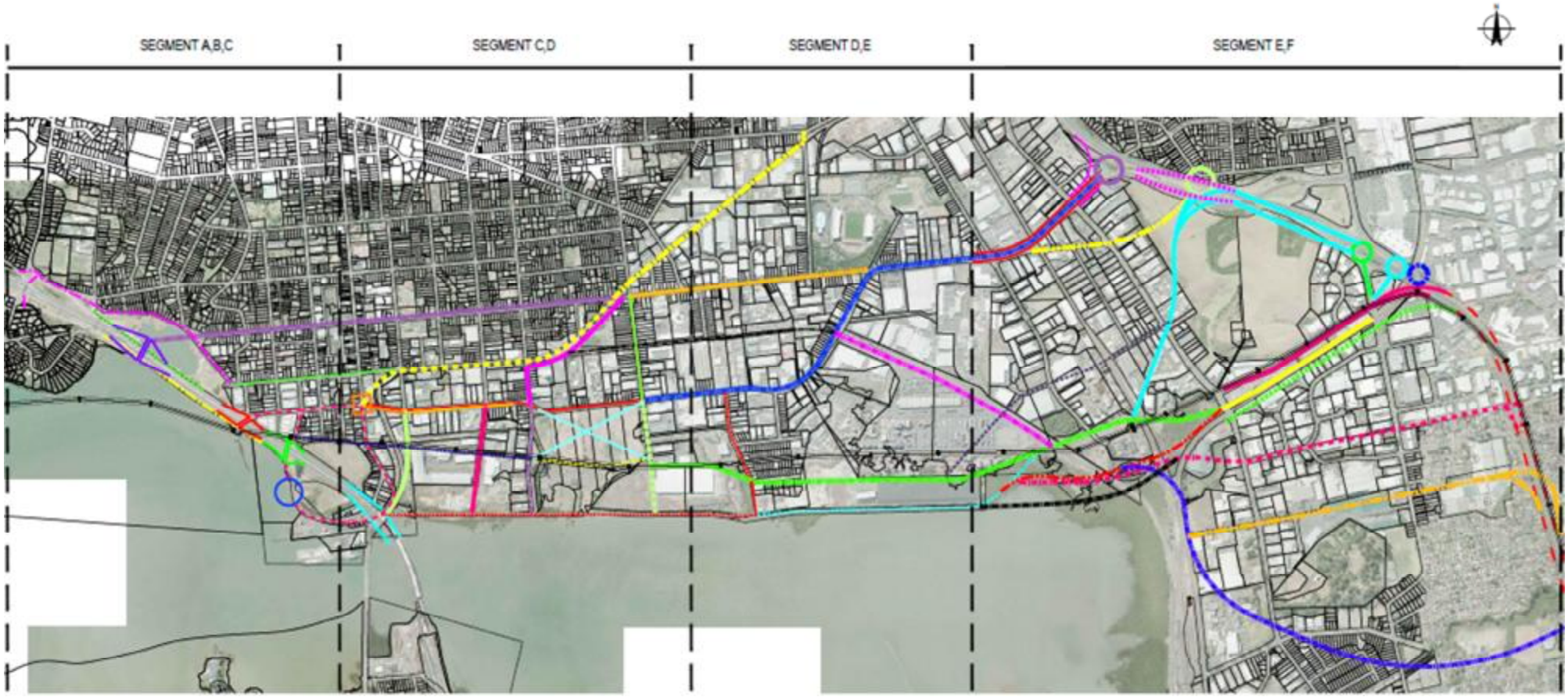
Segments	Covering Area
Segment A	SH20 North of Gloucester Park Interchange
Segment B	Gloucester Park Interchange
Segment C	Gloucester Park Interchange to Captain Springs Road (approx.)
Segment D	Captain Springs Road to Great South Road
Segment E	Great South Road to SH1
Segment F	Southern Motorway widening

The components ranged from minimal investment to greater levels of investment. Examples of components include (but are not limited to): lane-widening; freight only lanes; rationalisation of ramps; new connections and interchange improvements. In addition to the internal identification of segments, feedback from the community and stakeholders also identified further segment options. For indicative purposes, some of the components considered within each segment shown in Figure 7.2.

All components were then assessed through the MCA. Where broadly equivalent components (in terms of either transport performance or social, environmental or cultural outcomes) were identified, the best alternative proceeded to the development of the long list options. If no broadly equivalent alternative component existed, the component was progressed to the development of long list options.

The viable components for each segment were then workshopped to 'package' the components into a long list of options for the East-West route from SH20 to SH1 in the Onehunga–Penrose area. Outputs of the July-August stakeholder engagement process also informed the formation of the options list by indicating general support for the range of options being considered, and identifying additional segments which resulted in the development of further options for consideration. Sixteen options were identified which were developed to respond to the problems identified in the PBC.

FIGURE 7.2: INDICATIVE ROUTE COMPONENTS ACROSS SEGMENTS



7.1.1. Routes – the long list of options

In developing the long list, a full spectrum of options was considered against a "Do Minimum" scenario. Options ranged from low levels of new investment up to and including options which involve much greater intervention and investment. Sixteen options were developed for the long list and are set out in Table 7.1 below. An outline map and more detailed description of each of the options are included at Appendix K.

TABLE 7.1: LONG LIST OF OPTIONS

Long list Options	Description
Option 1	Existing route upgrade with freight lanes
Option 2	Existing route upgrade with new SH1 ramps at SEART
Option 3	Existing route upgrade to SH20 with new inland route to new SH1 ramps at Mt Wellington
Option 4	Existing route upgrade to SH20 with new foreshore route to new SH1 ramps at Mt Wellington
Option 5	Galway St Link to SH20 with new inland route to new SH1 ramps at Mt Wellington
Option 6	Galway St Link to SH20 with new inland route to existing SH1 ramps at Mt Wellington
Option 7	Galway St Link to SH20 with new Waikaraka/inland route to new SH1 ramps at Mt Wellington
Option 8	Galway St Link to new SH20 Interchange with new inland route to new SH1 ramps at Mt Wellington
Option 9	Neilson St route to new SH20 Interchange with new inland route to new SH1 ramps at Mt Wellington
Option 10	Galway St Link to SH20 with new Rail Corridor route to new SH1 ramps at Mt Wellington
Option 11	Galway St Link to SH20 with new Rail/Local Corridor route to new SH1 ramps at Mt Wellington
Option 12	Galway St Link to SH20 with new inland route to new SH1 ramps near Panama Road
Option 13	New SH20 Onehunga Interchange with new foreshore route to new SH1 ramps near Panama Road
Option 14	New SH20 Onehunga Interchange with new foreshore/Inland route to new SH1 ramps at Mt Wellington

Long list Options	Description
Option 15	New SH20 Onehunga Interchange with new full foreshore route to new SH1 ramps at Mt Wellington
Option 16	New full foreshore Motorway connection SH20 to SH1

7.2. The Do Minimum Option

A Do Minimum scenario was created against which to assess the project options. This scenario represents the expected baseline if none of the options were implemented in this study area. It does not represent the existing 'current day' situation, as it includes significant land use growth and significant investment in the transport system across the Auckland region.

AT and the Transport Agency have several large investment projects currently under development, ranging from the investigation to detailed design stages and there is a need for each of the project evaluations to be undertaken using consistent assumptions. These assumptions relate to the following:

- The land use scenario used for modeling purposes is referred to as Scenario I 8B and reflects a scenario based on Statistics New Zealand's medium growth projections and land use patterns consistent with the Proposed Auckland Unitary Plan.
- Regional strategies and policies to manage travel demand (travel plans, telecommuting, parking constraints etc.) have been included in the do mimimum scenario and reflected in the models via reduced traffic generation. The estimated impact of the travel demand management assumptions is a reduction in regional vehicle travel by up to 7%. Localised traffic demand management is discussed in further detail in Section 8.2.5.
- Substantial uptake of public transport is anticipated following regional PT network upgrades, including major projects such as the Central Rail Link (as discussed further in Section 8.2.6). As an illustration of forecast PT demand uptake, models indicate that growth up to 2041 is 50% for private vehicles accessing the study area but 342% for public transport.
- For infrastructure investment, the ART model has been updated to inform the Integrated Transport Programme 2016-2045 (ITP). Sitting within the ITP infrastructure assumptions is a series of ITP investment scenarios which are being used by AT and Auckland Council planning and strategy departments. Project models inform both the design of a project, as well as the economic justification of the project. Two ITP infrastructure scenarios are used in evaluating projects:
    - ITP Basic Programme plus TiGA (Transport in Greenfield Areas) (2016)
    - ITP Auckland Plan Network (2036)

The 2016 ITP Projects table (Appendix F) shows the list of the projects included within a default 2016 Basic Programme set of scenarios. These projects are to be assumed to be complete upon the opening year of the projects being assessed. In relation to the projects highlighted in the 2016 ITP Projects table, the 2016 ITP network will include the following additional projects:

- SH20/SH16 Western Ring Route

- SH1 Southern Corridor Improvements
- SH1 Northern Corridor Improvements
- SH20A Airport Improvements

7.3. Long List Options Assessment

7.3.1. Multi-Criteria Analysis

All sixteen options were assessed through a MCA, which considered a full range of impacts and performance against the project benefits.

Consistent criteria were used in assessing the components and long list options through the MCA approach. The criteria were established in a workshop and were further tested and amended to reflect wider stakeholder engagement, including engagement with Mana Whenua. The criteria were not weighted to avoid issues of subjectivity. Each criterion contributes toward a Key Result Area (KRA), and the full list of these is set out in Appendix C.

For the long list assessment, background data and research was mapped onto the study area to assist the assessment process. As the assessment moved from components to options, more design detail was incorporated which allowed a more detailed assessment to be undertaken. The assessment was led by highly experienced subject matter experts in the Project Team to ensure a quick focus and refinement of ideas. Impact assessment was based on a five point scale – assessing the significance of positive or negative effects. Additionally, a certainty assessment was undertaken to gauge the confidence in the impact assessment. The assessment of the long list assessment against the criteria is shown in-depth in Appendix G.

The criteria for transport performance are equivalent to the measures developed in Section 4.4.2. As such, the transport KRAs are equivalent to the transport benefits. Recall the benefits for Onehunga-Penrose Connections are:

- Benefit 1: An improvement in travel times and travel time reliability between businesses in the Onehunga–Penrose industrial area and State Highways 1 and 20.
- Benefit 2: An improvement in safety and accessibility for cycling and walking between Māngere Bridge, Onehunga, and Sylvia Park.
- Benefit 3: An improvement in journey time reliability for buses between SH20 and Onehunga town centre.

The results of the assessment are summarised in Table 7.2 below. For illustrative purposes, the following colour key has been used:

Minor Contribution	Contribution	Contributes Strongly

As an outcome from the assessment, the long list was refined to a short list via the identification of six options to under-go further refinement and analysis. The options range from low investment to high

investment options and demonstrate a range of transport performance outcomes. The shortlisted options proceeded to further assessment in the next phase of the project, discussed in the following chapter.

TABLE 7.2: MCA SUMMARY OF LONG LIST OPTIONS – OPTIONS SHORTLISTED

Project Benefits	Contribution	Other Issues	Decision
Option 1: Existing route upgrade with freight lanes			Cost Range: Low Est BCR[17]: High
Benefit 1	Minor contribution *Reduces congestion on SH20 and some improvement to access to Onehunga. Improved capacity on Neilson Street, but no improved connection to SH1. Only limited freight priority lanes possible through Mt Wellington Interchange.*	Uses existing corridors but construction challenges maintaining property access.	Some improvements in the western connections but very little improvement in the east. Shortlisted to represent low-cost option.
Benefit 2	Minor contribution *Cycle connection to Sylvia Park via existing routes*		
Benefit 3	Minor contribution *Congestion entering Onehunga Mall reduced but still conflict with trucks*		
Option 2: Existing route upgrade with new SH1 ramps at SEART			Cost Range: Low/Moderate Est BCR: Low
Benefit 1	Minor contribution *Reduces congestion on SH20 and some improvement to access to Onehunga Improved capacity on Neilson Street and improved connections to SH1 Extra traffic attracted to Church St which would require further upgrades, including likely grade-separation at Great South Rd and widening of Church St.(to be investigated at next stage).*	Moderate to low cost but could be much higher to mitigate extra traffic on Church St. Potential impact on Hamlins Hill.	Shortlisted to represent moderate-cost option using existing corridors.
Benefit 2	Minor contribution *Cycle connection to Sylvia Park via existing routes*		
Benefit 3	Minor contribution *Congestion entering Onehunga Mall reduced but still conflict with trucks*		
Option 5: Galway St Link to SH20 with new inland route to new SH1 ramps at Mt Wellington			Cost Range: Moderate/High Est BCR: Low
Benefit 1	Contributes *Reduced congestion on SH20 and improved resilience with new corridor. Improved capacity on Neilson Street and improved connections to SH1 via a new corridor to separate north and south connections to SH1.*	Construction challenges especially Transpower interface.	Shortlisted as moderate-cost option providing good transport benefits (and a better-performing version of Options 3 and 4).
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park, but crossing Great South Rd*		
Benefit 3	Contributes *Takes some industrial traffic out of Onehunga Mall, reduces congestion for buses accessing Onehunga*		
Option 8: Galway St Link to new SH20 Interchange with new inland route to new SH1 ramps at Mt Wellington			Cost Range: Moderate/High Est BCR: Low
Benefit 1	Contributes *Reduced congestion on SH20 and improved resilience with new corridor. May increase travel distance for Onehunga local trips accessing SH20. Reduced congestion accessing SH20 and SH1*	Construction challenges especially Transpower interface.	Shortlisted as representing an alternative interchange configuration from that in Option 5.
Benefit 2	Contributes *Direct cycle-connection to Sylvia Park, but crossing Great South Rd. Onehunga town centre traffic greatly decreased*		
Benefit 3	Contributes *Takes all industrial traffic out of Onehunga Mall. Reduces congestion for buses accessing Onehunga*		

[17] BCR categorised by Transport Agency Economic Evaluation Model classifications: High implies 5< BCR; Medium implies 3<BCR<5; Low implies 1<BCR<3.

Project Benefits	Contribution	Other Issues	Decision
Option 13: New SH20 Onehunga Interchange with new foreshore route to new SH1 ramps near Panama road			Cost Range: High Est BCR: Low
Benefit 1	Contributes Strongly *Reduced congestion on SH20 and improved access to Onehunga. Improved resilience with new corridor. Reduced congestion and improved connections accessing SH20 and SH1 and removes through traffic from Neilson St and Church St. Improved capacity on Neilson St.*	Construction challenges. Significant impact on natural and social environment. Opportunities for mitigation. Would benefit from further investigation	Shortlisted to represent high-cost option that fully-separates through traffic from Neilson/Church St
Benefit 2	Contributes *Direct cycle-connection to Sylvia Park, but crossing Great South Rd. Onehunga town centre traffic decreased*		
Benefit 3	Contributes Strongly *Separates local and industrial traffic at Onehunga, reduces congestion for buses accessing Onehunga*		
Option 14: New SH20 Onehunga Interchange with new foreshore/Inland route to new SH1 ramps at Mt Wellington			Cost Range: High Est BCR: Low
Benefit 1	Contributes Strongly *Reduced congestion on SH20, improved access to Onehunga. Improved resilience with new corridor. Reduced congestion accessing SH20 and SH1 and removes through traffic from Neilson St and Church St. Improved capacity on Neilson St.*	Construction challenges. Opportunities for mitigation. Would benefit from further investigation	Shortlisted as an alternative connection to SH1 than provided by Option 13
Benefit 2	Contributes *Direct cycle-connection to Sylvia Park, but crossing Great South Rd. Onehunga town centre traffic decreased*		
Benefit 3	Contributes Strongly *Separates local and industrial traffic at Onehunga, reduces congestion for buses accessing Onehunga*		

TABLE 7.3: MCA SUMMARY OF LONG LIST OPTIONS – OPTIONS NOT SHORTLISTED

Project Benefits	Contribution	Other Issues	Decision
Option 3: Existing route upgrade to SH20 with new inland route to new SH1 ramps at Mt Wellington			Cost Range: Moderate/High
Benefit 1	Contributes *Reduces congestion on SH20 and some improvement to access to Onehunga. Improved resilience. Improved capacity on Neilson Street and improved connections to SH1 via a new corridor to separate north and south connections to SH20. Reduced congestion accessing SH20 and SH1*	Construction challenges in new corridor, impact on business land.	Good transport benefits but not shortlisted as the similar Option 5 performs better with lower risks.
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park, but crossing Great South Rd.*		
Benefit 3	Contributes *No reduction in traffic on Onehunga Mall, but reduced congestion for buses accessing Onehunga*		
Option 4: Existing route upgrade to SH20 with new foreshore route to new SH1 ramps at Mt Wellington			Cost Range: Moderate/High
Benefit 1	Contributes *Reduces congestion on SH20 and some improvement to access to Onehunga. Improved resilience. Improved capacity on Neilson Street and improved connections to SH1 via a new corridor to separate north and south connections to SH1. Reduced congestion accessing SH20 and SH1*	Construction challenges in new corridor, impact on business land, foreshore impact	Not shortlisted as the similar Option 5 performs better with lower risks.
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park but crossing Great South Rd.*		

Project Benefits	Contribution	Other Issues	Decision
Benefit 3	Minor contribution *No reduction in traffic on Onehunga Mall, but reduced congestion for buses accessing Onehunga*		
Option 6: Galway St Link to SH20 with new inland route to existing SH1 ramps at Mt Wellington			**Cost Range: Moderate**
Benefit 1	Contributes *Reduced congestion on SH20 but increased congestion at Mt Wellington. Reduced congestion accessing SH20 and some improvement to accessing SH1*	Construction challenges in new corridor.	Good transport benefits but not shortlisted as the similar Option 5 performs better with lower risks.
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park, but crossing Great South Rd.*		
Benefit 3	Contributes *Similar to Option 5 but increased congestion for buses at Mt Wellington*		
Option 7: Galway St Link to SH20 with new Waikaraka/inland route to new SH1 ramps at Mt Wellington			**Cost Range: Moderate/High**
Benefit 1	Contributes *Reduced congestion on SH20 and improved resilience with new corridor. Reduced congestion accessing SH20 and SH1*	Construction challenges especially Transpower interface. Impact on Waikaraka Park	Not shortlisted as impacts on Waikaraka Park not justified over Option 5.
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park, but crossing Great South Rd.*		
Benefit 3	Contributes *Takes some industrial traffic out of Onehunga Mall, reduces congestion for buses accessing Onehunga*		
Option 9: Neilson St route to new SH20 Interchange with new inland route to new SH1 ramps at Mt Wellington			**Cost Range: Moderate/High**
Benefit 1	Contributes *Reduced congestion on SH20 and improved resilience with new corridor. Reduced congestion accessing SH20 and SH1*	Construction challenges especially Transpower interface	Not shortlisted as similar to Option 8 but with less potential for positive outcomes at Onehunga town centre.
Benefit 2	Minor contribution *No reduced traffic on pedestrian/cycle links into Onehunga but direct cycle-connection to Sylvia Park*		
Benefit 3	Contributes *Routes all industrial traffic through Neilson St in Onehunga. No separation of industrial and local traffic. Reduces congestion for buses accessing Onehunga.*		
Option 10: Galway St Link to SH20 with new Rail Corridor route to new SH1 ramps at Mt Wellington			**Cost Range: Moderate/High**
Benefit 1	Contributes Reduced congestion on SH20 and improved resilience with new corridor. Reduced congestion accessing SH20 and SH1, but creates conflict with through traffic and access to port/rail/road interface at Southdown	Construction challenges. Impacts on rail corridors and industrial land. Traffic conflict at Southdown	Not shortlisted as similar transport outcomes to Option 5 but with impact on operation of port/rail/road interface
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park, but crossing Great South Rd.*		
Benefit 3	Contributes *Takes some industrial traffic out of Onehunga Mall, reduces congestion for buses accessing Onehunga*		
Option 11: Galway St Link to SH20 with new Rail Corridor route to new SH1 ramps at Mt Wellington			**Cost Range: Moderate/High**

Project Benefits	Contribution	Other Issues	Decision
Benefit 1	Contribution *Reduced congestion on SH20 and improved resilience with new corridor. Less direct connection to Great South Road, than option 10. Reduced congestion accessing SH20 and SH1, but creates conflict with through traffic and access to port/rail/road interface at Southdown*	Similar to option 10	Not shortlisted as less direct route than Option 10, but with the same impact on operation of port/rail/road interface
Benefit 2	Minor contribution *Direct cycle-connection to Sylvia Park, but crossing Great South Rd.*		
Benefit 3	Contributes *Takes some industrial traffic out of Onehunga Mall, reduces congestion for buses accessing Onehunga*		
Option 12: Galway St Link to SH20 with new inland route to new SH1 ramps near Panama Road			Cost Range: Moderate/High
Benefit 1	Contributes *Reduced congestion on SH20 and improved access to Onehunga. Improved resilience with new corridor Further separates north and south connections to SH1, but uses local roads for a strategic route. Improved capacity on Neilson Street and reduced congestion accessing SH20 and SH1*	Construction challenges. Significant impact on natural and social environment	Not Shortlisted as extra property impacts not justified over similar-performing Option 5
Benefit 2	Contributes *Direct cycle-connection to Sylvia Park but crossing Great South Rd. Some reduced traffic in Onehunga Mall*		
Benefit 3	Contributes *Takes some industrial traffic out of Onehunga Mall, reduces congestion for buses accessing Onehunga*		
Option 15: New SH20 Onehunga Interchange with new full foreshore route to new SH1 ramps at Mt Wellington			Cost Range: High
Benefit 1	Contributes Strongly *Reduced congestion on SH20, improved access to Onehunga. Improved resilience with new corridor. Reduced congestion accessing SH20 and SH1 and removes through traffic from Neilson St and Church St. Improved capacity on Neilson St.*	Significant impact on Anns Creek	Not shortlisted as higher environmental impact than the similar Option 14
Benefit 2	Contributes *Cycle-connection to Sylvia Park via existing routes, decreased traffic in Onehunga Mall*		
Benefit 3	Contributes Strongly *Separates local and industrial traffic at Onehunga, reduces congestion for buses accessing Onehunga.*		
Option 16: New SH20 Onehunga Interchange with new full foreshore route to new SH1 ramps at Mt Wellington			Cost Range: High
Benefit 1	Contributes strongly *Reduced congestion on SH20, improved access to Onehunga. Improved resilience with new corridor. Faster through-traffic but reduced local connectivity to Onehunga and Penrose business areas. Reduced congestion accessing SH20 and SH1*	Very high cost and impact due to free-flow connections.	Not shortlisted as higher cost and impact but with lower transport benefits than Option 14.
Benefit 2	Contributes *Cycle-connection to Sylvia Park, decreased traffic in Onehunga Mall*		
Benefit 3	Contributes Strongly *Separates local and industrial traffic at Onehunga, reduces congestion for buses accessing Onehunga*		

8. SHORT LIST ASSESSMENT: ONEHUNGA – PENROSE CONNECTIONS

- Chapter 8 sets out how the short list of options identified through the preliminary analysis described in the previous chapter was developed through more detailed design and assessment, again using an MCA approach.
- Option F(a new connection across a reclaimed foreshore) was identified as delivering the highest level of benefits over the longer term but it also poses significant consenting risks. Option C also delivered transport benefits, but with a reduced delivery risk
- This option progressed to commercial and financial analysis (see Chapters 10 and 11 respectively)

The identified shortlisted options entered into a stage of more detailed design and assessment. In parallel, assessment framework was refined to ensure the decision was appropriately considered.

The process for assessing the shortlisted options is analogous to the process previously used to refine the long list to short list, although the process was informed with more precise details. The assessment of the shortlisted options informs the identification of a recommended option.

8.1. Concept Development

The concept design for each of the shortlisted option was refined through further geometric investigations, as well as consideration of operational performance (from transport modelling), safety concerns and enhanced knowledge of ground conditions, service locations, land ownership and environmentally sensitive areas. Of the shortlisted options, Option B was altered the most significantly as additional infrastructure was incorporated to address the anticipated impacts of extra traffic attracted to the corridor. The changes materially increased both the costs and travel time benefits of the option.

Options were also renamed for ease of reference:

Long list label	Description	Short list label
Option 1	Existing route upgrade with freight Lanes	Option A
Option 2	Existing route upgrade with new SH1 ramps at SEART	Option B
Option 5	Galway St Link to SH20 with new inland route to new SH1 ramps at Mt Wellington	Option C
Option 8	Galway St Link to new SH20 Interchange with new inland route to new SH1 ramps at Mt Wellington	Option D
Option 13	New SH20 Onehunga Interchange with new foreshore route to new SH1 ramps near Panama road	Option E
Option 14	New SH20 Onehunga Interchange with new foreshore/Inland route to new SH1 ramps at Mt Wellington	Option F

8.2. Short List Options Assessment

8.2.1. Transport performance assessment

Foremost, the assessment of the options focused on the transport performance criteria and subsequently the ability of the options to meet the project objectives. The criteria remained consistent with those in the long list assessment; however some indicators were adapted to become more quantifiable within the detailed modelling. The following table presents the performance of the options against the identified transport measures based on the design and detailed traffic modelling.

TABLE 8.1: ASSESSMENT OF OPTIONS AGAINST TRANSPORT CRITERIA

Measure	Description[18]	Do Minimum 2013	Do Minimum 2026	Expected change relative to do minimum by 2026						Comment
				Option A	Option B	Option C	Option D	Option E	Option F	
1) Reliable freight connections	Number of intersections on Neilson/Captain Springs and SH1/SH20 Connections* weighted by congestion.	11	12	+0.3	-4	-2.3	-3.3	-3.3	-4.3	Option A increases the overall number of intersections while Options B and F provide the most significant reductions. . For Options C-E, the reductions on the route to SH1 south are offset by increases elsewhere
			Score	0	4	2	3	3	4	
2) Efficiency of freight connections to strategic network	Daily mean travel time of freight on Neilson/Captain Springs and SH1/SH20 Connections* (total minutes aggregated across the eight connections)	61mins	69mins	-7mins	-19mins	-18mins	-17mins	-17mins	-17mins	All options reduce freight movement times to/from SH20. Option A does not materially reduce access times to SH1 south, however the other options have more significant savings for that movement, with little distinguishing Options B-F
			Score	2	4	4	4	4	4	
3) Efficiency of accessing freight network	Daily number of vehicles in Neilson/Church Corridor, aggregated across four locations	120,700	126,000	142,500	149,800	117,900	117,100	97,000	99,300	Options A and B increase traffic on the full corridor, thereby creating conflicts with vehicle access to properties. Options C and D reduce traffic on all but the western section of the corridor, where flows increase. Options E and F reduce traffic on the full corridor
			Score	-3	-5	2	2	5	5	
4) Efficiency of strategic network	Mean daily through travel time on SH20 and SH1 North/South (minutes aggregated across four routes)	16mins	21mins	-2mins	-2mins	-2mins	-2mins	-2mins	-2mins	For all Options, the effects of extra ramps/traffic on north-south through traffic is mitigated with small improvement
			Score	2	2	2	2	2	2	
5) Efficiency of access to strategic network	Daily mean travel time on Neilson/Captain Springs and SH1/SH20 Connections * (total minutes aggregated across the eight connections)	62mins	70mins	-6mins	-17mins	-16mins	-16mins	-15mins	-16mins	Similar to criteria 1, Options B-F all show strong improvement. Option A does not address access to SH1 south
			Score	1	4	4	4	4	4	
6) Enduring Benefits	Change in daily mean travel time on Neilson/Captain Springs and SH1/SH20 Connections * from 2026 to 2036 (change in total minutes aggregated across the eight connections)	N/A	+9mins	-1min	-5mins	-6mins	-6mins	-5mins	-6mins	Options A and B are least enduring due to their more rapid increase in congestion time and increased flows in the corridor over time. Options C and D have a slower increase in congestion and but have a residual problem with high flows in one part of the corridor. Options E and F are the most enduring with the slowest increase in travel times and traffic flows over time.
	Percentage change in $/km within the wider study area from 2026 to 2036	N/A	+7%	-1%	-1%	-1%	-1%	-1%	-1%	
	Change in daily number of vehicles in Neilson/Church Corridor from 2026 to 2036, aggregated across four locations	N/A	4,900	+1,100	+12,700	+2,700	+1,100	+1,000	+500	
			Score	1	0	2	2	4	4	
7) Integration of rail and	This criteria was used for the long list of options but was									

[18] Descriptions here are intended to summarise key information from the assessment, detailed descriptions that directly informed the scores are shown in Appendix M.

Measure	Description[18]	Do Minimum 2013	Do Minimum 2026	Expected change relative to do minimum by 2026						Comment
				Option A	Option B	Option C	Option D	Option E	Option F	
road freight	not considered to be a differentiator of the shortlisted options.									
8) Resilient Network	Qualitative score for provision of additional network choices		Score	0	1	3	2	4	4	Option A does not improve resilience as it continues to rely on single points of access. Option B provides only a single new access point while Option D provides 2 locations. Option C provides alternatives to 3 parts of the network while Options E and F provide alternative routes across four locations (Gloucester Park Interchange, Foreshore link, Southdown Link, SH1 ramps)
9) Improved safety and accessibility	Number of trucks daily at key sensitive locations** (aggregated across seven sites)	13,400	19,200	-200	-400	-3,500	-6,000	-2,100	-2,800	Options C and D remove the most freight vehicles from sensitive areas, predominantly Onehunga Mall/Neilson St.
			Score	0	0	4	5	2	3	
10) Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park	Qualitative score for quality and directness of route between Onehunga and Sylvia Park		Score	1	1	4	4	3	4	Options C, D & F provide the most direct, off-road links. Options A and B use the existing, less direct on-road routes while Option E has a longer route.
11) Improved safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park	Daily traffic volume at Onehunga Mall/Neilson St intersection	38,200	36,000	+10,900	+12,500	-12,500	-22,200	-6,800	-9,700	Option D strongest performer as it diverts much of the traffic away from the Onehunga Mall./Neilson St intersection.. Options A and B increase traffic at this location, reducing the amenity and scope for improved cycle connections.
			Score	-3	-3	3	5	2	2	
12) Improved journey time and reliability of buses accessing Onehunga	Qualitative score for improved bus access between SH20 and Onehunga Mall		Score	2	2	4	2	3	3	Options C best due to reduced traffic on Onehunga Mall/Neilson St intersection and scope to provide bus priority. Other options reduce current congestion but have lesser potential for priority.
13) Improved safety and accessibility	Sum of daily general traffic at key sensitive locations** in 2026 (aggregated across six sites)	112,500	125,400	-4,200	-5,300	-900	+1,800	+100	-6100	Option F delivers most reduction in traffic at sensitive areas due to new corridor.
			Score	1	1	0	0	0	2	

*"Neilson/Captain Springs and SH1/SH20 Connections" - includes Neilson/Captain Springs intersection to/from SH20 southbound & northbound, and to/from SH1 southbound & northbound.

**"Sensitive locations" – includes intersections at Onehunga Mall/Neilson St, Onehunga Mall/Church St, Church St/Victoria St, Church St/ Captain Springs Rd, Mt Smart Rd/Mays Rd/Victoria St, Selwyn St/Trafalgar St and Mt Wellington Hwy/Panama Rd.

Aggregate consideration of these criteria allows us to summarise the contribution of each of the options to the identified transport benefits. The scores for each benefit fed into the MCA assessment conducted in the Section 8.2.4.

8.2.2. Environmental and Social Assessments

The assessment of the shortlisted options involved a detailed assessment of the environmental and social context of the area, and subsequently the potential implications of each option. Assessments of the shortlisted options were undertaken and consisted of eleven specialist reports, including:

- Social and Community issues: Heritage, Visual and Landscape Amenity and Urban Form, Noise, Air Quality and Social Impact.
- Natural Environmental issues: Groundwater, Contaminated Land, Erosion and Sediment Control, Stormwater, Ecology, and Coastal processes.

The purpose for these reports was to assist with the assessment of options for the business case process, and to scope the topic areas for a future assessment for a consenting process. They are targeted at identifying key issues, risks and opportunities rather than identifying and assessing detail. The Transport Agency's Environmental and Social Responsibility Screen questions were used as a guide to inform the reporting – and the Screen also informed developing assessment criteria for multi-criteria analysis.

To the extent the outcomes were option dependent, these factors were captured within the multi criteria assessment of the options (see Section 8.2.4). However, the following general key issues were raised:

- Options involving reclamation have the opportunity to capture leachate and runoff from historic landfilling and land contaminating activities, which is currently discharging to the coastal environment. If this can be successfully designed and implemented, this will result in an important environmental benefit to health of the coastal environment
- All options will involve new stormwater treatment methods to varying degrees, and this will have a positive impact on water quality run off from the catchment to the stormwater network and ultimately the Manukau Harbour.
- Options that create a new alignment (i.e. all but A and B) are considered to be positive from a residential amenity (noise, air quality and general pleasantness) perspective, where they remove traffic (especially heavy traffic) from more sensitive residential, community and town centre areas.
- All options that pass beside or through Anns Creek will require careful design and consideration of how effects on the scheduled environmental features can be avoided, remedied or mitigated.
- All options that involve new structures in the vicinity of Hopua tuff crater (Gloucester Park) will require careful assessment, development of design and mitigation options.
- Most of the environmental assessments identified opportunities for mitigation and in some cases enhancement opportunities should this be needed (for example, foreshore options may provide an opportunity to improve management of leachate and runoff from historic landfilling and land contaminating activities).
- The heritage and cultural assessments do not support options that impact Mutukaroa-Hamlins Hill Regional Park. This view is supported by iwi as the area is Waahi Tapu.

- There is likely to be a notable amount of disruption from construction with all options. Those options that can be constructed offline are likely to be less disruptive, but all options will involve an increase in heavy traffic in the area.

8.2.3. Consentability Assessment

Given indications suggested consenting has potential to be a major risk for some of the options; high level assessment of possible challenges was undertaken. This included an overview of the key statutory documents, risks with a particular focus on the statutory provisions that govern reclamation, and the NZ Coastal Policy Statement, in light of the Supreme Court's decision in relation to salmon farming in the Marlborough Sounds. Consentability is a critical part of the options assessment process given that it is important to understand the consenting risks of each option, and whether there are any barriers that might completely preclude RMA approvals being sought.

As part of the preparation of the suite of Environmental and Social assessment reports, a Consentability Report was prepared which included an overview of key statutory documents, the policy and consenting framework that would likely apply for each option, and risks.

A more specific review of the statutory provisions that would apply to reclamation was prepared in light of the Supreme Court's decision in relation to salmon farming in the Marlborough Sounds and the NZ Coastal Policy Statement. This one issue is considered to be the most significant consenting risk for the project, and at present, this issue poses substantial risk for any reclamation option. However, whilst a consenting path for reclamation is currently not clear, options that require reclamation have still been considered for a number of reasons, including potentially important environmental outcomes, and key stakeholder support.

The following is a summary of some of the key overarching "consentability" issues that have had an influence on the options assessment process.

Anns Creek

- Despite having been modified over time, Anns Creek has significance from many perspectives: including as a cultural heritage site, a significant ecological area, an example of intact foreshore, significant lava flow features and a freshwater environment that supports a range of flora and fauna.
- All options that pass beside or through Anns Creek will require careful design and consideration to ensure consenting risks are managed.
- Anns Creek has been identified as an area with significant opportunity to achieve good environmental outcomes directly as a result of this project.

Mutukaroa-Hamlins Hill

- All options that impact Mutukaroa-Hamlins Hill Regional Park pose a significant consentability risk from a heritage perspective. This is due to the presence of significant archaeological sites including extensive evidence of pre-European occupation and the site's role as a vantage point overlooking a portage and both the Māngere Inlet and Tāmaki River
- Further to this, any option that impacts Mutukaroa-Hamlins Hill is not supported by Mana Whenua, again for similar reasons.

Outstanding Natural Landscapes/Features

There are several features in the vicinity of the site that will introduce consenting challenges.

- From previous experience, (for example, the Manukau Harbour Crossing consenting processes in around 2007-2008) it is expected that all options that involve new structures in the vicinity of Hopua tuff crater-Gloucester Park, will require careful consultation and design to manage consenting risks. This is a high profile area for the local community and while the issues are well understood, this will need to be carefully worked through in design and engagement with the community.
- The Aotea Sea Scouts building would need to be relocated for some options, and this has been assessed for feasibility with previous studies.

Reclamation

- All options that involve reclamation within the coastal environment will have a significant consentability risk due to the policy tests in the NZ Coastal Policy Statement.
- In short, the Supreme Court's decision in relation to Marlborough Sounds salmon farms interpreted the word "Avoid..." in the NZ Coastal Policy Statement as meaning "to prevent". Whilst this case related to Policy 13 and Policy 15, the principle of the meaning of the word "avoid" has significant implications under Policy 10: Reclamation.
- There are a number of policies in the NZCPS that the project would deliver on in a positive manner – in particular "Preservation of the Coastal Environment". These offer significant opportunities to demonstrate the benefits that the project could deliver for the coastal environment.

8.2.4. Summary of MCA Assessment

Combining the transport and non-transport areas, the MCA process considered 13 Key Results Areas. Each KRA is measured by a series of criteria, as reflected in Appendix N.

As reflected in Section 7.3.1, the transport KRAs are equivalent to the transport benefits, and are assessed using the measures in Table 4.1. Recall the transport benefits are:

- Benefit 1: An improvement in travel times and travel time reliability between businesses in the Onehunga–Penrose industrial area and State Highways 1 and 20.
- Benefit 2: An improvement in safety and accessibility for cycling and walking between Māngere Bridge, Onehunga, and Sylvia Park.
- Benefit 3: An improvement in journey time reliability for buses between SH20 and Onehunga town centre.

To reflect the additional detail in this assessment, the MCA criteria were judged against a 13 point scale:

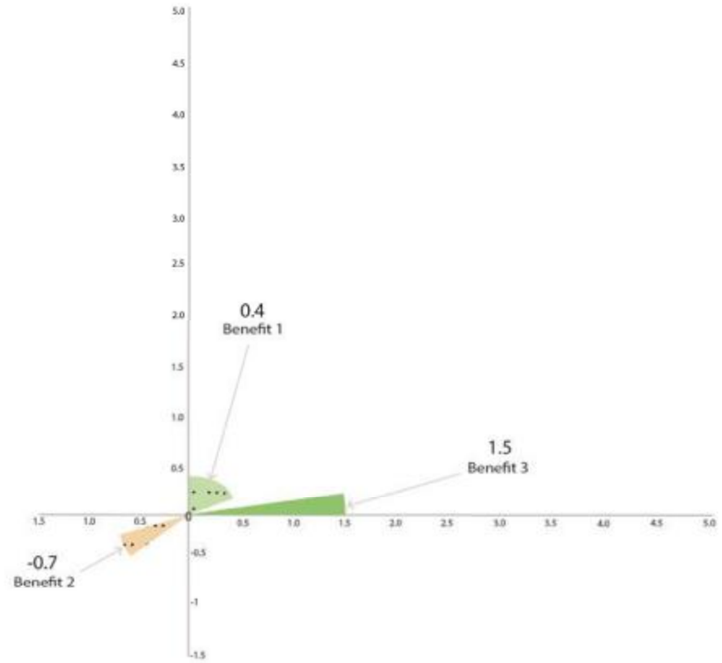
5	Significant Positive Outcomes
4	Highly Positive
3	Positive
2	More Than Minor Positive
1	Minor Positive
0	Neutral - No Change
-1	Minor Adverse
-2	More Than Minor Adverse
-3	Adverse
-4	Highly Adverse Effects
-5	Significant Adverse effects

Within the MCA framework, each of the shortlisted options was assessed against predefined criteria in a workshop on 4th November 2014. These assessments of each option are shown on the following pages. Note that costs reported in these tables are 50% estimates of real property + construction costs, rounded to the nearest $5M.

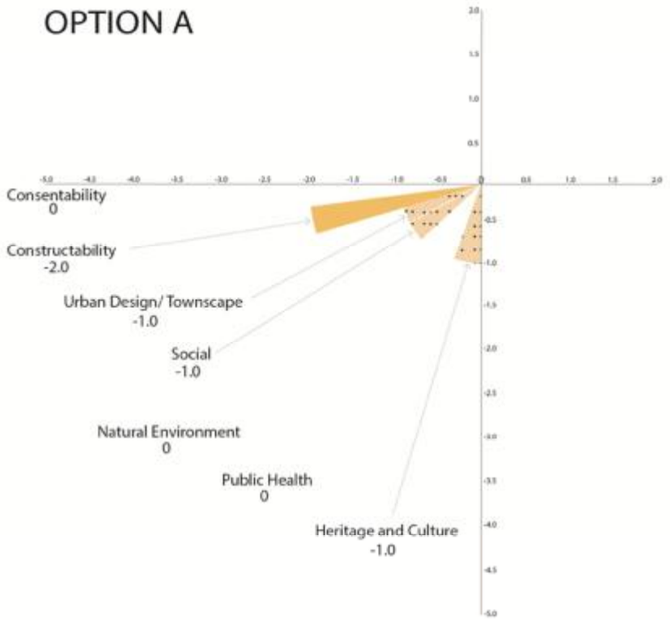
Detailed summaries of the MCA criteria scores that underpin the KRA scores presented are provided in Appendix N. A one page summary of each options assessment is presented in Appendix O.

Option A		Est cost: $150M
Key Result Area	Score	Comment
Transport Benefit 1	0	The improved connection to SH20 attracts more traffic into the Neilson/Church corridor, making it more difficult for local business access to properties. No improvements to SH1 connection
Transport Benefit 2	-1	The cycle/pedestrian connection to Sylvia Park is via limited enhancements to the existing on-road route via Hugo Johnston Drive and Church St East (then connecting to the SEART cycle path). Increased traffic volumes may challenge safety.
Transport Benefit 3	2	The improved access to SH20 (via the auxiliary lanes and upgrades at the Onehunga Mall / Neilson Street intersection) provides improved connectivity to SH20.
Consentability	0	Low risk (due to low change).
Constructability	-2	Moderate (or more than minor adverse) disruption of existing business as all construction works on existing corridors.
Urban Design and Townscape	-1	Some increase in adverse effects for urban design with greater severance of Onehunga Town Centre by Neilson Street (existing issue reinforced)
Social	-1	Existing issues of community connectivity (because of traffic through Onehunga) exacerbated with use of Neilson Street – minor adverse impacts.
Natural Environment	0	As this option relies on existing networks, the potential effects are minor increase over existing. Road widening through Waikaraka area has the potential for some 'accidental discovery' of historic heritage.
Public Health	0	
Cultural and Heritage	-1	

Transport summary

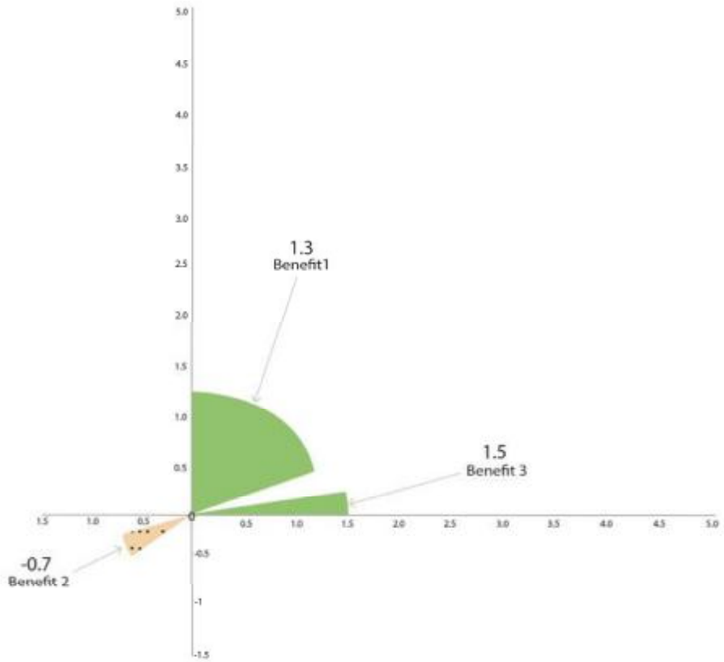


Non-transport summary



Option B		Est cost: $435M
Key Result Area	Score	Comment
Transport Benefit 1	1	Connections to SH1 and SH20 improved. However, significant increase in traffic attracted to the existing corridor, which somewhat limit the endurance of the network benefits.
Transport Benefit 2	-1	The cycle/pedestrian connection to Sylvia Park is via limited enhancements to the existing on-road route via Hugo Johnston Drive and Church St East
Transport Benefit 3	2	Improvements to journey time reliability for buses between SH20 and the Onehunga Town Centre.
Consentability	-5	The consenting risks are considered high to very high given the values of and impacts to Mutukaroa-Hamlins Hill.
Constructability	-4	Construction is considered very challenging, e.g. at Great South Road, over SH1 and with the SEART connection. Business disruption during construction also highlighted.
Urban Design and Townscape	-3	The significant increase in traffic flows along existing roads will exacerbate impacts on urban form in Onehunga and functioning of town centre. Visual impacts at SEART for residential properties is also identified as adverse,
Social	-3	Adverse impacts include: loss of and impacts on open space / recreation areas (particularly Mutukaroa-Hamlins Hill), adverse impacts on employment due to the significant increase in traffic volumes on Neilson Street / Church Street (impacting business access / functioning)
Natural Environment	-4	Adverse impacts on Mutukaroa-Hamlins Hill area including landscape and visual effects
Public Health	-1	Increased vehicles in existing corridor make noise/air quality impacts slightly worse than status quo.
Cultural and Heritage	-5	Impacts on Mutukaroa-Hamlins Hill have adverse effects related to heritage and historic significance and cultural impacts (both in terms of historic heritage but also cultural associations and current management structures for this reserve). This area is identified as waahi tapū.

Transport summary



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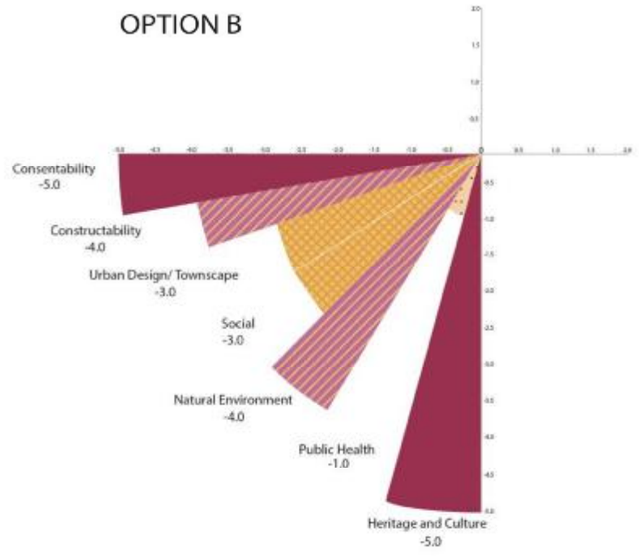
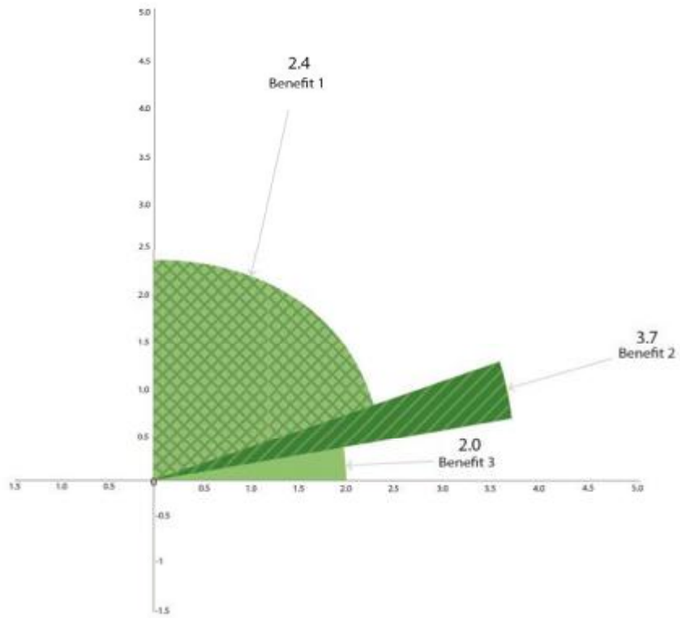


Option C		Est cost: $650M
Key Result Area	Score	Comment
Transport Benefit 1	2	Connections to SH1 and SH20 improved and Church St traffic reduced. However, Western Neilson St expected to somewhat limit the endurance of the network benefits.
Transport Benefit 2	4	Improved connections for pedestrians and cyclists, particularly along the Waikaraka cycleway to Sylvia Par. Mostly off-road.
Transport Benefit 3	2	Improvements to journey time reliability for buses between SH20 and the Onehunga Town Centre.
Consentability	-2	Key issues include potential works at the foreshore, particularly for any foreshore reclamation which has a high policy test. Other areas of consenting risk or challenge include works around Anns Creek (ecological area) and the multiple designations along the route.
Constructability	-3	Constructability issues include: disruption during construction and complexity of works around the Transpower towers; the complexity of works over closed landfills (contaminated land impacts identified).
Urban Design and Townscape	-1	The Neilson St corridor results in fragmentation of the Onehunga centre. However, benefits include the separation of through traffic and the Onehunga Mall / town centre area at the Onehunga Mall / Neilson Street intersection.
Social	-2	Potential issues for severance of the community across Neilson Street, particularly to access some key community sites including the Waikaraka walkway, Waikaraka Park and the cemetery as well as adverse impacts associated with the section of the corridor parallel to the Waikaraka cycleway. Improved connectivity with cycleway path access to Sylvia Park is identified as a benefit.
Natural Environment	-2	Impacts on Anns Creek and some increased reclamation at Onehunga foreshore around the tuff ring.
Public Health	0	Specialist design will need to be employed for all works on land that has been filled and where contamination is present.
Cultural and Heritage	-2	Potential disruption of historic heritage as a result of works in the area of Waikaraka Park (northern and eastern side of the Park area).

Transport summary



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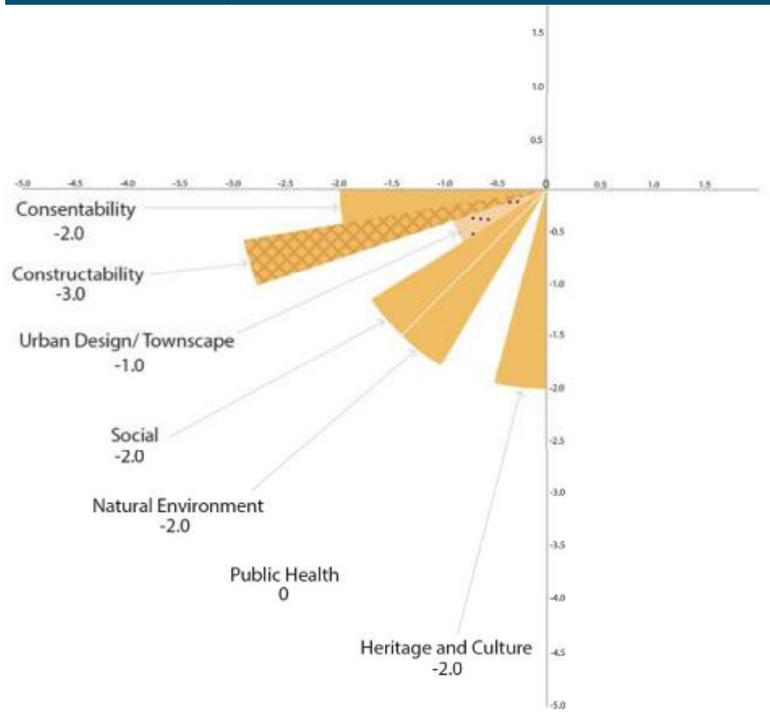
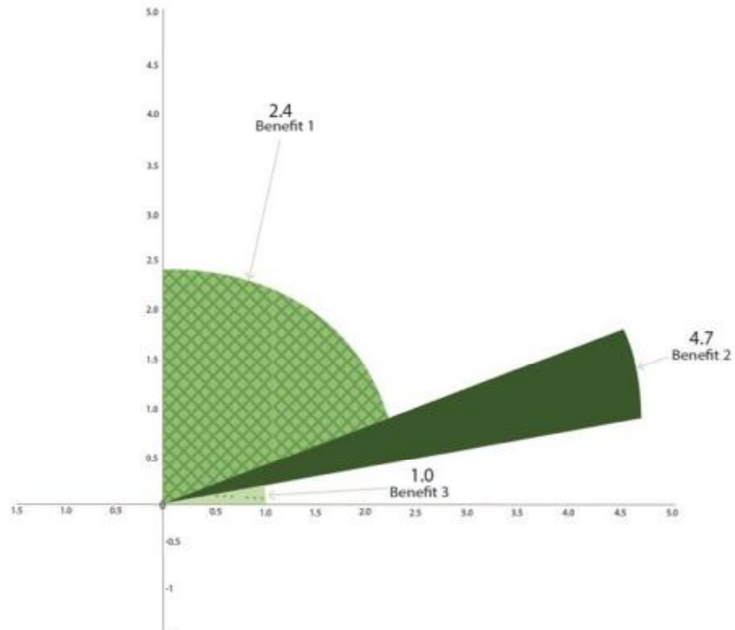


Option D		Est cost: $730M
Key Result Area	Score	Comment
Transport Benefit 1	2	Connections to SH1 and SH20 improved and Church St traffic reduced. However, Western Neilson St expected to somewhat limit the endurance of the network benefits.
Transport Benefit 2	5	Improved connections for pedestrians and cyclists, particularly along the Waikaraka cycleway to Sylvia Par. Mostly off-road.
Transport Benefit 3	1	Improvements to journey time reliability for buses between SH20 and the Onehunga Town Centre, though Gloucester Park Interchange increases movement into Town Centre in some cases.
Consentability	-3	Key issues include potential works at the foreshore, particularly for any foreshore reclamation (Onehunga and Māngere Inlet) which has a high policy test. Other areas of consenting risk or challenge include works at Gloucester Park (Hopua Tuff Ring), around Anns Creek (ecological area) and the multiple designations along the route.
Constructability	-4	The Neilson St corridor results in fragmentation of the Onehunga centre. However, benefits include the separation of through traffic and the Onehunga Mall / town centre area at the Onehunga Mall / Neilson Street intersection.
Urban Design and Townscape	-2	Potential issues for severance of the community across Neilson Street, particularly to access some key community sites including the Waikaraka walkway, Waikaraka Park and the cemetery as well as adverse impacts associated with the section of the corridor parallel to the Waikaraka cycleway. Improved connectivity with cycleway path access to Sylvia Park.
Social	-2	Impacts on Anns Creek and some increased reclamation at Onehunga foreshore around the tuff ring and scale / severance issues for scale of works at Onehunga / Gloucester Park.
Natural Environment	-3	Specialist design will need to be employed for all works on land that has been filled and where contamination is present. Foreshore reclamation at Onehunga will require further design and assessment.
Public Health	0	The Neilson St corridor results in fragmentation of the Onehunga centre. However, benefits include the separation of through traffic and the Onehunga Mall / town centre area at the Onehunga Mall / Neilson Street intersection.
Cultural and Heritage	-2	Potential disruption of historic heritage as a result of works in the area of Waikaraka Park (northern and eastern side of the Park area). Cultural values of Onehunga foreshore area with Gloucester Park interchange.

Transport summary



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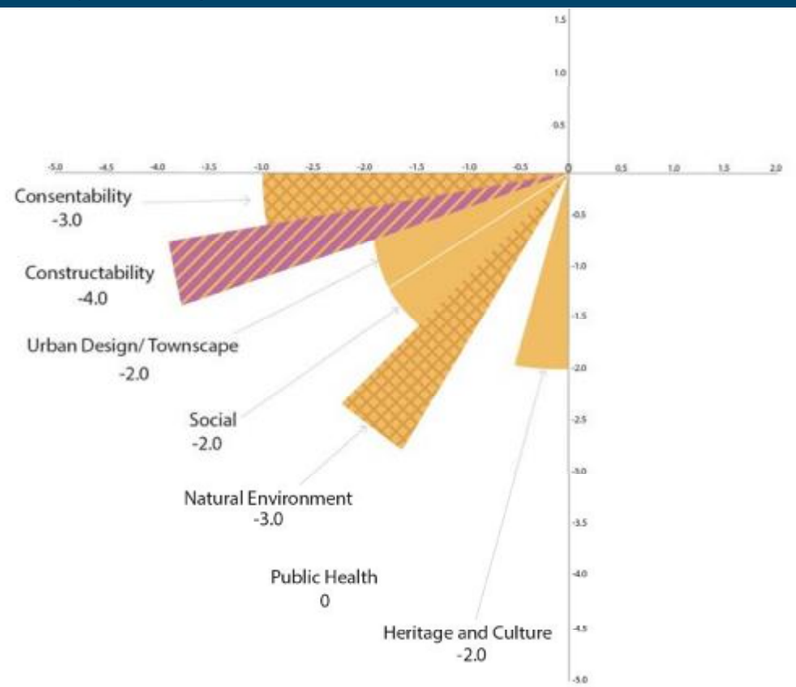
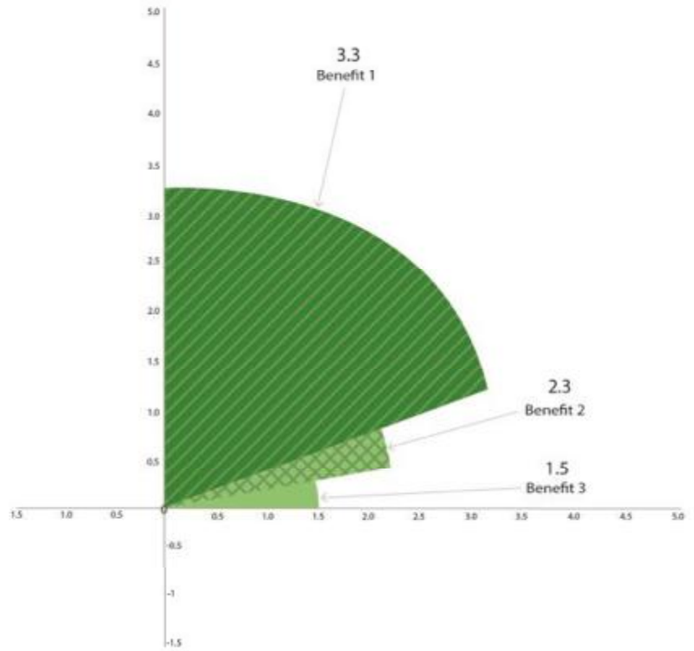


Option E		Est cost: $835M
Key Result Area	Score	Comment
Transport Benefit 1	3	Notably improves travel time savings and travel reliability between Onehunga – Penrose area and SH1 and SH20
Transport Benefit 2	2	Improved connections for pedestrians and cyclists, particularly along the Waikaraka cycleway to Sylvia Park are identified, with the potential for this to also improve connections to Mutukaroa / Hamlins Hill
Transport Benefit 3	2	There is reduced congestion for buses accessing Onehunga from SH20, and reduction in traffic at the Onehunga Mall/ Neilson St intersection.
Consentability	-5	Key issues include potential works at the foreshore, particularly for any foreshore reclamation which has a high policy test. Other areas of consenting risk or challenge include works at Gloucester Park (Hopua Tuff Ring), and around Anns Creek (ecological area).
Constructability	-4	Issues include: disruption during construction and complexity of works around the Transpower towers and high pressure gas main. The works over closed landfills are considered complex.
Urban Design and Townscape	-3	Gloucester Park interchange has adverse impact on visual and amenity impacts for the Onehunga town centre and connectivity to the foreshore.
Social	-4	Major impacts relate to business / employment land losses and residential property / community impacts at the eastern end of the project. Other issues or potential impacts relate to impacts on Waikaraka Cycleway and at the cemetery.
Natural Environment	-4	Gloucester Park interchange has adverse impact on the Hopua Tuff Ring / Onehunga foreshore, impacts at Anns Creek also significant.
Public Health	-1	Specialist design will need to be employed for all works on land that has been filled and where contamination is present (contaminated land works will be complex). Air quality & noise impacts on Panama Rd residents.
Cultural and Heritage	-4	Gloucester Park interchange has adverse impact on the Hopua Tuff Ring and works in the area of Waikaraka Park have potential disruption of historic heritage. Potentially undiscovered archeological in Eastern areas and identified areas of cultural values at Panama Road

Transport summary



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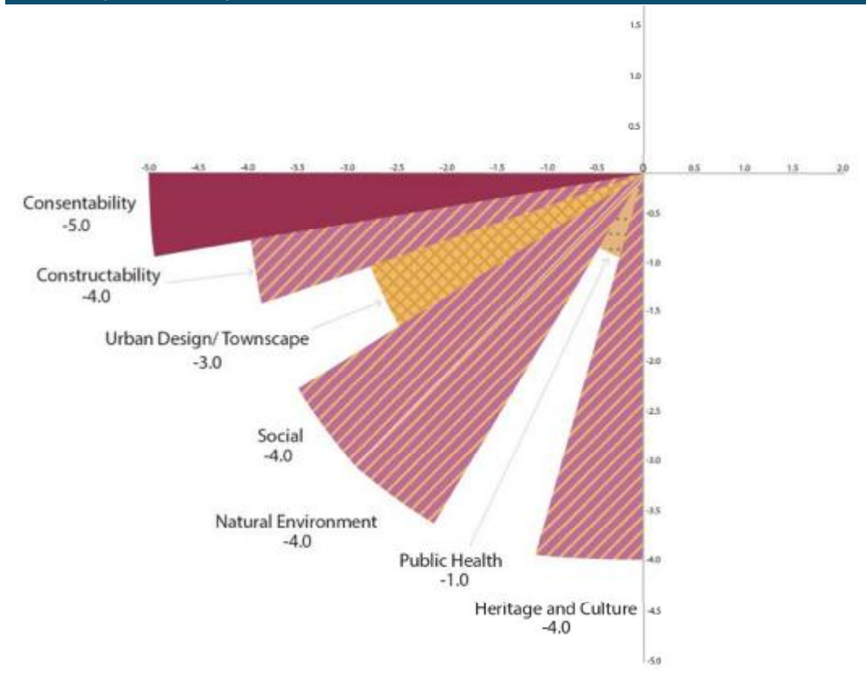
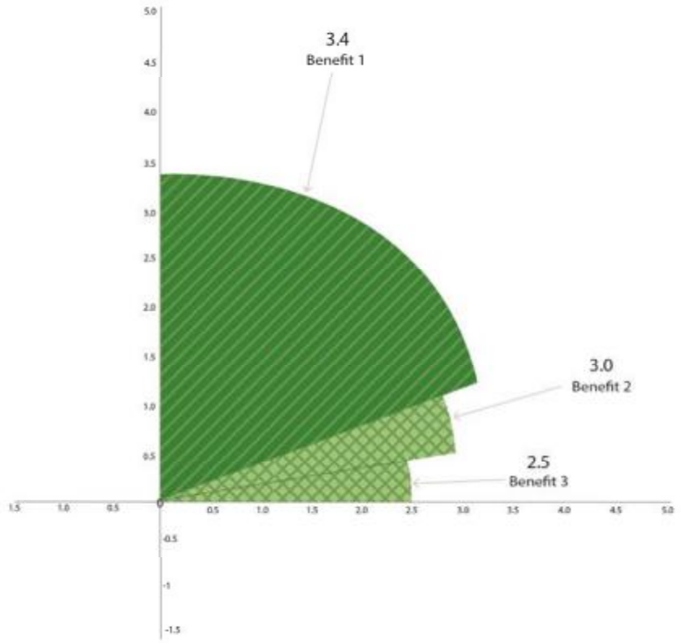


Option F		Est cost: $800M
Key Result Area	Score	Comment
Transport Benefit 1	3	Notably improves travel time savings and travel reliability between Onehunga – Penrose area and SH1 and SH20, directly linking to SH1 south via Great South Rd. Benefits are likely to be highly enduring.
Transport Benefit 2	3	Improved connections for pedestrians and cyclists, particularly along the Waikaraka cycleway to Sylvia Park are identified, with the potential for this to also improve connections to Mutukaroa / Hamlins Hill
Transport Benefit 3	3	Significantly reduced congestion for buses accessing Onehunga from SH20, and reduction in traffic at the Onehunga Mall/ Neilson St intersection.
Consentability	-4	Key issues include potential works at the foreshore, particularly for any foreshore reclamation which has a high policy test. Other areas of consenting risk or challenge include works at Gloucester Park (Hopua Tuff Ring), around Anns Creek (ecological area) and the multiple designations along the route.
Constructability	-4	Issues include: disruption during construction and complexity of works around the Transpower Towers (SH1 and Sylvia Park Road).
Urban Design and Townscape	-2	Gloucester Park interchange has adverse impact on visual and amenity impacts for the Onehunga town centre and connectivity to the foreshore.
Social	-2	Gloucester Park interchange has business and open space impacts in this area and works impact on Waikaraka Park (cemetery & park lands). Benefits from separation of through traffic and the Onehunga Mall / town centre area.
Natural Environment	-4	Gloucester Park interchange has adverse impact on the Hopua Tuff Ring. Reclamation required over basalt rock exposed at the Onehunga foreshore. There are potential work impacts on Waikaraka Park.
Public Health	2	Significant traffic volumes diverted from residential areas, improving air quality and noise. Specialist design will need to be employed for all works on land that has been filled and where contamination is present.
Cultural and Heritage	-3	Gloucester Park interchange has adverse impact on the Hopua Tuff Ring and works in the area of Waikaraka Park have potential disruption of historic heritage.

Transport summary



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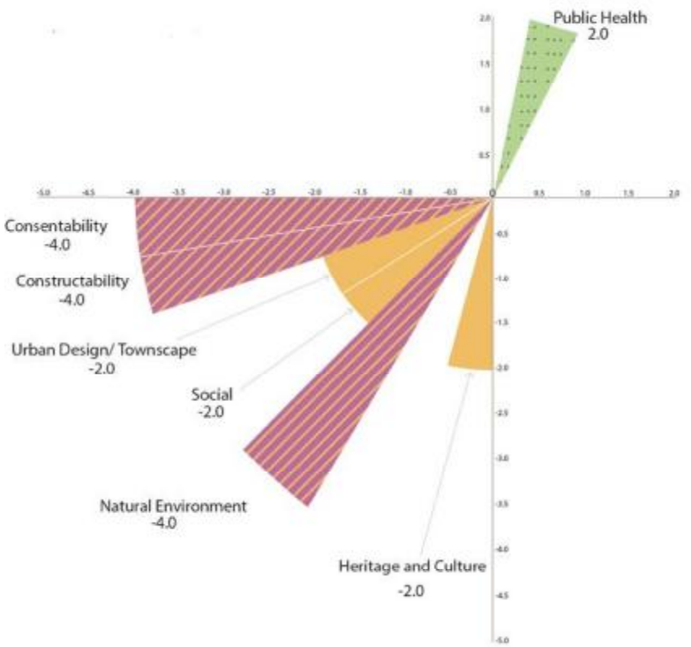


TABLE 8.2: SUMMARY OF MCA ASSESSMENT SCORES ACROSS OPTIONS

Key Result Area	Option A	Option B	Option C	Option D	Option E	Option F	Comment
Transport Benefit 1	0.4	1.3	2.4	2.4	3.3	3.4	Options E & F offer greatest connectivity between the freight hub and SH1/SH20.
Transport Benefit 2	-0.7	-0.7	3.7	4.7	2.3	3	Options C & D offer direct and mostly off-road cycle options.
Transport Benefit 3	1.5	1.5	2	1	1.5	2.5	All options improve journey time reliability for buses between SH20 and Onehunga town centre.
Consentablility	0	-5	-2	-3	-5	-4	Mutukaroa/Hamlins Hill (Option B) and foreshore reclamation (Options E & F) present major consenting challenges.
Constructability	-2	-4	-3	-4	-4	-4	The presence of existing designations and business disruption from construction impacts the constructability of Options B-F to some degree.
Urban Design and Townscape	-1	-3	-1	-2	-3	-2	Visual impact of SEART ramps in Option B and Gloucester Park Interchange in Options D-F. .
Social	-1	-3	-2	-2	-4	-2	Options B & E reinforce fragmentation of residential areas.
Natural Environment	0	-4	-2	-3	-4	-4	Negative impacts on Mutukaroa in Option B and foreshore reclamation (Option E & F).
Public Health	0	-1	0	0	-1	2	Option F diverts traffic from major residential areas, air quality & noise benefits.
Cultural and Heritage	-1	-5	-2	-2	-4	-3	Mutukaroa (Option B) and likely undiscovered sites on Eastern areas in Option E.

8.2.5. Traffic Demand Management Assessment

Traffic demand management considered at the IBC stage focused on the potential for traffic management (physical or ITS based vehicle priorities) and/or road tolling/pricing to influence the scale or form of project. As described in Section 7.1, regional level plans and policies for travel demand have been assumed within the do minimum scenario, and are therefore already reflected in lower traffic demands used across the options assessment.

The following traffic demand management tools have been considered:

1) Ramp signal bypass lanes

   It is assumed existing truck (and transit) bypass lanes of the ramp signals on the two SH20 motorway on-ramps at Neilson St are retained, as with the bypass lanes on the SH1 on-ramps at SEART and Mt Wellington. All options were assumed to include bypass lanes on new ramps, so these have already been included in the MCA assessment, and are not discussed further in this section.

2) Freight-only motorway ramps

   Conceptually these are feasible, providing adequate signage and enforcement can be provided to avoid potential safety concerns. The potential application of these in relation to the shortlisted options is considered further in this section.

3) Arterial freight lanes

   Arterial freight lanes are a similar design concept to arterial bus/transit lanes, and are most successful when deployed on sections of arterial road with no or limited property access to minimise conflicts created by turning vehicles within and across the lane. Given the high density of required property access on some key sections of the existing corridor (Neilson St, Gt South Road and parts of Church St) the high proportion of trucks turning to/from the freight lanes would create significant conflicts with vehicles in general traffic lanes as well as in the freight lanes. The design requirements to accommodate turning trucks to/from such freight lanes would require substantial additional lane/shoulder width, beyond that which is available in these corridors. Some limited application could be feasible on Church St (east of Neilson St) or at some key intersections. These would not be expected to materially alter the footprint of the project and are not explicitly considered further in this section.

4) ITS-based truck pre-emption

   ITS solutions are available that provide for priority vehicles to pre-emptively activate traffic signals. Such facilities are not considered suitable here in the existing corridors due to the very high volume and dispersed movements of trucks. The approximately 5000 trucks per day already on Neilson St would typically equate to some 8 trucks per minute arriving from multiple direction at the traffic signals. It would not be feasible to provide favourable green phases to all such movements. These tools are not considered likely to materially alter the scale or choice of preferred option and are not explicitly considered further in this section.

5) Road tolling

   Vehicle-specific tolling is an existing tool with the ability to influence demands, despite existing toll roads in NZ largely being tolled for revenue generation rather than demand management. The following considerations have been used regarding tolling for this analysis:

a) Current legislation effectively only permits tolling of new roads, not existing roads

b) Current legislation also requires provision of a feasible alternative (untolled) route

c) The current toll system used by the Transport Agency requires extensive infrastructure (toll gantries) and has transaction costs based on each toll gantry used. This means that use of multiple gantries involves both high capital cost to install and high transaction costs where vehicles pass through multiple gantries

d) The existing NZ toll roads charge higher tolls for trucks than light vehicles. To prioritise freight movement in this area (and discourage unwanted through traffic), it is likely that light vehicles would be targeted with higher tolls

e) The current tolling system would therefore make targeting of selected movements (e.g. through traffic) very difficult or inefficient. A GPS-based system would permit more targeted pricing of specific vehicles using specific sections of roads, however new legislation and technology advancement would be required for this to be achievable.

This section explores the potential for use of tolling as a traffic demand management tool within the shortlisted options. Consideration of the potential role for tolling (if any) in relation to the recommended option will take place in the DBC.

Traffic demand management assessment by option

The assessment of traffic demand management opportunities was undertaken at a concept level, and therefore the options were considered within three broad categories:

- In-corridor: Options A and B
- Partial new corridor: Option C and D
- Full new corridor: Option E and F

High-level assessment outcomes are provided in Table 8.3.

TABLE 8.3: ASSESSMENT OF TRAFFIC DEMAND MANAGEMENT OUTCOMES BY OPTION CATEGORY

Option Category	Assessment outcome
In-corridor	Both freight only ramps and tolled ramps have similar outcomes: • An improvement in travel time and reliability to/from the industrial area for trucks freight vehicles; and • A significant deterioration in travel time and increased congestion in trips to/from the industrial area for general traffic. Application of traffic demand management measures would not be likely to alter the scale of infrastructure required for an in-corridor option, nor improve its overall outcomes relative to other options.
Partial new corridor	Tolling demand management is unlikely to deliver large scale demand benefits as congestion/reliability improvements on tolled sections of the route are likely offset by increased congestion on non-tolled alternative routes (including those areas where diverted traffic from existing routes was a major benefit). The Southdown link and/or new SH1 ramps are not deemed suitable for freight-only access as light vehicle traffic from the Neilson/Church corridor would remain high and subsequently desired outcomes would not be achieved. Inclusion of targeted freight lanes within the existing footprint of key locations such

	as Church St/Greatt South Road should be considered at the detailed design stage.
Full new corridor	Despite the full new corridor being the most conducive to of the categories tolling due to the high potion of new road, it is likely tolling demand management will lead to congestion/reliability improvements on tolled sections of the route but increase congestion and decrease endurance on non-tolled alternative routes. Similar to above, freight only access as Southdown/Captain Springs Road/new SH1 ramps is deemed to be inconsistent with achieving relief of traffic volumes on existing corridors. Inclusion of targeted freight lanes within the existing footprint of key locations such as Church St/Great South Road should be considered at the detailed design stage.

Traffic demand management assessment conclusions

- Tolling under existing legislation and with existing technology used in NZ does not provide the ability to target specific movements for demand management. It would therefore be difficult and expensive to implement due to the wide range of movements within the corridor, associated with various functions including property access, local traffic distribution and through traffic.
- Targetted tolling of route components, specifically new roads, may provide some benefit to freight traffic through increased reliability of travel times but at significant cost to general traffic. It is likely general traffic demand would remain on existing corridors which would lead to significant deterioration in travel time, decreased amenity in residential areas and decreased endurance of the network. These outcomes are not favourable in relation to the transport measures used to assess the EWC options.
- Freight only access on new state highway ramps and key connections to new corridors (i.e. Southdown and Captain Springs Rd), is not conducive to realisation of the project benefits. Despite some potential benefit to freight traffic from freight only route components, general traffic will face additional congestion on existing routes and overall accessibility and network endurance will be reduced.
- Opportunities to include priority lanes at key intersections should be considered at the more detailed design phase. These should target areas of reduced or low traffic load, such as expected at the Church St/Great South Road intersection and new intersections in Options C-F.

In conclusion, traffic demand management will not materially reduce the required scale of the option, or alter the choice of one option over another.

8.2.6. Uncertainty Assessment

A qualitative assessment was undertaken to understand the level of uncertainty associated with the growth assumptions. The assessment considered the impact of uncertainty on the scale and timing of the project, and whether the selection of the recommended option would change.

The project, through the business case approach, is aimed at addressing the problems identified in Section 4.4. It is important to note that the problems in the study area are current problems, not anticipated future problems. Traffic growth assumptions have been made in order to model the transport performance of the options and assess how well each option addresses the identified problems. Traffic growth assumptions are largely a function of:

- Demand growth: Including assumptions regarding population growth, employment growth, land use and travel demand management.
- Network capacity: Including assumptions regarding forthcoming network upgrades.

Uncertainty of growth forecasts

The impact of regional growth assumptions is a major consideration for the EWC project. Previous analysis of the EWC project area has shown higher degree of sensitivity to wider regional growth as opposed to local growth (within the study area). Approximately 50% of the future increased traffic demands in this area arise due to population and employment growth within the area, and the remainder due to growth in the wider Auckland region. This high sensitivity to regional growth is a function of a number of factors, including:

- The study area being located across the only north-south routes joining the northern and southern parts of Auckland;
- The progressive development of the Western Ring Route which continues to strengthen the strategic regional function of this part of the network; and
- The economic function of the area as a regional freight and logistics hub.

The impacts of each of the key assumptions contributing to traffic growth forecasts are outlined in the table below.

TABLE 8.4: ASSUMPTIONS CONTRIBUTING TO TRAFFIC GROWTH FORECASTS

Population growth	Potential impact on options assessment: Low
Population growth forecasts have been taken from Statistics New Zealand medium growth projections. Actual population growth for the Auckland Region has generally been in line with the medium-growth forecasts. • If growth forecasts were higher, there would be an increased urgency for the project and stronger preference for a high scale (full corridor) option. • If growth forecasts were lower, there would be decreased preference for immediate delivery of a high scale option, with stronger preference for lower scale options or staged delivery of a high scale option. Given the realised growth could be higher or lower than the medium growth forecast, the population growth uncertainty is unlikely to impact the selection of the recommended option from the short list.	
Employment growth	**Potential impact on options assessment: Low**
Employment growth forecasts have been taken from Statistics New Zealand's medium growth projections. Within the study area the forecast growth is relatively low, but as noted above, the role of the area as a freight and logistics hub means local employment is not a key driver of traffic growth. • If growth forecasts were higher, there would be a marginally stronger preference for a high scale (full corridor) option. • If growth forecasts were lower, there would be a marginally stronger preference for lower scale options or staged delivery of a high scale option. There appears to be equal risk of higher than predicted employment growth rather than lower than predicted growth. The uncertainty will not impact the identification of a recommended option from the short list.	
Land use	**Potential impact on options assessment: Medium/High**
Assumptions around land use patterns are consistent with the Proposed Auckland Unitary Plan.	

Potential changes in patterns of land use introduce an element of uncertainty within the project area. Land use changes, once known, have the potential to impact the desirability of one option over another. The uncertainty of potential land use changes is inherent in any long term infrastructure planning. Modelling a range of unplanned land use scenarios is unlikely to deliver additional benefit at this stage of the analysis.
Traffic demand management — **Potential impact on options assessment: Medium**
Regional strategies and policies to manage travel demand (travel plans, telecommuting, parking constraints etc.) have been included in the do minimum scenario. The estimated impact of the travel demand management assumptions is a reduction in regional vehicle travel by up to 7%. • If travel demand management was less effective, there would be a stronger preference for a high scale (full corridor) option. • If travel demand management was more effective, there would be a marginally stronger preference for lower scale options or staged delivery of a high scale option. Given equal likelihood of travel demand management impacts being higher or lower than forecast, the uncertainty is unlikely to impact the selection of a recommended option.
Network capacity — **Potential impact on options assessment: Low**
Key network assumptions derived from planned investment in other parts of the network could affect demand in this area including widening of SH20 north of the project area, regional PT upgrades (including CRL) and completion of the Western Ring Route (see Section 7.2 and Appendix F for further detail). Demand assumptions for these projects have been included in the transport model and within the do minimum scenario. On balance it is not considered likely that the demand implications are highly sensitive to network assumptions, and therefore the uncertainty of network assumptions is unlikely to impact the selection of a recommended option.

Conclusion of uncertainty analysis

The presence of uncertainty does not lead to a preference of one option over another as there is generally a trade-off between conflicting outcomes. For instance, low scale options typically have more certain outcomes but risk becoming poorer long term investments if additional major investment is required in the future (in what may be a more constrained environment). In comparison, high scale options deliver enhanced resilience but present a risk of sub-optimal investment timing if excess capacity is created.

The sensitivity of key assumptions will be tested in more detail as part of the DBC.

8.3. Recommended Option Identification

The six options all respond to the identified transport problems in the Onehunga-Penrose area. The options cover a range through from upgrades to existing corridors, to new local roads, and new state highways through to an almost completely new corridor. Two of the options include a new connection which extends the full length between SH1 and SH20.

The MCA evaluation considered transportation performance, consentability, constructability and social and environmental issues. The six options were all evaluated individually (rather than relative to each other). The MCA evaluation and scoring informed discussion surrounding the option recommendation.

TABLE 8.6: SUMMARY OF OPTIONS

Option A	Performs at a level just above the "do minimum". It does the least to respond to the transport problems in the area. Unlikely to have notable adverse environmental effects.
Option B	Provides improved connections to SH1 and SH20, however, works against the problems it's trying to resolve by attracting very high traffic volumes to the Neilson/Church corridor. This undermines time savings for local trips due to difficulty accessing and leaving properties. It has significant risks associated with constructability and consentability due to encroachment into the Mutukaroa-Hamlins Hill Regional Park. This included negative responses in the heritage assessment and in engagement with Mana Whenua and the Department of Conservation..
Option C	Performs well and addresses the immediate problems and objectives. Performance is not enduring and by 2036 increased traffic volumes on the western section of Neilson St are predicted to make property access difficult. This option poses fewer consenting challenges than any of the options involving foreshore reclamation and still offers opportunities for improving the coastal edge, particularly in the vicinity of Anns Creek.
Option D	Performs marginally better than Option C but is more complex (than Option C) in terms of both consentability and constructability due to the form, scale, and reclamation required for the Gloucester Park Interchange and impacts associated with visual effects for Onehunga and reclamation in the Manukau Harbour. Offers similar opportunities for improving the coastal edge in the vicinity of Anns Creek and may offer additional opportunities to enhance linkages through to the new Onehunga foreshore project which is currently under construction.
Option E	Performs very well in transport terms, but has significant risks associated with constructability, consentability, and property acquisitions. This option is poorest overall performance from an environmental and social/community perspective. It is the only option that would have notable impacts on residential property. Whilst having high overall transport benefits, the scale of adverse social and environmental effects along with risks associated with consenting (due to NZ Coastal Policy Statement policy tests) are very significant.
Option F	Performs very well in transport terms, and addresses the longer-term issue of high traffic flows on the western section of Neilson St in an enduring way. It has the highest performance against transport criteria and amongst the highest economic benefits. It has the highest cost of all the options. This option has significant consenting risks associated with reclamation (due to NZ Coastal Policy Statement policy tests). However, the option also offers potential opportunities for environmental betterment (e.g. enhancing the Māngere Inlet foreshore environment, improving "naturalness" of the coastal edge, improved accessibility to the coastal marine area and, water quality

improvements). Responses in our stakeholder engagement (including engagement with Mana Whenua and the Department of Conservation) indicate that this option is worth pursuing further. However, the significant consentability risk exists.

In summary, the analysis concluded that Option F has superior transport performance and is more enduring. It best delivers the critical IBC outcomes of improved connectivity, travel time reliability including travel time savings of 4 to 7 minutes depending on route, and greater resilience along the Nelson/Church corridor (via removal of up to 10,000 vehicles per day). It has challenges with its higher cost and significant consenting risks. However, it also gives opportunities for positive environmental outcomes of great interest to key stakeholders (see Section 8.5). Further work is proposed at the DBC stage to determine how best to deliver option F. This will include consideration of staging, detailed consenting strategies, conceptual design refinement, and continued collaborative engagement with project partners.

8.4. Next Steps

The IBC recommends that the recommended options for Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections should proceed to a DBC with more detailed analysis with a focus on implementation:

- Developing more detailed design specifications for the options, including the design provisions for freight, public transport, walking and cycling access, to allow a more comprehensive assessment of the costs, benefits, opportunities and risks;
- Considering the potential for tolling and other alternatives to optimise the benefits achievable;
- Considering the impact of different growth and transport demand scenarios on the performance of the options and alternatives, as well as wider network impacts;
- Developing an implementation strategy for the project, including considering options for procurement, staging, consenting and property acquisition;
- Confirming a funding strategy for the project, including the respective allocations to the Transport Agency and AT; and
- Developing a management case to move the project through to pre-implementation.

8.5. Joint Working and Other Opportunities

Joint working with partners and stakeholders will be critical to ensure efficient progress of the projects. Organisational relationships that will affect the development and delivery of the preferred option include:

Transport Agency and AT - The ongoing relationship between these organisations is critical and they are expected to remain project partners through to project completion. Close working relationships at project delivery, governance and decision making levels will need to be maintained to ensure effective progress and delivery.

Auckland Council – Will continue to be actively engaged in the project. The scope of involvement will expand as the project moves towards delivery. The engagement on strategic level issues will continue

to ensure alignment with Auckland Plan objectives is well understood. The development of the consenting strategy will increase the requirement to engage directly with AC's planning staff.

Transpower –Options C and F impact on Transpower. Close co-ordination and communication between the project partners (and their consultants) and the appropriate representatives of Transpower will be maintained to ensure that implications for all parties are clear, and that all parties are able to work together to achieve acceptable solutions.

Mana Whenua - Will continue to be actively engaged on the project and will be consulted with at appropriate times.

KiwiRail – Discussion will take place to ensure the impacts of Option C and F on KiwiRail are fully understood including property impacts, impacts on operations/site utilization (including Southdown) and impacts on NIMT and Eastern lines during construction. The importance of the third freight line from Wiri to Westfield to compliment the road freight accessibility to Westfield/Southdown means that KiwiRail have an important role in supporting the expected project benefits.

DOC – Will continue to be engaged surrounding the impact of the project on the Māngere inlet foreshore.

The following opportunities have been identified that identify the potential to achieve positive environmental outcomes:

- The contaminated land report has identified the potential opportunity to achieve a positive water quality outcome in areas of reclamation, whereby existing leachate and other discharges from historic land uses may be able to be captured and/or better managed.
- Engagement with Mana Whenua has also indicated support for an option that would improve the mauri of water in the Manukau Harbour, along with tidying up historical reclamation in order to achieve a better community outcome.
- Limited work has been undertaken on the future form, function and appearance of the foreshore area should Option F be progressed. This is identified as a substantial potential opportunity for further work and innovative thinking about what could be achieved to enhance (a) public accessibility to the foreshore; (b) active recreation and transport mode options; and (c) opportunity to create a biodiversity corridor.
- Engagement with the Department of Conservation has re-confirmed that there are opportunities for achieving great social and environmental outcomes in the area. Whilst reclamation remains an option that is generally not preferred by the Department, their team has acknowledged that they understand the challenges and are being considered as part of this project (including the policy tests).

9. ECONOMIC ASSESSMENT

- Chapter 9 sets out the economic assessment of the shortlisted options for the Onehunga-Penrose Connections and the preferred variant for the Māngere, Ōtāhuhu and Sylvia Park Connections following the Transport Agency methodology
- It also includes sensitivity analysis – of discount rates and growth assumptions

The following economic costs and benefits were estimated for the shortlisted options. This BCR analysis undertaken on the short list is undertaken at a level suitable for selecting the recommended options. It uses the full-procedures of the Transport Agency's Economic Evaluation Methodology (EEM), however there are some simplifying assumptions used for this purpose (see Appendix P) that will be refined for the DBC.

Note that the "base case" estimates presented here have a 40 year assessment period, a 6% discount rate, 25% agglomeration and 2036 models for growth. The sensitivity of the assessment to these assumptions is presented in Section 9.1. BCRs have been calculated for P50 and P95 costs.

TABLE 9.1: ECONOMIC ASSESSMENT OF OPTIONS (BASE CASE)

	Option A	Option B	Option C	Option D	Option E	Option F	FN32
Total Benefits ($M PV)[19]	850	1650	1500	1200	1600	1550	25
Net Costs ($M PV)[20]	200	500	700	750	850	800	20
NPV ($M)	650-700	1150-1200	775-825	475-525-	750-800	725-775	5
BCR (P50)	4.9	3.4	2.2	1.7	1.9	1.9	1.2
BCR (P95)	3.3	2.3	1.6	1.2	1.4	1.4	0.8

9.1. Sensitivity Testing

It is important to understand the risks for investment so there is a need to broadly consider the implications of a range of population, employment and land use forecasts. Earlier work undertaken for the PBC confirmed that the relative performance of options was not expected to be highly sensitive to the predicted rate of growth, with the ranking of options (in terms of annual benefits) remaining the same in 2026 and 2041. This suggests that the expected problems (and benefits), relate as much to regional-level growth as to local-level growth. This is consistent with the regional nature of the freight and logistics industry based in the area.

[19] Rounded to the nearest $50M
[20] Rounded to the nearest $50M

Tables 9.2-9.4 show sensitivity of the P50 BCR to different discount rates, analytical periods. The P95 sensitivities would show similar percentage variations.

TABLE 9.2: P50 BCR SENSITIVITY TO DISCOUNT RATE AND ANALYSIS PERIOD

	Option A	Option B	Option C	Option D	Option E	Option F	FN32
4% Discount Rate							
40-Year Period	6.8	4.6	3.1	2.3	2.7	2.7	1.2
30 Year Period	5.1	3.6	2.2	1.7	2.0	2.0	1.2
6% Discount Rate							
40-Year Period	4.9	3.4	2.2	1.7	1.9	1.9	1.2
30 Year Period	4.0	2.8	1.7	1.3	1.5	1.5	1.2
8% Discount Rate							
40-Year Period	3.7	2.6	1.6	1.2	1.4	1.4	1.3
30 Year Period	3.1	2.2	1.4	1.0	1.2	1.2	1.3

The base case used agglomeration of 25%, whilst the PBC calculated agglomeration in the range 32-34%.

TABLE 9.3: P50 BCR SENSITIVITY TO AGGLOMORATION RATE

Agglomeration rate assumption	Option A	Option B	Option C	Option D	Option E	Option F	FN32
15%	4.5	3.1	2.0	1.5	1.8	1.8	1.1
20%	4.7	3.2	2.1	1.6	1.9	1.9	1.2
25%	4.9	3.4	2.2	1.7	1.9	1.9	1.2
30%	5.1	3.5	2.3	1.7	2.0	2.0	1.3
35%	5.3	3.7	2.4	1.8	2.1	2.1	1.3

Growth assumptions rely on forecasts from the Auckland Regional Transport (ART) model. Further details on how these are utilised is provided in Appendix P.

TABLE 9.4: P50 BCR SENSITIVITY TO GROWTH RATE ASSUMPTION

Growth assumption	Option A	Option B	Option C	Option D	Option E	Option F	FN32
Use 2026 and 2036 Models	4.9	3.4	2.2	1.7	1.9	1.9	1.2
Use 2026 models with flat growth beyond	3.1	2.3	1.4	1.1	1.3	1.3	1.2
Accelerate growth 5 years: use 2026 models in 2021 and 2036 models in 2031	6.1	4.1	2.7	2.0	2.3	2.3	1.2
Slow growth 5 years: use 2026 models in 2031 and 2036 models in 2041	3.8	2.7	1.7	1.3	1.6	1.5	1.2

At the DBC stage, sensitivity to growth will be considered again for the preferred option via testing the economic spreadsheet (it is very rare for full modelling of multiple land use scenarios to be undertaken). Instead, the latest and historic land use forecasts will be reviewed and a range of changes and outcomes discussed.

9.2. Assessment Profile

The shortlisted options were assessed using the Transport Agency Investment and Revenue Strategy (IRS) profiles and the economic evaluation is based on the EEM. The shortlisted options had a range of assessment profile from H/H/H to H/H/L.

Estimated benefits are derived from the project traffic model developed for this work (the EWC SATURN model). That model derives its travel demands from Auckland Council ART3 model. The approach and assumptions for this evaluation is stated in Appendix H.

Subsequent to the identification of the short list options, more refined analysis was carried out on those options. This included some optimisation of design and transport models. Route 32 was added to the BCR calculations for all shortlisted options.

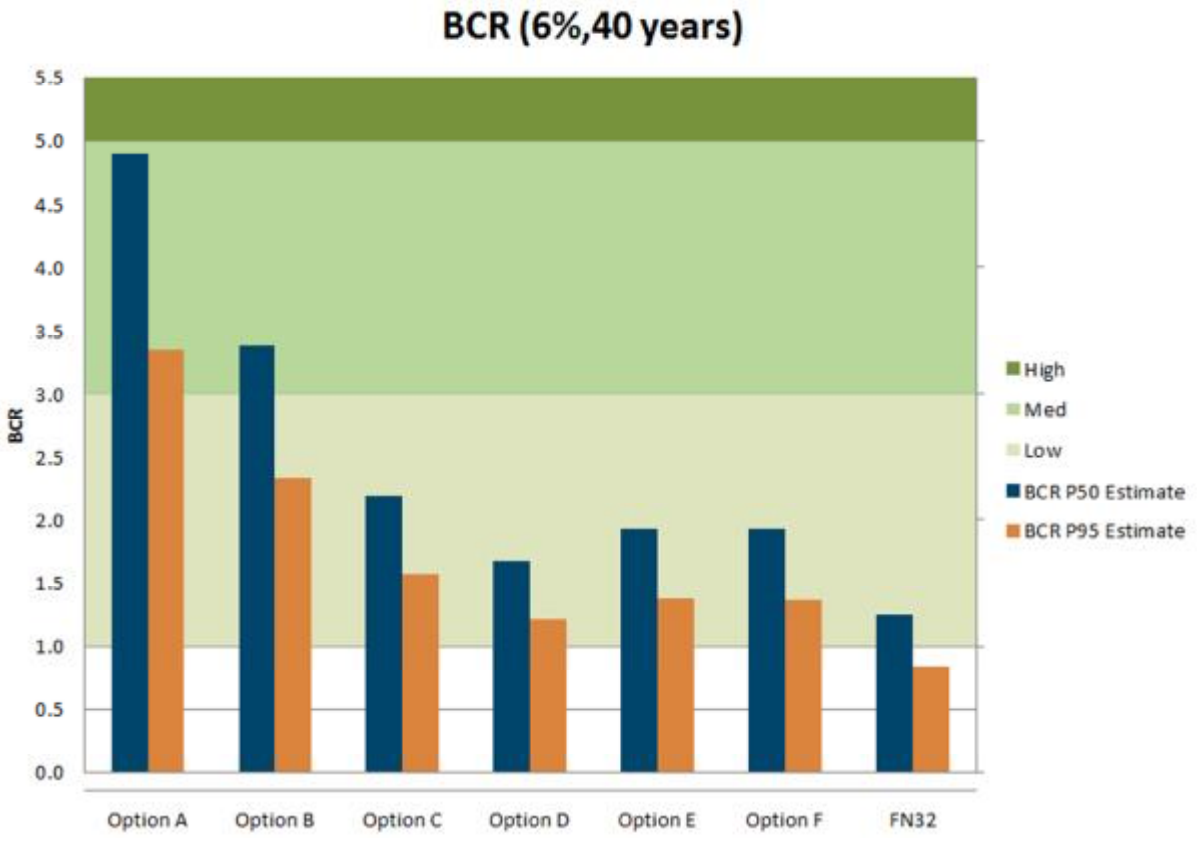
Following this optimisation, the long list was reviewed to identify whether the changes that were observed would have been likely to influence any of the other options to the extent that they should also proceed to the short list. The project team concluded that the short list remained robust.

TABLE 9.5: EWC SHORT LIST PROJECT'S RESPONSE TO THE IRS

Measure	IRS Assessment Criteria	Rationale of EWC shortlisted options
Strategic Fit (High)	New and improved infrastructure for state highways/local roads; potential for a nationally significant contribution to economic growth and productivity through significant improvements to (one or more): Journey time reliability Easing of severe congestion in major urban areas Relieving capacity constraints More efficient freight supply chains A secure and resilient transport network	The shortlisted options deliver improvements to targeted areas of congestion along high volume strategic urban routes. They target greater journey time reliability for freight, and providing improved connectivity especially along strategic freight routes and for strategic freight movements. Improvements to the linkages in the transport network will provide for greater network resilience of Auckland's key supply chains, both for goods coming into the region and national and international exports from Auckland.
Effectiveness (High)	Is a key component of the Transport Agency's supported strategy, endorsed package, programme or plan Is part of a whole of network approach Improves integration between transport modes Provides a solution that successfully integrates land transport, land use, other infrastructure and activities Supports networks from a national perspective Provides a solution that significantly contributes to multiple GPS impacts Is optimised against multiple transport outcomes and objectives	The EWC programme takes a one-system approach; is a joint AT/Transport Agency project considering potential state highway and local road solutions; considers better utilisation of the public transport network; and considers cycle connectivity and pedestrian safety and amenity. The project seeks to address the poor quality of transport choices to/from and within the study area, which is potentially hindering the development of liveable communities.
Efficiency (Low to High)	High: BCR greater than or equal to 5	The shortlisted Onehunga-Penrose Connections options achieve BCRs in the range from 1.7 to 4.9. Based on these BCRs, four options would

Measure	IRS Assessment Criteria	Rationale of EWC shortlisted options
	Benchmarking shows above-average efficiency (of cost-effectiveness) Medium: BCR greater than or equal to 3 and below 5 Benchmarking shows average efficiency (of cost-effectiveness) Low: BCR greater than or equal to 1 and below 3 Benchmarking shows below-average efficiency (of cost-effectiveness)	have a LOW efficiency profile of (between 1 and 3) and two would have a MEDIUM profile (between 3 and 5). The Māngere, Ōtāhuhu, Sylvia Park Connections project has a LOW BCR. The costs, benefits and net value of the shortlisted options are shown in Table 9.1.

FIGURE 9.1: BCR ESTIMATES OF SHORTLISTED OPTIONS



10. COMMERCIAL CASE

- Chapter 10 assesses the characteristics of the recommended option/s to inform the procurement strategy for the project by identifying a preferred delivery model
- This analysis will be confirmed during the DBC

10.1. Overview

This commercial case outlines the procurement considerations needed to identify the preferred procurement solution for the DBC stage of the Onehunga-Penrose Connections and the Māngere, Sylvia Park, Ōtāhuhu PT Connections.

In this IBC, the commercial case establishes a framework for determining the appropriate implementation strategy and approach for selecting the preferred procurement delivery model.

Whist the preferred procurement delivery model will ultimately be determined at the DBC stage, a preliminary assessment has been taken based on the preferred options selected at the IBC stage.

With respect to the Onehunga-Penrose Connections, this preliminary evaluation was completed for Options F as the preferred option (see Section 8 for a detailed description).

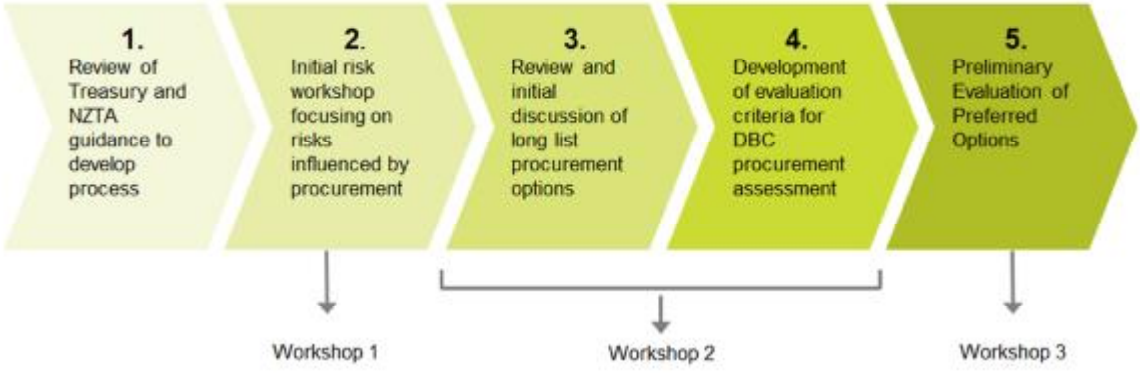
With respect to the Māngere, Sylvia Park, Ōtāhuhu PT Connections, this preliminary evaluation was completed for Variant B.

The details of the preferred delivery models (e.g. contractual terms, incentive structures, etc), have also not been considered at this stage with this assessment to form part of the DBC stage.

Methodology

The methodology for the evaluation framework was established through the IBC 'Commercial Case Process' (see Figure 10.1 below) during a series of participant workshop engagements. The Transport Agency's State Highway Procurement Strategy 2014 document was used as the basis for this methodology, although Treasury guidance was also reviewed to assess any significant differences.

FIGURE 10.1: COMMERCIAL CASE PROCESS



Whilst there are strong similarities between the Transport Agency's and Treasury's approach to procurement, subtle differences were identified. Most notably, the Transport Agency typically considers PPPs alongside other advanced procurement methods as part of its project characteristics analysis rather than as a separate procurement delivery model. In contrast, Treasury's guidance recommends separate gateway evaluation of PPPs based on specific hurdle criteria. The value for money test though remains an overriding principle under both sets of guidance.

10.2. Project Characteristics and Risks

A short description of the six shortlisted options for the Onehunga-Penrose Connections and the preferred option for the Māngere, Sylvia Park, Ōtāhuhu PT Connections is provided below. The potential for tolling is also noted, as this will create different implications for procurement should it be included as part of the preferred option at the DBC stage.

We note that Option F has been selected as the preferred option for the Onehunga-Penrose Connections.

TABLE 10.1: DESCRIPTION OF SHORTLISTED OPTIONS AND PROCUREMENT CONSIDERATIONS

Option	Description	Implications for Procurement
Option A	Existing route upgrade with freight lanes	• Option components are principally local roads • Approximate 2 year construction timeframe • No opportunity for tolling.
Option B	Existing route upgrade with new SH1 ramps at SEART	• Blend of state highway and local road components within option • Approximate 5 year construction timeframe • Limited opportunity for tolling
Option C	Galway St Link to SH20 with new inland route to new SH1 ramps at Mt Wellington	• Blend of state highway and local road components within option • Approximate 5 year construction timeframe • Possible opportunity for tolling, subject to further analysis
Option D	Galway St Link to new SH20 Interchange with NEW inland route to new SH1 ramps at Mt Wellington	• Blend of state highway and local road components within option • Approximate 5 year construction timeframe • Possible opportunity for tolling, subject to further analysis
Option E	New SH20 Onehunga Interchange with new	• Option components principally relate to state highways

Option	Description	Implications for Procurement
	foreshore route to new SH1 ramps near Panama road	• Approximate 6 year construction timeframe • Possible opportunity for tolling, subject to further analysis
Option F	New SH20 Onehunga Interchange with new foreshore/Inland route to new SH1 ramps at Mt Wellington	• Option components principally relate to state highways • Approximate 6 year construction timeframe • Possible opportunity for tolling, subject to further analysis
Māngere-Sylvia Park PT Option	On-road; bus (Option PT2 from Economic Case)	• Option components are on local roads. • AT to apply for funding to cover up to 50% of cost; Transport Agency to cover balance • 2 – 3 year construction timeframe

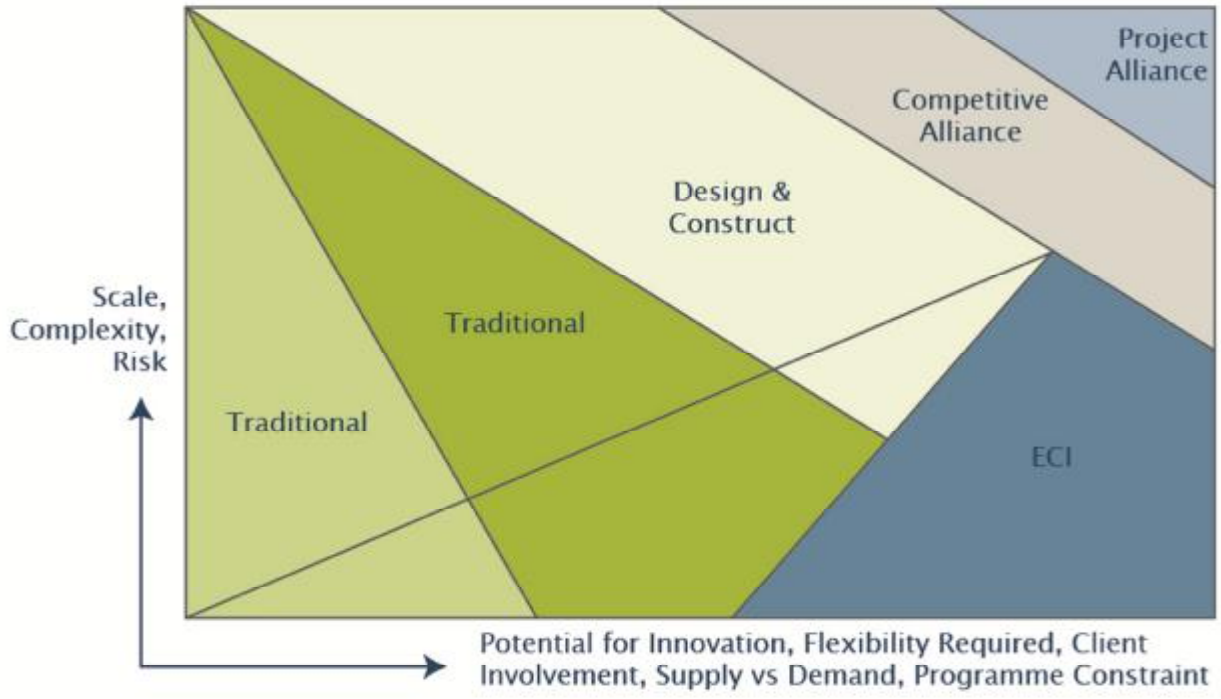
Risk Assessment

An important element of the evaluation framework is the identification and categorisation of specific project risks. During the participant workshops, a procurement risk register was established. This is effectively a subset of the wider project risk register and captures risks specifically relevant to the procurement process. All procurement risks identified through the workshops have been categorised and are described in Appendix Q.

10.3. Procurement Delivery Model Options

Figure 10.2 below illustrates the Transport Agency's state highway procurement model assessment process which categorises projects according to their scale, risk and complexity and further evaluates these factors against the potential for innovation, client involvement and risk transfer. The level of procurement model complexity increases diagonally from left to right.

FIGURE 10.2: TRANSPORT AGENCY'S STATE HIGHWAY DELIVERY MODEL PROFILES



Source: State Highway Procurement Strategy 2014

For the purposes of the preliminary evaluation, these methods were grouped into four categories:

TABLE 10.2: PROCUREMENT DELIVERY MODELS

Category	Asset Improvement Model	Recent Roading Examples
Traditional	• Design phase procured initially, followed by separate procurement of construction phase • Variants include Measure & Value, Lump Sum, Cost Plus	• Tauranga Harbour Link
Design Construct	• Bundled design and construct contract with a single supplier • Variants include Early Contractor Involvement (ECI)	• Manukau Extension
Pure Alliance	• Participants work as an integrated, collaborative team to deal with key project delivery matters	• Newmarket Viaduct
Competitive Alliances	• Participants work as an integrated, collaborative team to deal with key project delivery matters, with non-owner participants selected on a cost competitive basis	• Waterview • Manukau Harbour Crossing

Details of the advantages and disadvantages of these procurement delivery models based on Transport Agency guidance are provided in Appendix Q.

Public Private Partnerships

While not identified as a distinct procurement method in Table 10.2 above under Transport Agency guidance, public private partnerships (PPPs) are required to be considered as a potential procurement method for projects with whole of life costs in excess of $25M if the project requires Treasury funding / Cabinet approval. While the potential need for Treasury funding has not been confirmed, it is likely that PPPs will also need to be considered as a potential procurement delivery model at the DBC stage when the procurement delivery model is confirmed.

10.4. Procurement Evaluation Criteria

The evaluation framework for selecting the procurement delivery model is guided by the Transport Agency's existing protocols and in particular the Transport Agency's State Highway Procurement Strategy 2014 document.

Minor differences between the Transport Agency and Treasury's guidance for procurement evaluation criteria were identified during the workshops, although none were considered to affect the scope of the evaluation framework.

The eleven criteria noted in the Transport Agency's State Highway Procurement Strategy 2014 document will be used for procurement evaluation. These criteria together with an illustration of the scales to be applied to these criteria are outlined in Appendix Q of this IBC.

10.5. Packaging Option Components into Different Procurement Delivery Models

The Project is a combination of both State Highway and local road elements. As a consequence there is likely to be potential for the Project to be delivered by using more than one procurement delivery model.

An assessment as to whether better value for money might be achieved from separating delivery of the components into separate delivery 'packages' will be considered at the DBC stage, together with the potential for staging project delivery.

When considering the potential benefits for separating specific elements of a project into packages, the Transport Agency typically considers:

- Market dynamics
- Geographical spread
- Commonality of activity type
- Funding availability

An initial assessment of the potential for packaging was discussed during the workshop process, with the following preliminary conclusions reached:

- The preferred option for the Onehunga-Penrose Connections may benefit from the use of different procurement delivery models although this will be dependent on the staging of the components of the preferred option and will be determined at the DBC stage;
- In the interim and for the purposes of the preliminary procurement evaluation for the IBC, the Onehunga-Penrose Connections will be treated as a single package;
- While comprising both State Highway and local road elements, the Transport Agency and AT will coordinate together to procure the preferred option(s) in order to maximise scale benefits; and
- Procurement options for the Māngere, Sylvia Park, Ōtāhuhu PT Connections will be evaluated separately given the significantly different project characteristics.

10.6. Procurement Evaluation

As part of the workshop process, the participants evaluated the preferred option against the criteria on the following basis. Some of the criteria were split into two components to allow a more detailed assessment to be made.

For the purposes of this preliminary evaluation, Option F for the Onehunga-Penrose Connections has been assessed on a standalone basis. As noted in Section 10.5, the potential for packaging this option into multiple procurement processes will be assessed in more detail at the DBC stage.

TABLE 10.3: PRELIMINARY EVALUATION

#	Evaluation Criteria	Sub-Criteria	Option F	Route FN32
1	Scale		Large	Medium
2	Complexity (construction and interface)	- Construction - Interface	Medium High	Low Low
3	Innovation potential		High	Medium
4	Timing and urgency of the activity		Constrained	Unconstrained
5	Supplier market conditions		Unconstrained	Unconstrained
6	Risk profile		High	Medium
7	Stakeholder involvement and customer requirements		High	High
8	Level of client involvement needed and availability/expertise	- Need - Availability	High Unconstrained	Low Constrained
9	Need for focus on non-cost areas		High	High

10	Need to tangibly demonstrate value for money		High	High
11	Need for flexibility to deal with change	- Scope - Project mgmt.	Medium High	Low Low

Preliminary Conclusions

Based on the ratings in Table 10.3, each preferred option was assessed against the characteristics of the four procurement delivery models noted in Table 10.2, taking into account the specific advantages and disadvantages as noted in Appendix Q.

Given the larger scale of Option F and greater potential for staging of the process, these conclusions will be reassessed at the DBC stage if it is determined that it is best delivered in multiple stages, potentially utilising different procurement methods.

Based on this evaluation the following preliminary conclusions have been determined:

Option F

- An alliance is likely to be appropriate for Option F on a standalone basis, particularly given the relatively high risk profile and complexity of the option;
- A competitive alliance is favoured over a pure alliance given the greater assurance this delivery model provides that market pricing has been achieved and the relatively unconstrained supplier market; and
- A pure alliance may be more appropriate than a competitive alliance if variants of Option F are subsequently considered and the following issues arise:
    - Consenting conditions are challenging;
    - Property remains unpurchased; and/or
    - Transpower related issues remain a major challenge.

Route FN32

- Based on the relatively lower level of complexity, scale and need for flexibility in scope for the Route FN32 option, either a design construct or traditional procurement delivery model was seen as being likely to best deliver the required outcomes;
- Within these categories, the potential to utilise the early contractor involvement method was also discussed and will be further considered at the DBC stage; and
- The key factors that will allow the choice of procurement model to be further refined based on the final design of the preferred option determined include:
    - The scale of the project based on refined costings;
    - The resulting level of project complexity;
    - The certainty of the scope / need to preserve flexibility to make adjustments; and
    - The level of available expertise of AT employees to undertake a design construct procurement process.

PPP Hurdle Criteria

An initial assessment of the preferred options against the PPP hurdle criteria was also discussed at the Commercial case workshop. It was decided that Route FN32 was unlikely to meet the size criteria but that the preferred options for the Onehunga-Penrose Connections should be not be ruled out as a PPP at this stage and be re-considered at the DBC stage.

10.7. Community and Business Interests

The Project aims to deliver improved transport efficiency and outcomes to residents and users of the wider catchment area. Both the Transport Agency and AT are committed to providing outcomes that result in the highest level of service to customers.

Selection of the preferred procurement delivery model in the DBC will also take into consideration wider community interests in an effort to minimise disruptions to existing customers of the transport network and the extent to which opportunities for local employment can be created during the construction period.

10.8. Other Commercial Activities

There may be scope to advance possible commercial activities in the project catchment area. A decision on commercial activities will be made at the DBC stage.

10.9. Next Steps

The next steps that will be undertaken in the commercial case section of the DBC include:

- Confirmation of the preliminary conclusions noted above once the preferred options for each of the Onehunga-Penrose Connections and Māngere, Sylvia Park, Ōtāhuhu PT Connections projects have been confirmed;
- Determination of whether potential benefits can be gained through combining separate components of the preferred options into 'packages' which might be delivered through different procurement delivery models;
- Evaluation of the risks identified in Appendix Q, including specific analysis of the procurement risks;
- Development of a consenting strategy; and
- Development of a procurement strategy based on the conclusions determined.

11. FINANCIAL CASE

- Chapter 11 sets out a high-level assessment of the shortlisted options and preliminary financial analysis of the recommended option/s
- The financial analysis will be refined further in the DBC

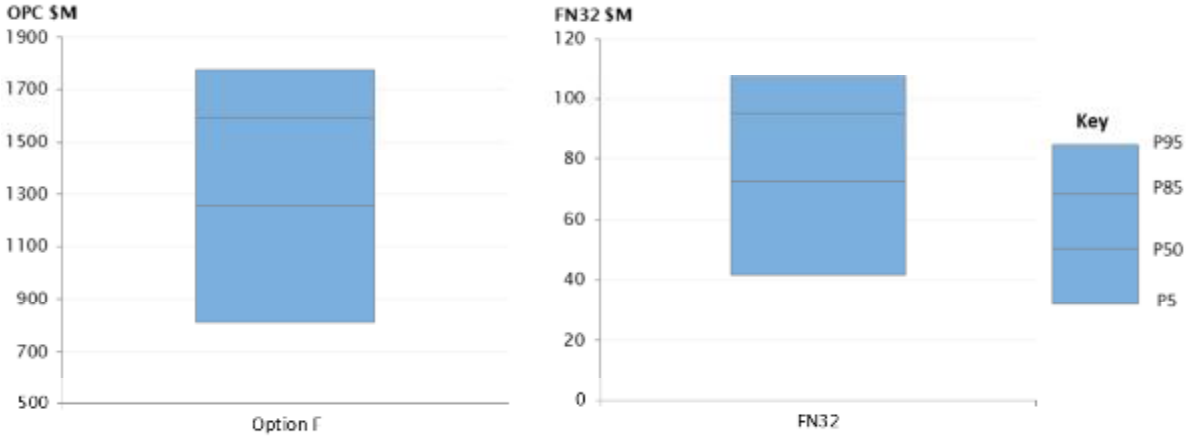
The financial analysis in this IBC presents a high level assessment of the Onehunga-Penrose Connections Preferred Option (Option F) plus the Māngere, Ōtāhuhu, Sylvia Park Public Transport (PT) Connections Preferred Option, each described in Chapter 8 of this IBC. The analysis investigates the affordability of the Preferred Options from a Transport Agency and AT perspective, and assesses the extent of any additional funding required to accelerate delivery. A detailed cost and affordability assessment for the Preferred Options will be undertaken during the DBC stage.

11.1. Preferred Option Assessment

Following identification of the short list, further detailed analysis of the Onehunga-Penrose Connections options was undertaken and is reported in Chapters 8. This assessment concluded that Option F (previously referred to as Option 14 in the short list) is the Preferred Option, however potential staging of Option F may involve some additional local roading work to be completed around Neilson Street and Captain Springs Road. The timing, scale, and costs of this staging will be examined in the DBC, and are not included in the analysis presented in this chapter. The effect of staging Option F through additional local road construction means that further expenditure is likely to impact on AT's share of costs.

Figure 11.1 below highlights the cost estimates for the Preferred Options for Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections at different percentiles. Costs are shown in a range from the 5th to the 95th percentile, with the 50th and 85th percentile shown for reference. Where possible (i.e. for property and construction costs) this analysis uses specific P95 estimates; for costs provided on a P50 basis only (i.e. other whole-of-life costs) this paper assumes a risk spread of ±40%. All costs are included on a real 2015 basis.

FIGURE 11.1: INDICATIVE COST RANGES FOR THE PREFERRED OPTIONS (REAL)

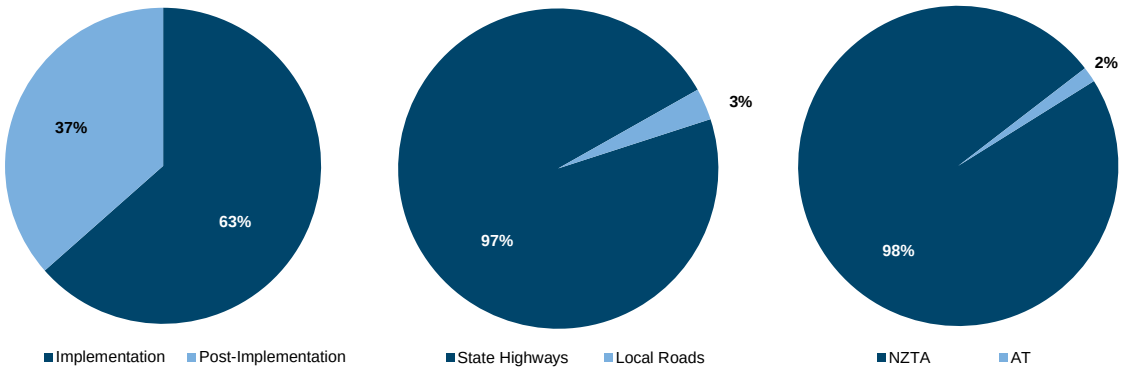


In contrast to the shortlisted Options detailed in Section 8, the updated cost estimates for the Preferred Option do not include asset maintenance costs during construction, and are inclusive of whole-of-life costs (such as renewal capex and operating costs) incurred after construction completion.

Onehunga-Penrose Connections

Figure 11.2 below shows the allocation of costs across implementation (construction and property acquisition) and post-implementation (operating, renewals and maintenance); the proportion of costs across asset classes; and an indicative assessment of the expected cost commitments for the Transport Agency and AT following the impact of the FAR, using an updated FAR of 51% when assessing NLTF contributions to Local Road costs

FIGURE 11.2: ALLOCATION OF PREFERRED OPTION COSTS FOR ONEHUNGA-PENROSE CONNECTIONS



The total unescalated P50 cost of the Preferred Option is approximately $1,250M, and includes the following components:

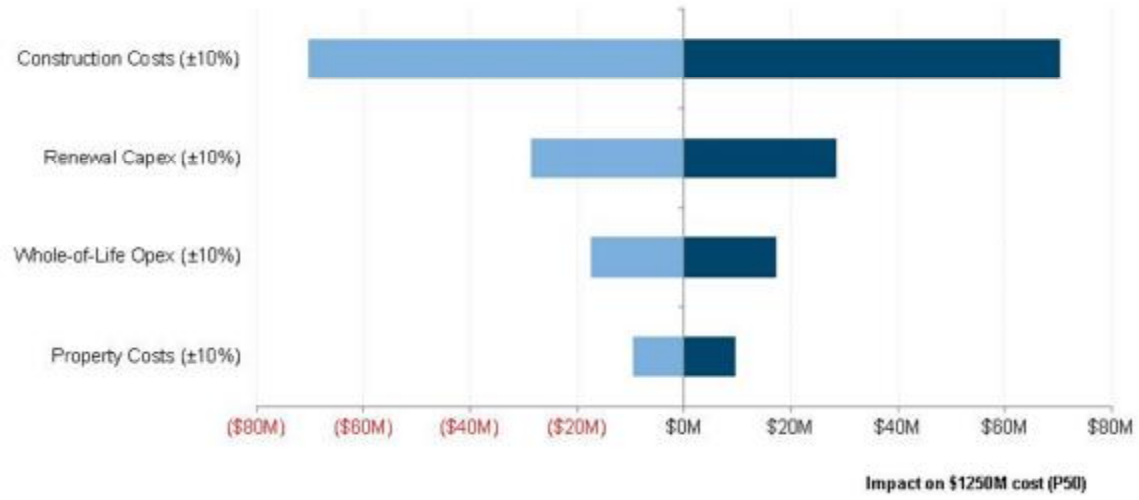
- Property costs represent c.$100M of the total outlay for the Preferred Option. The timing of property acquisition is important, as any delays in buying the necessary property assets could expose the project to Auckland's high real estate inflation. Since 2011, Auckland Council

estimates that residential property price growth has averaged 11.6% p.a. across Auckland, with both Onehunga (+12.3% p.a.) and Penrose (+13.0% p.a.) exceeding the city average.

- Construction forms the largest component of the Preferred Option's overall cost, estimated at $700M over 2016-22 based on an accelerated timetable. The focus on land reclamation, plus the development of new SH20 connections along the foreshore of the Mângere inlet and SH1 connections on Sylvia Park Road, means that the Preferred Option is estimated to require significant expenditure on Civil Works ($200M), Structural costs ($200M) and Traffic Management ($150M).
- Post construction completion, renewal capex (such as road resurfacing or bridge maintenance) is assumed to be spent annually over the lifetime of the Preferred Option, although in practice the works will be completed on a periodic basis (e.g. every 10 years). This follows the approach that money is set aside by the Transport Agency and AT each year in anticipation of these known renewal costs, in order to avoid a lumpy expenditure profile. Renewal capex comprises c.$300M of the Preferred Option's total cost.
- Operating costs for Onehunga-Penrose Connections include environmental protection, leachate control, and general operating & maintenance expenditure. The Preferred Option is estimated to incur operating costs of $150M.

Cost sensitivities for the Preferred Option are shown in Figure 11.3 below. The overall cost of Onehunga-Penrose Connections is most sensitive to construction costs, with a 10% movement in construction costs causing a 6% change in the overall cost of the Preferred Option.

FIGURE 11.3: COST SENSITIVITIES FOR THE ONEHUNGA-PENROSE CONNECTIONS PREFERRED OPTION (REAL)

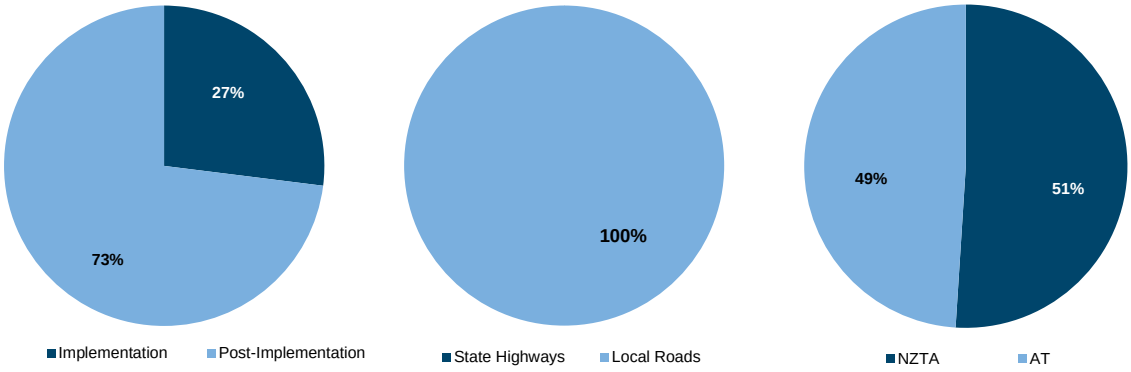


The expected costs of the Preferred Option do not take into account any costs of additional funding. Once a procurement model has been selected and the specific details for any financing requirements (e.g. interest or capital charges) have been established at the DBC stage, financing costs will be incorporated into cash flow assumptions and the resulting affordability assessment of the Preferred Option, as applicable.

Māngere, Ōtāhuhu, Sylvia Park, PT Connections

Variant B was identified as the preferred variant for the FN32 public transport route for the Māngere, Ōtāhuhu, Sylvia Park, PT Connections project. Figure 11.4 below shows the allocation of costs across implementation (construction and property) and post-implementation (operating, renewals and maintenance); the proportion of costs across asset classes; and an indicative assessment of the expected cost commitments for the Transport Agency and AT following the impact of the FAR, using an updated FAR of 51% when assessing NLTF contributions to Local Road costs.

FIGURE 11.4: ALLOCATION OF INDICATIVE OPTION COSTS FOR MĀNGERE, ŌTĀHUHU, SYLVIA PARK, PT CONNECTIONS

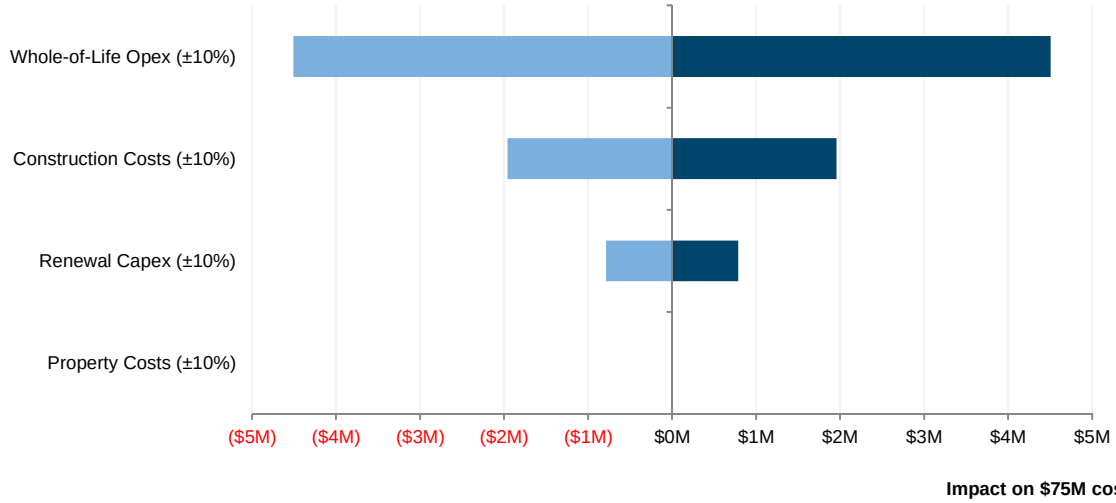


The total unescalated P50 cost of the Māngere, Ōtāhuhu, Sylvia Park, PT Connections project is approximately $75M, comprised of the following P50 costs:

- No property is expected to be acquired as part of the project. The Preferred Option represents an enhancement of an existing traffic corridor, with no privately-held property needing to be acquired in order to commence development.
- Construction is limited to Local Roads only, and is estimated to contribute c.$20M to the overall project cost. With the exception of some early design and MSQA fees incurred in 2016, this expenditure is expected to fall entirely in 2017. Given that Variant B effectively enhances an existing traffic corridor by providing new bus priority lanes, construction costs are relatively small (c.$10M to be spent on Civil Works and c.$5M on Traffic Management).
- Renewal capex contributes around $10M to the overall project cost.
- Operating costs form the bulk of the overall Māngere, Ōtāhuhu, Sylvia Park PT Connections Preferred Option costs, comprising $45M of the total project.

Cost sensitivities for the Preferred Option are shown in Figure 11.5 below. The overall cost of Māngere, Ōtāhuhu, Sylvia Park, PT Connections is most sensitive to a change in whole-of-life operating costs, with a 10% movement in operating costs causing a 6% change in the overall cost of the Preferred Option.

FIGURE 11.5: COST SENSITIVITIES FOR THE MĀNGERE, ŌTĀHUHU, SYLVIA PARK, PT CONNECTIONS PREFERRED OPTION (REAL)



Key Assumptions

The expected cost estimates for the Preferred Options reflect more detailed analysis than those highlighted at the short list stage. The final level of cost contingency is expected to reduce further as the Preferred Options are assessed in light of implementation surveys, field investigations and further detailed analysis to be undertaken as part of the DBC.

Please see Appendix R for details of the assumptions made when assessing the Preferred Option.

11.2. Sources of Funding

Actual funding requirements for the Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections will be finalised at the DBC stage through a detailed cost and affordability assessment of the Preferred Option and preferred procurement delivery model.

11.2.1. New Zealand Transport Agency Funding

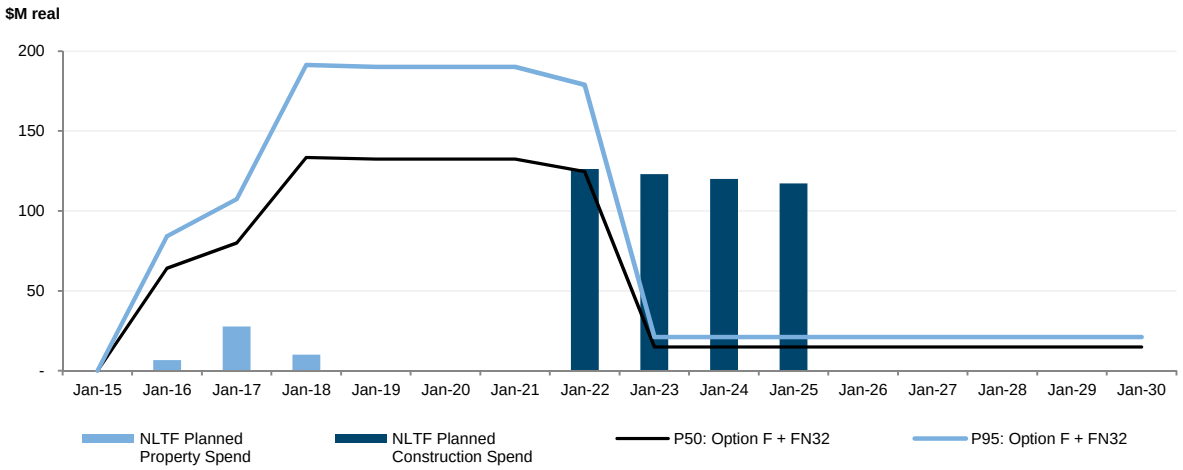
The National Land Transport Fund ('NLTF') is the Transport Agency's primary source of funding for transport infrastructure investment. The NLTF receives its funds from fuel excise duty (petrol tax), charges on diesel and heavy vehicles (road user charges) and vehicle registration and licensing.

The Transport Agency has identified EWC as a project of high priority. Following the recommendations made to Cabinet in February 2014 to accelerate a package of Auckland transport projects, the Transport Agency began investigating options to make funding available from the NLTF. The outcome of these investigations has resulted, in nominal terms, in $647M of NLTF funds being earmarked to deliver the Onehunga-Penrose Connections reference option, with $47M available for property acquisitions over 2016-18 and $600M allocated for construction between 2022-25.

Figure 11.6 demonstrates the misalignment between currently allocated NLTF funding and the estimated cost commitment for the Transport Agency on a 2016 construction start date (as modelled in the economic analysis) for the Onehunga-Penrose Connections (Option F) and Māngere, Ōtāhuhu,

Sylvia Park PT Connections (FN32) Preferred Options. The majority of costs on this timing would be incurred prior to the availability of NLTF funding. For consistency with the real cost estimates used in this analysis, programmed NLTF inflows are shown in real terms assuming a 2.5% p.a. escalation rate and a base date of 30 June 2015. In real terms the NLTF funding stream is estimated to be worth approximately $531M.

FIGURE 11.6: NLTF INFLOWS VS. ESTIMATED TOTAL NZ TRANSPORT AGENCY COSTS (REAL)

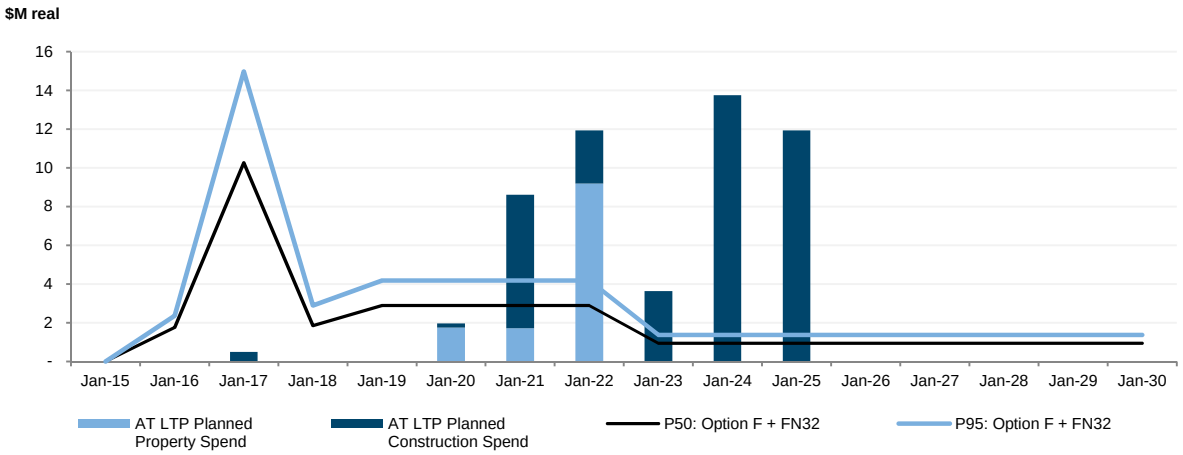


11.2.2. Auckland Transport Funding

AT receives funding for transport projects through allocations under Auckland Council's LTP, which is allocated to prioritised projects through the Integrated Transport Plan ('ITP'). AT has also identified East-West Connections as a project of high priority, with $107M (real) of total funding allocated in the ITP for local road elements of Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections. This $107M allocation includes expected NLTF contributions, with the availability of AT's funding dependent on the Transport Agency making available its share of Local Road costs at the prevailing FAR rate. Excluding the NLTF contribution, AT's own funding commitment is $52M. Note that the LTP is currently under revision. Funding allocations will be reassessed at the DBC stage in light of progression on LTP finalisation.

Figure 11.7 demonstrates a similar timing difference between currently allocated ITP funding and the estimated cost commitment for AT based on a 2016 construction start date for the Onehunga-Penrose Connections (Option F) and Māngere, Ōtāhuhu, Sylvia Park PT Connections (FN32) Preferred Options.

FIGURE 11.7: AT ITP FUNDING VS. ESTIMATED TOTAL AT COSTS (REAL)



11.3. Overall Affordability

The indicative cost analysis in Section 11.1 illustrates the expected cost commitments for the Transport Agency and AT for the Preferred Options for both Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections. A comparison with anticipated funding inflows is as follows:

- On a whole-of-life basis, i.e. without accounting for the timing of the project's cost commitments for the Transport Agency, currently allocated NLTF funding of $531M (real) represents c.60% of the Transport Agency's total property and construction costs required to deliver the Preferred Options of Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections. Inclusive of renewal capex and operating costs, current NLTF funding meets c.40% of the Transport Agency's total cost commitment for both projects. Note that the Transport Agency's estimated funding requirement reflects its investment in State Highways plus the NLTF's FAR contribution to Local Roads.
- On a whole-of-life basis, i.e. without considering the timing of the project's cost commitments for AT, at current levels the AT ITP's $52M (real) allocation (i.e. net of NLTF contributions) is sufficient to fund its total share of costs for the Onehunga-Penrose Connections and Māngere, Ōtāhuhu, Sylvia Park PT Connections Preferred Options. While currently programmed ITP funding is adequate for the Preferred Options, unforeseen changes in project costs or changes to the make-up of the Preferred Options (e.g. staging Option F through additional local road investment) could potentially lead to a higher cost commitment for AT.
- Additional funding external to AT or the Transport Agency is not required to deliver the Preferred Option for Māngere, Ōtāhuhu, Sylvia Park PT Connections.

The remainder of this section focuses on the scale of funding needs for the Onehunga-Penrose Connections project.

11.3.1. Transport Agency Funding Requirements – Onehunga-Penrose Connections

Table 11.1 below highlights the additional funding estimated to be required by the Transport Agency, in excess of current NLTF allocations, to deliver the Preferred Option for Onehunga-Penrose Connections on a 2016 construction start-date (consistent with the option as modelled in the economic analysis). All costs are rounded to the nearest $50M, and are presented at both the P50 and P95 level.

If the Preferred Option is delivered on a 2016 construction start date, additional funding of c$800M would be required. This is because of a misalignment of timing with NLTF funds as set out in Figure 11.6 above. It is assumed that the additional funding will cover the full $800M cost of property and construction (implementation costs). Future programmed NLTF inflows would be used to repay this additional funding based on the current NLTF funding profile. However, as set out in the table below (Additional Implementation Funding Required for 2016 Start Date), there remains a shortfall of c$270-570M (P50-P95 cost estimates).

Regardless of the timeframes for construction start-date, programmed NLTF inflows on current prioritisation cover only a portion of the whole of life costs (implementation and post-implementation) of the Preferred Option (Additional Whole of Life Funding Required for Project Delivery).

TABLE 11.1: TRANSPORT AGENCY – ADDITIONAL FUNDING BREAKDOWN FOR ONEHUNGA-PENROSE CONNECTIONS PREFERRED OPTION

New Zealand Transport Agency	Preferred Option (Option F)	
NZ$M, real	P50	P95
Delivery of Preferred Option to 2016 start date		
Implementation Costs	800	1,100
Additional Implementation Funding Required for 2016 Start Date	**800**	**1,100**
NLTF Inflows Identified for Future Repayment	(531)	(531)
Unfunded	269	569
Whole-of-Life Funding Requirement	**1,250**	**1,750**
Implementation Costs	800	1,100
Post-Implementation Costs	450	650
less:		
NLTF Inflows	(531)	(531)
Additional Whole of Life Funding Required for Project Delivery	**719**	**1,219**

After taking into account whole-of-life P50 costs and the current NLTF allocations, the Preferred Option requires the Transport Agency to secure approximately $700M of additional funding over the life of the project to deliver the Preferred Option.

11.3.2. Auckland Transport Funding Requirements – Onehunga-Penrose Connections

The costs to AT of the Preferred Option for the Onehunga-Penrose Connections project, as compared to current ATLTP allocations, are shown in Table 11.2 below. All costs are rounded to the nearest $5M, and are presented at both the P50 and P95 level.

If the Preferred Option is delivered on a 2016 construction start date, additional funding of c$10M would be required. This is because of a misalignment of timing with LTP funds as set out in Figure 11.7 above. Where additional funding is necessary to deliver the Preferred Option on a 2016 construction start date, it is assumed that the additional funding will cover the full $10M cost of property and construction (implementation costs). Future programmed AT LTP inflows would be used to repay this additional funding based on the current LTP funding profile (Additional Implementation Funding Required for 2016 Start Date).

Notwithstanding the potential for additional Local Roads costs incurred as a result of staging Option F, the current ATLTP allocation of $52M ($107M inclusive of NLTF contributions) is sufficient to meet AT's share of whole-of-life costs for Onehunga-Penrose Connections under the Preferred Option.

TABLE 11.2: AT – ADDITIONAL FUNDING BREAKDOWN FOR ONEHUNGA-PENROSE CONNECTIONS PREFERRED OPTION

Auckland Transport	Preferred Option (Option F)	
NZ$M, real	P50	P95
Delivery of Preferred Option to 2016 start date		
Implementation Costs	10	15
Additional Implementation Funding Required for 2016 Start Date	**10**	**15**
AT LTP Inflows Identified for Future Repayment	(52)	(52)
Unfunded	-	-
Whole-of-Life Funding Requirement	**20**	**25**
Implementation Costs	10	15
Post-Implementation Costs	10	10
less:		
AT LTP Inflows	(52)	(52)
Additional Whole of Life Funding Required for Project Delivery	**-**	**-**

11.3.3. Additional Funding Sources

Potential additional funding sources to either address a timing misalignment or to reduce the overall pressure on existing funds include:

- Reprioritisation of existing projects within the NLTF
- Additional public funding:
    - Crown grant;
    - Crown loan, bearing interest at approximately the NZ 10-year Government bond rate;

- Crown loan with interest written off.

In addition to the funding options identified above, the following revenue raising options have also been identified:

- Tolling. This potential revenue stream could serve a dual purpose, both as a funding contribution to initial property and construction costs and whole-of-life costs, and as a means of managing traffic demand for the Onehunga-Penrose corridor;
- Benefit capture mechanisms; and
- Financial contributions.

11.4. Next Steps

Key steps that will be undertaken as part of the financial case during the DBC include:

- Prepare scheme estimates of the Preferred Option to better understand the full estimated cost of development.
- Sensitivity analysis of the Preferred Option, including the calculation of 5th, 85th and 95th percentile estimates for individual costs.
- Confirmation of the cost allocations between the Transport Agency and AT for the Preferred Option.
- Development of a funding plan for the Transport Agency and AT to cover the cost of the Preferred Option for each of the two projects selected as part of the DBC.

12. MANAGEMENT CASE

- The Management Case sets out the project management strategy and framework for the project that has been used through the IBC and will continue through to the DBC.

12.1. Project Management Strategy and Framework

The IBC has been developed as a coordinated approach with both Transport Agency and AT involvement across all levels of project development and decision-making. This section outlines how the project team will manage the relevant activities and inputs to deliver the DBC.

12.1.1. Contract Management

A Professional Services contract (PA3879) has been commissioned by Transport Agency for the completion of both the IBC and DBC phases of work for East West Connections. While the contract is with the Transport Agency, the scope of work includes option investigation on both the local road and state highway network in Auckland. As such, AT is a partner to the contract. Work on the DBC will continue as per the terms of the existing contract (PA3879) and the successfully tendered methodology.

A Heads of Agreement has been established to define an agreed cost share between the Transport Agency and AT for the work associated with the development of the IBC and DBC. The Transport Agency will invoice AT for their share of the overall work programme in accordance with the terms of the Heads of Agreement.

12.1.2. Risk Management

Given the timeframe and complex urban environment in which the project is situated, effective and timely risk management is a critical component in ensuring the project remains on track. A comprehensive risk register has been established in accordance with the guidance provided in the Transport Agency's Z44 Risk Management Minimum Standard. This includes management plans which have been established by each of the discipline leads for the key risks. The risk register remains a live document for the duration of the project and is compiled from risks remaining live from the PBC phase plus newly identified risks that may affect the successful outcome of this project.

The current top five risks identified for the project are set out in Table 12.1 below.

TABLE 12.1: TOP 5 PROJECT RISKS

No	Category	Description
1	Funding	The cost of the preferred option exceeds available funding in the NLTP / RLTP.
2	Stakeholders	Politically influential groups advocate for an option other than the AT/Transport Agency preferred option.
3	Consenting	The consenting process may result in compromises to the preferred option and lead to impacts on the programme timeframes and scope.
4	Transport Planning	Traffic modelling assumptions differ from actual, impacting on the preferred option and network operational performance.
5	Timeframe	The tight timeframe impacts on the quality of the investigation used to compare the options and decision making resulting in additional costs.

12.1.3. Governance and Reporting

The Transport Agency and AT have established a governance structure in line with the principles of collaboration and are involved in making integrated decisions. A detailed governance plan has been developed to provide complete direction for project control and clarify accountabilities and responsibilities for decision-making and strategic direction setting. A copy of the Governance Plan is attached as Appendix S.

A Project Control Group (PCG) has been established between the Transport Agency and AT to provide high level decision-making and strategic direction for the project development through the IBC and DBC.

A Programme Governance Group (PGG) has also been established to provide strategic oversight of the overall EWC programme and ensure direction setting is being consistently applied across the sub-regional area which includes major transport investments including AMETI, SMART (rail to the airport), and EWC. The PGG includes senior management representation from Auckland Council, AT, and the Transport Agency.

The Governance Plan does not replace the relevant reporting requirements internal to AT and the Transport Agency. Decisions required at Board level will still need to go through the appropriate channels (Transport Agency: regional DMT and VAC; AT: CRC).

12.1.4. Stakeholder Engagement and Communications Plan

A Stakeholder Engagement Plan has been developed to guide engagement activities during the current and subsequent phases of EWC project development. This includes identification of designated roles

and responsibilities to implement the various action plans. The Engagement Plan is a living document and will continue to be updated as the project progresses.

The Stakeholder Engagement Plan lists approaches for communicating with internal and external stakeholders. The engagement risks identified by the Transport Agency and AT in the overarching project engagement strategy are highlighted in the Stakeholder Engagement Plan and also included in the project risk register, together with an appointed 'owner' of each risk. Moving forward, a detailed action plan for future phases will be produced.

13. FUNDING REQUIREMENTS TO PROCEED TO THE DETAILED BUSINESS CASE

- This IBC seeks formal approval to proceed to a DBC with a short list of options for two projects: Onehunga-Penrose Connections and Māngere, Ōtāhuhu and Sylvia Park PT Connections.
- Funding for the development of a DBC has been approved by the Chief Executive of the Transport Agency

13.1. Overview

In July 2014 the Chief Executive of the Transport Agency approved funding for the development of the DBC for the project at an estimated cost of $8.25M from NLTF funds with costs being split as below:

- $6.00M – the Transport Agency (HNO) at a financial assistance rate of 100% and
- $2.25M – AT at a financial assistance rate of 53% (the Transport Agency sharing $1.19M).

This IBC seeks formal approval to proceed to a DBC with a short list of options for two projects:

- Onehunga-Penrose Connection and,
- Māngere, Ōtāhuhu, Sylvia Park PT Connection.

The IBC has developed a robust short list and proceeded to identify a recommended option/s. The process undertaken has mitigated the risks associated with narrowing the list of options too early in the assessment process and potentially rejecting an option that might have proved to be favourable if further analysis had been carried out.

13.2. Project Team

A project team has been appointed bringing the skills and experience necessary to deliver a robust BC and DBC. Owner Interface Managers from both the Transport Agency and AT are core members of the project team.