Working document.
Updates underway to executive summary, costs and economics

EAST-WEST MIDTOWN PUBLIC TRANSPORT LINK

AUCKLAND TRANSPORT

INDICATIVE BUSINESS CASE

Final

February 2017

JACOBS

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East-West Midtown PT Link

Project no:	IZ047400
Document title:	Indicative Business Case
Document no:	IZ061800-0000-CT-RPT-002
Revision:	Final
Date:	February 2017
Client name:	Auckland Transport
Jacobs Team Lead:	Sam Corbett
Lead Author:	Terri Collett
File name:	J:\IE\Projects\02_New Zealand\IZ061800\02 Documents\IBC\1. IBC report\Final\Final March\EW_Midtown_Link_IBC_2.7.docx

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Document history and status

Revision	Date	Description	By	Review	Approved
Rev 0	30/09/2016	Draft IBC report for review	Terri Collett with inputs from Boffa Miskell and MRC	Sam Corbett	Sam Corbett
Rev 1	14/10/2016	Updates to draft post Biserka Stetic review	Terri Collett	Sam Corbett	Sam Corbett
Final	24/2/17	Updates to finalise, address stakeholder feedback and incorporate PM peak modelling	Terri Collett	Sam Corbett	Sam Corbett
Final	16/03/2017	Working document – updates underway	Terri Collett		

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Abbreviations

AADT	Annual average daily traffic
AMA	Auckland Motorway Alliance
BCR	Benefit Cost Ratio
CCFAS	City Centre Future Access Study
CCPTP	City Centre Public Transport Programme
CEWT	City East West Transport Study
CRL	Central Rail Link
DBC	Detailed Business Case
IBC	Indicative Business Case
ILM	Investment Logic Map
JMAC	Joint Modelling Application Centre
KPI	Key Performance Indicator
LRT	Light Rail Transit
LRV	Light Rail Vehicle
PBC	Programme Business Case
PTNP	Public Transport Network Plan
RLTP	Regional Land Transport Programme
RLTS	Regional Land Transport Strategy
RPTP	Regional Public Transport Plan
Transport Agency	New Zealand Transport Agency
UCF	Urban Cycleway Fund
Vpd	Vehicles per day

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Executive Summary

The Auckland Plan seeks to nearly double the number of trips to the city centre whilst holding car travel to the city centre at current levels. To deliver this aspiration will require a greater increase in the number of trips by public transport, walking and cycling.

To cater for this increase in public transport trips, the Auckland Regional Public Transport Plan (RPTP) sets out a transformational shift in public transport to provide a simpler, more connected network for Auckland over the next 10 years; referred to as the New Network.

This IBC aligns with and expands on the evidence and findings within the City Centre Public Transport Programme (CCPTP) Strategic Case, 2013 and Programme Business Case (PBC), 2014 and addresses two areas of the New Network, including the east-west PT link (commonly identified as Wellesley Street) and the Learning Quarter.

To implement the New Network, as shown in Figure 0.1, and support the Learning Quarter's high public transport mode share it is important that an effective, efficient and high quality public transport network is implemented along the east-west Midtown link and to the Learning Quarter with provision for layover spaces while supporting high quality public spaces.

Figure 0-1: The New Network in Auckland City Centre (simplified schematic)

While progress has been made in Auckland over the past few years with the completion of a number of cycleways, inadequate facilities exist along the east-west Midtown link to accommodate trips by bike. It is expected that 52km of cycleways will be built in Auckland in the next 3 years through the Auckland Urban Cycleways Programme and the Urban Cycleway Fund investment; including an east-west Midtown cycleway. An east-west Midtown cycle connection would enhance the cycle network by connecting existing north-south cycle links to key destinations in the city centre between Victoria Quarter and the Domain.

Strategic Fit

To support the Draft Government Policy Statement (GPS) on Land Transport, the Auckland Transport Alignment Project (ATAP), Auckland Regional Public Transport Plan and guiding transport and land use policy documents the East-West Midtown Public Transport (PT) Link will enable more people to access Midtown and the Learning Quarter more efficiently, enabling an increase in economic growth and productivity through the provision of a more reliable and predictable public transport link through Midtown.

Investment objectives

The IBC has been developed with an extensive stakeholder engagement approach, involving interviews, meetings and workshops with stakeholder representatives. The outcomes of this engagement refined the objectives and evaluation framework and were at the forefront of the option development and evaluation process.

The objectives, which will be further refined as part of the DBC, include:

- Create engaging places for people, recreation and businesses that have a character unique to Tamaki Makaurau / Auckland and consistent with existing plans and visions;
- Invest in affordable, right sized solutions that provide value for money over the life of the asset with investment times and designed to integrate with development;
- Unlock economic and social performance by enabling more people to access the city centre more effectively;
- Provide high quality access for public transport and associated pedestrian network while maintaining a connective traffic network;
- Deliver environmentally sustainable infrastructure;
- Provide for the effective operation of the city centre public transport network;
- Provide safe, connected and efficient cycling strategic network in eastern part of study area; and
- Provide a great customer / user experience.

Assumptions

The study was undertaken applying the future transport and land use context for 2026 as described in section 4 and assumes that light rail will be constructed on Dominion Road, Ian McKinnon Drive and Queen Street, replacing all Dominion Road and half of Sandringham Road bus services into the CBD. This was agreed by stakeholders in the Do Minimum workshop. Thus the overall corridor volumes in the East-West Midtown project are substantially lower than those cited in the Bus Reference Case, which does not include/assume light rail.

Project specific problems and benefits

The East-West Midtown PT Link addresses the following study specific problems:

- Problem 1: Inadequate public transport infrastructure along the East-West Midtown corridor and at route end to enable reliable operation of the New Network within constrained city centre location (45%);
- Problem 2: Accessibility to Learning Quarter, Midtown and Victoria Quarter is inadequate for workers, students, residents and visitors by public transport and active modes (25%);
- Problem 3: Current public transport infrastructure is not integrated with the area's public realm and adjacent land use activities (20%); and
- Problem 4: Existing east-west transport connections in the midtown area do not allow safe, efficient and connected trips by bike for confident and interested but concerned cyclists (10%).

The potential benefits of successfully addressing the key transport problems have been identified for the IBC and include the following:

- Benefit 1: Improved provision of corridor for public transport (25%);
- Benefit 2: Improve network efficiency (20%);
- Benefit 3: Meet operational requirements, within study area, to support the New Network (20%);
- Benefit 4: Enables quality urban form (25%); and
- Benefit 5: Improved provision of cycling facilities (10%).

Option investigation

The long list option process developed the Do Minimum and 18 options covering bus route and cycleway patterns. In the beginning of the IBC development, LRT (Light Rail Transit) construction was assumed to occur within the next decade and therefore LRT was included in the Do Minimum and all options.

These long list options considered using one or more of Victoria Street, Wellesley Street and Mayoral Drive for bus service as well as whether North Shore services would terminate in the city centre, Grafton Gully or outside the study area. The long list assessment also included a number of site options for a Grafton Gully bus terminal. Through workshop discussions these 18 options were reduced to 12 for evaluation.

Long list maps showing the bus infrastructure requirements and cycle routes are included in Appendix E.

The evaluation of the long list against the project objectives and an assessment of whether the options can address the project problems resulted in taking forward the following options to the shortlist for further investigation:

- Do Minimum 2026, including LRT;
- 1B: Buses on Wellesley Street with North Shore services terminating in Grafton Gully;
- 1D: Buses on Wellesley Street with North Shore services terminating in Grafton Gully and Isthmus buses accessing Symonds Street via Wakefield Street;
- 4D: Buses on Wellesley Street and Victoria Street with North Shore services terminating in Grafton Gully; and
- 4E: Buses on Wellesley Street and Victoria Street with North Shore services terminating on Princes Street.

All four shortlisted options deliver the high volume of bus passengers expected in the future whilst supporting surrounding land uses. Option 1B consists of all buses operating on Wellesley Street and requires the use of the uphill slip lane from Wellesley Street to Symonds Street for outbound Isthmus buses, which stakeholders from both the University of Auckland and Auckland University of Technology do not support.

A variation on this Option 1B, being Option 1D, uses Wakefield Street instead, which avoids the slip lane but does not serve the University of Auckland as well in the outbound direction. Options 4D and 4E both utilise Victoria Street for Isthmus services and North Shore services respectively, which incurs additional travel time but also serves the northern part of the University of Auckland better.

Option 4D provides access to a larger area of the Learning Quarter than Options 1B and 1D. Options 1B and 1D may also result in a reduction of patronage due to the new route alignment and the relocation of bus stops.

Two sites were short listed for the Grafton Gully terminal including off-street site 1 and on-street site 8. Section 6.3 provides more detail on these sites. Further work is needed to confirm the layover site location. Providing a Grafton Gully terminal offers significant benefits, as a bus terminal within Grafton Gully could have the potential to accommodate bus layover, vehicle storage during the day and bus driver facilities above that required for the East-West Midtown corridor. A Grafton Gully terminal could have wider benefits for multiple passenger transport projects around the City Centre.

Economic Case

Operational cost and concept design capital cost estimates were prepared for the shortlisted options, as included in Table 0.1. For costing purposes Grafton Gully site 8 (on-street) was included in the base costs for options 1B, 1D and 4D and if site 1 (off-street) was preferred then an additional $24,000,000 is estimated due to additional land acquisition and site works.

Table 0.1: Capital and operational expenditure estimates (2026)

Short listed option	Opex	Capex
Do Min	$49,625,876	TBC
Option 1B	$49,677,834	TBC
Option 1D	$49,561,652	TBC
Option 4D	$50,175,071	TBC
Option 4E	$49,205,486	TBC

An economic analysis was completed to assess the likely costs and benefits of the proposed public transport improvements for the shortlisted options, as included in Table 0.2.

Table 0.2: Economic appraisal

Option	NPV Cost	NPV Benefit	Benefit Cost Ratio
Option 1B	TBC	TBC	TBC
Option 1D	TBC	TBC	TBC
Option 4D	TBC	TBC	TBC
Option 4E	TBC	TBC	TBC

Add in summary of options travel time comparison overview summary text

The modelling showed that Option 1B and Option 1D resulted in the greatest travel time improvements for buses, with Option 1D having the least impact on general traffic.

It is important to note options 1B, 1D and 4D do not include costs for short term solution (Option 4E).

Investment assessment profile

Options 1B, 1D, 4D and 4E were assessed using the Transport Agency Investment Assessment Framework profile as described in section 15.1. Taking into account the options strategic fit, effectiveness and efficiency (BCRs) the assessment profile results in **TBC** for options 1B and 1D and **TBC** for options 4D and 4E.

Preferred option/s to take forward

Table 0.3 provides an overview of the shortlisted options opportunities, constraints and requirements.

Options 1B and 1D are discounted from being taken forward to the Detailed Business Case (DBC) for further investigation due to the potential to reduce patronage volumes as a result of the relocation of bus stops and new bus routes, which would be a reduced customer experience, and due to the use of the slip lane for Option 1B.

Option 4D is the preferred option to proceed to the DBC and was supported and endorsed by all stakeholders. It received support from the University of Auckland and AUT stakeholders as it negates the need to use the slip lane between Wellesley Street and Symonds Street. This option is also supported by ATMetro as it provides the largest patronage catchment for the Learning Quarter and good coverage for Midtown, and as it is similar the current bus service routes there will be limited impact on patronage volumes and accessibility. It is also considered that using Victoria Street as a second eastbound corridor for Isthmus services could take pressure off Wellesley Street in the case that Light Rail is not delivered in the expected timeframe. This option also enables cycle facilities to be provided along Victoria Street.

It was identified that the provision of bus priority along Waterloo Quadrant will need to be provided as part of the East-West Midtown busway, as without bus priority Waterloo Quadrant could represent a constraint to the bus operation with the potential for delays along Waterloo Quadrant and at the intersection with Symonds Street. However, modelling undertaken as part of Option 4D for this IBC did not include a bus priority lane along Waterloo Quadrant. Whilst Option 4D currently has a TBC BCR, further investigation and modelling in the DBC phase with bus priority along Waterloo Quadrant could potentially show Option 4D having further improved travel time benefits for public transport passengers, resulting in an improved BCR.

The Princes Street terminal (Option 4E) received less support from stakeholders as it does not provide the long-term layover requirements; impacts high turn-over parking on Princes Street and does not provide access to the south of the Learning Quarter. However, it was identified to be taken forward to the DBC to be investigated as a short term solution before a Grafton Gully terminal can be provided.

It is important to highlight that the Isthmus services route for Option 4D and Option 4E are different, with Option 4D Isthmus services travelling a one way loop along Victoria Street and Wellesley Street and Option 4E Isthmus services travelling along Wellesley Street. Additionally, Option 4E currently utilises the Wellesley Street slip lane which is not supported by Stakeholders and would require an alternative route along Wakefield Street (as per Option 1D Isthmus services). Therefore, additional infrastructure and intersection upgrades are required to provide for the short term Option 4E than is required in the longer term for Option 4D. The DBC should further investigate an alternative route for the Isthmus services under Option 4E which is more aligned with Option 4D.

Taking into consideration the evaluation against project objectives, modelling, economic appraisal and stakeholder liaison; this IBC seeks formal approval to proceed to the DBC for further investigation of options 4D and 4E, as shown in Figure 0.2.

Financial Case

The preferred options rough order cost is $TBC million for Option 4E and $TBC million for Option 4D. The Auckland Transport funding budget is $29 million, which results in a $TBC million to $TBC million funding deficit, depending on which option is taken forward.

The bulk of Auckland Transport's funding is currently allocated to 2022 for construction which is not aligned with the expected project spend. There are several options for dealing with this funding shortfall re-phase project spend; re-organise current planned capex programme to free-up funding; or work with funders to identify alternative funding mechanisms.

Commercial Case

The East-West Midtown PT Link project will be delivered by Auckland Transport with coordination with partners such as the Transport Agency and Auckland Council. The project is needed as soon as possible to enable and support the implementation of the New Network and to cater for the growing Learning Quarter demand for public transport services.

It is expected that design will be undertaken in 2017 and 2018 with physical works to commence in 2019. Interim works will be needed to support the New Network before the bus priority and terminal is operational. Short term options are considered in Appendix N.

Further investigation

Taking into consideration the evaluation against project objectives, modelling, economic appraisal and stakeholder liaison; this IBC seeks formal approval to proceed to the DBC for further investigation of options 4D and 4E.

Further investigation is required in the following areas, as detailed in section 17:

- Option 4E Isthmus services;

  It is important to highlight that the Isthmus services route for Option 4D and Option 4E are different, with Option 4D Isthmus services travelling a one way loop along Victoria Street and Wellesley Street and Option 4E Isthmus services travelling along Wellesley Street. Additionally, Option 4E currently utilises the Wellesley Street slip lane which is not supported by Stakeholders and would require an alternative route along Wakefield Street (as per Option 1D Isthmus services). Therefore, additional infrastructure and intersection upgrades are required to provide for the short term Option 4E than is required in the longer term for Option 4D. The DBC should further investigate an alternative route for the Isthmus services under Option 4E which is more aligned with Option 4D.

- Grafton Gully short listed sites;

  The Graton Gully sites have been assessed at feasibility level and require further investigation into bus layout and arrangement and site accessibility, along with constructability.

- Ensure synergy with proposals for Midtown cycleway project as the business case and design of the PT Link progresses;

- There is still some uncertainty about the timing of light rail, and there is a possibility that it may not be in place by 2026. In this case some variations would need to be made for additional infrastructure to handle the additional Isthmus buses;

- Implications to on-street parking, in particular along Princes Street; and

- It was identified that without bus priority Waterloo Quadrant could represent a constraint to the bus operation with the potential for delays along Waterloo Quadrant and at the intersection with Symonds Street. Further investigation was undertaken to determine if bus priority could be provided along Waterloo Quadrant for isthmus services under Option 4D. Two bus priority options were identified and the study concluded that, if Option 4D is taken forward to the DBC then further investigation is required to:

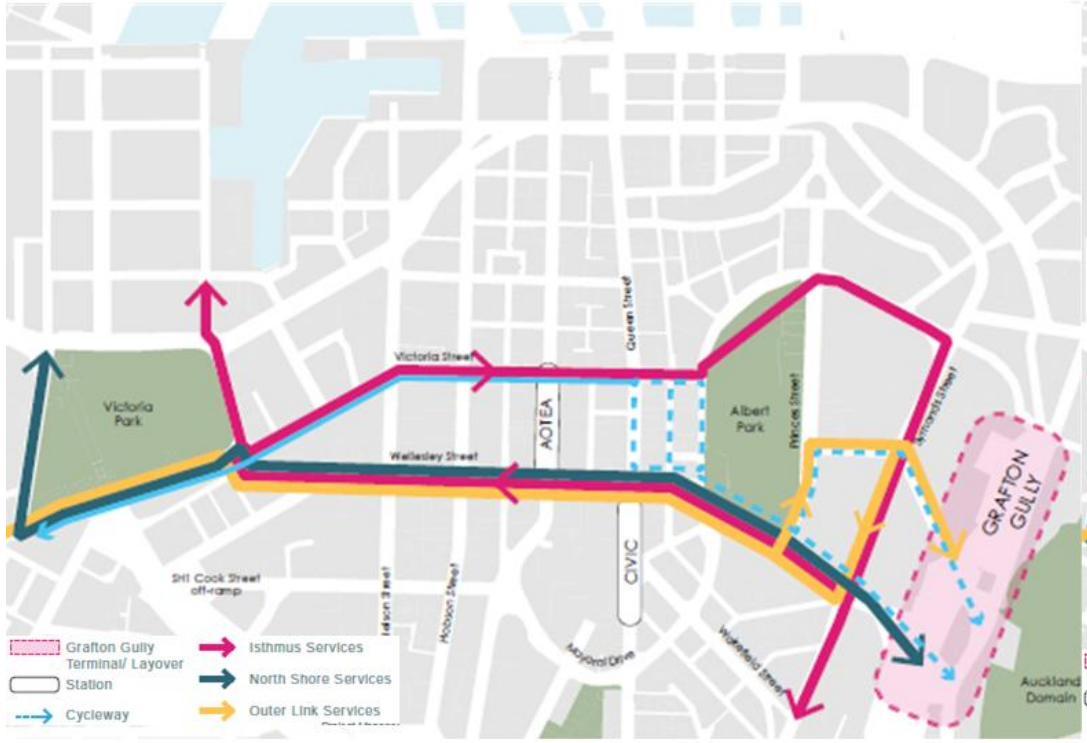
  1. Model these options, including intersection modelling of the Symonds Street and Princes Street intersections to enable various permutations of lane assignment to be tested and to better understand the effects of upon buses and general traffic; and

  2. Undertake design assessment including CAD design, vehicle tracking and signal design to determine the feasibility of the concept options.

Table 0.3: Shortlist options summary

Option	Opportunities	Constraints/ Limitations/ Risks	Requirements	Recommendation
Do Minimum	Low cost option and can be implemented in a short time due to minimal changes to infrastructure.	Does not adequately address the project area problems or achieve the desired benefits as it is inconsistent with New Network principles and CEWT and results in long and unreliable journey times. Stakeholders agree that the Do Minimum does not achieve the project objectives and will not resolve the project area's problems.	Alignment with CRL North Shore services terminal Intersection improvements	**Reference point for the preferred option**
Option 1B: Buses on Wellesley Street with a Grafton Gully Terminal	Addresses the project area problems, will achieve the desired benefits and has a positive BCR. Consistent with the New Network principles and CEWT and supports the development of the Victoria Street cycleway and Linear Park. Consolidates East-West Midtown bus services along a single corridor providing a more consistent public transport service and promoting legibility for customers. Provides a single, high quality transfer point between bus, heavy rail and light rail at Aotea station. AT Cycling team supports option due to the ability to provide the cycleway along Victoria Street. The cycleway can be provided on Wellesley Street from Queen Street and continue on the slip lanes or through the underpass to Grafton Gully. The largest improvements in travel time over the Do Minimum results from moving bus routes from Victoria Street to Wellesley Street.	The University of Auckland and AUT are opposed to the use of the slip lane between Wellesley Street and Symonds Street. While ATMetro are concerned that the bus routing does not provide access to the north of the University of Auckland and that the relocation of bus stops would impact on patronage volumes. If light rail is delayed or does not proceed, then the additional buses on Wellesley Street may result in peak bus volumes and an increase in bus stop capacity. However, there are options that can be investigated that can address this.	Alignment with CRL North Shores services terminal (Option 4E before the Grafton Gully terminal). Learning Quarter Gateway Station Wellesley Street slip lane Intersection improvements More waiting capacity at Symonds street bus stop (#7148)	**Option 1B is not preferred and discounted from going forward to the DBC** Option 1 B is not supported by stakeholders due to potential patronage impacts, poor customer outcomes, and the use of the slip lane.
Option 1D: Buses on Wellesley Street via Wakefield Street with a Grafton Gully Terminal	Option 1D is the same as Option 1B with the exception of Stakeholder views in relation to the slip lane, costs and as it has the highest BCR. Addresses the project area problems, will achieve the desired benefits and has a positive BCR. Favourable to stakeholders as it negates the need to use the slip lane between Wellesley Street and Symonds Street.	Option 1D is the same as Option 1B with the exception of positive Stakeholder views in relation to the avoidance of the slip lane.	Alignment with CRL North Shores services terminal (Option 4E before the Grafton Gully terminal). Learning Quarter Gateway Station Intersection improvements	**Option 1D is not preferred and discounted from going forward to the DBC.** As per 1B, 1D is not supported.
Option 4D: Buses on Wellesley street and Victoria street with a Grafton Gully Terminal	Addresses the project area problems and will achieve the desired benefits. Favourable to stakeholders as it negates the need to use the slip lane between Wellesley Street and Symonds Street. Good coverage for both Midtown and the Learning Quarter catchments. Due to similar routes to current services there will be limited impact on patronage. For these reasons this options has support from ATMetro. Using the Victoria Street as a second eastbound corridor for Isthmus services could take pressure off Wellesley Street in the case that Light Rail is not delivered in the expected timeframe. Has the potential to provide cycle facilities along Victoria Street.	Inconsistent with CEWT as Victoria Street is the cycleway corridor and Wellesley Street is the dedicated busway corridor. Bus services on multiple corridors are less efficient, requires more overall space and infrastructure and provides a lower level of customer service compared to the concentration of services. This is in part as the use of Victoria Street as an east-west bus corridor, is a major source of travel time disbenefit for public transport passengers.	Alignment with CRL North Shores services terminal (Option 4E before the Grafton Gully terminal). Learning Quarter Gateway Station Intersection improvements Waterloo Quadrant Bus Priority	**Preferred Option to take forward to the DBC.**
Option 4E: Buses on Wellesley Street and Victoria Street with a Princes Street Terminal	Addresses the project area problems and will achieve the desired benefits, however this option has been identified as only a short term solution. The Princes Street terminal provides a legible terminal at the front door of the University of Auckland, and offers the opportunity for the street to be rebuilt with public space elements. While there is no opportunity to provide a Learning Quarter Gateway Station as described on Wellesley Street; the Princes Street provides an alternative location for a Learning Quarter Gateway bus terminal. Has the potential to provide cycle facilities along Victoria Street.	Option 4E is the lowest-cost option, however it has a negative BCR, this is in part due to the use of Victoria Street as a bus corridor. Inconsistent with CEWT as Victoria Street is the cycleway corridor and Wellesley Street is the dedicated busway corridor. Bus services on multiple corridors are less efficient, requires more overall space and infrastructure and provides a lower level of customer service compared to the concentration of services. Less stakeholder support as it does not provide for long-term layover requirements and the use of Princes Street as a bus terminal (i.e. parking impacts). Although this will be a focus of design to mitigate any impacts.	Alignment with CRL Princes Street terminal Intersection improvements	**Proceed to DBC as a short term solution.**

Option 4D: Buses on Wellesley Street and Victoria Street with a Grafton Gully Terminal



Option 4E: Buses on Wellesley Street and Victoria Street with a Princes Street Terminal

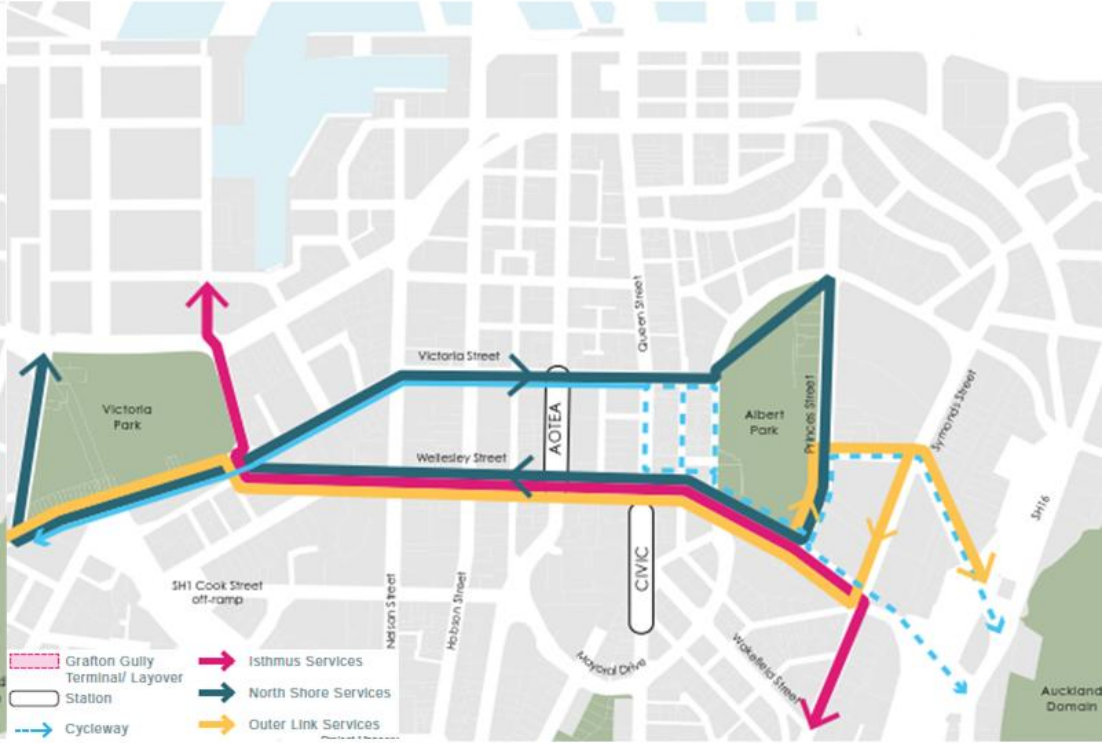


Figure 0-2: Short listed options to take forward to DBC

**See section 7 and Appendix G for the location of bus stops*

1. Introduction

To support the Draft Government Policy Statement (GPS) on Land Transport, the Auckland Transport Alignment Project (ATAP) and guiding transport and land use policy documents the East-West Midtown Public Transport (PT) Link will enable more people to access Midtown and the Learning Quarter more efficiently, enabling an increase in economic growth and productivity through the provision of a more reliable and predictable public transport link through Midtown.

The Auckland Regional Public Transport Plan (RPTP) sets out a transformational shift in public transport to provide a simpler and more connected network for the Auckland region over the next 10 years; referred to as the New Network.

The New Network proposes a significant increase in the number of buses along Wellesley Street and requires quality bus provisions and new requirements for bus terminating, layover and interchange within the Learning Quarter. The Learning Quarter also requires bus priority and increased services to continue to support the Universities, as the largest destination of bus passengers in Auckland.

Auckland Transport commissioned Jacobs and project partners to develop an IBC for the East-West Midtown Public Transport (PT) Link elements of the New Network and to investigate the feasibility of a cycle connection between Queen Street and Grafton Gully.

The study area, as illustrated in Figure 1.1, covers Wellesley Street, Victoria Street as well as the Learning Quarter, including the University of Auckland and Auckland University of Technology (AUT).

To develop the IBC specialist technical investigations were undertaken by public transport planners, transport planners, urban designers, modellers, engineers, economists, quantity surveyors and resource planners.

This IBC follows the NZ Transport Agency's Business Case framework and aligns with the evidence and findings within the Strategic Case, 2013[1], Draft Programme Business Case (PBC), 2014[2] and CAP PBC[3], 2013.

The IBC identifies and progresses a short list of options to take forward for comprehensive investigation in a Detailed Business Case (DBC). Figure 1-1 highlights the investigations and reports that will complete the Business Case process for the East-West Midtown PT Link.

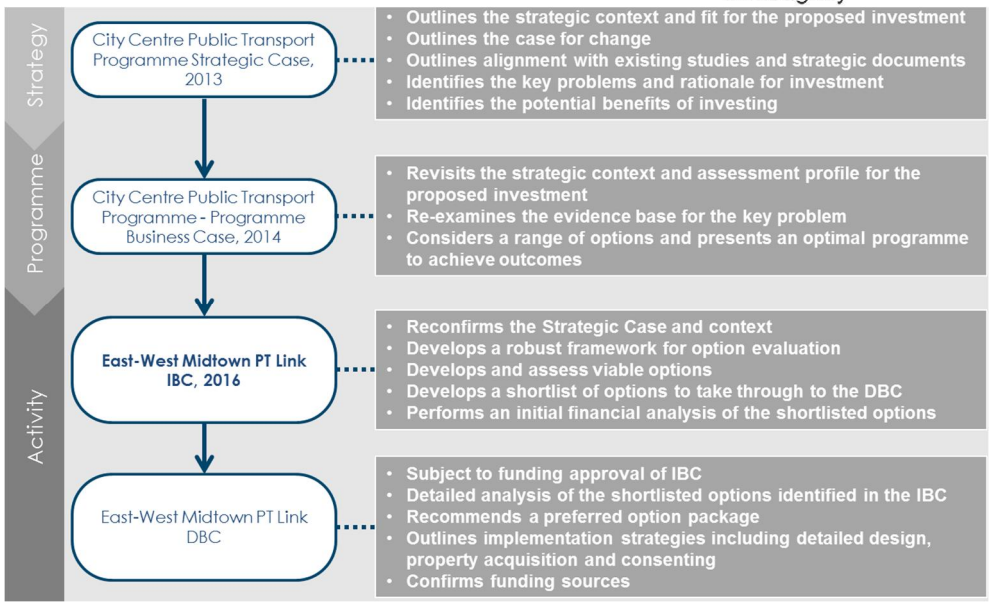


Figure 1-1: Core studies

Figure 1-2: Study area

[1] City Centre Access Programme Strategy Strategic Case, July 2013
[2] City Centre Public Transport Programme – Draft PBC, NZTA and Auckland Transport, November 2014
[3] Auckland Central Access Programme (CAP) PBC, Auckland Transport, March 2016.

1.1 Investment objectives

Project objectives were developed with stakeholder involvement to guide project outcomes including option development and evaluation. The project objectives include:

- Create engaging places for people, recreation and businesses that have a character unique to Tamaki Makaurau / Auckland and consistent with existing plans and visions;
- Invest in affordable, right sized solutions that provide value for money over the life of the asset with investment times and designed to integrate with development;
- Unlock economic and social performance by enabling more people to access the city centre more effectively;
- Provide high quality access for public transport and associated pedestrian network while maintaining a connective traffic network;
- Deliver environmentally sustainable infrastructure;
- Provide for the effective operation of the city centre public transport network;
- Provide safe, connected and efficient cycling strategic network in eastern part of study area; and
- Provide a great customer / user experience.

1.2 Project process

The IBC was developed with a strong stakeholder engagement approach, involving interviews meetings and workshops with:

- Auckland Transport;
- Auckland Council;
- NZ Transport Agency;
- University of Auckland;
- Auckland University of Technology;
- Waitematā Local Board;
- Mana Whenua;
- City Centre Advisory Board; and
- Learning Quarter Forum.

Interviews with key stakeholders were undertaken by Auckland Transport and Jacobs to capture each stakeholder's local knowledge within the study area, explain the projects scope and to discuss and refine the project objectives. This engagement and workshop approach defined the project objectives; problem and benefits; evaluation framework and guided long list and short list options and project outcomes. Table 1.1 provides an overview of the workshops' purpose and outcomes and Table 1.1 outlines the project process.

Table 1-1: Stakeholder liaison workshop overview

Workshop	Purpose	Outcome	Attendees
Workshop 1 3 June 2016	Problem confirmation and stakeholder interview summary	Refinement of project problem definition and benefits Refinement of project objectives	Auckland Transport Auckland Council NZ Transport Agency University of Auckland AUT Waitemata Local Board
Workshop 2 14 June 2016	Do Minimum and Evaluation framework	Agreement on project problem definition and benefits Development and agreement on the Do Minimum and future year transport and land use context assumptions Refinement and agreement on the option evaluation criteria	
Workshop 3 15 July 2016	Long list option development	Development of the long list of options and agreement to rule out options from investigation	
Workshop 4 13 September 2016	Short list presentation	Agreement on the short list options to proceed to the DBC	
Workshop 5 December 2017	Waterloo Quadrant bus priority options	Discussion on Waterloo Quadrant bus priority options	ATMetro

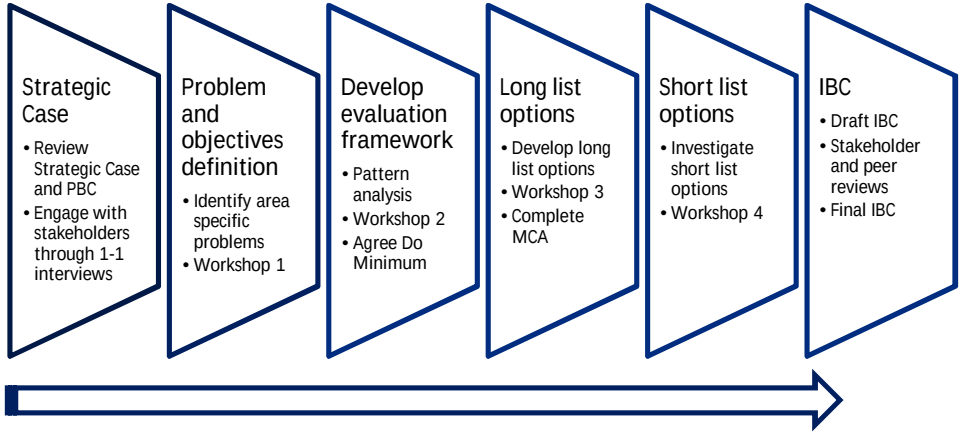


Figure 1-3: Project process

2. Strategic Case for investment

The strategic fit for investment in public transport is identified in a number of central and local government policy documents. The framework for investment in land transport is identified in Figure 2.1. In general, funding is appropriated based upon a three-tier policy framework with each tier of policy having to give effect to the policy above it.

The highest tier of policy consists of the Government Policy Statement on Land Transport. This outlines the government's priorities for the investment in the transport network over a ten-year period, the following two tiers of policy are prepared by Auckland Transport and the New Zealand Transport Agency. Auckland Transport is responsible for the preparation of a Regional Land Transport Plan for the Auckland region that identifies the projects that AT wants to prioritise for funding, these projects need to be a strategic fit with the GPS in order to be eligible for funding from the National Land Transport Fund (NLTF).

The remaining tier consists of the National Land Transport Programme that identifies the projects NZTA has assessed as being a strong strategic fit with the GPS and are therefore eligible for partial funding from the NLTF.

Within the Auckland region there are two mechanisms in place for transport projects to achieve partial central government funding, these are; through the NLTF or through the Auckland Transport Alignment Project (ATAP). As ATAP is intended to fund those projects that will unlock transformational growth of the Auckland region and are of national significance (for example the City Rail Link) the majority of these projects have been predetermined in a funding agreement between Auckland Council/ Auckland Transport and the Government.

In contrast, the Regional Land Transport Programme identifies those projects, which are of significance for the Auckland region and reflect both the priorities of the GPS along with being a strategic fit with Auckland Councils/ Auckland Transports funding objectives.

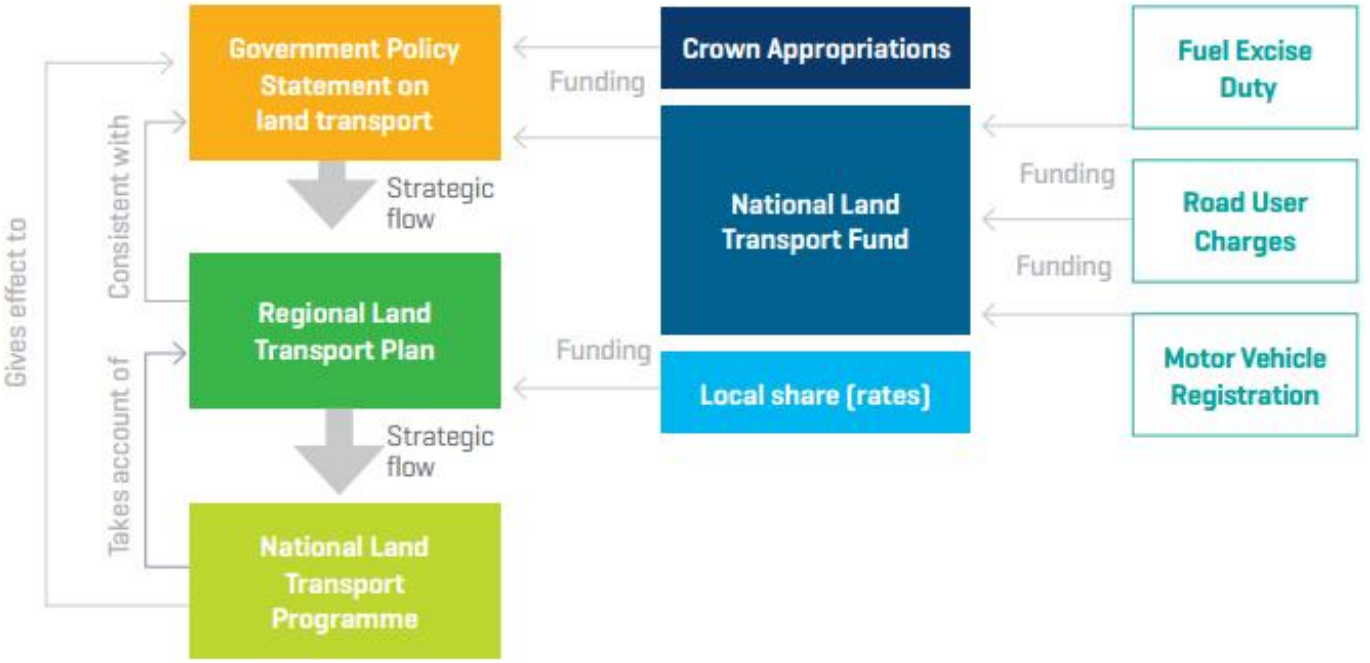


Figure 2.1: Framework for investment in land transport

Figure 2.2: GPS Strategic priorities for land transport funding

2.1 Strategic fit

The East-West Midtown PT Link has a strong strategic fit with the following strategies and as described in this section.

- Draft Government Policy Statement on Land Transport (2018/19 – 2027/28);
- Auckland Transport Alignment Project (ATAP), 2016;
- Auckland Plan, 2012;
- Regional Public Transport Plan; including New Network;
- Draft Roads and Streets Framework;
- City Centre Master Plan;
- City East-West Transport Study (CEWT);
- Aotea Framework;
- Urban Cycleways Programme;
- Auckland Central Access Programme (CAP) PBC; and
- City Centre Draft PBC.

2.1.1 Draft Government Policy Statement on Land Transport (2018/19 – 2027/28)

The Draft Government Policy Statement on Land Transport (GPS) sets out the government's priority areas and funding available for the improvement of the land transport network over a 10 year period. The process to access this funding is to ensure that projects are included in the Regional Land Transport Plan and reflect the governments funding priorities; these are identified in Figure 2.2.

Projects which offer value for money are likely to provide automatic advances in economic growth, productivity and road safety improvements the GPS acknowledges that although some projects will have a low Benefit/ Cost Ratio, these projects may be necessary to advance government policies. Therefore, consideration will be given to these projects if they strongly align with government policies and their inclusion is made in a transparent manner.

As a key outcome for the East-West Midtown PT Link is to enable more people to access Midtown and the Learning Quarter more efficiently, this project achieves a strong strategic fit with government's priorities. This increase in access will also enable an increase in economic growth and productivity through the provision of a more reliable and predictable public transport network. Moreover, the inclusion of a Midtown separated cycle facility as part of this project will result in road safety improvements, particularly for those using bikes, increasing the strategic alignment between this project and the draft GPS.

2.1.2 Auckland Transport Alignment Project (ATAP)

The Auckland Transport Alignment Project (ATAP) identifies the strategic approach that central government and Auckland Transport will follow in the development of Auckland's transport network over the next decade.

This strategic approach is identified in Figure 2.3 and was developed based upon the objectives identified in Table 2.1

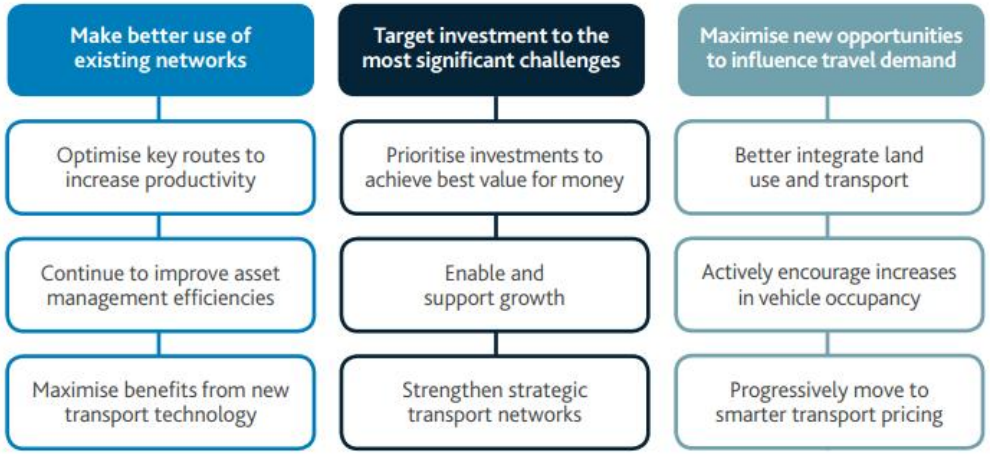


Figure 2.3 : ATAP recommended strategic approach to investment in the Auckland transport network

Table 2-1: ATAP project objectives

ATAP project objectives
1. To support economic growth and increased productivity by ensuring access to employment/ labour improves relative to current levels as Auckland's population grows.
2. To improve congestion results, relative to predicted levels, in particular, travel time and reliability in the peak period and to ensure congestion does not become widespread during working hours.
3. To improve public transport's mode share, relative to predicted results, where it will address congestion
4. To ensure any increase in the financial costs of using the transport system deliver net benefits to users of the system.

Both the strategic approach identified and the ATAP project objectives create a strong strategic case for public transport investment for projects that align with ATAP.

As the aim of the East-West Midtown Public Transport Link project is to ensure that more people are able to access the centre city more efficiently by public transport, there is a strong relationship between this project and ATAP. This is due to improvements in the efficiency of public transport services likely resulting in an increased Public Transport mode share whilst reducing congestion and lifting economic productivity.

2.1.3 Auckland Central Access Programme (CAP) PBC

Auckland CAP PBC[4] was published by Auckland Transport in March 2016 to address existing and future accessibility issues in the city centre.

The PBC has identified three key issues which include:

- Inability to meet current and projected transport demand on key corridors will sustain unreliable travel and poor access to productive central city jobs;
- Blockages and delays in central bus services worsen travel times and customer experience for those using public transport; and
- High and increasing traffic volumes on residential and inner city streets create adverse urban amenity and environmental effects.

This IBC does not directly follow on from the CAP PBC; however, the need for investment and analysis undertaken as part of the PBC is relevant and has an influence on the development of the IBC.

Detailed analysis undertaken as part of the PBC has shown that bus congestion on Wellesley Street is likely to increase in the absence of significant interventions.

Figure 2.4 **Error! Reference source not found.**includes the alignment between the CAP recommendations and the IBC objectives.

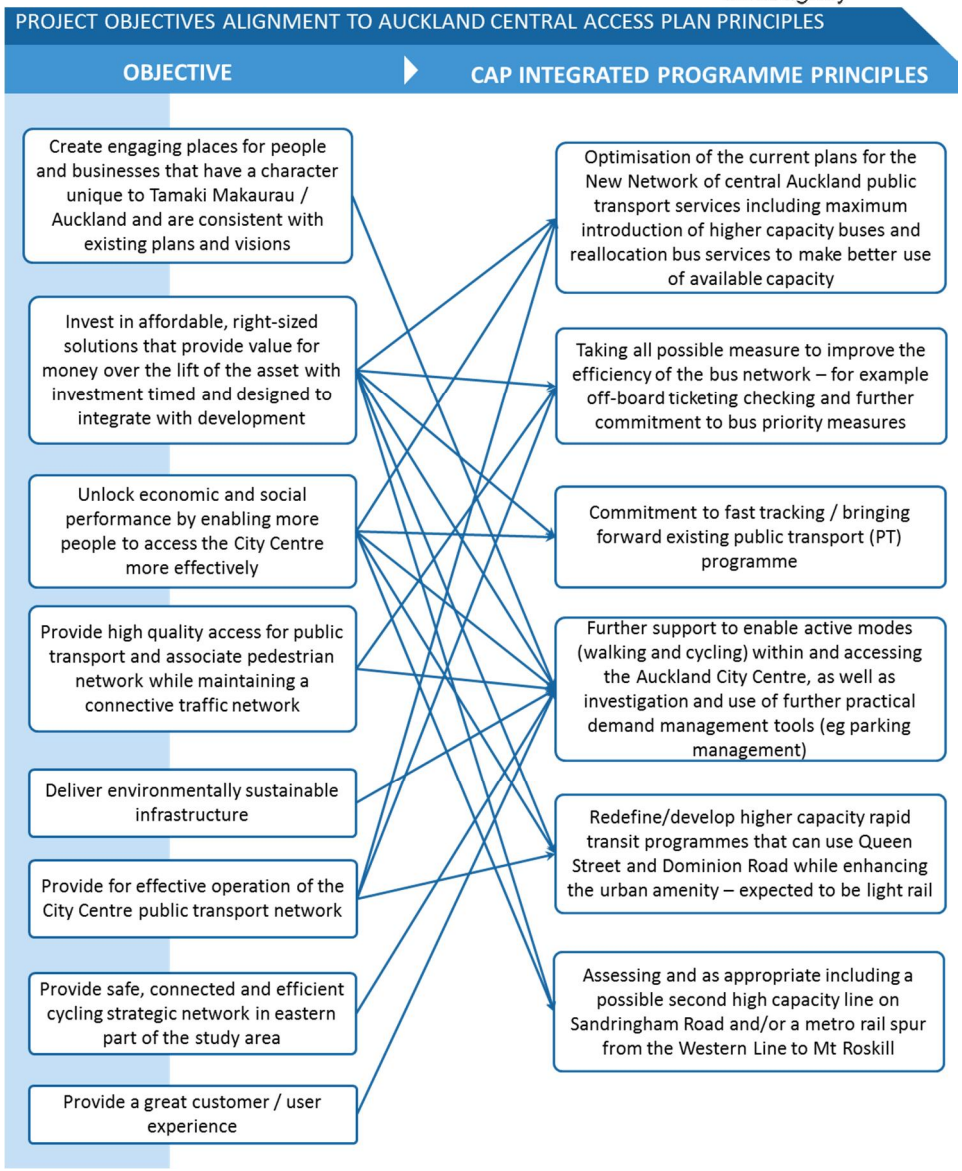


Figure 2.4 : Alignment between CAP PBC and IBC project objectives Alignment between CAP PBC and IBC project objectives

[4] Auckland Central Access Programme (CAP) PBC, Auckland Transport, March 2016

2.1.4 Auckland Plan

The Auckland Plan, adopted in March 2012, is a 30 year plan that provides a long-term strategic direction for Auckland's development and infrastructure and includes social, economic, environmental and cultural goals.

The Auckland Plan aspires to make the city centre highly accessible with a high quality experience for users of public transport, pedestrians and cyclists whilst holding car travel to the city centre at current levels. The plan outlines a number of targets for the future transport network and priorities as shown in Figure 2.5.

This includes nearly doubling the number of trips to the city centre. To deliver this aspiration will require a much greater increase in the number of trips by public transport, walking and cycling. The Auckland Plan targets an increase in public transport morning peak mode share into the city centre to 69% by 2040, from its 2014 mode share of approximately 50%.

The goal of the Auckland Plan is to integrate all transport components using a single system approach. This requires strategic investment and close-co-operation between the Auckland Council and Central Government.

The three components required to address current congestion problems to accommodate future business and population growth, and move to a single transport system are to;

- improve and complete the existing road and rail network;
- encourage a shift towards public transport; and
- support environmental and health objectives through walking and cycling.

Providing investment in improved public transport accessibility to the city centre is needed to ensure that the public transport mode share can continue to grow and deliver transformational improvements to the level of accessibility of the city centre.

The Auckland Plan identifies the transformation of the city centre as one of two top-tier priorities for the Auckland Council. The City Centre Masterplan, as discussed in section 2.1.5, was developed in parallel with the Auckland Plan as a key companion document to guide future planning and investment in the city centre.

Figure 2.5: Strategic Direction

2.1.5 Auckland City Centre Master Plan 2012 (CCMP)

The City Centre Master Plan 2012 provides a clear vision:

"By 2032 Auckland's city centre will be highly regarded internationally as a centre for business and learning, innovation, entertainment, culture and urban living – all with a distinct Auckland flavour".

The CCMP outlines eight transformational moves to unlock the potential of the city centre and contribute to becoming the world's most liveable city. The Master Plan recognises that the city centre is at the heart of the region's economy, hosting two universities with 60,000 students and more than 9,000 staff working at the city centre's universities and a high proportion of the country's businesses and services. The vision for an easily accessible, vibrant and prosperous city centre hinges on transport and improving the accessibility of the city.

The City Centre Masterplan, which supports the Auckland Plan, provides a blueprint for a 20-year transformation of the city centre.

The eight key moves include:

- Uniting the waterfront with the city centre;
- Connecting the western edge of the city to the centre;
- Fostering the central business and retail district as the city's "engine room";
- Nurturing the universities and knowledge-based industries;
- Building underground railway stations as part of the City Rail Link;
- Connecting city centre parks and the waterfront;
- Connecting the city centre to the city-fringe suburbs; and
- Becoming a "water city" – a city closely connected to the harbour and coast.

CCMP recognises a number of challenges that the city centre faces. A high number of private motor vehicles dominate the city centre, and for pedestrians, this The CCMP also recognises opportunities, noting that in the past 10 years, peak-time car volumes in the city centre have reduced slightly and most peak-travel growth has occurred in public transport, walking and cycling. This means poor-quality walking environments, inconvenient routes and inefficient travel times.

The Victoria Linear Park, as shown in Figure 2.6, is one of the key transformational projects identified in the CCMP, and is focused on delivering a significant green public space and east-west walking street through the midtown area, that supports the high footfall associated with the Aotea Station and provides a cycling route connecting routes to the east and west.

The CCMP influences the City East West Transport Study, as discussed in section 2.1.6.

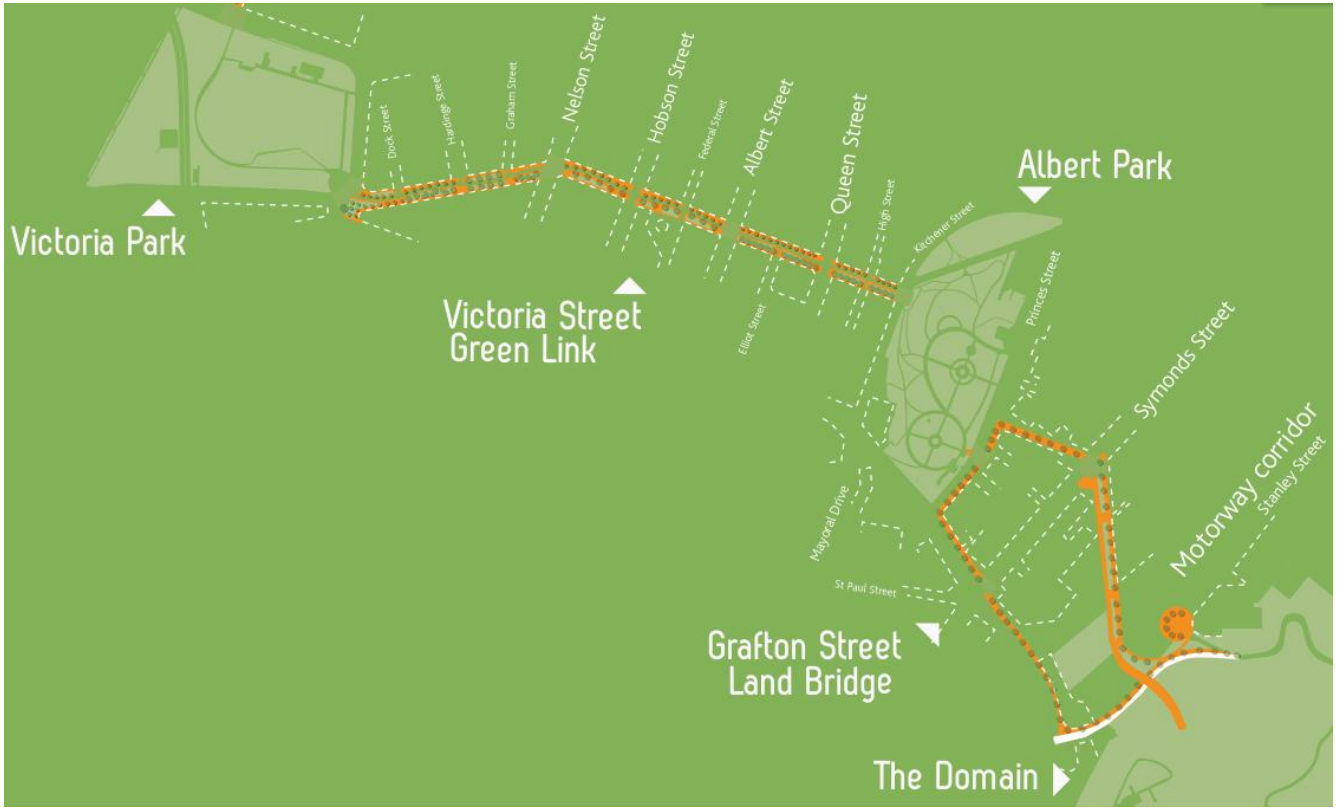


Figure 2.6 : Victoria Street Green Link

2.1.6 City East West Transport Study (CEWT)

The CEWT study is a non-statutory supporting document that sits beneath the Auckland Plan and Integrated Transport Programme and feeds though to the Regional Land Transport Programme and associated investigation, design and implementation work streams. It is also influenced by other strategic plans, such as the City Centre Masterplan and Waterfront Plan.

The CEWT study led to the identification of preferred strategic outcomes and modal priorities for all key east-west transport corridors through the city centre, including Victoria Street, Wellesley Street and Cook Street / Mayoral Drive through the midtown areas. The direction for these corridors are summarised in the diagram in Figure 2.7.

The CEWT study outlines the strategic direction and vision for Wellesley Street over the next 30 years, which involves the corridor becoming the primary east-west public transport spine through midtown between the Learning Quarter and Victoria Park to support the planned increased bus volumes into the city centre. It is to maintain general traffic connection in the East between Mayoral Drive and Grafton Gully State Highway.

A substantial uplift in the provision of pedestrian-oriented public realm and place-making opportunities were also identified along the central blocks of Wellesley Street between Albert Street and Albert Park, supporting the heavy pedestrian demand in the very core of the city including the need for transfer between buses and rail at the future Aotea Station.

This preferred direction see significant bus infrastructure and lane capacity provided along Wellesley Street and reflects the Regional Public Transport Plan approach of providing a simplified bus network using fewer bus corridors to improve legibility for users. A number of quality cycle routes through the city centre were also identified including on Wellesley Street.

The study also confirmed Victoria Street as the preferred location of a future linear park as previously envisaged by the CCMP. The Victoria Street Linear Park would involve reducing traffic capacity to ideally 2 or a maximum of 3 lanes and consolidating the space allocation as a broad and continuous public realm corridor along the southern side of the street. Cross-town east-west cycle connection was also identified for Victoria Street.

The study identified the need for further investigation including:

- Bus connections between Wellesley Street and Symonds Street;
- Provisions for bus stops within the Learning Quarter; and
- Facilitating bus turnarounds for buses required to return to Wellesley Street westbound.

Figure 2.7 : Preferred CEWT network strategy :

2.1.7 Aotea Framework

The Aotea Framework, as shown in Figure 2.8, aims to advance the strategic direction set out in the Aotea Quarter Plan 2007 and the CCMP to provide the strategic vision for the next 20 years.

The framework places a focus on opportunities to improve the public realm and unlock the potential of sites that will contribute to the vision for Aotea Quarter.

The framework identifies four outcomes to deliver the vision. These are:

- **Outcome 1: A Civic and Cultural Heart**

  The quarter core as the enduring home for the arts, culture, entertainment and civic life, creating a unique destination.

- **Outcome 2: Transport-Enabled Development**

  A public transport node that improves accessibility supports growth and enables high-quality development.

- **Outcome 3: Supporting Neighbourhoods**

  Liveable, vibrant and diverse inner-city neighbourhoods engaging and supporting the quarter core.

- **Outcome 4: Sustainable and Cultural Showcase**

  Spaces and buildings that lead and showcase Auckland's drive for sustainability, and celebrate its unique cultural identity through the Te Aranga Māori design principles.

Aotea Quarter is expected to become one of the best connected areas in Auckland resulting from a number of planned transport investments which will redefine the character and role of streets within the area.

The Framework addresses how the multi-modal transport network changes can integrate with major development and public space opportunities at Aotea Quarter. Achieving this closer integration of public transport and public realm is particularly important given the high level of investment planned for the city centre.

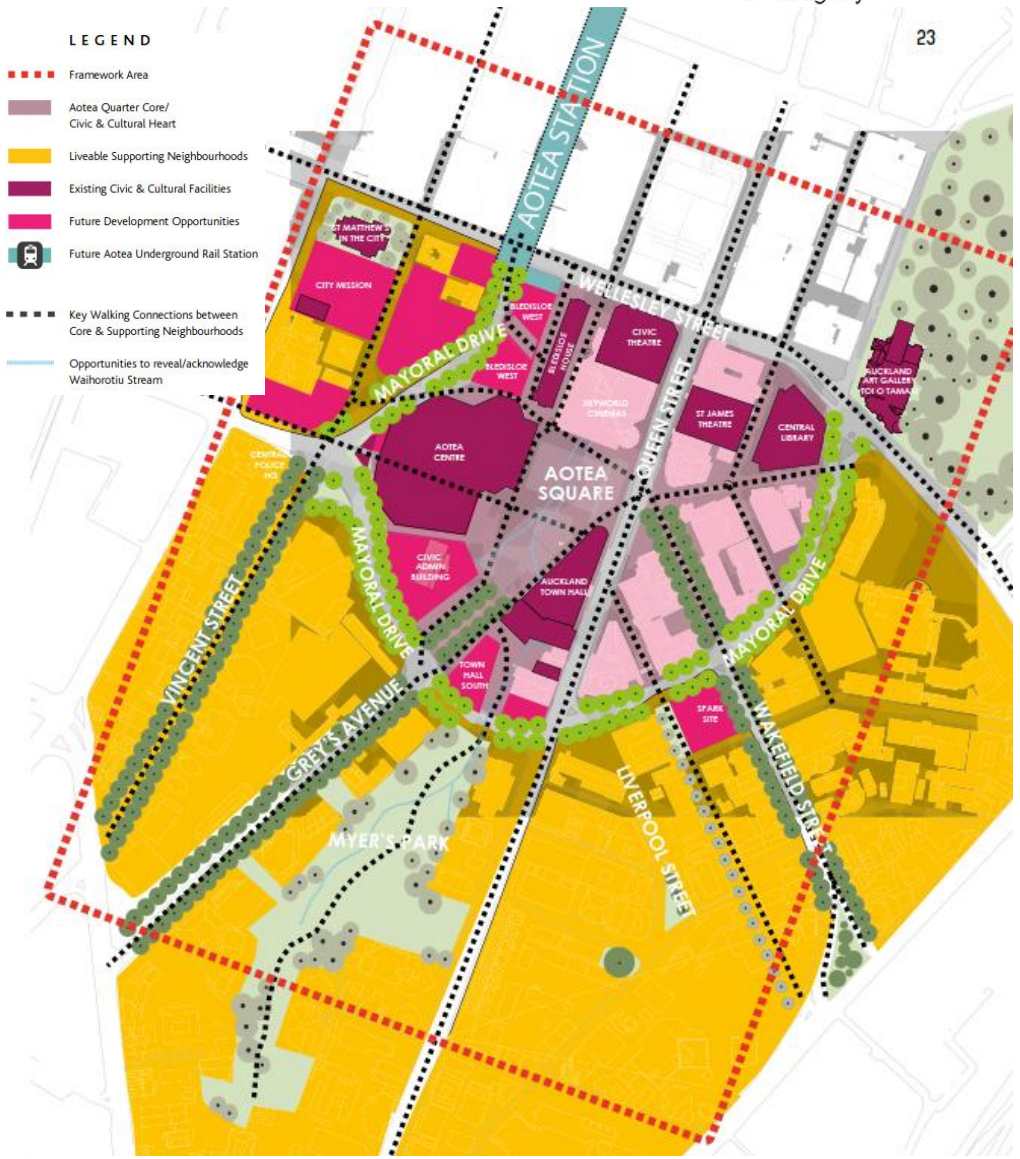


Figure 2.8 : Future development and built form

2.1.8 Draft Roads and Streets Framework, 2016

The draft Auckland Roads and Streets Framework (RASF) sets out the approach to managing roads and streets to enable place making and movement to be considered together. The Framework depicts street typologies for different street environments and proposes tools to apply which can mitigate conflicting modal priorities and enhance the six different functions a street can provide (as shown in Figure 2.9).

The aim is to develop great places, move people and goods as efficiently as possible and to ensure Auckland's roads and streets provide better and safer places for activities, along with transformed conditions for walking and cycling. Offering both world-class places and efficient and effective transport networks is vital to support Auckland's vision to become the world's most liveable city.

The RASF recognises that a fit for purpose approach is vital as Auckland continues to grow. As a road or street can perform different functions at different times of the day or day of the week, it needs to perform better across a number of functions as shown in in Figure 2.8.

Figure 2-9: Roads and Streets functions

2.1.9 Regional Public Transport Plan (RPTP)

The Regional Public Transport Plan (RPTP) is a statutory document that describes the services that are integral to Auckland's public transport network and the policies and procedures that apply to those services. The RPTP also describes the public transport services that Auckland Transport proposes for the region over a 10-year period and outlines how this vision will be delivered.

The Auckland Plan seeks to nearly double the number of trips to the city centre whilst holding car travel to the city centre at current levels. To deliver this aspiration will require a much greater increase in the number of trips by public transport, walking and cycling.

In order to achieve the transformational shift in public transport proposed in the Auckland Plan, the RPTP proposes a new service network that provides a simpler, more connective network for Auckland over the next 10 years; referred to as the New Network as shown in Figure 2.10 and described in section 2.1.10.

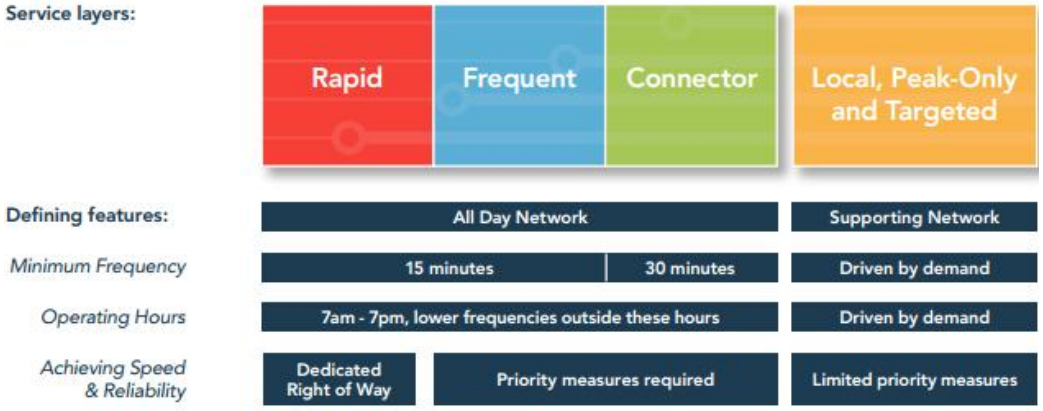


Figure 2-10: New Network concept

2.1.10 New Network

The New Network is a rationalisation of Auckland's public transport network which involves fewer, simpler bus routes running at higher frequencies with higher capacity vehicles. At present, this network is assumed to be rolled-out by 2018. A schematic of the New Network in the city centre is shown in Figure 2.11

To support the implementation and success of the New Network, it is important that an effective, efficient and high quality public transport network is implemented along the east-west Midtown link and to the Learning Quarter, while supporting high quality public spaces.

For the New Network within the city centre buses will primarily utilise four corridors, including:

- **Midtown East-West Corridor (Wellesley Street, Victoria Street)**
  The focal point of this study, this corridor is served by North Shore, Isthmus and Link services and connects the Learning Quarter / University Precinct with Aotea / Midtown, Victoria Quarter and Victoria Park.
- **Western North-South Corridor (Albert Street, Vincent Street)**
  This corridor includes bus services from the west and northwest and intersects the study area at Albert Street.
- **Eastern North-South Corridor (Symonds Street, Anzac Avenue)**
  This corridor includes services from Mt Eden Road and East Auckland and intersects at Symonds Street. The key Isthmus services that utilise the Midtown East-West Corridor also utilise Symonds Street to/from the south.
- **Downtown East-West Corridor (Fanshawe, Customs and Quay Streets)**
  This corridor does not intersect the study area, and is primarily comprised of services accessing Britomart from the North Shore, Eastern Suburb, City Link and Inner Link.

Connections allow passengers to travel to/from points outside the city centre, and also allow for better distribution of public transport users within the city centre, for example, passengers arriving from West Auckland will be able to connect with frequent services at Aotea in order to reach the universities.

Britomart, located at the northern end of the North-South and Downtown East-West corridors, is also a key connection, but is not part of the study area. Britomart will continue to serve as the terminus for many bus routes, as well as connections with heavy rail and the Downtown Ferry Terminal, and potentially light rail.

Key connection points within the study include:

- **Learning Quarter**
  Located at the intersection of the Eastern North-South and the Midtown East-West corridors, the Learning Quarter represents both the city centre's largest destination in terms of bus patronage as well as the potential for some passengers to make connections. Services connecting the North Shore with the Universities are proposed to terminate here and accommodation of these services are a key element of this project.
- **Aotea**
  Located at the intersection of the East-West Midtown and the Western North-South corridors, this is the access point for the southern CBD as well as civic and arts precincts. Passengers will be able to connect between west and northwest suburbs services on Albert Street and North Shore, Isthmus and Link services on Victoria and/or Wellesley Streets. In the future, connections will also be available with rail service at Aotea Station (following delivery of CRL), and potentially with light rail service along Queen Street. Aotea is located in the middle of the study area, and the accommodation of connecting passengers at this location will be a key consideration of this project.
- **Wynyard Quarter / Victoria Park**
  Wynyard Quarter serves as the terminus for Isthmus services and connection point between North Shore, Link and Isthmus services. This terminal and transfer point were elements of the Wynyard Quarter Interchange – Fanshawe Street Bus Priority Study, and serves as the western end of the East-West Corridor.

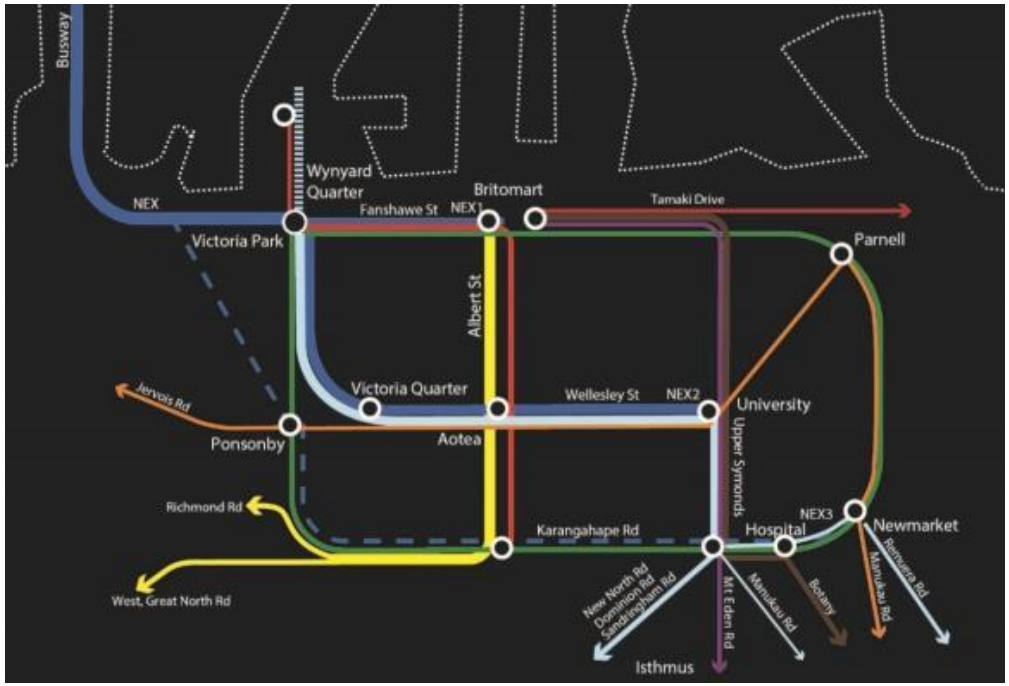


Figure 2.11 : The New Network in the city centre (simplified schematic):

2.1.11 Bus Reference Case

The Bus Reference Case looks at the specific implications of the New Network on the city centre, focussed on providing further detail on bus stop dimensions. bus stop capacity and the specific routes and volumes of buses anticipated to operate in each corridor, or to be accommodated by each terminal for 2018, 2026 and 2036.

The Bus Reference Case preferred stop dimensions are as follows[5]:

- 15 metre long bus stops;
- 15 metre lead-in to bus stops;
- 9 metre lead-out of bus stops; and
- 9 metres between individual positions within double, triple (or longer) stops.

The maximum bus stop capacity[6] of a single stop was identified to be 16 buses per hour, a double stop (bus stop with two bus positions) to be 33 buses per hour, and a triple stop (stop with three positions) to be 53 buses per hour. Longer stops are not recommended due to poor customer service outcomes.

As 2026 has been selected to be the planning horizon year for this study, 2026 volumes are included in tables 2.2, 2.3 and 2.4[7].

Table 2-2: North Shore to Midtown and Universities Bus Volumes - 2026

Service	Route Number	Peak Volume	All Day Volume
Northern Express - University	NX2	30	10
Milford & Takapuna to University	n4 & n4a	8	6
Hillcrest to University	n23a & b	5	4
Windy Ridge to University	n81	5	0
Chatswood to University	n91	5	0
Beach Haven to University	n92	5	0
TOTAL		**58**	**20**

Table 2-3: Isthmus to Midtown and Wynyard Bus Volumes - 2026

Service	Route Number	Peak Volume	All Day Volume
Manukau Road	30	10	6
Mangere / Onehunga to City via Manukau Road	309 & 309x	6	3
New North Road	22a & b	6	6
Sandringham Road	24a & b	20	8
Dominion Road	25 & 26	24	12
Remuera Road	70	10	6
Abbotts Way to Newmarket (to City pak)	701	5	Terminates at Newmarket
TOTAL		**81**	**41**

Table 2-4: Link Bus Volumes - 2026

Service	Route Number	Peak Volume	All Day Volume
Inner Link	INN	10	10
Outer Link	OUT	6	6
Pt. Chevalier to University via Jervoius Rd	101	6	0
TOTAL		**22**	**16**

The Do Minimum scenario for this project assumes Light Rail will be constructed from Mount Roskill to Wynyard Quarter via Dominion Road, Ian McKinnon Drive and Queen Street by 2026.

This impacts this project by altering the Bus Reference Case volumes for the Isthmus services. The assumption is that all Dominion Road services (routes 25 & 26) will be removed, as well as half the peak volume of the Sandringham Road services (routes 24a & b). North Shore and Link bus volumes will remain unchanged.

Table 2.5 outlines the volumes the 2026 Isthmus volumes that will be used as the baseline for this project.

Table 2-5: Isthmus to Midtown and Wynyard Bus Volumes (including LRT on Dominion Road)

Service	Route Number	Peak Volume	All Day Volume
Manukau Road	30	10	6
Mangere / Onehunga to City via Manukau Road	309 & 309x	6	3
New North Road	22a & b	6	6
Sandringham Road	24	10	8
Remuera Road	70	10	6
Abbotts Way to Newmarket (to City pak)	701	5	Terminates at Newmarket
TOTAL		**47**	**29**

[5] These stop dimensions are not always possible given available space, and the lead-in and/or lead-out space available

[6] These capacities are based on a two-minute traffic signal cycle and tolerance for stop failure (i.e., a bus having to wait for others to leave before it can enter the stop) of 10%. Longer signal cycles or lower tolerance for stop failure would further reduce stop capacity, while shorter signal cycles or higher tolerance for stop failure would increase stop capacity. These capacities also assume dwell times are short enough to allow buses to enter the stop, passengers to board and disembark, and the bus to exit the stop all within one light cycle. Longer dwell times due to busy stops, crowded vehicles, or passengers accessing the upper level of a double-decker could result in significant reduction in stop capacity.
These capacities also assume dwell times are short enough to allow buses to enter the stop, passengers to board and disembark, and the bus to exit the stop all within one light cycle. Longer dwell times due to busy stops, crowded vehicles, or passengers accessing the upper level of a double-decker could result in significant reduction in stop capacity.

[7] Peak volumes are assumed to be the number of buses per hour operating during the peak period in the peak direction, while the all day volumes are assumed to operate throughout the day, in the contra peak direction, and on weekends. Suitable high capacity buses (e.g. double deckers) are assumed to be used where feasible in order to minimise the number of buses that enter the CBD.

2.1.12 Urban Cycleways Programme (UCP)

Auckland Transport is constructing 52km of cycleways in the next 3 years. A network of separated cycleways to and through the city centre is being implemented aided by government funding through the Urban Cycleways Fund.

The Urban Cycleways Fund will accelerate the programme and help to deliver safe facilities in the city centre, key corridors to the east and west. Cycling in Auckland will be a key contributor to improving travel options and increasing reliability across the transport network. With automatic counters reporting a 24% increase in the morning peak between April 2015 and April 2016, cycling has become a transport mode of choice for an increasing number of people in Auckland.

The Auckland Urban Cycleways map in Figure 2.12 shows existing and planned future cycle links in the city centre and wider area. The city centre package of separated cycleways and intersection treatments will connect key parts of Auckland's central city. These include Quay Street and the waterfront, Karangahape Road and Upper Queen Street, and a number of east-west connections. The cycleways will also connect with the city's other key cycling corridors and link workplaces, shops schools and tertiary institutes within the central city.

It is intended that this package of work will provide safer and more connected cycling network throughout the city centre, with a variety of routes that are largely separated from traffic and pedestrians. Particular attention will be paid to intersection and junctions in order to make the cycling experience a safer and more comfortable journey through the city centre.

The package will link the inner suburbs with the central city and provide more transport choice for Aucklanders coming into the city. It is primarily aimed at people living within 5-8km of the city centre. Construction is anticipated to begin in late 2015 and be completed by mid-2018.

The two main existing cycle links within the study area are the Nelson Street and the Grafton Gully cycleways. Heavy traffic conditions coupled with the lack of dedicated facilities along the east-west corridor makes cycling undesirable through Midtown at present.

Victoria Street and Wellesley Street East are identified as new cycleways receiving urban cycleways funding as shown in Figure 2.12. An east-west Midtown cycle connection would enhance the cycle network by connecting existing north-south cycle links to key destinations in the city centre between Victoria Quarter and the Domain.

Beyond 2018, cycleways are planned for Queen Street, Mayoral Drive, Albert Street and Kitchener Street.

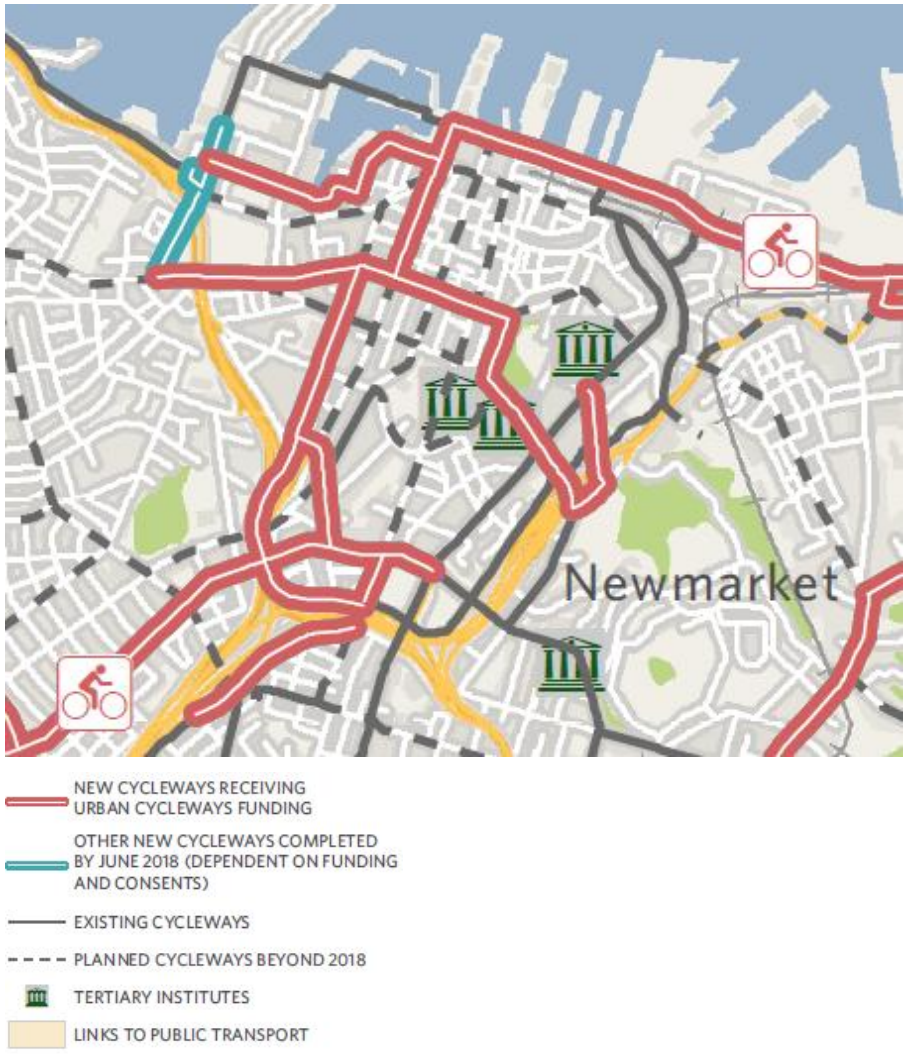


Figure 2-12: The Auckland Urban Cycleways map

2.2 Strategic case for investment

2.2.1 City Centre Public Transport Draft Programme Business Case

The City Centre Public Transport Programme (CCPTP) Strategic Case[8] and Draft Programme Business Case[9] (PBC) presents the case for further investigation of the City Centre Public Transport Programme.

The Strategic Case clearly identifies the entrenched problems of accommodating growth in the city centre as an area of significant economic importance for Auckland, as well as nationally.

The Strategic Case draws heavily upon existing strategy and planning, including the Auckland Plan; Regional Public Transport Plan, including the New Network; draft Integrated Transport Plan; and the draft Government Policy Statement, which emphasises the need for improvement for system wide improvements to address identified problems.

The case notes that the city centre street network is highly congested during the morning and afternoon peak commute period and has no capacity for additional traffic and highlights that without significant improvements to public transport, Auckland's already congested roads will only become further gridlocked, which will have an adverse impact upon economic growth and development. Consequently, to ensure that access is maintained to the city centre, all growth in travel must occur via public transport, walking and cycling. Delivering a comprehensive Rapid Transit Network is acknowledged as a key element of providing improved public transport and ensuring the growing demand for assessable and reliable public transport to the City Centre can be met.

The CCPTP was selected in the PBC to provide a faster, more reliable, legible and efficient network of public transport services through and within the city centre that will enable the economic growth of Auckland and provide access to the high value jobs that are located within the city centre.

The elements which make up the CCPTP are shown in Figure 2.13 and this develops the east – west public transport corridor (Wellesley Street) and Learning Quarter bus facilities elements of the CCPTP to support the city centre's largest destination in terms of bus patronage.

An investment logic mapping (ILM) workshop was held on 3 July 2014 and was attended by key stakeholders from Auckland Transport, the City Centre Integration Unit and the New Zealand Transport Agency (Transport Agency). The purpose of the exercise was to gain a better understanding of the causes and scale of the problems identified in the Strategic Case phase. These problems were refined for the study area and are detailed in section 3.

Figure 2.13 : CCPTP elements

The stakeholder panel identified and confirmed the following ILM problems relating to public transport in the city centre:

- Problem 1: Inefficient public transport infrastructure is having a negative effect on network and public transport performance;
- Problem 2: Public transport currently has lower level of service than travelling by car which discourages people from using public transport[10];
- Problem 3: Constrained transport access and inefficient allocation of road capacity will limit city centre investment and growth; and
- Problem 4: Public transport infrastructure is not well integrated into the city fabric which inhibits city centre growth.

[8] City Centre Public Transport Programme Strategic Case, Auckland Transport, July 2013
[9] City Centre Public Transport Programme Draft PBC, Auckland Transport, November 2014

[10] The ILM Problem 2 was originally '*Travelling by bus is perceived to be inferior to the car which discourages people from using public transport'.* The Auckland Transport Senior Management team requested a revision to Problem 2 in April 2016 to reflect changes since the ILM workshop and a wider public transport approach.

2.2.2 Register of previous studies

The table below provides an overview of some of the previous studies undertaken as part of the evolution of the project.

Table 2-6: Register of previous studies

	Document	Overview
BUSINESS CASE	City Centre Public Transport Programme Strategic Case	The Strategic Case concluded that the CCPT Programme is aligned and well supported by Auckland's strategic documents, and that the indicative assessment profile for the Programme was determined as HH.
	City Centre Public Transport Programme Draft PBC	The PBC further developed the strategic context presented in the Strategic Case and the case for change and is summarised in section 2
	Auckland Central Access Programme (CAP) PBC, Auckland Transport, March 2016	The CAP PBC was developed to address existing and future accessibility issues in the city centre. The PBC has identified three key issues which include: · Inability to meet current and projected transport demand on key corridors will sustain unreliable travel and poor access to productive central city jobs; · Blockages and delays in central bus services worsen travel times and customer experience for those using public transport; and · High and increasing traffic volumes on residential and inner city streets create adverse urban amenity and environmental effects. This IBC does not directly follow on from the CAP PBC; however, the need for investment and analysis undertaken as part of the PBC is relevant and has an influence on the development of the IBC. Detailed analysis undertaken as part of the PBC has shown that bus congestion on Wellesley Street is likely to increase in the absence of significant interventions. Appendix A shows the alignment between the CAP recommendations and the IBC objectives.
INVESTIGATIONS	City East West Transport Study (CEWT)	The CEWT study outlines the strategic direction and vision for Wellesley Street over the next 30 years which involves the corridor becoming the primary east-west public transport spine through midtown, enhancing provisions for pedestrians and supporting adjacent land uses. The study identified the need for further investigation including: · Bus connections between Wellesley Street and Symonds Street; · Provisions for bus stops within the Learning Quarter; and · Facilitating bus turnarounds for buses required to return to Wellesley Street westbound. ·
	Learning Quarter Bus Facilities – Pre Feasibility Study, Beca Ltd, 2014	The CEWT study (summarised in section 2.2.3) identified the need to address two bus operational issues to achieve the strategic direction for Wellesley Street and the Learning Quarter – how bus stops will be managed within the Learning Quarter and how buses will be routed between Wellesley Street and Symonds Street. The Pre-Feasibility study identified and developed high-level concepts which contributed towards resolving these bus operational issues. These concepts include: · Modifications to intersections and roads to allow for bus manoeuvres that are not currently possible; · Additional buses on existing routes to increase capacity; · Make better use of existing bus stop capacity; · Providing new bus stops or increasing the capacity of existing; · Bus link only roads; · New off-street terminal facilities; and · Routing buses on existing roads not currently used by buses. An evaluation of the options was undertaken and eight combinations were shortlisted for further investigation.
	Auckland Domain Masterplan	The Masterplan identifies walking and cycling improvements for the Domain including new pedestrian connections through the Domain to the future Parnell Station and cycling improvements to the eastern side of Grafton Road between the Domain Drive entrance and Nicholls Lane. The east-west midtown cycleway is intended to connect with these greenway linkages at the Grafton Road entrance, extending the midtown cycleway to/from major destinations in Parnell, Newmarket, Grafton and Auckland Hospital.
	Midtown Cycleway Feasibility Report, MRCagney, March 2016	The study investigated the feasibility of a new cycleway across the middle of the city centre to provide connections to wider bike facilities and destinations. The report identifies a preferred route which uses Wellesley Street, Queen Street and Victoria Street to provide a connection between College Hill and the Domain. The route integrates with the Nelson Street, Grafton Gully and proposed College Hill cycleways and provides access to key destinations along the cycle route such as Midtown, Aotea Quarter and the Learning Quarter.

2.3 Existing constraints and opportunities

Existing constraints and opportunities within the study area were identified through site visits, workshops and stakeholder engagement. These constraints are further explored and detailed within section 3 problems, benefits and performance measures.

Key existing constraints include the following:

- The east-west roadways across midtown are largely built out with limited to no opportunity for land acquisition;
- There are a considerable number of side streets and driveways along the major east-west roadways to which access must be retained, restricting the placement of bus stops;
- Access needs to be retained to Elliott Street and the Civic Theatre in the heart of the Wellesley Street corridor;
- The planned northern entrance to Aotea station, which sits within the existing carriageway of Victoria Street, and associated footpath widening significantly restricts the dedicated space available for buses and cycling on Victoria Street between Queen Street and Federal Street while also maintaining necessary general traffic access;
- A separated cycleway is planned across midtown, which competes for re-allocation of existing roadway space with public transport and pedestrians and may result in conflicts between bus operations and safe cycling;
- The need for North Shore buses to turn around at the Learning Quarter is limited by the street network and the sensitivity of some adjacent uses. A similar problem is encountered for Isthmus buses in Victoria and Wynyard quarters;
- No site has been secured for North Shore services to terminate and layover to date, and potential sites are potentially costly and limited in number; and
- There is limited capacity to accommodate additional buses on Symonds Street north of Wellesley Street, and no capacity to accommodate additional buses on Symonds Street south of Wellesley Street.

The following are key opportunities that may be actualised through the project:

- To leverage off the universities' high public transport mode share (91%) and provide a high quality experience for the very large number of passengers arriving and departing from the Learning Quarter;
- To leverage off of the existing demand in Midtown and achieve an even higher public transport mode share with provision of high quality public transport;
- To increase and meet the demand for public transport in Victoria Quarter, which is currently experiencing growth and redevelopment;
- To provide high quality public spaces in the city centre, including around the intersection of Queen and Wellesley Streets outside the Civic Theatre and along the Victoria Street corridor (e.g., with the Victoria Street Linear Park);
- To increase the number of people cycling to, from and within the city centre and Learning Quarter in particular through the provision of well-connected and safe cycling facilities;
- To provide a well-sized terminal facility that can both satisfy terminal needs during the peak periods and throughout the day, as well as for buses to layover during the day, thus avoiding significant dead running costs for Auckland Transport;
- To create a highly legible public transport network across the city centre that facilitates both rapid intra-city bus trips, as well as provides quick, easy and legible connections between heavy rail (i.e., CRL), bus service and proposed light rail along Queen Street across a single location;
- To provide a greatly improved walking environment across and along the major east-west corridors in Midtown; and
- To provide missing pedestrian and cycling connections across the Grafton Gully motorway, providing a strong linkage between the city centre and the Auckland Domain, Auckland Hospital and Grafton neighbourhood.

3. Problem, benefits and performance measures

The PBC problems, as noted in section 2, were discussed and refined for the project level with stakeholders at the problem definition workshop and took into account the constraints and opportunities within the wider study context. These constraints and opportunities were then further explored at the short list level in section 7.

The problem statement map and a detailed benefits map are included in Appendix A which covers the measures, baseline and targets corresponding to each of the benefits. The problem and benefits are included in Figure 3.1.

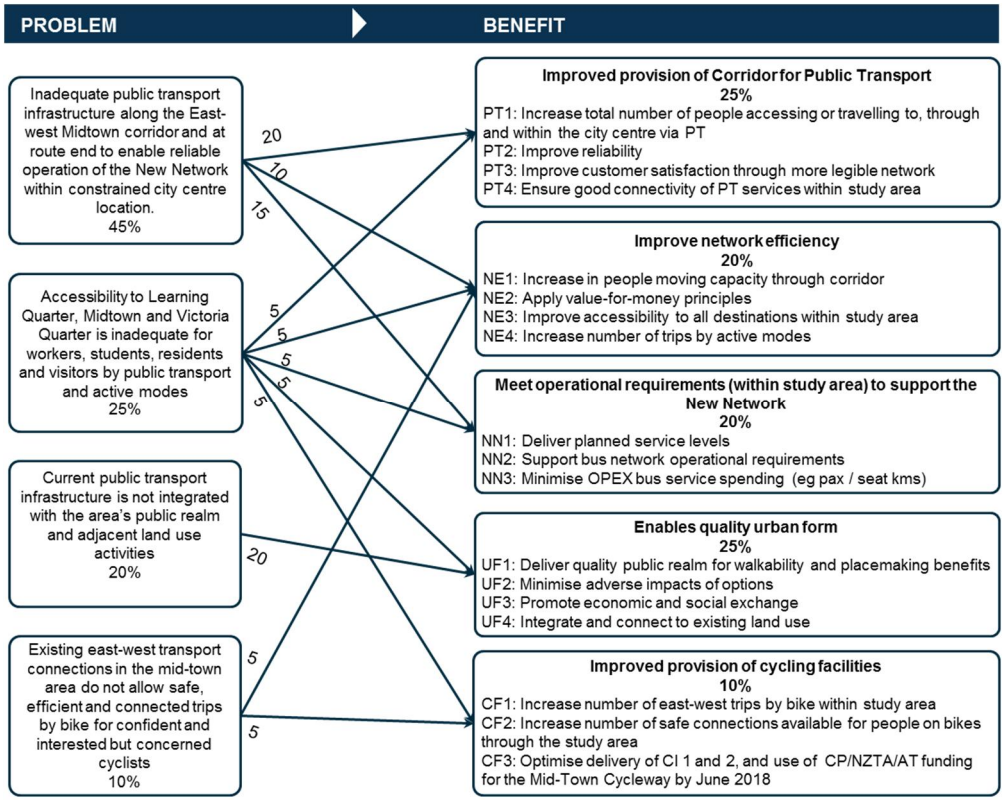


Figure 3-1: Project investment logic map

The following problems have been identified at the project level for the East-West Midtown PT Link IBC and were confirmed during the problem definition stakeholder workshop held on 3 June 2016:

- Problem 1: Inadequate public transport infrastructure along the East-west Midtown corridor and at route end to enable reliable operation of the New Network within constrained city centre location (45%);

  This problem statement is focused on the current provision of infrastructure along Wellesley Street, Victoria Street, Princes Street, Mayoral Drive, Symonds Street and in Grafton Gully and whether it can support the infrastructure requirements in the future for the New Network bus volumes and layover requirements.

- Problem 2: Accessibility to Learning Quarter, Midtown and Victoria Quarter is inadequate for workers, students, residents and visitors by public transport and active modes (25%);

  This problem statement is focused on public transport access along key corridors in the city centre and in particular to the Learning Quarter. It covers current and future desired mode share for the city centre, along with current and forecasted public transport patronage along Wellesley Street, Fanshawe Street and Symonds Street.

- Problem 3: Current public transport infrastructure is not integrated with the area's public realm and adjacent land use activities (20%); and

  This problem statement is focused on how the city centre public realm and adjoining built form and land use activities integrates with current and planned public transport facilities.

- Problem 4: Existing east-west transport connections in the midtown area do not allow safe, efficient and connected trips by bike for confident and interested but concerned cyclists (10%).

  This problem statement is focused on the provision of cycleways to and through the city centre providing a safe, high-quality and well-connected cycle network.

The potential benefits of successfully addressing the key transport problems have been identified for the IBC and include the following:

- Benefit 1: Improved provision of corridor for public transport (25%);

  This benefit involves the investment benefits of increasing the total number of people accessing or travelling to, through and within the study area; improving accessibility; improving customer satisfaction through a more legible network and ensuring good connectivity of public transport services along an east-west link.

  The benefits will be measured with public transport patronage, boarding and alighting volumes; travel time variability, number of public transport trips and number of complaints.

- Benefit 2: Improve network efficiency (20%);

  This benefit involves the investment benefits of increasing people moving capacity through the corridor; applying value for money principles, improving accessibility and increasing the number of trips by active modes.

  The benefits will be measured with public transport patronage, vehicle volumes, an economic assessment; public transport catchments and volume of cyclists and pedestrians.

- Benefit 3: Meet operational requirements, within study area, to support the New Network (20%);

  This benefit involves the investment benefits from delivering planned service levels, supporting bus network operational requirements and minimising OPEX bus service spreading.

  The benefits will be measured with accommodating planned peak service levels in the corridor, minimising out of service kilometres, meeting terminal requirements and minimising operating cost of service.

- Benefit 4: Enables quality urban form (25%); and

  This benefit involves the investment benefits of delivering quality public realm for walkability and placemaking benefits, minimising adverse impacts, promoting economic and social exchange and integrating and connecting to existing land use.

  The benefits will be measured with the allocation of space for pedestrian functions, length of reconstructed pavement, minimised severance and visual dominance effects from public transport operations, pedestrian counts and increase in ground level frontage activation.

- Benefit 5: Improved provision of cycling facilities (10%).

  This benefit involves the investment benefits from increasing the number of east-west trips by bike, increasing the number of safe connections available to people on bikes, promoting economic and social exchange and integrating and connecting existing land use.

  The benefits will be measured with the number of cycle trips, percentage of jobs within 400m of the cycleway and retail takings.

3.1 Scale of problems

This section provides evidence for the problems, potential implications and benefits if the problem is addressed.

Table 3.1 provides as overview of the problems, benefits of addressing the problem and how the problem aligns to the project objectives.

Table 3-1: Problem definition overview

Problem	Study area specific problem	If not addressed	Benefits of addressing problem	Project Objectives
Problem One: Inadequate public transport infrastructure along the east-west Midtown corridor and at route end to enable reliable operation of the New Network within constrained city centre location	There is insufficient space and facilities to accommodate the expected bus volumes within the study area under the New Network. In particular there is insufficient allocated space for public transport layover, staging/ recovery, and driver facilities.	This may lead to increased travel times for bus users, reduced travel time reliability and customer experience and increased bus operating costs. This may potentially increase adverse effects on the public realm and adjoining properties. This will in turn reduce accessibility to the Learning Quarter. Some users will respond by choosing not to use the New Network.	Addressing this problem will within study area: · Increase total number of people accessing or travelling to, through and within the city centre via PT · Improve reliability for buses · Improve customer satisfaction through more legible network · Ensure good connectivity of PT services · Increase in people moving capacity through corridor · Apply value for money principles · Deliver planned service levels · Support bus network operational requirements · Minimise OPEX bus service spending	Addressing this problem will: · Invest in affordable, right sized solutions that provide value for money over the life of the asset with investment times and designed to integrate with development · Unlock economic and social performance by enabling more people to access the city centre more effectively · Provide high quality access for public transport and associated pedestrian network while maintaining a connective traffic network · Deliver environmentally sustainable infrastructure · Provide effective operation of the city centre public transport network · Provide a great customer / user experience
Problem Two: Accessibility to Learning Quarter, Midtown and Victoria Quarter is inadequate for workers, students, residents and visitors by public transport and active modes	Current allocation of road capacity along the east-west is inadequate corridor restricts accessibility to key areas within the study area, including the Learning Quarter. There are limited bus infrastructure, walking and cycling facilities connecting key destinations.	This discourages people from using public transport and active modes and results in car mode share increasing. If access is not improved through the provision of additional bus infrastructure and walking and cycling facilities, businesses may relocate or choose not to locate /invest in city centre making it more difficult to achieve Auckland's economic goals. If access to the Learning Quarter by bus is compromised the current high public transport mode share will reduce.	Addressing this problem will: · Ensure good connectivity of public transport services · Improve reliability for buses · Improve accessibility to all destinations · Increase the number of trips by active modes · Deliver planned service levels · Deliver quality public realm for walkability and placemaking benefits · Integrate and connect to existing land use · Increase number of safe connections available for people on bikes	Addressing this problem will also address all of the project objectives.
Problem Three: Current public transport infrastructure is not integrated with the area's public realm and adjacent land use activities	Current public transport arrangements do not enable sufficient access to and through the study area, which reduces the potential for development and economic activity within the city centre.	This may lead to reduced public realm amenity and reduced property values within the study area. This may in tern hinder the development of engaging places for people and businesses. Also this will affect Auckland's' aspiration of becoming the world's most liveable city.	Addressing this problem will within study area: · Deliver quality public realm for walkability and placemaking benefits · Minimise adverse impacts of options · Promote economic and social exchange · Integrate and connect to existing land use	Addressing this problem will: · Creating engaging places for people, recreation and businesses that have character unique to Tamaki Makaurau / Auckland and consistent with existing plans and visions. · Invest in affordable, right sized solutions that provide value for money over the life of the asset with investment times and designed to integrate with development · Unlock economic and social performance by enabling more people to access the city centre more effectively · Deliver environmentally sustainable infrastructure · Provide safe, connected and efficient cycling strategic network in eastern part of study area
Problem Four: Existing east-west transport connections in the midtown area do not allow safe, efficient and connected trips by bike for confident and interested but concerned cyclists	Currently there is no east-west Midtown cycling facility, resulting in inexperienced cyclists not having a dedicated space to ride within a heavy traffic environment. East – west connections are required to connect to the cycle network, including the proposed Skypath, Nelson Street, Quay Street, and Victoria Park cycle facilities.	If not addressed cycling along the east-west Midtown link will become more undesirable for people, particularly with the increased and frequency of buses expected as part of the New Network. There will also be a gap in the Midtown cycle network restricting access to key destinations in the city centre including Victoria Quarter to the Domain.	Addressing this problem will within study area: · Increase number of trips by active modes · Increase number of east-west trips by bike · Increase number of safe connections available for people on bikes · Optimise delivery of CI 1 and 2, and use of UCF/NZ Transport Agency/Auckland Transport funding for the Midtown Cycleway by June 2018	Addressing this problem will: · Deliver environmentally sustainable infrastructure · Provide safe, connected and efficient cycling strategic network in eastern part of the study area · Provide a great customer / user experience

Problem Statement 1: Inadequate public transport infrastructure along the East-West Midtown corridor and at route end to enable reliable operation of the New Network within constrained city centre location

This problem statement is focused on the current provision of infrastructure along Wellesley Street, Victoria Street, Princes Street, Mayoral Drive, Symonds Street and in Grafton Gully and whether it can support the infrastructure requirements in the future for the New Network bus volumes and layover requirements.

The strategic aspiration for the East-West Midtown PT corridor is to enable the New Network and provide for frequent, reliable and efficient bus service and connections between the North Shore and Midtown / Universities as well as between the Isthmus and Midtown.

This is essential for the role of east-west midtown corridor as it connects key areas in the city centre, namely Victoria, Aotea and Learning Quarters. Provision of bus priority and supporting infrastructure to improve journey time and service reliability is a key factor in enabling the New Network and in influencing travellers' choice of mode.

ADD in PT travel time now vs future figure and text

At present, there is insufficient space and infrastructure to accommodate the planned increased bus volumes and the New Network cannot be delivered under current conditions. The corridor requires infrastructure and priority for future operation of high frequency and high occupancy buses in the city centre, as shown in Figure 3.2.

Figure 3.3 shows the current bus volumes within the study area while the New Network bus volumes in 2026 are included in Figure 3.4. The Bus Reference Case, which sets out AT Metro's assumptions regarding City Centre bus volumes is described in Section 2.2.7 New Network, and the 2026 volumes (assuming Light Rail has been delivered on Queen Street and Dominion Road) are included in Table 3.2[11].

While the Bus Reference Case describes City Centre bus volumes *without* light rail the East-West Midtown PT Link study assumes that light rail will be constructed on Dominion Road, Ian McKinnon Drive and Queen Street, prior to the planning horizon year of 2026. Therefore, the bus volumes included in this document assume that light rail replace all Dominion Road and half of Sandringham Road bus services entering the City Centre. As such, the overall bus volumes used for the corridor in the East-West Midtown PT Link project are substantially lower than those cited in the Bus Reference Case without Light Rail.

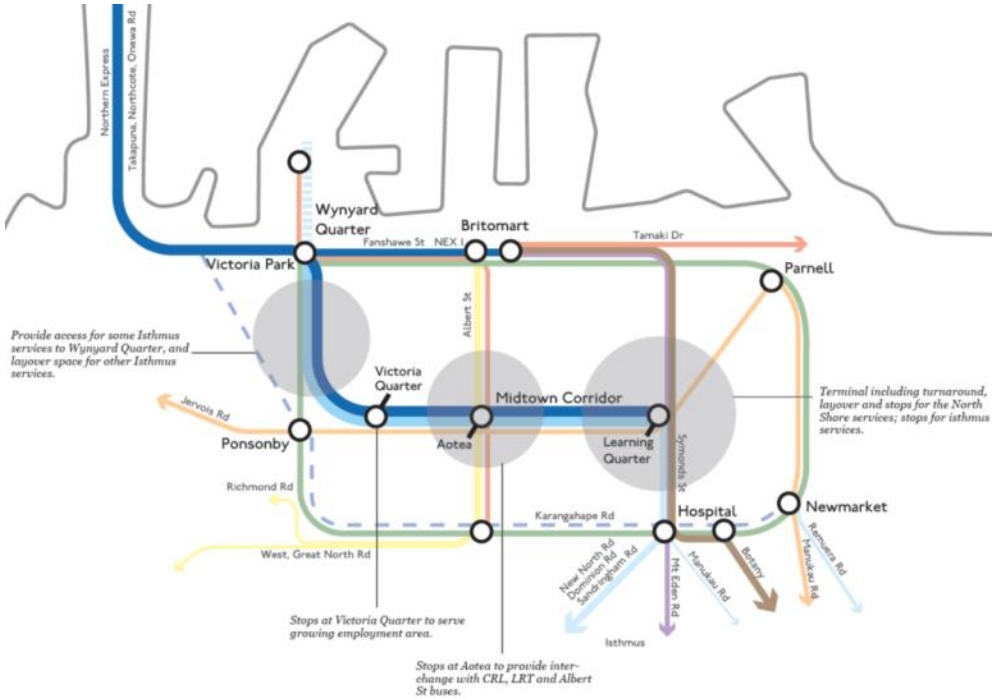


Figure 3-2: New Network requirements for along East-West PT Corridor

Table 3-2: New Network bus volumes, 2026

Service route group	Routes Number	Peak vol.	All Day Volume
North Shore to Midtown and Universities	NX2, n4, n4a, n23a & b, n81, n91, n92	58	20
Isthmus to Midtown and Wynyard	30, 309 & 309x, 22a & b, 24, 70, 701	47	29
Link	INN, OUT, 101	22	16

[11] Note: peak volumes are assumed to be the number of buses per hour operating during the peak period in the peak direction, while the all day volumes are assumed to operate throughout the day, in the contra peak direction, and on weekends. Suitable high capacity buses (e.g. double deckers) are assumed to be used where feasible in order to minimise the number of buses that enter the CBD.

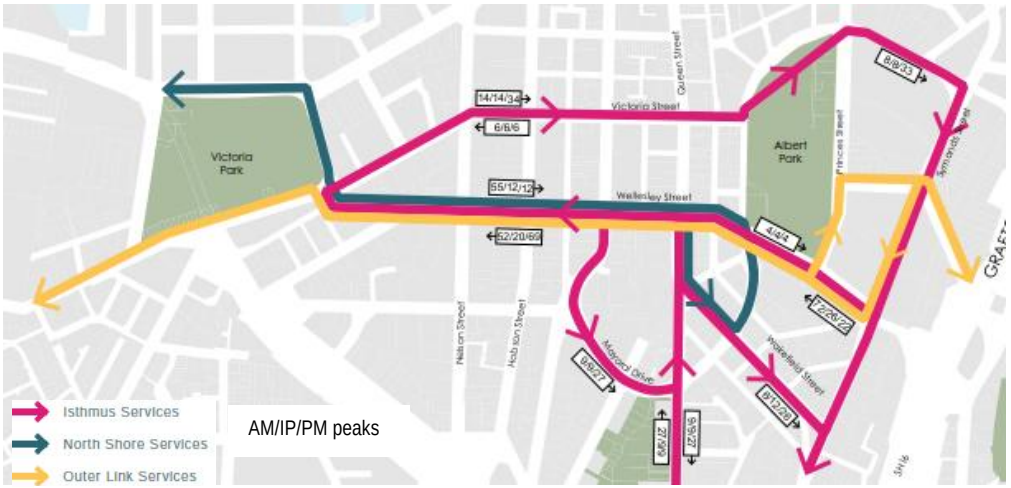


Figure 3-3: Existing bus volumes

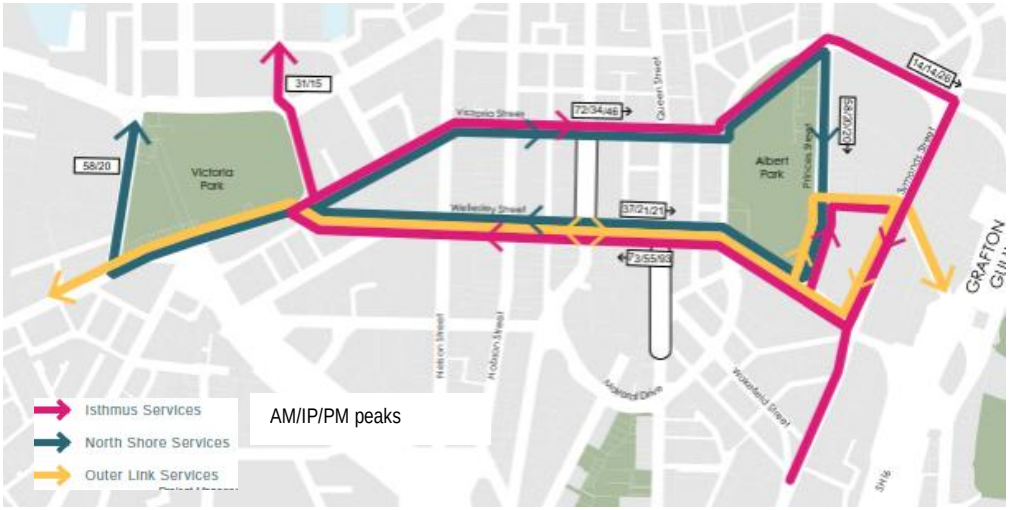


Figure 3-4: Do Minimum bus volumes, 2026[12]

Wellesley Street Bus Capacity

The New Network has generally envisioned the east-west Midtown corridor to be on Wellesley Street, which provides the most direct/fastest route between Victoria Park/Wynyard Quarter to the west and the Learning Quarter/Symonds Street to the east. However, existing bus infrastructure along Wellesley Street will not cater for the New Network bus volumes.

Currently, Wellesley Street is used by the Outer Link service, limited westbound Isthmus service (Dominion Road service from Symonds Street to Queen Street, Manukau Road service from Queen Street to Mayoral Drive, and Sandringham Road and New North Road services from Symonds Street to Victoria Street), as well as some North Shore services to/from Takapuna, East Coast Bays, Hillcrest and various peak express services in both directions west of Queen Street.

The resulting volume of buses (see Figure 3-5) exceeds the existing stop capacity on the street, primarily comprised of single and double stops which should service up to 16 or 33 buses per hour, respectively, based on guidelines outlined in the Bus Reference Case. One triple stop (for up to 53 buses per hour) is currently provided in front of the Civic Theatre.

Delivery of the New Network will further increase the volume of buses operating in this corridor, which is already over capacity with regard to stop infrastructure. In order to accommodate the New Network across Midtown, additional bus infrastructure and bus priority would be required on Wellesley Street. Due to concerns over the proposed high volumes of buses on Wellesley Street as well as the University of Auckland's concerns regarding use of the ramp connecting eastbound Wellesley Street to Symonds Street, the New Network has been adapted through the consultation process to move some eastbound services to Victoria Street in the short term.

The North Shore Rapid Transit Study[13] identified that City Centre bus stops, corridor and termini for the Northern Busway are likely to be at capacity by the mid-2020s and over capacity by the mid-2020s. An East-West Midtown PT Link will help to maximise the Northern Busway operation.

Figure 3-5: Bus congestion on Wellesley Street and crowded footpath by the bus stop

[12] Adapted from the Bus Reference Case, 2016 to assume Rapid Transit as per agreed project assumptions, which reduces the bus volumes by 34 buses per hour in the peak.

[13] North Shore Rapid Transit Study, July 2016

Symonds Street Bus Capacity

Currently, Symonds Street functions as the key bus corridor connecting the core Isthmus and East Auckland bus services with either Britomart or Midtown. This includes buses from Dominion Road, Mt Eden Road, Mangere/Manukau Road, New North Road and Sandringham Road as well as Howick and Botany. In addition, this corridor is used by Route 881 Northern Busway service to/from the North Shore and a number of peak-only South and East Auckland services.

Up to 150 buses per hour use Symonds Street during the peak period in the peak direction, resulting in frequent congestion and a degraded passenger experience, as even with continuous bus lanes in place, bus stops in the corridor are not large enough for the volume of buses using them.

This congestion on Symonds Street has been noted by Auckland Transport and is a key impetus for projects such as the Central Access Plan and Light Rail Project, which seek to reduce the overall volume of buses along Symonds Street.

The New Network will temporarily reduce the total number of buses travelling on Symonds Street; however, as demand for public transport increases, this corridor will again experience congestion as the volume of buses exceeds the capacity of available stop infrastructure.

In the New Network, there are routes that are planned to use Symonds Street. The Isthmus/ East Auckland services to/ from Britomart (Botany, Mt Eden Road, peak Howick services) will use the full length of Symonds Street from Grafton Bridge to and including Anzac Avenue. By 2026, this group will constitute approximately 40 buses per hour during the peak.

The core Isthmus services including Dominion Road, New North Road, Sandringham Road, Manukau Road and Remuera Road will use Symonds Street south of the East-West Midtown corridor. This latter group will consist of 92 buses per hour in the peak hour and peak direction upon implementation of the New Network in 2018, but will be reduced to 81 buses per hour following implementation of LRT, which for the purposes of this project is assumed to replace all of Dominion Road and half of Sandringham Road services.

Based on existing infrastructure and available kerb space, it is assumed that south of Wellesley Street, groups of two triple stops could be provided at each stop location in each direction. North of Wellesley Street, single sets of triple stops could be provided on each side of the street at each stop location. This level of infrastructure could roughly support up to 53 buses per hour north of Wellesley Street and up to 106 buses per hour south of Wellesley Street.

This means that stops north of Wellesley Street will operate within capacity (40 buses per hour during the peak by 2026 with total capacity for up to 53 buses per hour), while stops south of Wellesley Street will exceed capacity or require further expansion (121 buses per hour by 2026, while capacity is 106 buses per hour).

There is limited capacity to accommodate additional buses on Symonds Street north of Wellesley Street, and no capacity to accommodate additional buses on Symonds Street south of Wellesley Street.

Terminal Requirements

As part of the New Network, North Shore services travelling across Midtown to the Learning Quarter require a place to terminate the inbound service, take recovery[14], originate for outbound service and provide facilities to allow drivers to take breaks outside of the peak periods.

This facility may be located on street, off street, or outside the study area (e.g. at Auckland Hospital, Newmarket, or beyond). Wherever the terminal is located, adequate space will need to be provided to allow the planned service volumes to operate. The layover accommodation does not all have to be provided in one location.

Assuming the minimum recovery/staging times of five minutes, and assuming that additional driver layovers do not take place at the facility during the peak periods, a minimum of eight spaces will be required to accommodate the terminal, as shown in Table 3.3. This estimate includes one “extra” space in order to allow for operational flexibility and/or future growth; however, it *does not* include passenger stops. Note that the provision of more than the minimum number of layover spaces may provide benefits in terms of operational flexibility and reduced operating costs.

Separate stop facilities will need to be provided for passengers to disembark at the end of the line as buses go out of service, as well as to board at the beginning of service toward the North Shore.

Table 3-3: Minimum Terminal requirements (2026)

Route group	Peak bus volume	All day bus volume	Afternoon peak staging spaces	Midday layover spaces
Northern Express - University	30	10	3	1
Milford, Takapuna & Hillcrest	13	10	2	1
Birkenhead & Glenfield and Point Chevalier Beach (Peak only)	21	0	2	0
Extra	-	-	1	1
TOTAL	**64**	**20**	**8**	**3**

[14] A minimum of five minutes recovery time is specified in PTOM contracts

Problem overview

Within the study area, there is currently insufficient infrastructure provided to enable the New Network, including:

- Stops, wayfinding and pedestrian facilities;
- East-west corridor bus priority to accommodate the higher bus volumes and frequency expected under the New Network; and
- Terminal at or near the Learning Quarter.

To ensure reliable journey times and improve bus service performance, the additional buses need to be provided with greater bus priority and appropriate facilities. The CCFAS identified that unless additional capacity is provided in the city centre, efforts to improve the performance of the bus network through the allocation of additional road space or improved signal priority, would only exacerbate traffic congestion issues. This will have negative effects on public realm, degrade the quality of the city centre and restrict economic growth and investment in the city centre.

If these issues are not addressed, this may lead to increased travel times for public transport users, reduced travel time reliability, poor customer experience and increased bus operating costs. Most importantly, the anticipated growth in public transport will not be possible.

In addition, this may increase travel times for car users accessing the city centre and Learning Quarter, make walking and cycling more challenging and have adverse effects on the public realm and adjoining properties. It may also lead to reduced safety.

In summary, addressing this problem will:

- Increase total number of people accessing or travelling to, through and within the city centre via public transport;
- Improve reliability for buses;
- Improve customer satisfaction through more legible network;
- Ensure good connectivity of public transport services;
- Increase in people moving capacity through corridor;
- Apply value for money principles;
- Deliver planned service levels;
- Assist in maximising Northern Busway operation;
- Support bus network operational requirements; and
- Minimise opex bus service spending.

Problem Statement 2: Accessibility to Learning Quarter, Midtown and Victoria Quarter is inadequate for workers, students, residents and visitors by public transport and active modes

This problem statement is focused on public transport access along key corridors in the city centre and in particular to the Learning Quarter. It covers current and future desired mode share for the city centre, along with current and forecasted public transport patronage along Wellesley Street, Fanshawe Street and Symonds Street.

The CCMP estimates that by 2032 in the city centre there will up to 140,000 workers and upwards of 45,000 residents. At these levels of population and employment, it is likely that close to 100,000 people will need to be able to access the city centre on a daily basis across all modes of transport. The mode share for trips into the city centre is forecast to increase for all non-car based modes by 2041, as shown in Figure 3.6.

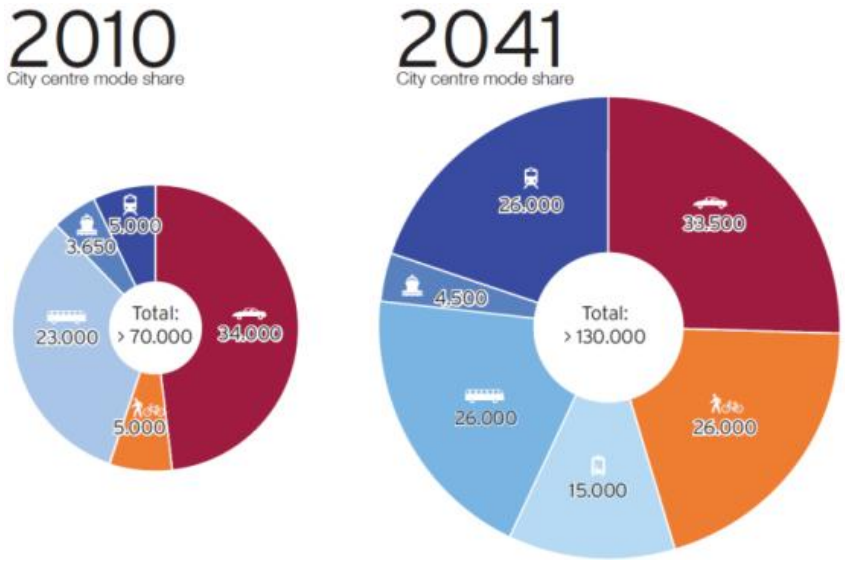


Figure 3-6: Mode share outcomes for the city centre in 2010 and 2041

Patronage on the East-West public transport corridors is forecast to significantly increase from almost 6,400,000 in 2015 to over 13,500,000 in 2047, as shown in Figure 3.7. Figure 3.8 shows the forecasted annual patronage on the key city centre public transport corridors Symonds Street and Fanshawe Street as a comparison.

Figure 3.9 shows the distribution of origins for public transport commute trips to the City Centre based on 2013 census data, highlighting the importance of providing bus priority for North Shore services (19% of total commuters to the area) and Isthmus services (20% of total commuters to the area).

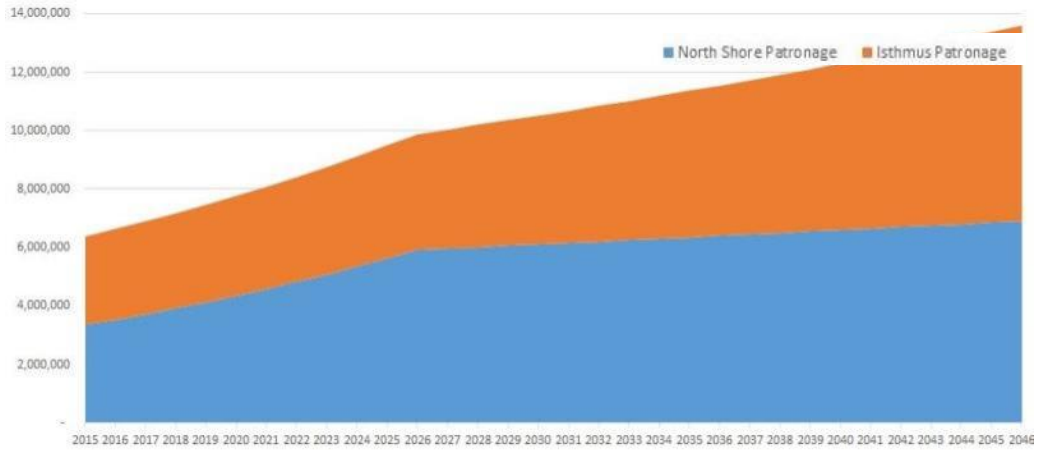


Figure 3-7: Annual patronage on the east-west Midtown public transport corridor[15]

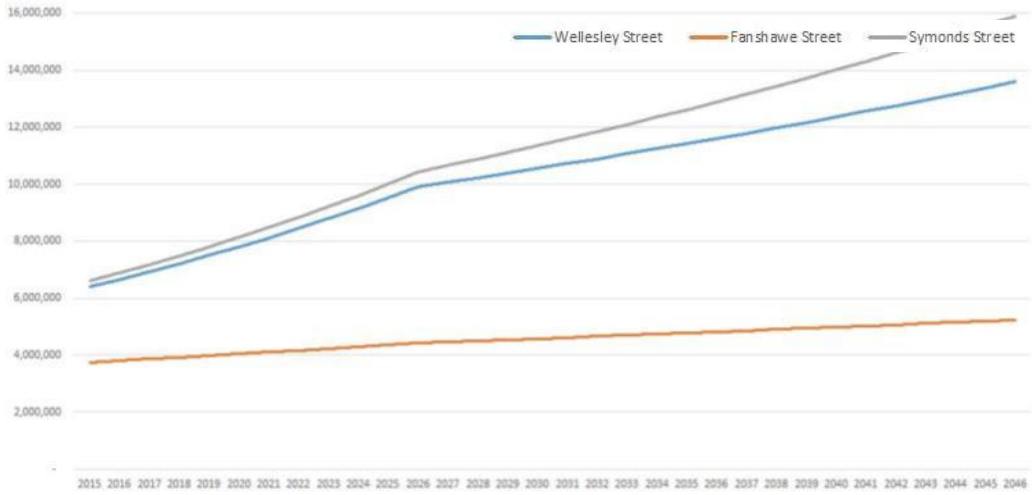


Figure 3-8: Annual patronage on key city centre public transport corridors[16]

[15] HOP data, 2015 and APT model forecast, Auckland Transport
[16] HOP data, 2015 and APT model forecast, Auckland Transport

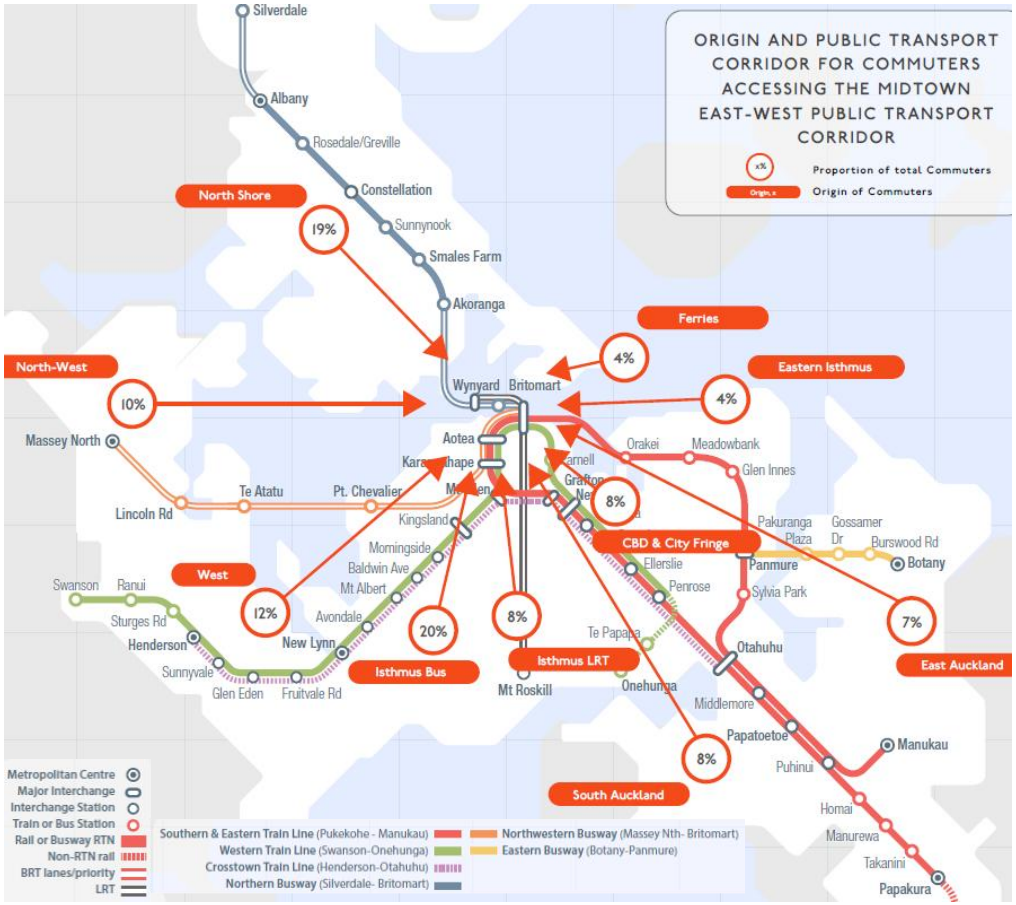


Figure 3-9: Origin of public transport commute trips to the City Centre, 2026

Public transport currently has substantially longer trip times for access to the City Centre when compared to vehicle access from throughout Auckland. Figure 3.10 shows the current public transport and vehicle access within 15, 30 and 45 minutes of travel to/from the City Centre.

The longer travel times for passengers on the current public transport network discourages potential passengers from using public transport and could result in increased trips by private vehicle. This will make it more difficult to achieve the city centre mode share targets mentioned above. Reducing overall travel times by public transport by providing improved stop infrastructure and bus priority measures will assist in achieving these targets.

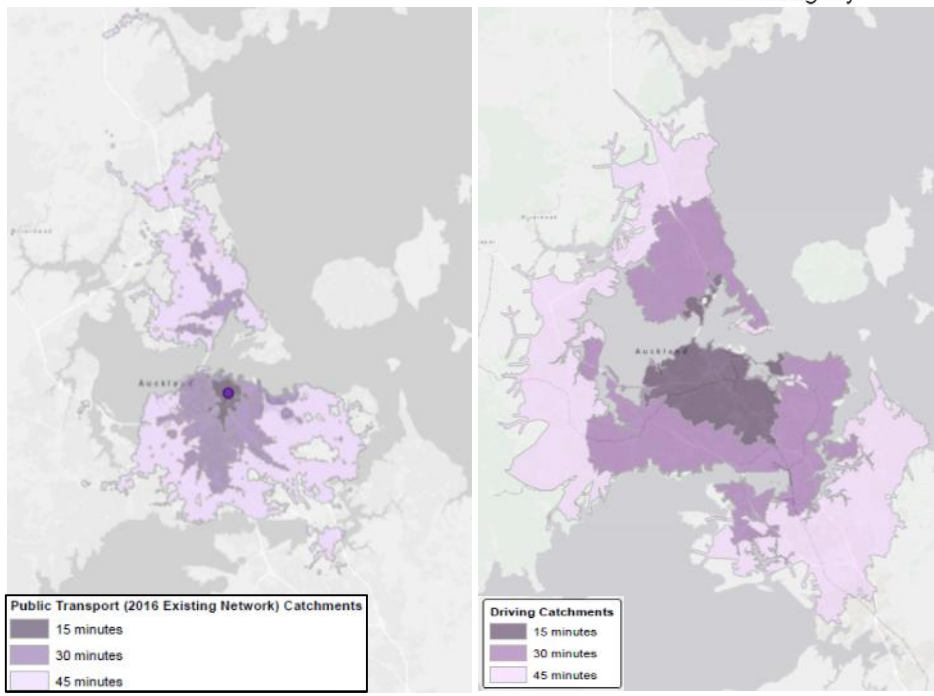


Figure 3-10: Existing travel times access by public transport versus by car[17]

Learning Quarter accessibility

The Learning Quarter runs north to south over approximately 1km and the University of Auckland has a 91% non-car mode share, as shown in Figure 3.11. It is important to provide for the New Network to continue to support a high public transport mode share.

The proportion of students who walk and cycle to campus are relatively low and have declined since 2006. The study indicates a significant decrease in perceived accessibility by these modes. Providing more pedestrian crossings and safer cycle lanes are some of the most common suggestions made by students for making cycling and walking easier to the campus.

Main travel mode	AUT City Full-time Student Trips (%)					UoA (city) Full-time Student Trips (%)				
	2006	2008	2010	2014	2016	2006	2008	2010	2014	2016
Public bus	47%	49%	46%	51%	55%	45%	46%	44%	46%	55%
Drove alone in a car	10%	6%	7%	10%	5%	9%	9%	8%	3%	5%
Train	11%	19%	14%	13%	15%	7%	7%	10%	12%	12%
Walk/run	15%	14%	18%	14%	11%	16%	22%	21%	26%	18%
As a passenger in a car	6%	6%	7%	2%	8%	11%	8%	7%	5%	4%
University shuttle bus	3%	1%	3%	4%	5%	2%	<1%	1%	0	0%
Drove myself and others in a car	3%	1%	2%	2%	0%	4%	2%	4%	2%	0%
Cycle	1%	<1%	1%	1%	0%	2%	1%	2%	2%	2%
Motorcycle/Scooter	1%	<1%	1%	1%	0%	2%	2%	2%	1%	1%
Ferry	1%	2%	1%	3%	2%	2%	3%	2%	5%	2%
Other	<1%	<1%	0	0	0%	<1%	0	0	0	0%

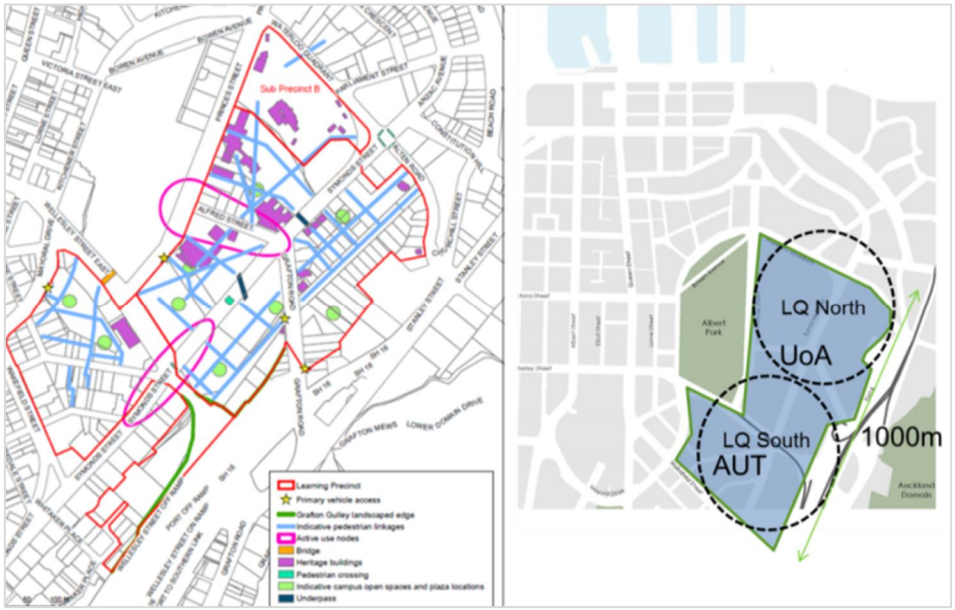


Figure 3-11: Learning Quarter[18]

Accessibility

As well as the regional accessibility issues noted, within the study area the following key accessibility issues were identified during a site walkover by the project team:

- Accessibility to the Learning Quarter is currently difficult due to inadequate footpath widths in certain sections of Wellesley Street, delays at intersections and the steep topography to the east of Wellesley Street;
- Pedestrian connectivity issues between the University and the Domain (across the Motorway). Large pedestrian volumes use the Grafton Gully Cycleway through this area;
- A number of properties including key cultural facilities are present on Wellesley Street between Kitchener Street and Albert Street. If general traffic were banned along this section of the corridor as suggested in previous studies undertaken by Auckland Transport, property access through side streets and service lanes will need to be considered; and
- With the completion of a number of new cycleways in Auckland over the past few years, including Beach Road, Grafton Gully and Nelson Street cycleways, it has been identified that there is a gap on the network in the east-west direction where cycling provision is limited. Further discussion is provided under Problem Statement 4 below.

Problem overview

The mode share for trips into the city centre is forecast to increase for all non-car based modes by 2041 and current accessibility to Learning Quarter, Midtown and Victoria Quarter is inadequate for workers, students, residents and visitors by current public transport travel times.

Addressing this problem will:

- Ensure good connectivity of public transport services;
- Improve reliability for buses;
- Improve accessibility to all destinations;
- Increase the number of trips by public transport and active modes;
- Deliver planned service levels;
- Deliver quality public realm for walkability and placemaking benefits;
- Integrate and connect to existing land use; and
- Increase number of safe connections available for people on bikes.

[18] 2016 Tertiary Student Travel Survey, Auckland Transport

Problem Statement 3: Current public transport infrastructure is not integrated with the area's public realm and adjacent land use activities

This problem statement is focused on how the city centre public realm and adjoining built form and land use activities integrates with current and planned public transport facilities.

Auckland's city centre is currently experiencing a significant urban renaissance, with major investment in public realm, building development and transport infrastructure set to change the face of the city in the coming decade.

The city centre has already been showing impressive growth in the number of employees, residents and international visitors over the past 5 year period. This multi-billion dollar investment by both the public and private sectors is closely aligned with the strategic direction set by the Auckland Plan that identifies the transformation of the city centre as essential to provide an economic and cultural heart for all of Auckland that is more vibrant and internationally competitive and contributes to making Auckland the world's most liveable city.

The City Centre Master Plan 2012 provides a clear vision and series of transformational moves and projects to achieve this. Central to these plans are a much improved quality of public realm on city centre streets for people, encouraging further investment in high quality built development.

Currently public transport infrastructure in many areas of the city centre, such as the Wellesley Street corridor, is poorly integrated with the public realm and adjoining built form and land use activities.

The CEWT study identified that existing footpath widths on the major east-west streets, in particular Customs, Victoria and Wellesley Streets, were insufficient in width to accommodate the high level of existing pedestrian movements while also accommodating bus stops and supporting infrastructure, without taking away space for place-making elements or opportunities within the public realm streetscape and having negative impacts on adjoining development, particularly retail frontages within the blocks to either side of Queen Street.

These space challenges for public realm and adjoining building frontages are compounded by the increased demands of the future Aotea Station, with in-street entrances proposed on Victoria and Wellesley Streets. Bus stops and supporting infrastructure are the public transport elements that tend to present the biggest integration demands to such constrained and high demand stretches of pedestrian pavement. This is highlighted in Figure 3.12.

Improving the integration of public transport infrastructure with the area's public realm is a big part of achieving this vision while continuing to fuel growth in the city centre in the future. The need to align future investment in transport infrastructure with these place-led plans, and the place-movement challenges this presents, has been well established and investigated through recent studies including the CCFAS and the CEWT study.

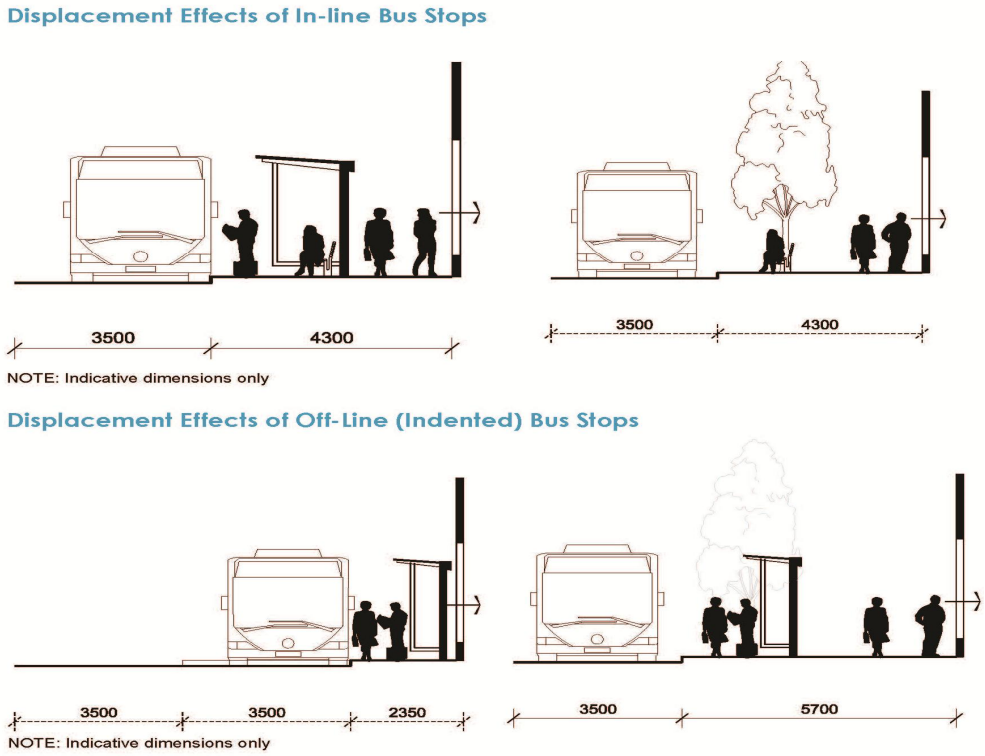


Figure 3-12: Displacement effects on the adjoining public realm

The CEWT study in particular led to the identification of preferred strategic outcomes and modal priorities for all of the key east-west transport corridors through the city centre, including Victoria Street, Wellesley Street and Cook Street / Mayoral Drive through the midtown areas (refer to Figure 3.13).

Wellesley Street was identified as a key east-west public transport corridor. The preferred direction for the corridor includes bus infrastructure and lane capacity provided to support the planned increased bus volumes into the city centre. A substantial uplift in the provision of pedestrian-oriented public realm and place-making opportunities were also identified along the central blocks of Wellesley Street between Albert Street and Albert Park, supporting the heavy pedestrian demand in the very core of the city including the need for transfer between buses and rail at the future Aotea Station.

Figure 3-13: Preferred CEWT network strategy

The study also confirmed Victoria Street as the preferred location of a future linear park as first proposed in the CCMP. The Victoria Street Linear Park would involve reducing traffic capacity to ideally 2 or a maximum of 3 lanes and consolidating the space allocation as a broad and continuous public realm corridor along the sunny southern side of the street as shown in Figure 3.14.

Figure 3-14: Victoria Linear Park (The Green Link)

The Linear Park is focused on delivering a significant green public space and a high quality walking street through Midtown that overcomes the significant topographical and movement barriers to cross-town pedestrian movements that currently exist. The linear park will also support the high footfall associated with the Aotea Station and can accommodate an east-west midtown cycling route, connecting the city centre feeder routes to east and west.

The Aotea Framework further supports the vision set out in the CCMP by addressing how multi-modal transport network changes can integrate with major development and public space opportunities at Aotea Quarter. It is anticipated that Aotea Quarter will become one of the best connected areas in Auckland through a number of transport investments. The framework recognises that public transport and public realm need to work together to support the city centre's growth goals. The 2009 Learning Quarter Framework, which is currently under review by the Council and Learning Quarter Forum, also acknowledges the movement challenges that the big streets create in separating out the sub-precincts of the Quarter and inhibiting a feeling of closer integration and ease of pedestrian movement between areas.

Further Paramics modelling has been undertaken by Auckland Transport / JMAC to test the CCMP network and desired projects. This modelling showed that the proposed CCMP network is not viable without a 20% reduction in traffic. East-west connections were particularly impacted by the CCMP network due to the considerable capacity reduction in the proposed network. Strategically any future arrangement must provide for reliable New Network bus improvements and not cause significant traffic congestion in an east-west direction.

Problem overview

Within the study area, there are wide ranging challenges for integrating bus infrastructure with the public realm and adjacent land use activities. These challenges include narrow footpaths, which struggle to accommodate both pedestrian demand and bus infrastructure.

Addressing this problem will within study area:

- Deliver quality public realm for walkability and placemaking benefits;
- Deliver a high quality customer experience for public transport passengers;
- Minimise adverse impacts of options on adjoining development; and
- Promote economic and social exchange with wider economic benefits.

The development of the east-west public transport corridor and learning quarter bus facilities are an important component of addressing these problems. In particular they will enable the intended function and success of the New Network while servicing development at Victoria, Aotea and Learning Quarter areas and improving future economic performance of the city centre.

Problem Statement 4: Existing east-west transport connections in the Midtown area do not allow safe, efficient and connected trips by bike for confident and interested but concerned cyclists

This problem statement is focused on the provision of the need for an east-west cycleway midtown link to and through the city centre providing a safe, high-quality and well-connected cycle network.

The draft Auckland Cycling Strategy (unpublished) sets out the overall vision, goals and outcomes to be achieved through the rollout of the Auckland cycleway network.

In 2013, only 1% of commuting trips were made by bike in Auckland compared to 83% for private and company cars, trucks and vans[19]. The underlying barrier to cycling in Auckland is found to be the perception that cycling is unsafe, particularly in heavy traffic and with limited cycling infrastructure.

Considerable progress has been made in Auckland over the past few years with the completion of a number of cycleways. It is expected that 52km of cycleways will be built in Auckland in the next 3 years through the Auckland Urban Cycleways Programme. This involves separated cycleways to and through the city centre providing a safe, high-quality and well-connected cycle network to encourage cycling as a mode of choice.

The 2015 cycling counts show high levels of cycling in areas where cycle networks and facilities have been provided, particularly to the east and west of the city centre as shown in Figure 3.15. In addition to these counts, the Quay Street Cycleway was opened on 8 July 2016 and has had more than 50,000 cycle trips since it was opened[20].

This highlights that when dedicated facilities are provided, they become well used; and also that there is demand for an east-west cycle dedicated facility connection through the city. The number of Aucklanders travelling by bike is increasing considerably with automatic counters reporting a 24% increase in the morning peak between April 2015 and April 2016.

The two main cycle links within the study area are the Nelson Street and the Grafton Gully cycleways. Figure 3.16 shows the existing and planned future cycle links in the wider area and highlights how they are generally focused in a north-south direction. Currently, there are no crosstown east-west cycling facilities provided in the city centre and furthermore there is no legally permitted access for cyclists across Grafton Gully on Wellesley Street.

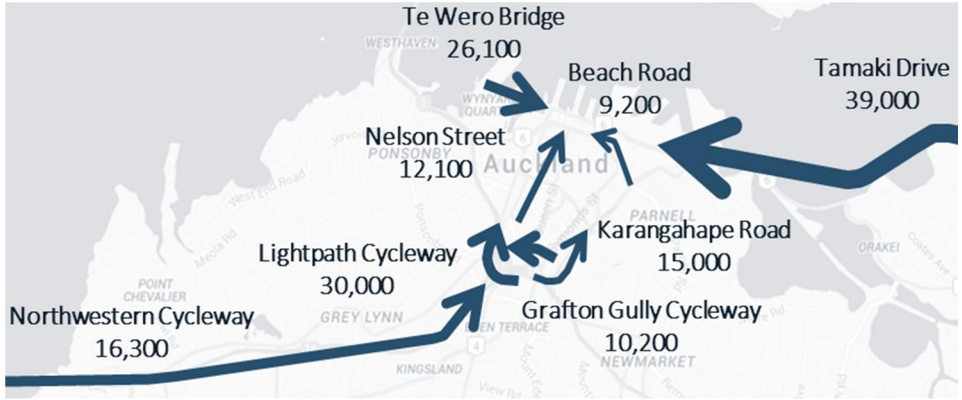


Figure 3-15: Monthly cyclist counts in December 2015[21]

Heavy traffic conditions coupled with the lack of dedicated facilities along the east-west corridor makes cycling undesirable through Midtown. An east-west midtown cycle connection would enhance the network by connecting existing north-south cycle links to key destinations in the city centre between Victoria Quarter and The Domain.

Options for a new cycleway across Midtown, linking College Hill to Lower Domain Drive and providing connections to wider bike facilities and local destinations have been investigated[22] by Auckland Transport. The preferred alignment, as shown in Figure 3.18, uses Victoria Street West between College Hill and Queen Street, Queen Street between Victoria Street and Wellesley Street, and Wellesley Street East from Queen Street to the Domain.

The Feasibility Report shows a bidirectional cycleway on the northern side of Wellesley Street using the underutilised space under the Symonds Street overbridge that connects to the Grafton Gully cycleway. A clip-on pedestrian and cycle facility is also shown to provide an east/west facility for pedestrians and cyclists to travel between Grafton Road and the Learning Quarter.

[19] 2013 census data (main means of travel to work), Statistics New Zealand, 2013
[20] Auckland Transport: https://at.govt.nz/projects-roadworks/quay-street-cycleway/

[21] December 2015 automated cycle counter data, Auckland Transport, 2015
[22] Midtown Cycleway Feasibility Report, MRCagney, March 2016

Figure 3-16: Existing and future planned cycle links

To encourage cycling as a mode of choice, it is essential to provide high-quality cycleways that are separated from general traffic and well-connected to the existing network.

There have been a number of crashes involving cyclists in the corridor. Between 2010 and 2015, 16[23] cycle crashes occurred along the Wellesley Street and Victoria Street corridors which resulted in 17 injuries (2 serious and 15 minor injuries), with 2 crashes involving multiple people. Two non-injury crashes were also reported. Figure 3.18 shows the location of the crashes with 8 crashes on Wellesley Street, 1 on Victoria Street, 5 on Symonds Street and 1 on Grafton Gully Road.

All the crashes occurred on weekdays, with the majority occurring in the afternoon. The majority of the crashes (11) occurred at intersections with a cluster of crashes occurring around the Wellesley Street / Symonds Street intersection. Significant contributing factors[24] were turning movements (8) at intersections or driveways and failure to/see other vehicles (including bicycles) and two crashes involved buses.

Cycle friendly design within broader road improvements and the provision of a dedicated cycle facility will lead to a safer environment for cyclists.

[23] In addition to these reported crashes it is also likely that a significant number of unreported crashes also occurred as a known limitation of accident databases is the underreporting of cycle accidents - Turner *et al.,* (2006). *Predicting Accident Rates for Cyclists and Pedestrians (New Zealand Transport Agency Report 289)*.

[24] Note that crashes are likely to have more than one contributing factor. For example right turning car hit bicycle due to failure to give way

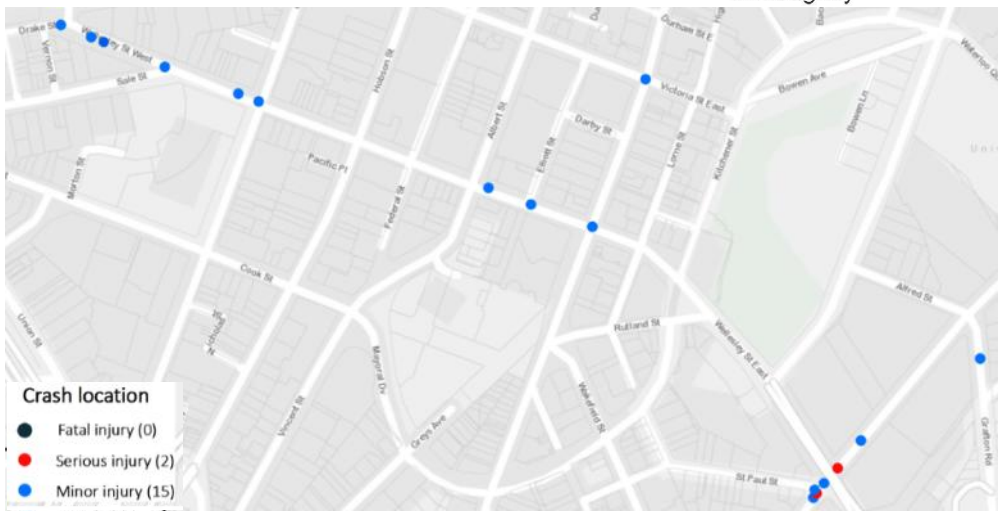


Figure 3-17: East-West Midtown Cycle Crash Location Map[25]

Problem overview

Within the study area there is an absence of any east-west cycle connection. Auckland has relatively low levels of cycling and evidence shows that when safe, dedicated routes are provided they become well used.

There are steep gradients on sections of streets within the study area and this makes route selection difficult. Data shows a high number of cycle crashes within the study area which also supports the case for providing dedicated cycle routes.

Addressing this problem will provide a number of benefits:

- Increase number of trips by active modes;
- Increase number of east-west trips by bike;
- Increase number of safe connections available for people on bikes; and
- Optimise delivery of CI 1 and 2, and use of UCP/NZTA/Auckland Transport funding for the Midtown Cycleway by June 2018.

[25] New Zealand Transport Agency Crash Analysis System (CAS) 2010-2015

4. Future year assumptions

The future year context and Do Minimum was developed at a stakeholder workshop held on 14 June 2016.

4.1 Do Minimum bus service patterns and infrastructure

The NZTA Economic Evaluation Manual contains the following description of the 'Do Minimum':

> *For many transport activities, it is often not practical to do nothing. A certain minimum level of expenditure may be required to maintain a minimum level of service. This minimum level of expenditure is known as the do-minimum and shall be used as the basis for evaluation, rather than the do-nothing.*
>
> *It is important not to overstate the scope of the do-minimum, i.e., it shall only include that work which is absolutely essential to preserve a minimum level of service. Note that this may not coincide with the current level of service or any particular desired level of service.*

The Do Minimum for East-West Midtown PT Link IBC represents the minimum amount of infrastructure that would be required to operate the bus volumes planned for the New Network.

New Network service patterns under the Do Minimum are based on those currently under discussion to be the interim service patterns upon implementation of the New Network routes, prior to delivery of any major infrastructure development.

Thus, these service patterns minimise required changes in infrastructure to be operable. Note that some slight adjustments were incorporated to accommodate increased demands to serve growing areas such as Wynyard Quarter. In many cases, these service patterns are similar to the service patterns seen today.

Do Minimum service patterns are summarised in Table 4.1 and Figure 4.1 shows the Do Minimum route alignments with light rail along Queen Street. The Dominion Road bus services are assumed to be replaced by light rail along Queen Street before the planning horizon of 2026 — the alignment in the table represents what is assumed for the short term.

The East-West Midtown PT Link study assumes that light rail will be constructed on Dominion Road, Ian McKinnon Drive and Queen Street, replacing all Dominion Road and half of Sandringham Road bus services into the CBD. This was agreed by stakeholders in the Do Minimum workshop.

Thus the overall corridor volumes in the East-West Midtown project are substantially lower than those cited in the Bus Reference Case, which does not include/assume light rail.

The assumption is that light rail will be operational by the 2026 assessment year. However, if light rail is not delivered within that timeframe then other bus volumes and capacity considerations options may need to be considered.

Table 4-1: Do Minimum Service Patterns

Service(s)	Inbound Route	Termination & Departure Point	Outbound Route
North Shore to University services	Beaumont Street - Victoria Street - Bowen Ave - Princes Street	Princes Street	Princes Street - Wellesley Street - Beaumont Street
New North Road & Sandringham Road services	Symonds Street - Wellesley Street - Victoria Street	Victoria Street by Spark & NZME buildings	Victoria Street - Bowen Ave - Waterloo Quadrant - Symonds Street
Remuera Road & Manukau Road services	Symonds Street - Wellesley Street - Halsey Street - Wynyard Quarter	Northern Wynyard Quarter	Halsey Street - Wellesley Street - Princes St - Alfred Street - Symonds Street
Outer Link	Grafton Road - Symonds Street -Wellesley Street - Victoria Street West	Wellesley Street between Queen Street & Lorne Street	Victoria Street West - Wellesley St - Princes St - Alfred St - Grafton Road
Inner Link	Queen Street - Victoria St - Victoria St West	Customs Street near Britomart	Victoria St West - Victoria Street - Queen Street

Wellesley Street has recently had bus lanes added in some sections due to CRL works, which would be included in the Do Minimum. The Do Minimum is further described in section 7.1.

Figure 4-1: Do Minimum Service Patterns with Light Rail

4.2 Future year projects in city centre

This section describes the future year 2026 as agreed within the Do Minimum Workshop, including the agreed and funded projects. There is an extensive programme of work for streetscape and public realm projects funded by the Auckland Council planned over the next ten year period to 2026.

Both universities in the Learning Quarter have significant development projects underway and planned on their central city campuses that will continue the step up in the scale of investment seen in recent years.

The projects that fall within or adjoin the study area and have an influence on the future context for this project are included in Figure 4.2 and descriptions of the projects follow.

Key projects of greatest relevance include:

- City Rail Link, including station entrances on Wellesley Street and Victoria Street;
- Upgrade of Albert Street;
- Victoria Linear Park is described in section 3;
- Hobson and Nelson Street streetscape upgrade to improve the public realm of these motorway feeder routes, starting with reducing Hobson Street to 4 traffic lanes between SKYCITY and the Convention Centre;
- Laneway Circuit streetscape upgrades including Federal Street South between Wellesley Street and Mayoral Drive, with enhanced pedestrian connections to Aotea Square;
- St Matthew's-in-the-City Churchyard Public realm upgrade to integrate the historic site with the public realm of Wellesley Street, creating an attractive, north-facing pocket public space;
- Learning Quarter future public realm investment including potential shared spaces and pedestrian priority improvements to some public streets in relation to both the University of Auckland campus and AUT; and
- Queen Street enhancements with LRT (stage 1), shown in Figure 4.1, will result in significant streetscape works to create a transit pedestrian mall typology on Queen Street between Mayoral Drive and Customs Street. This project will significantly enhance the already major pedestrian spine function that Queen Street plays for the city centre as a whole.

Hotspots of change that relate closely to the study area include:

- University of Auckland campus on-going redevelopment and expansion in accordance with their masterplan. Major future projects such as the Engineering Building redevelopment will continue the scale and quality of recently completed projects such as the Science Building extension;
- AUT city campus on-going redevelopment and intensification starting with the St Paul Street Precinct redevelopment. Further development potential exists including the ability for additional buildings on the southern side of Wellesley Street opposite Albert Park;
- Aotea Square Framework signals redevelopment of sites, which include the Bledisloe West carpark, redevelopment and possible expansion of the Aotea Centre, re-use and redevelopment of the Civic Administration Building, and a site to the south of the Town Hall. Collectively these development opportunities represent a significant concentration of new development and change in close proximity to the midtown transport corridor. While timing is uncertain, it can be expected that some of these sites may be redeveloped by 2026 in response to the opening of the Aotea Station;

- New Zealand International Convention Centre, with frontage to Wellesley Street is due for completion by 2019. It is expected to significantly change the dynamic of this part of the city, becoming a major new destination that will also drive future redevelopment of surrounding areas. Basement and service access to all facilities is from SKYCITY vehicle entrance on Nelson Street; there are no vehicle access requirements on Wellesley Street to service the development; and
- The mixed use Victoria Quarter, such as the City Works Depot with significant future development potential, is an intensifying mixed use precinct of new-build offices and apartments that can be expected to be developed over the next decade. The midtown bus corridor will be an important public transport connection for this rapidly developing western side of the city centre.

In addition to the above areas, it can be expected that many more sites within Midtown will redevelop over the next decade in response to the planned opening of City Rail Link and Aotea Station that is expected to be the impetus for significant re-investment and regeneration in the midtown area.

Collectively this land use change will further intensify the density and diversity of the area over the next decade, adding to the resident and daytime populations and demand for all transport modes, but in particular increased foot traffic and demand for public transport services within a closely connected and compact central city location.

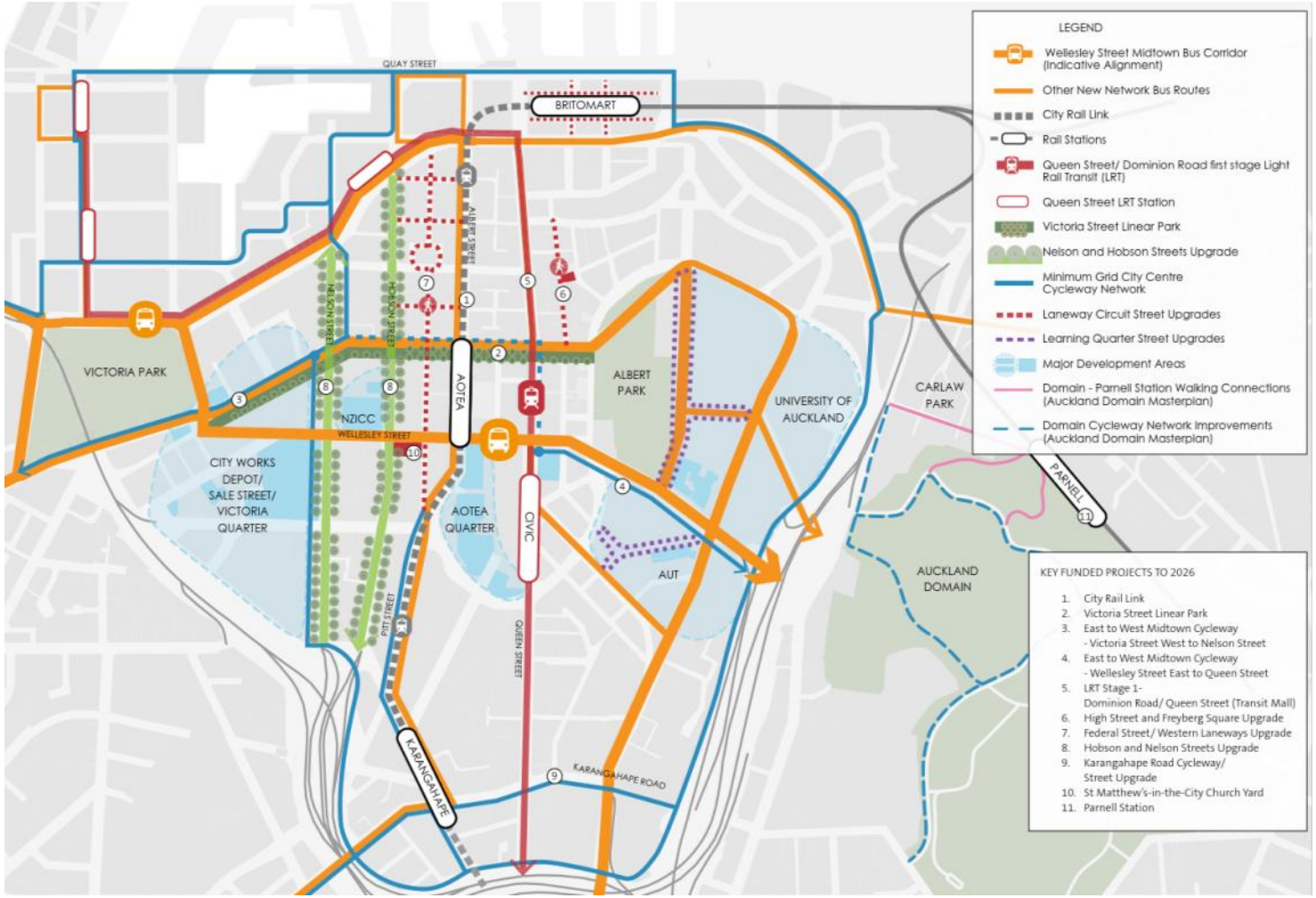


Figure 4-2: Programme of Works - 2026

5. Long list option development

5.1 Option development methodology

An options development workshop was held with stakeholders on the 15 July 2016 to develop a long list of options to implement the New Network along the east west corridor. Appendix B shows the option refinement process from the identified long list, refined short list and the preferred options identified to take forward to the DBC and Appendix C includes minutes of the option development workshop.

Figure 5.1 shows the option development process. To develop a long list of options, an extensive list of locational, directional and gradient considerations was developed for the project key elements, being:

- Bus route patterns;
- Cycle route patterns; and
- Terminal areas.

These key elements are included in Table 5.1. Table 5.1 also discounts some considerations at a high level due to significant costs, construction and traffic disruption and urban design impacts.

Taking into account the extensive list of considerations, potential route alignments or "patterns" were developed for buses and cyclists and locations for bus terminals were identified. Bus route alignments are assumed based on the most recent plans for the New Network that were approved through public consultation.

Stakeholders reviewed these patterns at workshop 1. Cycle alignment patterns developed were based on existing cycle studies along the east-west corridor and potential cycle connections. Possible bus terminal locations were based on previous investigations and knowledge of potential sites in the area. These patterns and terminal sites are included within Appendix D.

The patterns and terminal sites were integrated into combined options to discuss at the long list option development workshop. Not all combinations of patterns were viable, which resulted in some patterns being discounted.

The long list of options is included in Appendix E and described in section 5.2. The long list of options was evaluated against the project objectives and described in section 6.2.

Figure 5-1: Option Development Framework

Table 5-1: Extensive list

	Bus	Cycle	Terminal
Location	• Wellesley Street • Victoria- Wellesley • Cook - Wellesley • Cook - Mayoral - Wellesley • Wakefield - Mayoral –Wellesley • Victoria – Mayoral • Symonds Street - *discounted due to capacity*	• Victoria - Queen – Lorne / Kitchener /Wellesley E/Grafton • Victoria - Wellesley – Princes – Alfred – Grafton • Victoria – Bowen – Alten • Wellesley - Albert Park Alfred – Grafton • Victoria – Wakefield – St Paul shared street – bridge	• Albert Park loop • Grafton Gully • Mayoral Drive loop • Victoria/Wellesley loop • Out of study area (Hospital/ Newmarket)
Direction	• One-way • One-way loop • One-way pair • Two-way • Two-way pair	• Kerbside cycle lanes • Segregated two -way	• On-street • Off-street • Continue to terminate out of study area
Level / Grade	• At grade • Tunnel – *discounted due to costs and disruption* • Raised – *discounted due to urban design, costs and disruption*	• At grade • Tunnel through Albert Park – *discounted due to consenting, costs and disruption* • Raised – *discounted due to urban design, costs and disruption*	• At grade • Tunnel – *discounted due to costs and disruption* • Raised – *discounted due to urban design, costs and disruption*

5.2 Long list options

Taking into account the bus route and cycle route patterns in Appendix D, the options developed for the workshop included the bus or cycle facilities to be focused along either:

- Wellesley Street;
- Victoria Street; or
- Cook Street / Mayoral Drive.

In addition, three broad locations were considered for a terminal area:

- A: City terminal;
- B: Grafton Gully Terminal; or
- C: Out of the study area.

Six sets of options were discussed at the workshop, as shown in Figure 5.2.

The workshop introduced a further alternative option, which turned North Shore buses around before reaching the Queen Street Valley. This Option was then discounted as it did not support the Learning Quarter demand or project objectives and the benefits of the option were captured in existing options proposed to continue to the long list.

The workshop resulted in ruling out the following options from further investigation:

- All City terminal options except Princes Street, Mayoral Drive and Wakefield Street as land in the city centre is highly valuable and other city centre locations do not serve the Learning Quarter well;
- All options to extend North Shore services beyond the study area or interline them with Isthmus services ("C" options) as these options would have a high operational cost and simply displaces the problem elsewhere;
- The use of Mayoral Drive/Cook Street as the primary PT corridor (without Wellesley or Victoria Streets), as it does not adequately serve the core Midtown catchment destinations along Wellesley and Victoria Streets or provide access to the Learning Quarter in the east; and
- The Bowen Avenue cycleway option, due to previous work undertaken and gradient.

Three additional options were identified through further stakeholder input and are included in Figure 5.3.

Options that were endorsed to proceed to the long list option evaluation against project objectives are included as Appendix E. Section 6 details the option evaluation against project objectives.

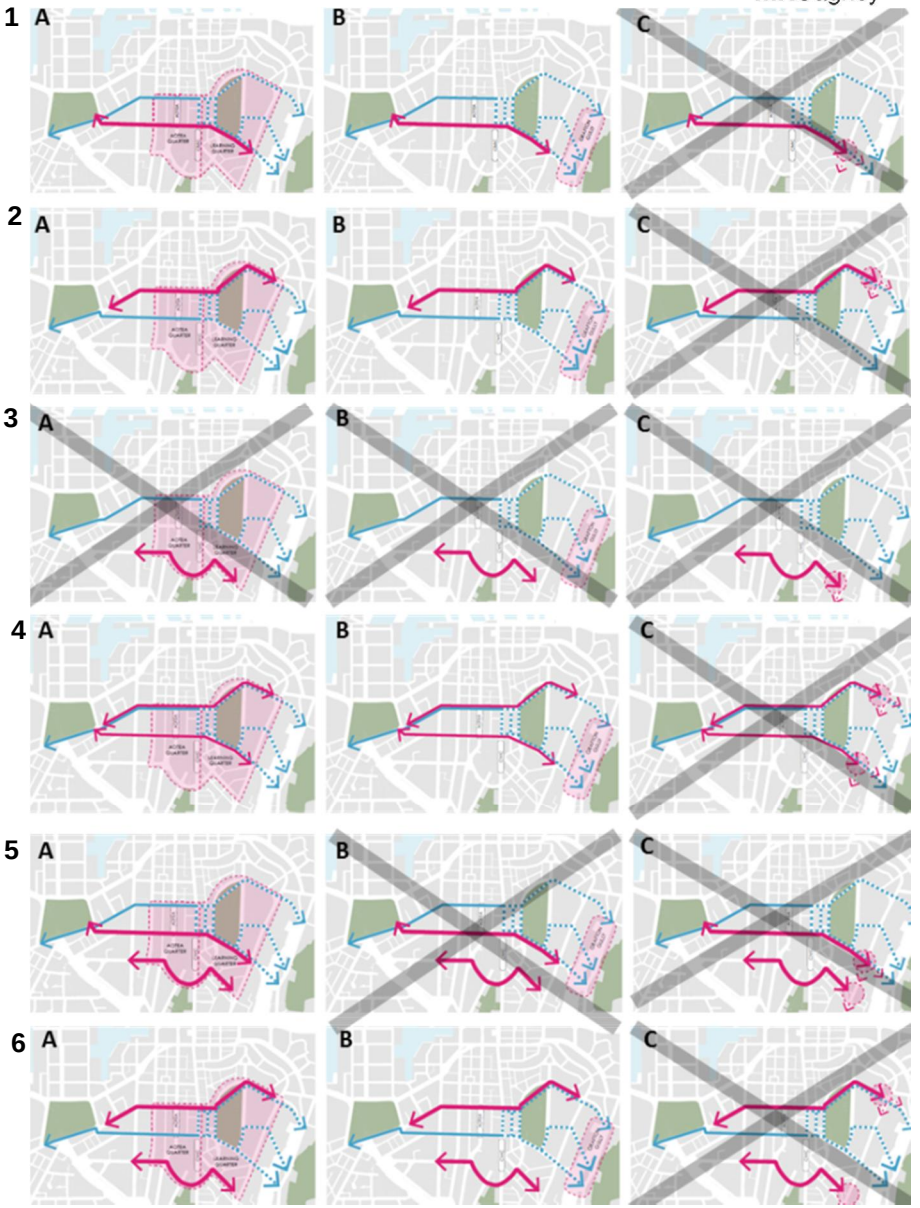
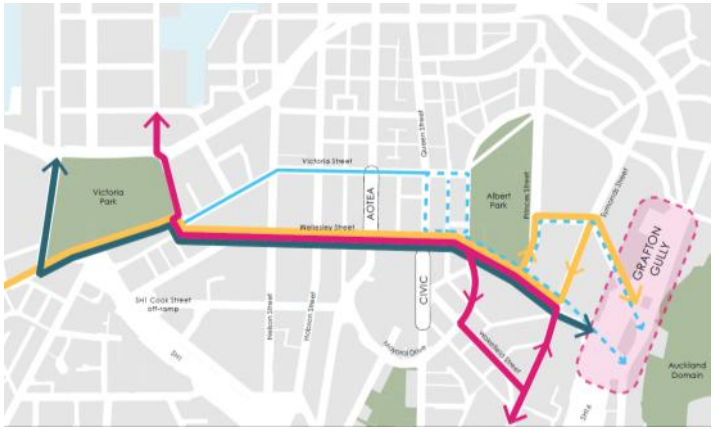


Figure 5-2: Options discussed within the Option Development Workshop

1D



4D

4E

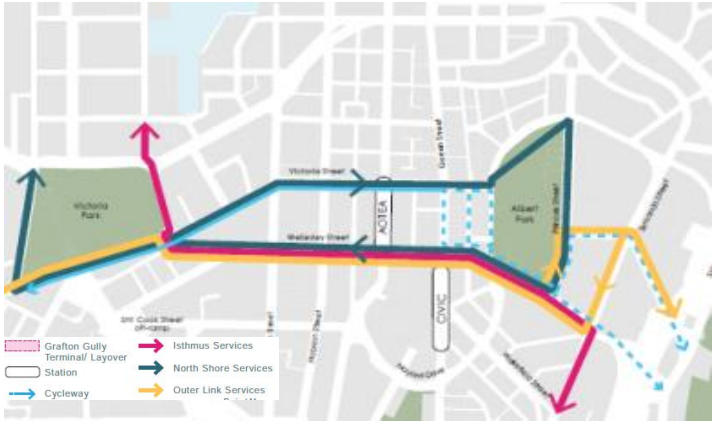


Figure 5-3: Additional long list options identified

5.3 Grafton Gully bus terminal **long list options**

Eight sites were identified to be potential locations for a Grafton Gully Terminal, as shown in Figure 5.4. These sites were assessed against site constraints and the project objectives and detailed in section 6.3.

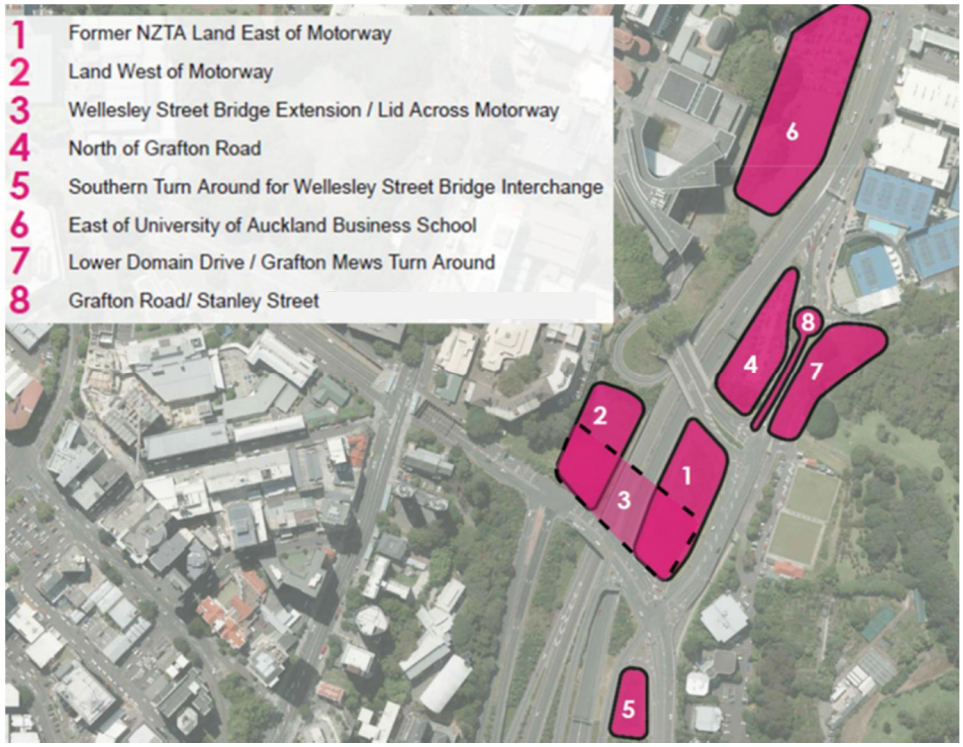


Figure 5-4: Potential Grafton Gully terminal locations

5.4 Cycle connections

A key requirement of the IBC is to facilitate a midtown east-west cycleway consistent with the plans for the Auckland Cycling Network. All options have sought to include provision for cycle facilities along the east-west corridor providing an important link across the central city increasing the accessibility of inner city destinations and connecting the four Quarters (Wynyard, Victoria, Aotea and Learning).

Figure 5.5 shows the cycle connections that are constant in all of the long list options, including the Victoria Street cycleway (southern alignment) between Beaumont Street and Halsey Street, and the potential connections across Grafton Gully motorway to The Auckland Domain and Grafton Road.

The general route alignment, with western city access via Victoria Street West, and eastern city centre access via Wellesley Street East, is consistent with the preferred route options from the previous midtown cycleway investigations carried out by Auckland Transport.

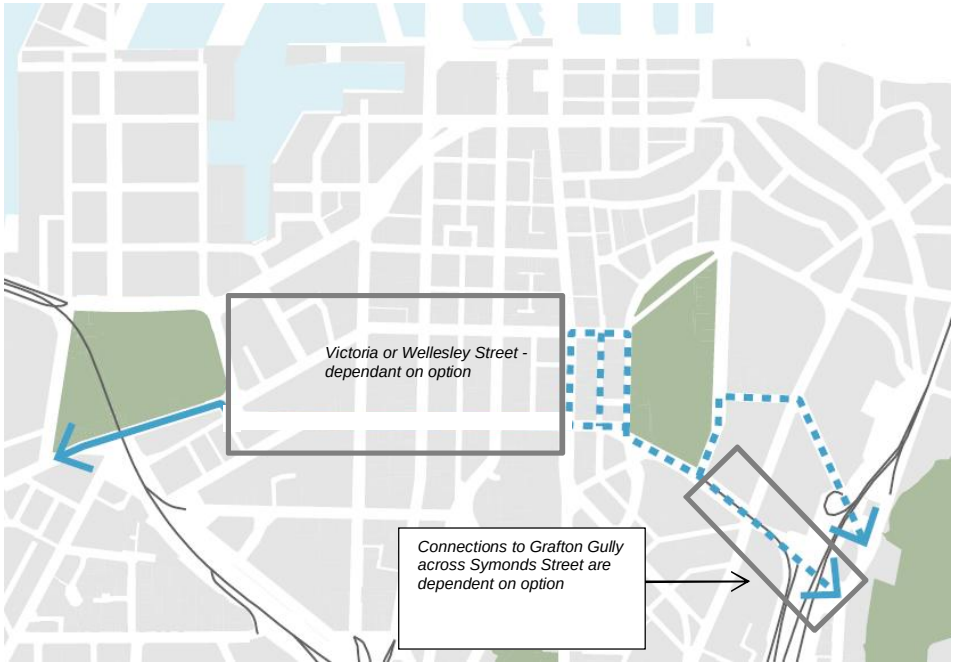


Figure 5-5: Cycle connections

Running between College Hill (Victoria Park) and Grafton Road (Auckland Domain), the proposed 2.5km Midtown cycleway route has been split into two sections as follows:

- **West of Queen Street** – Auckland Transport is moving ahead with scheme assessment of the proposed cycleway west of Queens Street. This stage of the project will identify options for cycle facilities between Beaumont Street/College Hill intersection and Queen Street. Due to the construction of City Rail Link, there is expected to be little infrastructure that can be provided, at this stage, between Queen Street and Federal, Hobson streets. However, the Auckland Transport project will look at opportunities to provide interim safety improvements and wayfinding for people on bikes.
- **East of Queen Street -** Midtown cycleway has been included in the IBC to determine how buses and people on bikes can co-exist in the Wellesley Street corridor. Parts of the cycleway will be identified for design and delivery before July 2018.

5.4.1 West of Queen Street

West of Queen Street, Options 1A, 1B, 1D, 4B, and 5A are consistent with these plans in providing for a route the full length of Victoria Street West, in conjunction with the future Victoria Street Linear Park. Options 2A, 2B, 6A and 6B, that would utilise Victoria Street as a significant bus corridor, would shift the cycling route south to a Wellesley Street alignment between Victoria Park and Queen Street.

The Do Minimum and Options 4A, 4D, 4E 5A, that would require both Victoria Street and Wellesley Street to become major bus corridors, present significant space allocation challenges to achieving an east-west cycling route through midtown, taking into account constrained footpaths and requirements for ongoing local traffic access and circulation.

5.4.2 East of Queen Street

The previous midtown cycling investigation work ruled out the option of continuing the alignment on Victoria Street East and Bowen Avenue due to the very steep gradient. The default position for the IBC is therefore to switch to a Wellesley Street East alignment east of Queen Street, consistent with the Auckland Cycling Network plans.

Long list option investigations have confirmed there is sufficient space for a separated two-way cycleway to co-exist with buses on a northern (Art Gallery / Albert Park) alignment of Wellesley Street East between Queen Street and Princes Street. As such, this route is considered feasible for a cycleway irrespective of the preferred alignment for buses.

5.4.3 North-South linkages – Queen / Lorne / Kitchener

Having established Victoria Street West and Wellesley Street East as the preferred western and eastern access routes for a separated cycleway into the city centre, options for north-south links are Queen Street, Lorne Street and / or Kitchener Street.

There is no impediment on Wellesley Street East to connect with a cycleway alignment on either Queen, Lorne and/ or Kitchener Street. Establishing a preferred alignment therefore comes back to the different qualities and implications for the cycling network of a route on Queen, Lorne or Kitchener.

Of these three route options, Queen Street is a clear preferred route, given it is flat, has sufficient width to accommodate dedicated cycle lanes and is both a major destination in itself and central feeder route north-south through the very heart of the city. Should LRT plans proceed for Queen Street, a dedicated space allocation can be accommodated for a delineated level surface cycleway in each direction within the shared space / transit mall street typology (Figure 5.6).

Figure 5-6: Queen Street with LRT (LRT Design Report)

Lorne Street between Victoria and Wellesley Streets has the potential to become a complementary cycling route as part of the Laneway Circuit to the east of Queen Street. If a north-south link was established on this central block of Lorne Street as part of the midtown cycling route, it could become a useful feeder route in combination with High Street to the north towards Fort Street / Britomart / Waterfront areas and to the south via the existing Lorne Street Shared Space across Wellesley Street, providing access to the Central Library, AUT and Aotea Quarter areas.

At around 14m in width Lorne Street is spatially constrained and the current streetscape arrangement, while providing a slow speed environment for confident on-street cyclists in a southbound direction within the one-way traffic environment, is not suitable to accommodate contraflow cycling northbound without changes to the streetscape design. This would best be achieved through a transition to a shared space or similar level surface design in future, an upgrade that is not planned at this time.

Kitchener Street is also spatially constrained, has a relatively abrupt and steep level change outside the Art Gallery coming to and from Wellesley Street East. At the northern end, this would also require cyclists to continue up the steeply rising section of Victoria Street East between Lorne and Kitchener Streets, a climb avoided by the flat Queen Street and less elevated and more gradual Lorne Street route.

Route-wise, Kitchener Street also has the disadvantage of being the most peripheral, and somewhat hidden route away from highly frequented midtown areas. It does not have the same benefits as a Queen or Lorne Street route in feeding key destinations to the north and south, and should be ruled out as a two-way route for these reasons.

There is potential for Lorne and Kitchener Streets to operate as a one-way pair for cycling. Given the space constraints on both streets, this would likely need to necessitate comprehensive streetscape changes for a share with care / shared space environment.

Given these various qualities and access implications of the three north-south routes, while no one route should be considered not feasible at this stage, there is a clearly preferred route of Queen Street, with Lorne Street having potential subject to future streetscape design changes, to offer a secondary, feeder role to areas to the north and south via the Laneway Circuit.

5.5 Bus provision and pedestrian connections

Figure 5.7 shows the pedestrian catchment of the three key east west corridors Victoria Street, Wellesley Street and Cook Street/ Mayoral Drive. The figure highlights how the northern area of the central city will provide strong public transport and pedestrian accessibility due to the downtown bus priority corridor currently planned along Fanshawe and Sturdee Street to the Downtown Interchange.

A Victoria Street bus corridor pedestrian catchment would overlap with this northern corridor and not provide the same level of pedestrian accessibility as a Wellesley Street corridor could. The Cook Street/Mayoral Drive catchment highlights how east-west bus priority along this corridor would provide less access to the Learning Quarter.

A Victoria Street bus corridor catchment could provide access to around 50,000 jobs within the city centre with a 400m walk, whereas the Wellesley Street bus corridor catchment could provide access to around 35,000 jobs with a 400m walk[26].

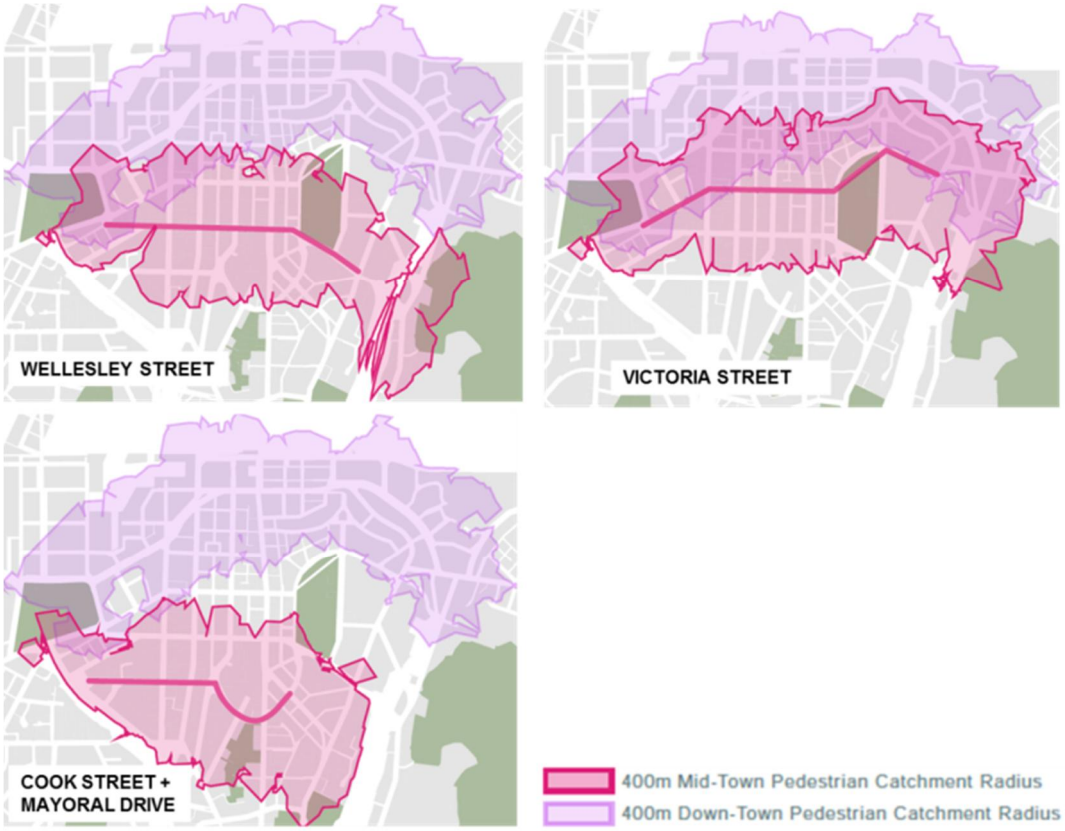


Figure 5-7: Potential pedestrian catchments

[26] Remix Public Transport Planning tool, Auckland Transport, 2017

6. Long list options assessment

This section provides a high level summary of the evaluation of the long list options, including a review of the alignment of the long list options against the project problem statements and an assessment of the Grafton Gully terminal sites.

The assessment against the project problems and evaluation of the long list options against the criteria resulted in the Do Minimum and four options continuing to the short list, including:

- Do Minimum 2026, as a base to which to compare the other options;
- 1B: Buses on Wellesley Street with a Grafton Gully terminal;
- 1D: Buses on Wellesley Street with a Grafton Gully terminal via Wakefield Street;
- 4D: Buses on Wellesley Street and Victoria Street with a Grafton Gully terminal; and
- 4E: Buses on Wellesley Street and Victoria Street with a Princes Street terminal.

6.1 Alignment with problems

An assessment was carried out to examine whether or not each option addressed the identified problems. Table 6.1 presents this high-level assessment of whether the options align with the project problems.

Table 6-1: Alignment with problems

Problem	Do Min	1A	1B	1D	2A	2B	4A	4B	4D	4E	5A	6A	6B
Inadequate public transport infrastructure along the East-West Midtown corridor and at route end to enable reliable operation of the New Network within constrained city centre location (45%)	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	No	No
Accessibility to Learning Quarter, Midtown and Victoria Quarter is inadequate for workers, students, residents and visitors by public transport and active modes (25%)	No	No	Yes	Yes	No	No	No	Yes	Yes	Yes	No	No	No
Current public transport infrastructure is not integrated with the area's public realm and adjacent land use activities (20%)	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No
Existing east-west transport connections in the mid-town area do not allow safe, efficient and connected trips by bike for confident and interested but concerned cyclists (10%)	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

6.2 Benefits and dis-benefits

Table 6.2 presents the options benefits applying the evaluation criteria. Option dis-benefits are summarised in Table 6.3 and the benefits and dis-benefits of the options are captured within the option evaluation as discussed in section 6.2. Issues and risks are also discussed within section 7.

Table 6-2: Benefits

--- Significantly fails criterion; -- Does not meet criterion; - Partially fails criterion; Not applicable / neutral; + Partially meets criterion; ++ Meets criterion; +++ Exceeds criterion

Scale of benefits	Do Min	1A	1B	1D	2A	2B	4A	4B	4D	4E	5A	6A	6B
Improved provision of corridor for Public Transport	--	++	++	++	--	--	-	-	+	+	+	--	--
Improve network efficiency	-	-	++	+	-	-	+	-	+	+	-	--	--
Meet operational requirements (within study area) to support the New Network	--	++	++	+	--	--	-	-	-	-	+	--	--
Enables quality urban form	--	+	++	++	--	-	-	--	+	+	-	--	--
Improved provision of cycling facilities	-	+	+	+	++	++	+	--	+	+	+	+	+

Table 6-3: Dis-benefits summary

Do min	1A	1B	1D	2A	2B	4A
Poor connectivity of PT services, poor travel time reliability and customer experience. High bus operational costs, Adverse effects on the public realm and properties	Poor connectivity of PT services, limited integration of land uses and PT services	May increase capital costs dependant on Grafton Gully site	May increase capital costs dependant on Grafton Gully site	Displaces planned cycle route along Victoria Street. Does not implement the principles of the New Network as planned.	Displaces planned cycle route along Victoria Street. Does not implement the principles of the New Network as planned. Capital costs may increase dependant on Grafton Gully site	One clear east-west PT corridor is not provided. One way loop reduces wayfinding and a clear urban form and also increases opex
	4B	**4D**	**4E**	**5A**	**6A**	**6B**
	A clear PT network is not provided. Capital costs may increase dependant on Grafton Gully site. Higher opex due to Isthmus routes using Victoria St in both directions	One way PT loops may reduce wayfinding. Capital costs may increase dependant on Grafton Gully site	One legible east-west PT corridor is not provided. Higher opex due to Isthmus routes using Victoria St outbound	Poor connectivity of PT services, limited integration of land uses and PT services	Poor connectivity of PT services, limited integration of land uses and PT services. Higher opex due to Isthmus routes using Victoria St in both directions	Poor connectivity of PT services, limited integration of land uses and PT services. Higher opex due to Isthmus routes using Victoria St in both directions

6.3 Long list options assessment overview

The options long list was evaluated against the project objectives which were developed at the evaluation framework workshop held on 15 June 2016, and are included within Table 6.4.

Table 6.5 provides a summary of the option evaluation against the project objectives and Appendix F provides the full evaluation and detail to support the evaluation ratings of the long list options.

Table 6-4: Long list evaluation criteria

Project Objective	Evaluation Criteria
1. Create engaging places for people, recreation and businesses that have a character unique to Tamaki Makaurau / Auckland and consistent with existing plans and visions	· Integration and consistency with strategic plan's vision and principles, specifically: - Auckland Plan - City Centre Master Plan - CEWT Study, 2014 - Aotea Framework · Alignment with University development plans (i.e., Learning Quarter Plan, 2009) · Enables high quality urban realm · Consistency with other LTP and committed projects · Avoids severance and visual dominance from public transport operations
2. Invest in affordable, right sized solutions that provide value for money over the life of the asset with investment times and designed to integrate with development	· Capex (low / medium / high) · Opex (low / medium / high) · Constructability · Enables timely delivery
3. Unlock economic and social performance by enabling more people to access the city centre more effectively	· Increases the total number of people that can move along the east-west connection · Improves the reliability of public transport along the east-west connection · Maintaining reliability of motorway interchanges · Enables a resilient transport network (i.e., increases transport options available)
4. Provide high quality access for public transport and associated pedestrian network while maintaining a connective traffic network	· Supports high PT mode share to Learning Quarter · Enables quality walking connections as identified within the CCMP · Maintains the reliability of car travel along east-west connections
5. Deliver environmentally sustainable infrastructure	· Minimise impact on the Domain, Albert Park and other public open spaces
6. Provide for the effective operation of the city centre public transport network	· Ensure sufficient space and facilities to enable the operation of the principles of the New Network (including arrivals/departures and transfers) · Consistent with LRT and CRL plans · Consistent with CAP IBC, 2016[27]
7. Provide safe, connected and efficient cycling strategic network in eastern part of study area	· Delivers cycling facility between Queen Street and Grafton Road · Increases the safety, comfort and convenience of cycling
8. Provide a great customer / user experience	· Improves the ease and pleasantness of reaching destinations for public transport users, covering legibility; wayfinding and frequency of services

[27] Appendix A includes the alignment between the CAP recommendations and the IBC objectives.

Table 6-5: Long list evaluation summary

--- Significantly fails criterion
-- Does not meet criterion
- Partially fails criterion
Not applicable / neutral
+ Partially meets criterion
++ Meets criterion
+++ Exceeds criterion

Project objectives		Do Minimum 2026	Option 1A Wellesley Street with city terminal	Option 1B Wellesley Street with Grafton Gully terminal	Option 1D Wellesley Street with Grafton Gully terminal via Wakefield Street	Option 2A Victoria Street with city terminal	Option 2B Victoria Street with Grafton Gully terminal	Option 4A Isthmus & North Shore EB on Victoria + WB on Wellesley with city terminal	Option 4B Isthmus two-way on Victoria & North Shore two-way on Wellesley with Grafton Gully terminal	Option 4D Isthmus eastbound on Victoria; westbound on Wellesley. North Shore buses on Wellesley with Grafton Gully Terminal	Option 4E Isthmus two-way on Wellesley St & North Shore one way eastbound on Victoria St + one way westbound on Wellesley with Princes St terminal	Option 5A Wellesley Street & Mayoral Drive with city terminal	Option 6A Victoria Street & Mayoral Drive with city terminal	Option 6B Victoria Street & Mayoral Drive with Grafton Gully terminal
1	Create engaging places for people and businesses that have a character unique to Tamaki Makaurau/Auckland and are consistent with existing plans and visions	--	+	++	++	--	-	-	--	-	-	-	--	--
2	Invest in affordable, right-sized solutions that provide value for money over the life of the asset with investment timed and designed to integrate with development *(Capex / Opex)*	Low / Medium	Low / Low	High / Low	High / Low	Low / High	High / High	Low / Medium	High / High	High / Medium	Low / Low	Low / Low	Low / High	High / High
3	Unlock economic and social performance by enabling more people to access the City Centre more effectively	+	-	++	+	--	--	++	-	+	++	-	-	-
4	Provide high quality access for public transport and associated pedestrian network while maintaining a connective traffic network	-	+	++	-	-	-	-	-	+	+	+	-	--
5	Deliver environmentally sustainable infrastructure	-	++	++	++	-	+	-	+	+	+	++	++	+
6	Provide for effective operation of the City Centre public transport network	--	+++	+++	++	--	--	-	--	-	-	-	--	--
7	Provide safe, connected and efficient cycling strategic network in eastern part of study area	-	+	+	+	++	++	+	--	+	+	+	+	+
8	Provide a great customer / user experience	--	+	++	+	++	++	-	+	-	-	+	-	-

The options taken forward to form the short list (1B, 1D, 4D, and 4E) enable people to access the city centre more effectively (objective 3), deliver environmentally sustainable infrastructure (objective 5), and provide a safe, connected and efficient cycling network in the study area (objective 7).

Options 1B, 1D, 2B, 4B, 4D and 6B terminate in Grafton Gully which results in a high capital cost. Having a high capex is not necessarily a fatal flaw for an option if the capital investment facilitates a reduction in opex, and thus cost savings in the long term, and/or enables better outcomes with regard to customer service, transport operations and/or delivery of a high quality urban realm.

Options 1A, 1B and 1D avoid conflict with the planned cycleway alignment on Victoria Street West and preserve the opportunity for the future Victoria Street Linear Park by concentrating buses on Wellesley Street in accordance with CEWT. Its use of one direct corridor (Wellesley Street) allows good network operations and user experience, while keeping operational costs low. They meet or exceed objective 6, to provide for effective operation of the city centre public transport network, objective 7 cycleway provision, and objective 8, to provide a great customer/user experience.

Options 1B and 1D proceed to the short list as they perform well against the project objectives and provide access to both universities, while 1A does not perform as well as it provides less access to the Learning Quarter and therefore was not shortlisted.

Options 2A and 2B that concentrate buses on Victoria Street impact on the ability to provide a linear park and cycleway as proposed and therefore do not meet objective 1. While not consistent with existing strategic plans these options do however have the potential to shift the cycleway and linear park to the Wellesley Street corridor to the south. The use of Victoria Street in these options also increases operating costs and may result in reliability issues. Option 2A and 2B were not taken forward as they did not achieve objectives 1,2,3, 4 and 6.

Options 4A and 4B split bus priority between Victoria and Wellesley streets and fail to meet objectives 4 and 6 due to not providing for pedestrian activity within the public transport network, being inconsistent with the east-west corridors envisaged by CEWT, and not being able to meet the space requirements for stops. Option 4A was not taken forward as the option did not achieve objectives 1,4,5, 6 and 8. While Option 4B did not achieve objectives 1,2,3,4,6 and 7.

Option 4D has a reduced impact than that of 4A and 4B and achieved most of the project objectives.

Option 4E has its terminal on Princes Street, rather than Grafton Gully. This location does not require buses to pass through the SH-16 interchanges, avoiding traffic impacts at those interchanges (objective 3). It also avoids a potential barrier effect on the Auckland Domain (objective 5). It does not use the Wellesley Street underpass, space that could be used to provide a cycleway connection.

Options 5A, 6A and 6B were not taken forward due to the use of both Victoria Street or Wellesley Street and Mayoral Drive for bus priority, which is inconsistent with CEWT modal corridors, reduces legibility, makes transfers more difficult and reduces accessibility along the east-west route, particularly in the Learning Quarter. Additionally, operating buses on Mayoral Drive interferes with the planned traffic corridor connecting with both the SH-1 and SH-16 motorways. This resulted in Options 5A, 6A and 6B not meeting objectives 1, 3 and 6 while Option 6A and 6B also did not meet objectives 4 and 8.

6.4 Grafton Gully site assessment

The shortlisted options 1B, 1D and 4D include Grafton Gully for the bus terminal location. The advantage of a Grafton Gully bus terminal location is that it could accommodate layover and

vehicle storage during the day. A description of the Grafton Gully terminal sites is provided within Table 6.6.

Figure 6.1 provides a high level overview of the short listed Grafton Gully terminal sites and the evaluation is include in Table 6.7. The sites that were short listed for the Grafton Gully terminal include an on-street site (site 8) and off-street site (site 1).

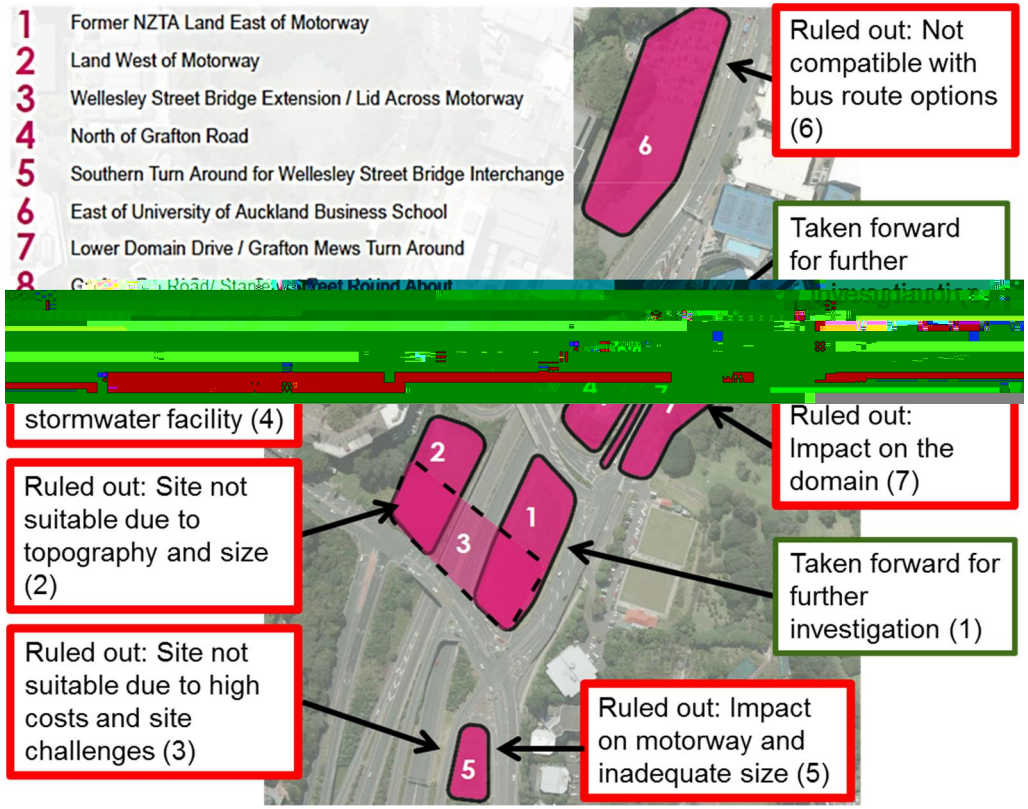


Figure 6-1: Grafton Gully Terminal sites long list assessment conclusions

Table 6-6: Grafton Gully Assessment

Ref.	Location	Description	Findings	Site images
Site 1 Off-street		This site is highway reserve between Grafton Road and the motorway. This land is no longer owned by the NZ Transport Agency. Buses could enter the site off Grafton Road near the Wellesley Street intersection and exit onto Grafton Road turning right onto Grafton Road with another right turn at the Stanley Street intersection looping back to connect back to Wellesley Street. The Grafton Road and Stanley Street intersection would require changes to signals and road alignment including the removal of the median. Initial bus tracking identified that the site could provide for the required layover spaces. This site could interface with any pedestrian / cyclists infrastructure improvements adjacent to Wellesley Street.	Take forward site to short list and to be further investigated within the DBC.	
Site 2 Off-street		This site is between the University of Auckland and the SH16 Northwestern motorway. The Grafton Gully Cycleway crosses the site linking the cycleway between Grafton Road and Wellesley Street. Accessing this site by bus would require changes to the traffic lights and changes to the underpass to reduce safety implications of the buses slowing as they exit the underpass to turn into the site. The site is not large enough to provide for the minimum number of layover bus stops when bus turning movements and access onto Wellesley Street are taken into account. Initial bus tracking identified that the required layover spaces cannot be safely provided with the cycleway.	Not shortlisted for further investigation as the topography of the site is very challenging. Using this site as a terminal would also significantly impact the Grafton Gully cycleway. Alterations to the signals would be required and impacts on the motorway ramps would be likely.	
Site 3 Off-street		This site option involves an extension of the Wellesley Street Bridge to form a cap over the motorway. This allows the opportunity to provide more than the required layover spaces and provide for open space. The CCMP includes a proposal to cap over the motorway to improve the pedestrian and cyclist movement between the Domain and Albert Park. The CCMP aspiration includes expansive land to also include possible recreational facilities. This site could interface with any pedestrian / cyclists infrastructure improvement adjacent to Wellesley Street and connection to Grafton Gully cycleway.	Not shortlisted for further investigation as the site is challenging from a delivery point of view. It would be expensive to build, and difficult to construct. Funding sources are also uncertain for the wider scheme.	**City Centre Masterplan** 
Site 4 Off-street		Situated on the corner of Grafton Road and Stanley Street at the Wilsons carpark is the SH16 Stanley Street Sediment detention vault (SQID Tank). This stormwater management asset is 85m long x 10m wide and the largest of its kind in New Zealand, serving a total contributing catchment area of 10.6 ha. The SQID tank is also able to contain contaminants in the event of a spill incident at this important port-link section of SH16. This asset is covered by Resource Consent to divert and discharge stormwater - Permit No. 25487. Operation of this asset requires regular monitoring and access. It was recommended by the AMA that bus operations should not be undertaken on this site. Initial bus tracking identified that the SQID tanks could not be avoided.	Not shortlisted for further investigation due to stormwater facility and the inability to drive buses across it. However, a combined solution with site 8 could be developed.	

Site 5 On / off-street		Grass motorway reserve between Grafton Road and the motorway slip road. Initial bus tracking identified that the site is too small to provide the required bus layover spaces without impacted on the slip lane.	Not shortlisted for further investigation as the site is too small to accommodate anticipated bus volumes and movements.	
Site 6 Off-street		Wilson cark park located off Alten Road. The Grafton Gully Cycleway extend across the frontage of the site This site is not compatible with the short listed bus route options.	Not shortlisted for further investigation as the site is not compatible with the short listed bus route options	
Site 7 Off-street		This site option includes buses turning down, laying over and turning on Lower Domain Drive. Initial bus tracking identified that this movement was not possible without land acquisition on the Domain and impacts on trees.	Not shortlisted for further investigation as the bus routing cannot avoid significant impact on the Domain	
Site 8 On-street		This on-street option would utilise Stanley Street for bus layover. The road layout would need to be altered to provide for layover spaces which would result in the removal of the median and changes to the intersection with Lower Domain Driver to provide a roundabout. Initial bus tracking identified that the site could provide for 8 layover spaces. Careful consideration and design would be required to ensure the site did not negatively impact on the walking and cycling connections to the Domain and along Stanley Street in general.	Take forward site to short list to be further investigated within the DBC. A combined solution with the adjacent site 1 could be developed.	

Table 6-7: Grafton Gully Assessment

--- Significantly fails criterion
-- Does not meet criterion
- Partially fails criterion
Not applicable / neutral
+ Partially meets criterion
++ Meets criterion
+++ Exceeds criterion

Project Objectives		Grafton Gully Interchange Assessment Criteria	Site 1 Former NZTA land east of motorway	Site 2 Land west of motorway	Site 3 Wellesley Street bridge extension/lid of motorway	Site 4 North of Grafton Road	Site 5 Southern turn around for Wellesley bridge interchange	Site 6 East of UoA business school	Site 7 Lower Domain Drive/Grafton Mews (north) turnaround	Site 8 Grafton Road / Stanley St roundabout
1	Create engaging places for people and businesses that have a character unique to Tamaki Makaurau/Auckland and are consistent with existing plans and visions	Avoids severance and visual dominance from public transport operations	+++	++	+++	++	+++	++	--	++
2	Invest in affordable, right-sized solutions that provide value for money over the life of the asset with investment timed and designed to integrate with development	Capex (low / medium / high)	Medium	Medium	High	Medium	Low	Medium	Low	Low
		Constructability	+	+	-	--	+	+	--	++
		Enables timely delivery	++	++	--	+	++	+	--	+++
		Land Ownership	--	-	-	++	++	++	--	++
		Site feasibility (topography, size, access)	+	---	+	--	--	+	--	++
3	Unlock economic and social performance by enabling more people to access the City Centre more effectively	Improves the reliability of public transport along the east-west connection	+	++	++	+	--	---	+	+
		Maintaining reliability of motorway interchanges	+	-	++	+	--	--	+	+
5	Deliver environmentally sustainable infrastructure	Minimise impact on the Domain, Albert Park and other public open spaces	++	++	++	++	++	++	---	+
6	Provide for effective operation of the City Centre public transport network	Ensure sufficient space and facilities to enable the operation of the principles of the New Network (including arrivals/departures and transfers)	+++	-	+++	--	---	+	-	++
		Works efficiently with services from Victoria St	--	--	--	--	--	+	--	--
		Works efficiently with services from Wellesley St	++	++	++	++	++	--	++	++
		Works efficiently with services from Cook St	+	+	+	+	+	--	+	+

6.4.1 Further consideration of sites 3 and 4

Grafton Gully site 3 was not shortlisted for further investigation as the site is challenging from a delivery point of view. It would be expensive to build, and difficult to construct. Funding sources are also uncertain for the wider scheme.

Site 3 involves the construction of a cap over the motorway and could deliver a high quality strategic link for pedestrians and cyclists as well as the terminal. It could be a city-changing project and given the cost, construction challenges and scope it is recommended that the investigation of this option be taken forward as a separate urban realm project.

Site 4 is a technically difficult site due to the sediment detention vault (SQID tank) which is below the site. Further investigation has determined that it would not be possible to utilise the site without buses driving and parking on top of the SQID tank and this would pose a risk to the structure of the tanks as well as impeding access to the tanks for inspection.

Figure 6.2 shows the bus tracking and possible layover space locations, the tank covers are visible, showing how the buses would need to traverse and potentially have to layover on the tanks.

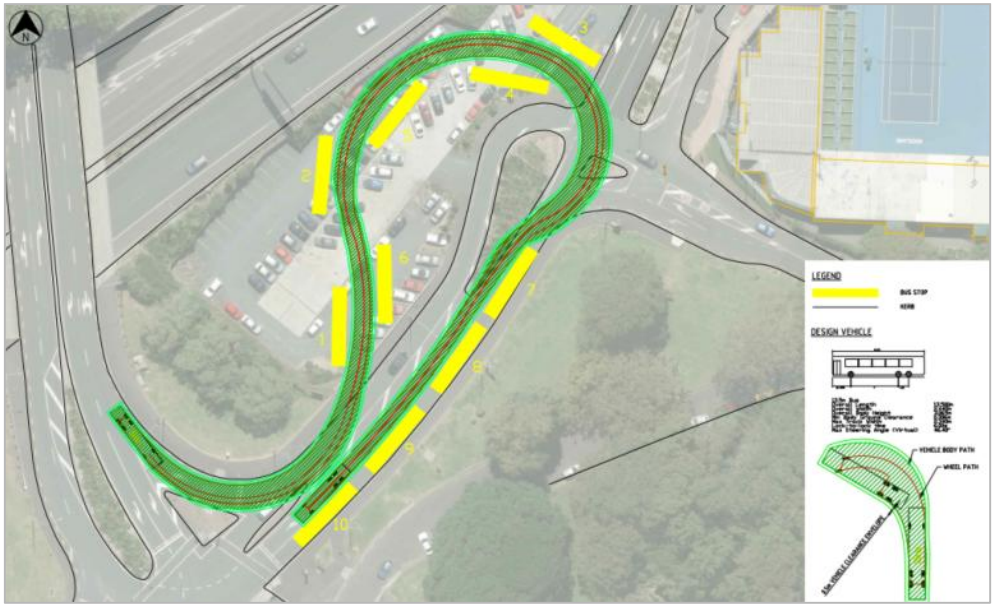


Figure 6-2: Site 4 - Bus tracking and possible layover spaces[28]

[28] This figure is not a recommended design or layover layout. It was developed purely for the identification of whether bus routing and layover can avoid the SQID tank.

6.5 Summary

The selection of options for the short list was based on how well the option addressed the four problems identified in section 6.1 and whether the option met most of the project objectives.

The evaluation of the long list options resulted in the development of the Do Minimum and four short list options; including:

- Do Minimum 2026, as a base to which to compare the other options;
- 1B: Buses on Wellesley Street with a Grafton Gully terminal;
- 1D: Buses on Wellesley Street with a Grafton Gully terminal via Wakefield Street;
- 4D: Buses on Wellesley Street and Victoria Street with a Grafton Gully terminal; and
- 4E: Buses on Wellesley Street and Victoria Street with a Princes Street terminal.

The Grafton Gully sites taken forward as part of the short list include an on-street site (site 8) and off-street site (site 1).

These options were taken forward to the short list because they best addressed the four problems identified in the business case, and because they met most, if not all, of the project objectives and are considered to be feasible from a construction point of view.

The infrastructure requirements for short list options are included in Appendix G and section 7.

7. Short list options

This section provides an overview of the requirements of the short list options; including:

- Do Minimum 2026, as a base to which to compare the other options;
- 1B: Buses on Wellesley Street with a Grafton Gully terminal;
- 1D: Buses on Wellesley Street with a Grafton Gully terminal and outbound Isthmus buses accessing Symonds Street via Wakefield Street;
- 4D: Buses on Wellesley Street and Victoria Street with a Grafton Gully terminal; and
- 4E: Buses on Wellesley Street and Victoria Street with a Princes Street terminal.

Typical cross sections for Victoria Street and Wellesley Street and details on the Learning Quarter Station, Grafton Gully and Princes Street terminals and cycle connections are included in section 10.

7.1 Do Minimum 2026:

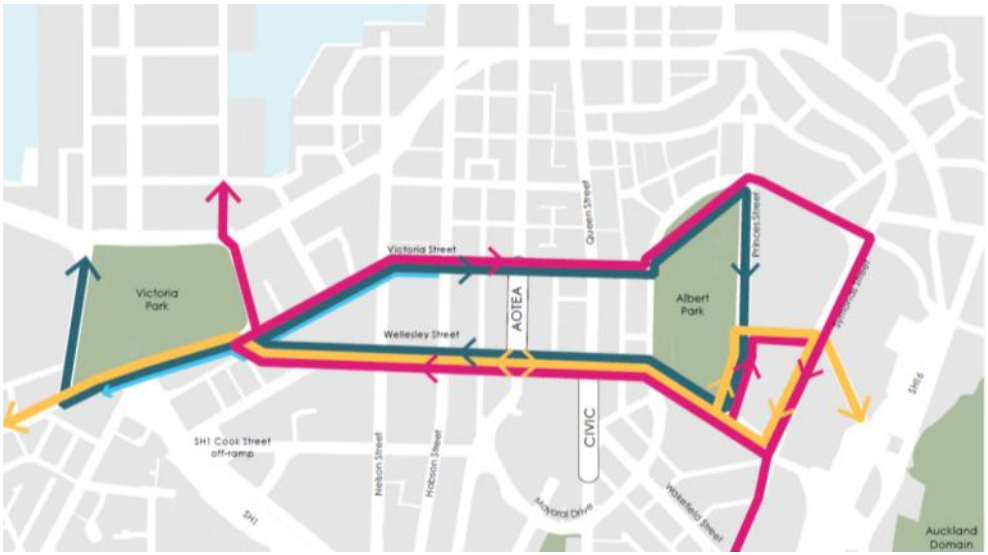
Figure 7.1 provides an overview of the Do Minimum bus priority and cycle facility routes, resulting intersection implications, opex and capex and shows the bus infrastructure requirements.

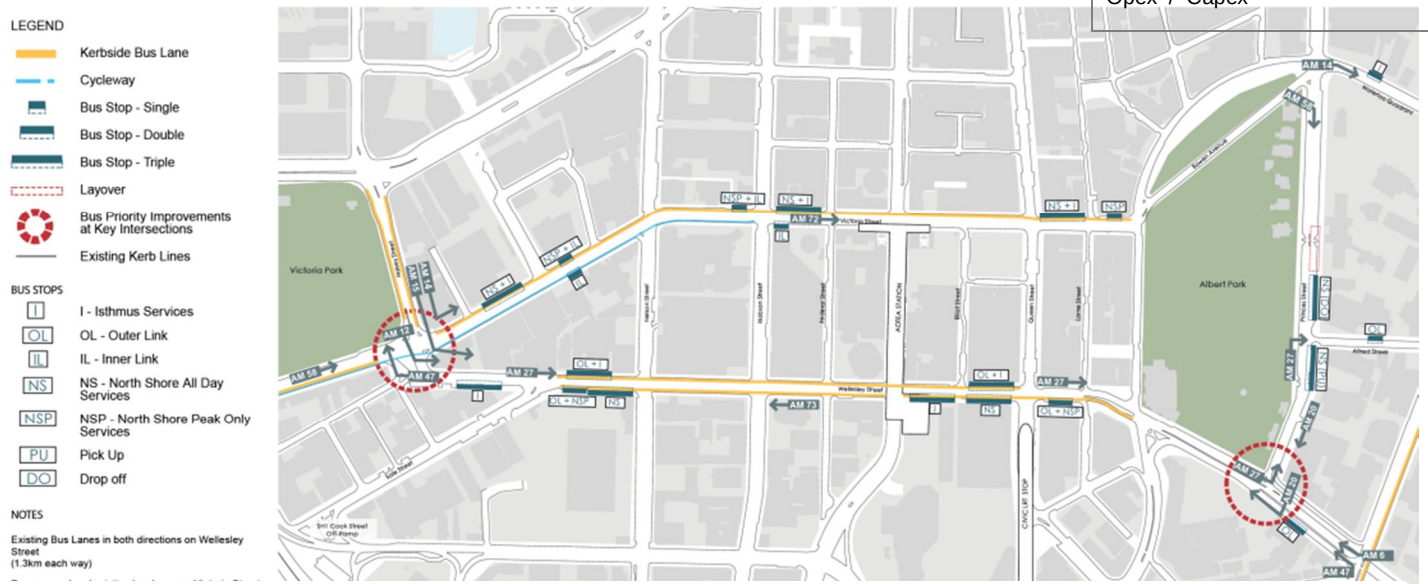
To support the Do Minimum new bus stops along Wellesley Street, a bus lane and stops along Victoria Street in the eastbound direction and new departure, terminal, recovery and layover spaces along Princes Street will need to be provided.

The Do Minimum requires limited infrastructure improvements and therefore offers a low cost option which can be implemented in relatively short timeframe compared to the other options. The Do Minimum spreads eastbound buses across two corridors which may help to cope with short-term (pre-LRT) bus volumes, or in case LRT is not delivered in the expected timeframe.

The following issues or risks are anticipated with the Do Minimum scenario:

- Inconsistent with CEWT, which focuses on Wellesley Street as a public transport corridor, and Victoria Street providing pedestrian space and a linear park;
- Inconsistency with the New Network principles to provide frequent and legible services due to the five different route patterns along the corridor;
- Poor bus priority and lack of turning restrictions would result in long and unreliable journey times;
- Passengers would board buses on different streets from which they would alight, reducing legibility and leading to customer confusion;
- Having buses on multiple corridors is less efficient, takes up more space for infrastructure and may have a more significant impact on city centre vehicular congestion;
- Impacts upon the Linear Park and Cycleway, particularly adjacent to the planned CRL station entrance at Victoria Street and Albert Street;
- Waterloo Quadrant may not have the stop space available to accommodate the volume of buses required and suffers from reliability issues in the afternoon peak, as outlined in Appendix J. This may lead to increased operating costs, unreliable journey times for passengers, and uncertain wait times for passengers boarding further along the corridor;
- Bus routing is likely to negatively impact upon amenity around the Learning Quarter; in terms of potential severance effects that inhibits ease of pedestrian movement around the Quarter, and;
- High impacts on adjoining development and activity, particularly by the circulation of Isthmus and Outer Link services around the Princes / Alfred / Symonds / Wellesley Street block at the heart of the University of Auckland campus.





Do Minimum 2026		
Midtown cycle facility	Segregated facility along Victoria Street to intersection with Hobson Street	
Bus provision – Isthmus services	Some services westbound on Wellesley Street and eastbound on Victoria Street, Bowen Avenue and Waterloo Quadrant, with others using Wellesley Street in both directions (accessing Symonds Street via Princes and Alfred Streets)	
Bus provision – North Shore services	Eastbound on Victoria Street and Westbound on Wellesley Street with terminal on Princes Street	
Link services	Both directions on Wellesley Street	
Intersection priority or upgrades considerations	Victoria Street / Wellesley Street / Halsey Street and Princes Street / Wellesley Street	
Opex / Capex	$49,625,876	$13,500,000

Figure 7-1: Do Minimum 2026 overview and bus infrastructure requirements

7.2 Option 1B: Wellesley Street (Grafton Gully terminal)

Option 1B involves providing bus priority along Wellesley Street and a Grafton Gully terminal for the North Shore services. The North Shore services will access Grafton Gully via Wellesley

Street and the Wellesley Street underpass. The cycleway will be provided along Victoria Street connecting to Wellesley Street after Queen Street via a number of potential routes and connect to the Grafton Gully cycleway via either the Wellesley Street slip lanes or through the underpass with a reduced cross section (see sections 10 and 11 for more detail on the interchange and cycleway considerations).

Figure 7.2 provides an overview of the Option 1B bus priority and cycle facility routes, resulting intersection implications, opex and capex. Figure 7.3 shows the bus infrastructure requirements of this option.

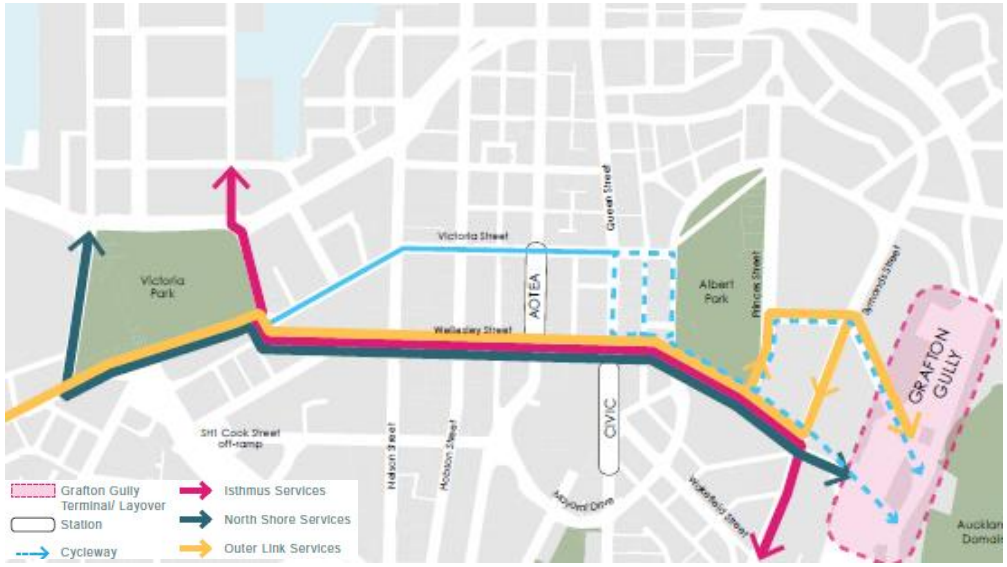
This option provides a single, high quality transfer point between bus, heavy rail and light rail at Aotea station and maximises legibility by providing two-way service on a single east-west corridor. Option 1B includes the ability to provide a high quality Learning Quarter Gateway station for North Shore services in the Wellesley Street underpass.

The following infrastructure would need to be provided to support Option 1B:

- Upgraded bus lanes in both directions along the length of Wellesley Street, Victoria Street West (alongside Victoria Park) and Beaumont Street;
- High quality bus station in the underpass on Wellesley Street at Symonds Street;
- A terminal facility for North Shore services in Grafton Gully;
- A bidirectional separated cycle lane on the north side of Wellesley Street from Queen Street to Princes Street. Cycle access either via the Wellesley Street underpass or on the current footpath on the ramp between Wellesley Street and Symonds Street;
- Major upgrade of Wellesley Street from Lorne Street to Albert Street including removal of general traffic (except local access), high quality bus stops and improved pedestrian space to include wider footpaths;
- Redesign of the intersection of Wellesley Street and Symonds Street to enable the right turn from Wellesley Street eastbound to Symonds Street southbound. This would involve extending the current signalised intersection to the north and widening the intersection;
- Access from Wellesley Street eastbound to the uphill ramp leading to Symonds Street for buses to reach Symonds Street;
- A Grafton Gully terminal provides the opportunity for layover of additional buses if required; and
- Access through the Wellesley Street underpass would be reconfigured to allow for single east and westbound general traffic lanes along with one west bound bus lane.

The following issues or risks are anticipated with Option 1B:

- The University of Auckland and AUT are opposed to the use of the uphill ramp / slip lane between Wellesley Street and Symonds Street, as buses using the ramp are considered to have an adverse impact on the universities; and
- If light rail is delayed or does not proceed, then the additional buses on Wellesley Street may result in an increase in peak bus volumes and an increase in bus stop capacity, that exceed what can be accommodated by the proposed infrastructure in this option. Options to address this are identified in Appendix P.



Option 1B – Wellesley Street with a Grafton Gully Terminal		
Midtown cycle facility	Segregated facility along Victoria Street. Cycleway can be provided on Symonds Street slip lanes or through underpass	
Bus provision – Isthmus services	Both directions on Wellesley Street	
Bus provision – North Shore services	Both directions on Wellesley Street with terminal in Grafton Gully and gateway station in the Wellesley Street underpass	
Link services	Both directions on Wellesley Street	
Intersection priority or upgrades considerations	Victoria Street / Wellesley Street / Halsey Street; Princes Street / Wellesley Street; Wellesley Street / Symonds Street	
Opex / Capex	$49,677,834	$44,500,000

Figure 7-2: Option 1B – Wellesley Street with a Grafton Gully Terminal

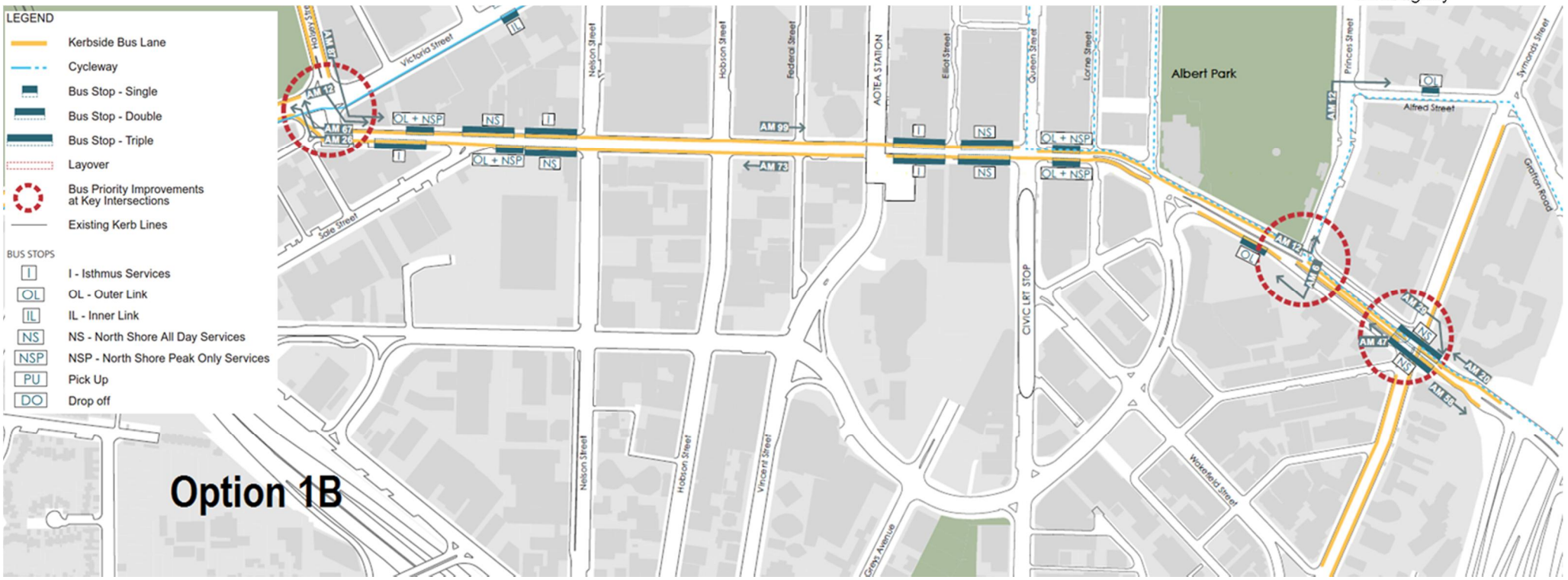


Figure 7-3: Option 1B bus infrastructure requirements

7.3 Option 1D: Wellesley Street (Grafton Gully terminal) via Wakefield Street

Option 1D is essentially the same as 1B, however the Isthmus services do not use the slip lanes to access Symonds Street and instead travel via Mayoral Drive and Wakefield Street in the outbound direction.

Figure 7.4 provides an overview of the Option 1D bus priority and cycle facility routes, resulting intersection implications, opex and capex. Figure 7.5 provides the bus infrastructure requirements for this option.

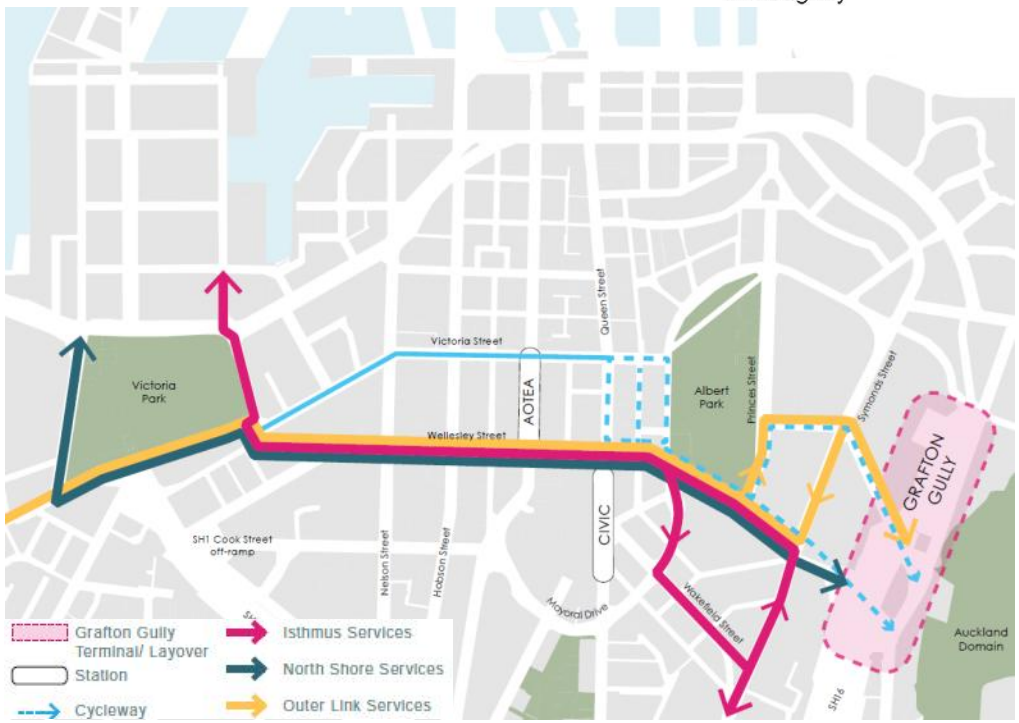
Option 1D provides a single, high quality transfer point between bus, heavy rail and light rail at Aotea station and maximises legibility by providing two-way service on a single east-west corridor. This option also includes the ability to provide a high quality University station for North Shore services in the Wellesley Street underpass.

The following infrastructure would need to be provided to support Option 1D:

- Major upgrade of Wellesley Street from Lorne Street to Albert Street including removal of general traffic (except local access), high quality bus stops and improved pedestrian space;
- Upgraded bus lanes in both directions along the length of Wellesley Street, Victoria Street West (alongside Victoria Park) and Beaumont Street;
- High quality bus station in the Wellesley Street underpass;
- A terminal facility for North Shore services in Grafton Gully;
- Redesign of the existing intersection of Wellesley Street and Mayoral Drive to allow buses travelling eastbound on Wellesley Street to make a right turn onto southbound Mayoral Drive;
- A Grafton Gully terminal provides the opportunity for layover of additional buses if required; and
- Cycle access either via the Wellesley Street underpass or on the current footpath on the ramp between Wellesley Street and Symonds Street.

The following issues or risks are anticipated with Option 1D:

- The use of Wakefield Street means the isthmus services using the East-West Midtown corridor will not stop in the University of Auckland precinct in the eastbound direction; and
- If light rail is delayed or does not proceed, then the additional buses on Wellesley Street may result in an increase in peak bus volumes and an increase in bus stop capacity, that exceed what can be accommodated by the proposed infrastructure in this option. Options to address this are identified in Appendix P.



Option 1D: Wellesley Street (Grafton Gully terminal) via Wakefield Street		
Midtown cycle facility	Segregated cycle facility along Victoria Street. Cycleway can be provided on Wellesley Street slip lanes or through underpass	
Bus provision – Isthmus services	Both directions on Wellesley Street West with eastbound services using Mayoral Drive and Wakefield Street to access Symonds Street	
Bus provision – North Shore services	Both directions on Wellesley Street with terminal in Grafton Gully and gateway station in Wellesley Street underpass	
Link services	Both directions on Wellesley Street	
Intersection priority or upgrades considerations	Victoria Street / Wellesley Street / Halsey Street; Wellesley Street / Mayoral Drive; Symonds Street / Wakefield Street	
Opex / Capex	$49,561,652	$45,500,000

Figure 7-4: Option 1D Wellesley Street with a Grafton Gully Terminal via Wakefield Street

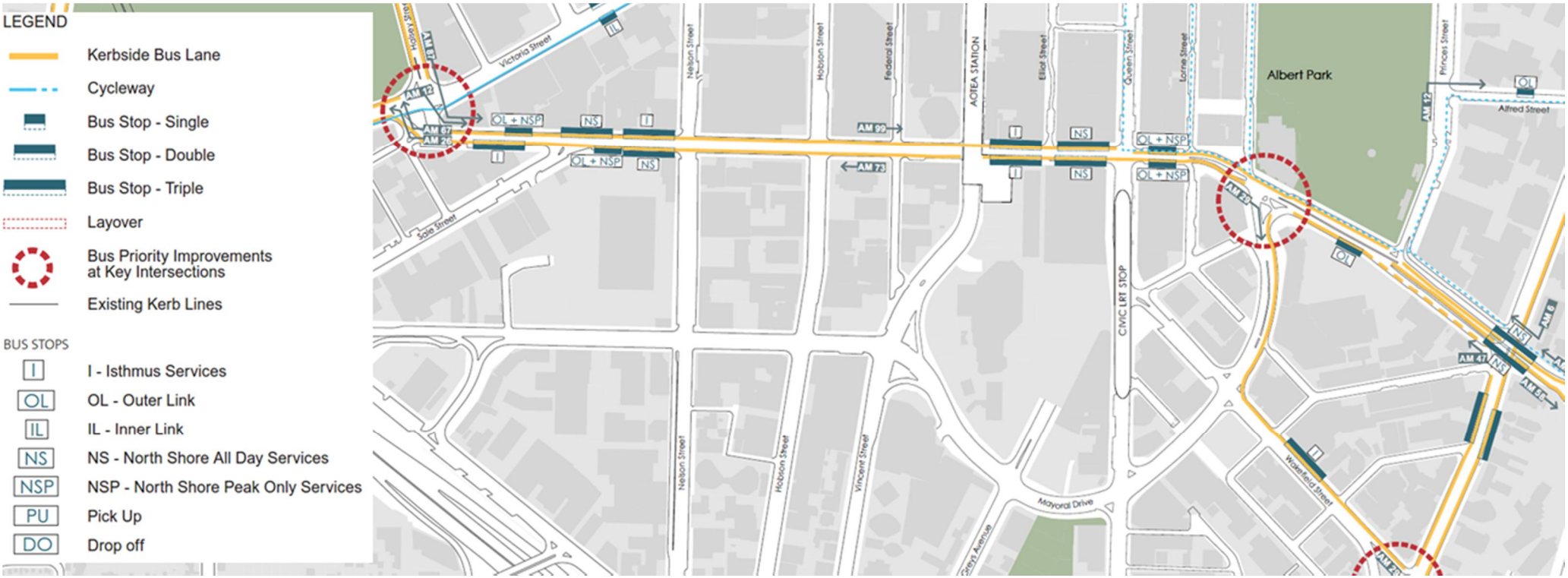


Figure 7-5: Option 1D bus infrastructure requirements

7.4 Option 4D: Victoria Street, Bowen Avenue, Symonds and Wellesley Streets (Grafton Gully terminal)

Option 4D consists of Isthmus services heading into the city via Wellesley Street, and leaving the city via Victoria Street, Bowen Ave, Waterloo Quadrant and Symonds Street. North Shore services will be focused along Wellesley Street. The North Shore services will access Grafton Gully via Wellesley Street and the Wellesley Street underpass.

Figure 7.6 provides an overview of Option 4D bus priority and cycle facility routes, resulting intersection implications, opex and capex and the bus infrastructure requirements.

Option 4D includes the ability to provide a high quality Learning Quarter station for North Shore services in the Wellesley Street underpass and use of Victoria Street as a second eastbound corridor for Isthmus services to take pressure off Wellesley Street in the case that Light Rail is not delivered in the expected timeframe.

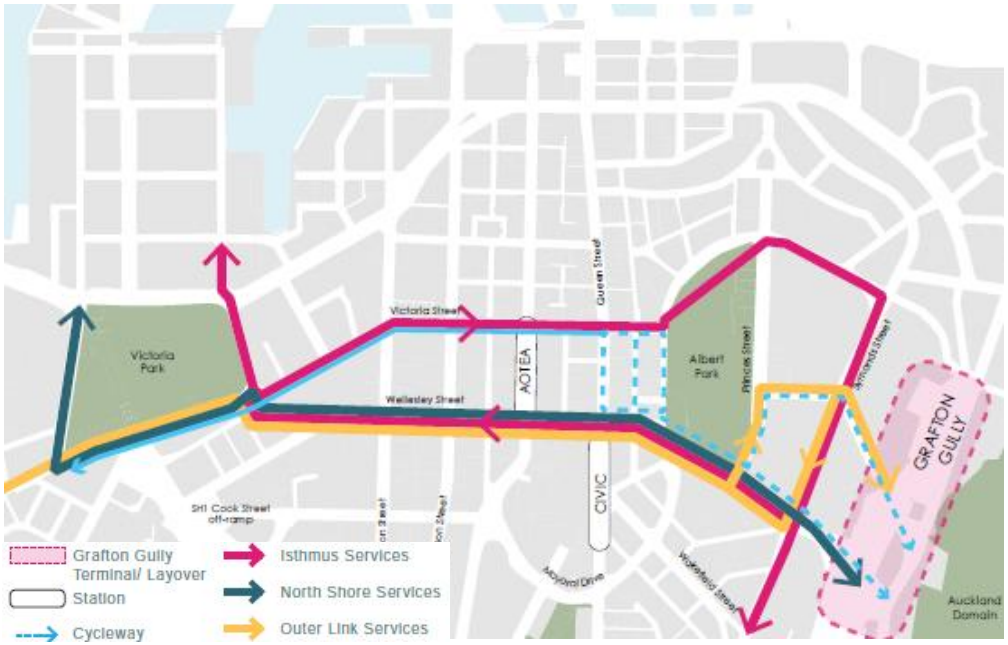
The following infrastructure would need to be provided to support Option 4D:

- Major upgrade of Wellesley Street from Lorne Street to Albert Street including removal of general traffic (except local access), high quality bus stops and improved pedestrian space;
- Upgraded bus lanes in both directions along the length of Wellesley Street, Victoria Street West (alongside Victoria Park) and Beaumont Street;
- Upgraded, continuous eastbound bus lane on Victoria Street, Bowen Avenue and Waterloo Quadrant;
- High quality bus station in the underpass on Wellesley Street at Symonds Street and a terminal facility for North Shore services in Grafton Gully;
- A Grafton Gully terminal provides the opportunity for layover of additional buses if required;
- Waterloo Quadrant bus priority, as discussed in Appendix J, to reduce the impact of traffic on bus travel times[29]; and
- Cycle access either via the Wellesley Street underpass or on the current footpath on the ramp between Wellesley Street and Symonds Street.

The following issues or risks are anticipated with Option 4D:

- If light rail is delayed or does not proceed, then the additional buses on Wellesley Street may result in an increase in peak bus volumes and an increase in bus stop capacity, that exceed what can be accommodated by the proposed infrastructure in this option. It should be noted that the impact of this is lesser than Options 1B and 1D due to the split of bus services across Victoria Street and Wellesley Street.
- Isthmus bus routes are confusing / less legible due to being split between Wellesley Street and Victoria Street;
- There is the potential for the need for further consultation with stakeholders and the public if there are impacts on the CCMP aspirations; and
- Bus stops just south of Symonds Street / Alten Road may need to be lengthened to accommodate expected bus volumes and this could impact upon existing street trees. The likelihood / extent of which is to be investigated as part of the DBC.

[29] Note: Rough order costs do not include bus priority along Waterloo Quadrant



Option 4D: Victoria Street, Bowen Avenue, Symonds and Wellesley Streets		
Midtown cycle facility	Segregated cycleway along Victoria Street. Cycleway can be provided on Wellesley Street slip lanes or through underpass	
Bus provision – Isthmus services	Westbound on Wellesley Street and Eastbound on Victoria Street, Bowen Avenue and Waterloo Quadrant	
Bus provision – North Shore services	Both directions on Wellesley Street with terminal in Grafton Gully and gateway station in Wellesley Street underpass	
Link services	Both directions on Wellesley Street	
Intersection priority or upgrades considerations	Victoria Street / Wellesley Street / Halsey Street	
Opex / Capex	$50,175,071	$51,500,000

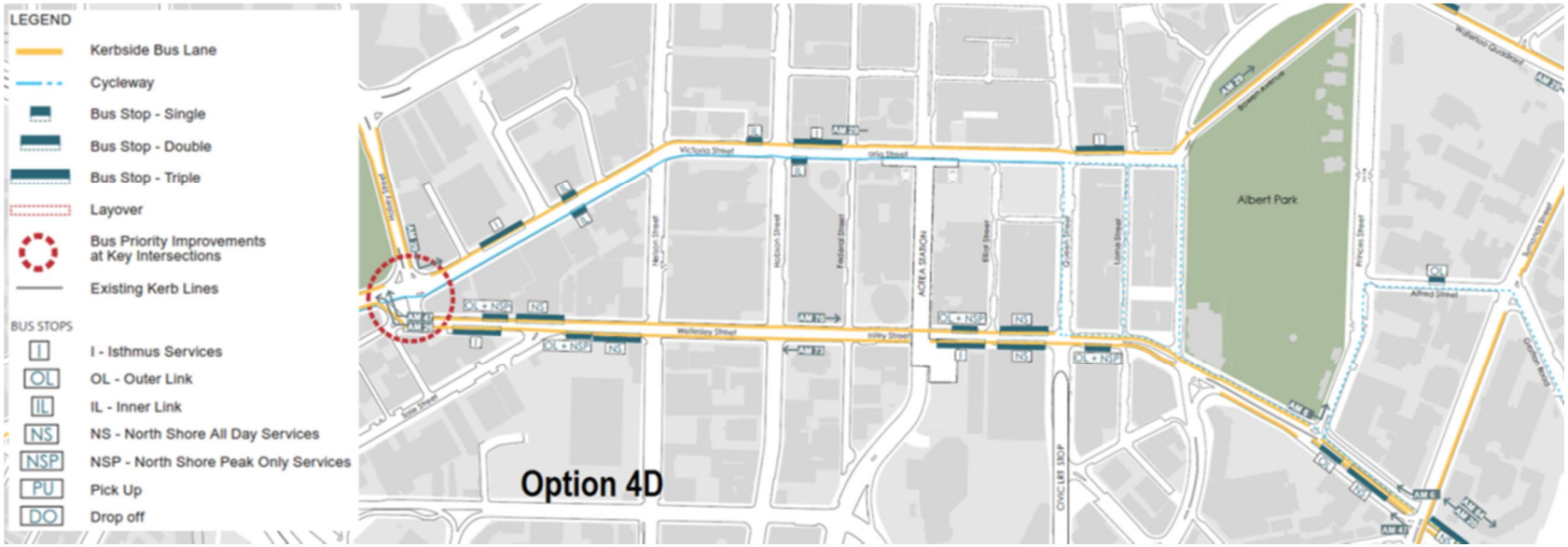


Figure 7-6: Option 4D overview and bus infrastructure requirements

7.5 Option 4E: Victoria Street, Bowen Avenue, Princes and Wellesley Streets (Princes Street terminal)

Option 4E consists of Isthmus services in both directions along Wellesley Street, with North Shore services heading inbound via Victoria Street and Bowen Ave, and outbound via Wellesley Street. This option includes a Princes Street terminal for North Shore services.

Figure 7.7 provides an overview of Option 4E bus priority and cycle facility routes, resulting intersection implications, opex and capex. Figure 7.8 shows the bus infrastructure requirements of this option.

Option 4E presents the following opportunities:

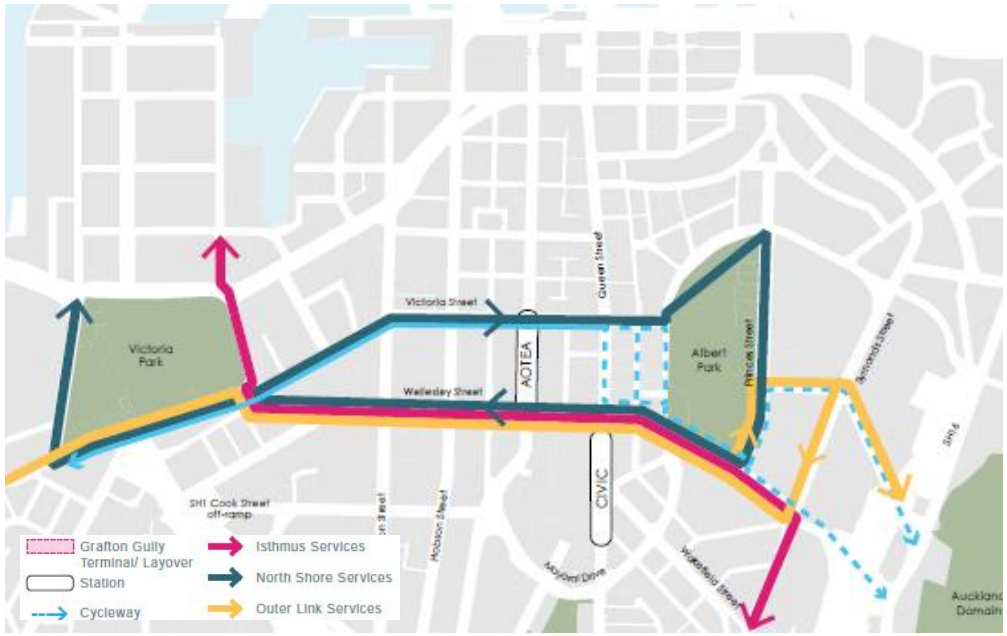
- The Princes Street terminal provides a legible terminal at the front door of the University of Auckland, and offers the opportunity for the street to be rebuilt with public space elements; and
- The use of Victoria Street as a second eastbound corridor will take pressure off Wellesley Street in the case that Light Rail is not delivered in the expected timeframe.

The following infrastructure would need to be provided to support Option 4E:

- Major upgrade of Wellesley Street from Lorne Street to Albert Street including removal of general traffic (except local access), high quality bus stops and improved pedestrian space;
- Upgraded bus lanes in both directions along the length of Wellesley Street, Victoria Street West (alongside Victoria Park) and Beaumont Street;
- Upgraded, continuous eastbound bus lane on Victoria Street, Bowen Avenue and Waterloo Quadrant;
- Compact bus terminal including stops and recovery time on Princes Street. This also involves pedestrian realm improvements, and some parking removal;
- Eastbound Isthmus buses travelling between Wellesley Street and Symonds Street use either the uphill ramp (as in Option 1B) or Mayoral Drive and Wakefield Street (as in Option 1D) with associated infrastructure changes as described previously;
- Cycle access either via the Wellesley Street underpass or on the current footpath on the ramp between Wellesley Street and Symonds Street;
- Princes Street terminal would not provide any extra capacity to meet any growth in bus numbers.

The following issues or risks are anticipated with Option 4E:

- Impacts on number of parking spaces along Princes Street;
- If light rail is delayed or does not proceed, then the additional buses on Wellesley Street may result in an increase in peak bus volumes and an increase in bus stop capacity, that exceed what can be accommodated by the proposed infrastructure in this option;
- The Princes Street terminal is highly constrained due to adjacent historic buildings, and therefore is unsuitable for all day bus layover in the long term; and
- There is the potential for the need for further consultation with stakeholders and the public if there are impacts on the CCMP aspirations.



Option 4E: Victoria Street, Bowen Avenue, Princes and Wellesley Streets		
Midtown cycle facility	Segregated cycleway along Victoria Street. Cycleway can be provided through underpass	
Bus provision – Isthmus services	Both directions on Wellesley Street (option for eastbound services to use Mayoral Drive and Wakefield Street to access Symonds Street)	
Bus provision – North Shore services	Eastbound on Victoria Street and Westbound on Wellesley Street with terminal on Princes Street	
Link services	Both directions on Wellesley Street	
Intersection priority or upgrades considerations	Victoria Street / Wellesley Street / Halsey Street; Princes Street / Wellesley Street; Wellesley Street / Symonds Street	
Opex / Capex	$49,205,486	$35,000,000

Figure 7-7: Option 4E: Victoria Street, Bowen Avenue, Princes and Wellesley Streets

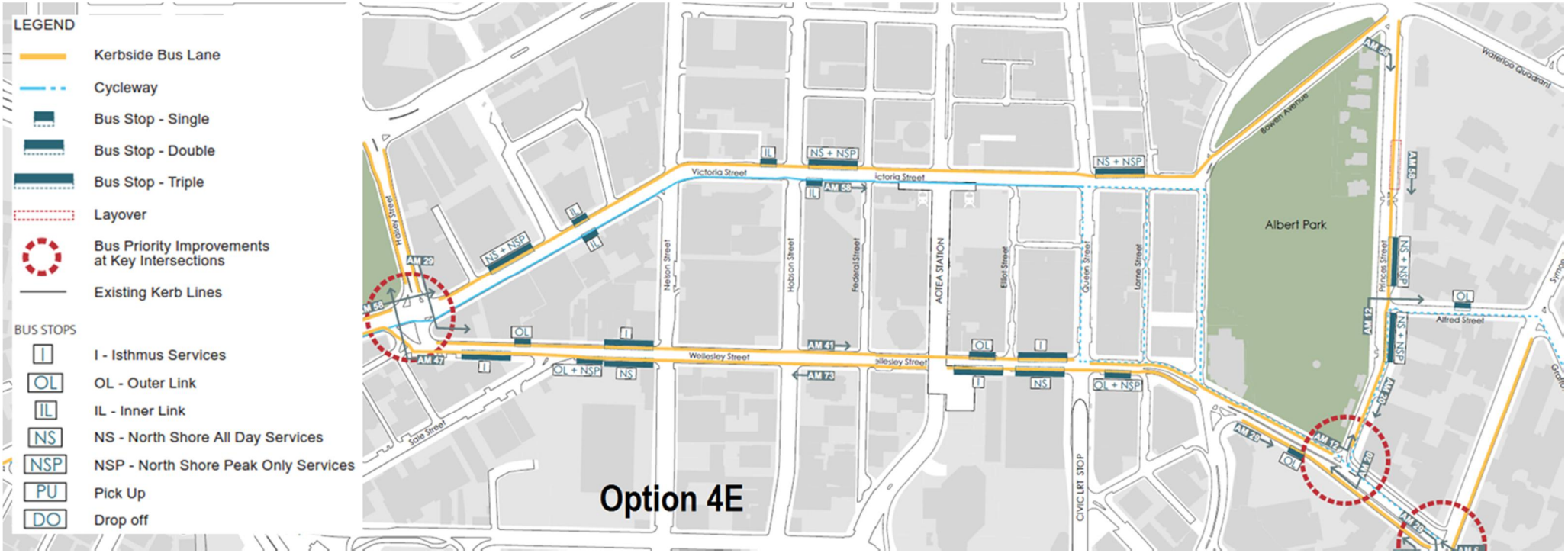


Figure 7-8: Option 4E bus infrastructure requirements

7.6 Shortlist options summary

Table 7.1 provides an overview of the shortlisted options opportunities, constraints and requirements.

Table 7-1: Option summary

Option	Opportunities	Constraints/ Limitations/ Risks	Requirements
Do Minimum	Low cost option and can be implemented in a short time due to minimal changes to infrastructure.	Does not adequately address the project area problems or achieve the desired benefits as it is inconsistent with New Network principles and CEWT and results in long and unreliable journey times. Stakeholders agree that the Do Minimum does not achieve the project objectives and will not resolve the project area's problems.	Alignment with CRL North Shore services terminal Intersection improvements
Option 1B: Buses on Wellesley Street with a Grafton Gully Terminal	Addresses the project area problems, will achieve the desired benefits and has a positive BCR. Consistent with the New Network principles and CEWT and supports the development of the Victoria Street cycleway and Linear Park. Consolidates East-West Midtown bus services along a single corridor providing a more consistent public transport service and promoting legibility for customers. Provides a single, high quality transfer point between bus, heavy rail and light rail at Aotea station. AT Cycling team supports option due to the ability to provide the cycleway along Victoria Street. The cycleway can be provided on Wellesley Street from Queen Street and continue on the slip lanes or through the underpass to Grafton Gully. The largest improvements in travel time over the Do Minimum results from moving bus routes from Victoria Street to Wellesley Street.	The University of Auckland and AUT are opposed to the use of the slip lane between Wellesley Street and Symonds Street. While ATMetro are concerned that the bus routing does not provide access to the north of the University of Auckland and that the relocation of bus stops would impact on patronage volumes. If light rail is delayed or does not proceed, then the additional buses on Wellesley Street may result in peak bus volumes and an increase in bus stop capacity. However, there are options that can be investigated that can address this.	Alignment with CRL North Shores services terminal (Option 4E before the Grafton Gully terminal). Learning Quarter Gateway Station Wellesley Street slip lane Intersection improvements More waiting capacity at Symonds street bus stop (#7148)
Option 1D: Buses on Wellesley Street via Wakefield Street with GG Terminal	Option 1D is the same as Option 1B with the exception of Stakeholder views in relation to the slip lane, costs and as it has the highest BCR. Addresses the project area problems, will achieve the desired benefits and has a positive BCR. Favourable to stakeholders as it negates the need to use the slip lane between Wellesley Street and Symonds Street.	Option 1D is the same as Option 1B with the exception of positive Stakeholder views in relation to the avoidance of the slip lane.	Alignment with CRL North Shores services terminal (Option 4E/GG). Learning Quarter Gateway Station Intersection improvements
Option 4D: Buses on Wellesley street and Victoria street with a Grafton Gully Terminal	Addresses the project area problems and will achieve the desired benefits. Favourable to stakeholders as it negates the need to use the slip lane between Wellesley Street and Symonds Street. Good coverage for both Midtown and the Learning Quarter catchments. Due to similar routes to current services there will be limited impact on patronage. For these reasons this options has support from ATMetro. Using the Victoria Street as a second eastbound corridor for Isthmus services could take pressure off Wellesley Street in the case that Light Rail is not delivered. Has the potential to provide cycle facilities along Victoria Street.	Inconsistent with CEWT as Victoria Street is the cycleway corridor and Wellesley Street is the dedicated busway corridor. Bus services on multiple corridors are less efficient, requires more overall space and infrastructure and provides a lower level of customer service compared to the concentration of services. Negative BCR. This is in part as the use of Victoria Street as an east-west bus corridor, is a major source of travel time disbenefit for public transport passengers.	Alignment with CRL North Shores services terminal (Option 4E before the Grafton Gully terminal). Learning Quarter Gateway Station Intersection improvements Waterloo Quadrant Bus Priority
Option 4E: Buses on Wellesley Street and Victoria Street with a Princes Street Terminal	Addresses the project area problems and will achieve the desired benefits, however this option has been identified as only a short term solution. The Princes Street terminal provides a legible terminal at the front door of the University of Auckland, and offers the opportunity for the street to be rebuilt with public space elements. While there is no opportunity to provide a Learning Quarter Gateway Station as described on Wellesley Street; the Princes Street provides an alternative location for a Learning Quarter Gateway bus terminal. Has the potential to provide cycle facilities along Victoria Street.	Option 4E is the lowest-cost option, however it has a negative BCR, this is in part due to the use of Victoria Street as a bus corridor. Inconsistent with CEWT as Victoria Street is the cycleway corridor and Wellesley Street is the dedicated busway corridor. Bus services on multiple corridors are less efficient, requires more overall space and infrastructure and provides a lower level of customer service compared to the concentration of services. Less stakeholder support as it does not provide long-term layover requirements and the use of Princes Street (i.e. parking impacts). Although this will be a focus of design to mitigate.	Alignment with CRL Princes Street terminal Intersection improvements

8. Patronage and Bus Stop Capacity Considerations

For Option 4D the Isthmus service buses use a similar bus pattern to existing services while Option 1B uses Wellesley Street and Option 1D uses Wakefield Street instead of Waterloo Quadrant and Symonds Street and therefore will require relocating bus stops.

This section summarises the potential implications of relocating the outbound Isthmus bus stops from Symonds Street to either Wellesley Street or Wakefield Street from a passenger catchment, patronage volumes and bus stop Level of Service (LOS) perspective. The potential implications are summarised below and further discussed within Appendix I.

8.1 Patronage catchments

When considering the impacts of route alignments, different groups of people have different demand elasticities, i.e., some groups of people are more likely to change travel behaviour due to changes in fare, reliability, travel time, or stop location than others. For example, City Centre workers, would be more likely to own cars and therefore would be more likely than students to change from public transport in favour of driving if public transport became less convenient due to longer travel times or less reliable service.

Figure 8.1 includes the existing pedestrian catchment from the Symonds Street bus stops in yellow and the proposed bus stops catchments in blue. The catchments do not take into consideration the topography constraints that would impede access for some users. The 400m catchments are included in Appendix I.

As the increased walking distances to the new bus stops may detract some people from accessing public transport, Table 8.1 includes sensitivity tests to identify any lost patronage that may occur if 5% or 10% of passengers chose to no longer use outbound Isthmus bus services.

Table 8-1: Potential change in Isthmus boardings due to bus stop relocation

Option	2016 Average daily Isthmus service boardings (passengers)[30]	Sensitivity tests			
		Potential decrease in average daily boardings (passengers)		Adjusted potential average daily Isthmus boardings (passengers)	
		-5%	-10%	-5%	-10%
1B	174[a]	9	17	165	157
1D	653[b]	33	65	620	588

[30] Number of passengers being moved to a new stop location due to route option
a: 38 passengers (#7014) + 136 (#7146)
b: 38 passengers (#7014) + 136 (#7146) + 227 (#7148)

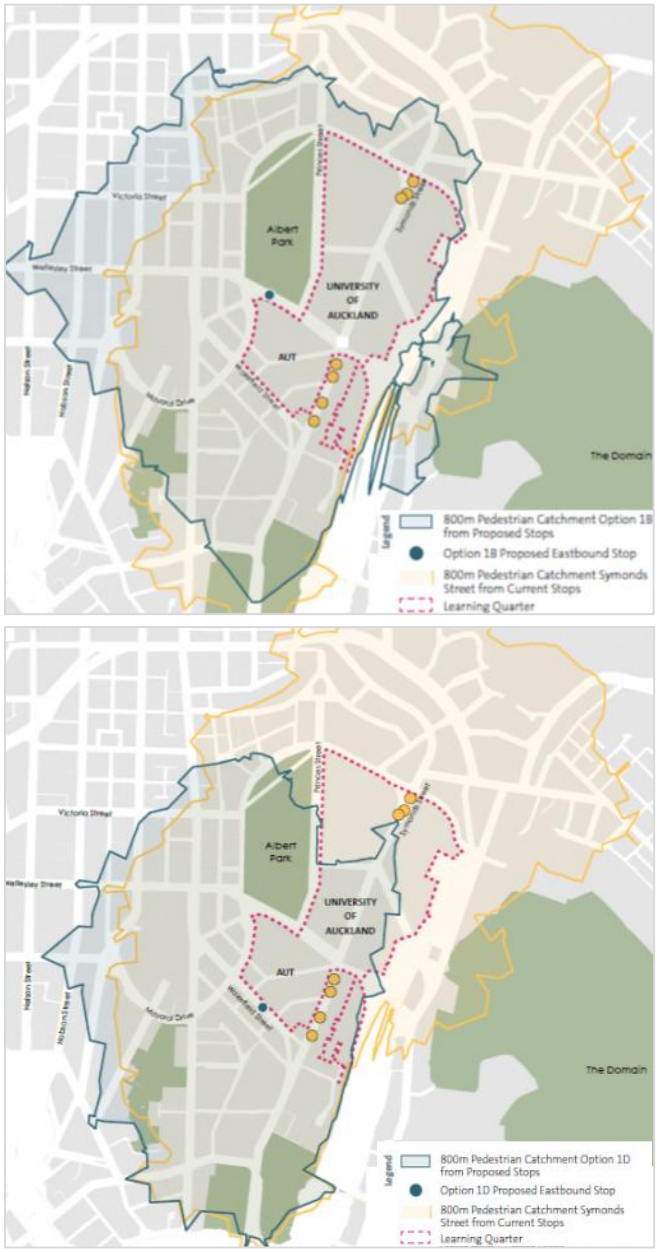


Figure 8-1: Options 1B and 1D 800m pedestrian catchments

The proposed Option 1B Wellesley Street bus stop provides access to all of the Learning Quarter area within an 800m (10 minute) walk of the proposed stop location.

The proposed Option 1B stop also provides improved access to Wellesley Street and Victoria Street along with Grafton Gully.

The proposed Option 1D Wakefield Street bus stop provides improved access to the south of the City Centre when compared to Option 1B.

Half of the University of Auckland is not within 800m of the Option 1D Wakefield Street bus stop and an additional walk will be required for those accessing the stop from the outer reaches of the Learning Quarter.

8.2 Bus stop Level of Service

Bus stop Level of Service (LoS) is determined by identifying the amount of space that is required by waiting bus passengers compared to the amount of space physically available at a stop.

LoS analysis was undertaken to determine the current LoS for the Symonds Street bus stops, and at the proposed bus stop locations, in order to identify if these locations have adequate capacity to accommodate the peak maximum number of people under the New Network and in 2026.

The LoS assessment was undertaken based PM AT Hop data for Wednesday March 2016, on-site bus stop measurements from 12 December 2016, and New Network frequencies as provided on the Auckland Transport website. The LoS at each stop was determined using the Fruin method which assigns a LoS corresponding with industry recognised waiting area requirements.

Figure 8.2 shows where the existing bus stops are located along Symonds Street and Waterloo Quadrant and Table 8.2 includes the LoS scenarios tested to take into the account likely and maximum scenarios for each bus stop.

Figure 8-2: Existing bus stop locations for outbound Isthmus services

Table 8-2: LoS scenarios

Option	Scenario	Description
Existing	Existing	Existing bus routes and AT Hop data patronage
4D	Test 1	100% of #7014 Isthmus patrons move to stop #7146 in 2017 and 2026
1B	Test 1	100% of #7014 Isthmus patrons move to Wellesley Street stop in 2017 and 2026 100% of #7146 Isthmus patrons move to Wellesley Street stop in 2017 and 2026
	Test 2	100% of #7014 Isthmus patrons move to Wellesley Street stop in 2017 and 2026 50% of #7146 Isthmus patrons move to Wellesley Street stop in 2017 and 2026 50% of #7146 Isthmus patrons move to #7148 stop in 2017 and 2026
	Test 3	100% of #7014 Isthmus patrons move to Wellesley Street stop in 2017 and 2026 100% of #7146 Isthmus patrons move to #7148 stop in 2017 and 2026
1D	Test 1	100% of #7014, 7146 and 7148 Isthmus patrons move to Wakefield Street stop in 2017 and 2026
	Test 2	100% of #7014, 7146 and 7148 Isthmus patrons move to Wakefield Street stop in 2017 and 2026

Figures 8.3 and 8.4 include the LoS results, highlighting how the Option 1B Wellesley Street stop has an acceptable LoS in 2017 and 2026. The LoS improves due to the higher New Network frequencies. Option 1D does not have an acceptable LoS with a LoS D in 2017 and E in 2026, based on the New Network frequencies.

Figure 8-3: LoS for Option 1B

Stop #7088/ New Stop			
Test	Current	2016 volumes + New Network	2026 New Network
Do Min	A/A	N/A	
Test 1		B/B	C/C
Test 2		A/A	B/B
Test 3		A/A	A/A

Stop #7148			
Test	Current	2016 volumes + New Network	2026 New Network
Do Min	C/C	C/C	D/D
Test 1	N/A	C/C	D/D
Test 2		C/D	D/E
Test 3		C/D	D/E

(Average passengers/ Maximum passengers)

New Wakefield bus stop			
Test	Current	2016 volumes + New Network	2026 New Network
Do Min	N/A	N/A	
Test 1		D/D	E/E

(Average passengers/ Maximum passengers)

Figure 8-4: LoS for Option 1D

8.3 Option 1D Mitigation

Option 1D consolidates three existing stops (#7014, #7146 and #7148) into a new outbound Isthmus stop on Wakefield Street between St Pauls Street and Mount Street. Based upon the LoS analysis undertaken a bus stop at this location would likely result in a PM peak LoS of D or below.

A potential mitigation measure to improve this LoS would be to split Isthmus services between this location and the existing stop (#7128) located further up Wakefield Street as shown on Figure 8.5 and 8.6.

If the relocation of the bus stop #7146 onto Wakefield Street proves to be infeasible due to a variety of issues with this stop location, an alternative bus stop location exists on Mayoral Drive. As per the Option 1D Wakefield bus stop, this option consolidates the existing stops (#7014, #7146 and #7148) into a new outbound Isthmus stop.

Figure 8.5 provides the location of the alternative outbound bus stop on Mayoral Drive (in blue) for Option 1D and a pedestrian catchment analysis showing that the south of the Learning Quarter is within an 800m walk from the proposed stop location, while some of the northernmost buildings on the University of Auckland's campus are further away.

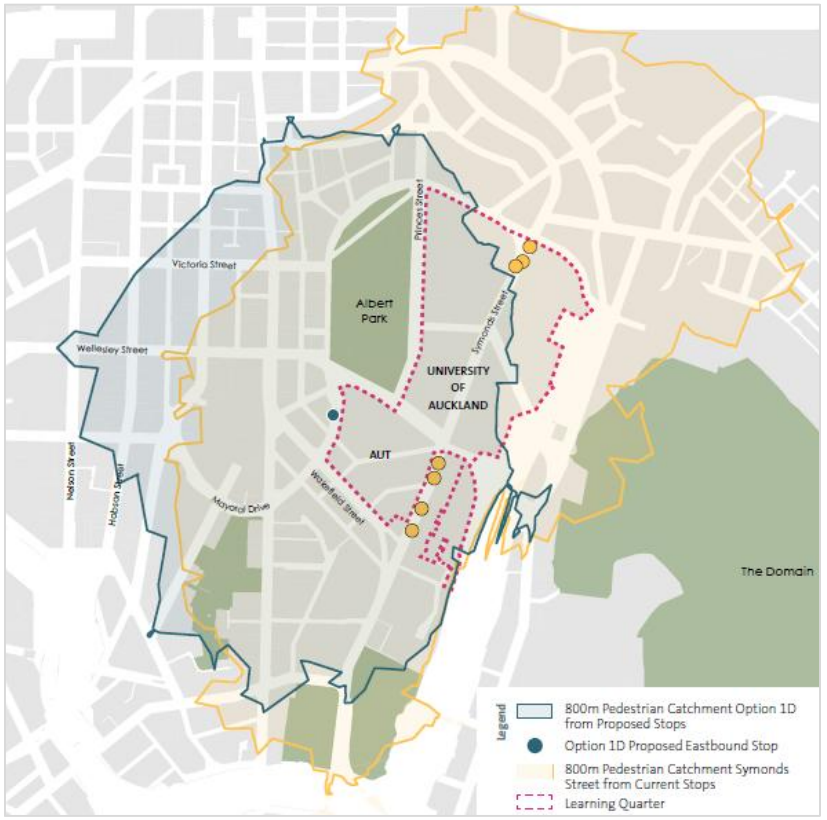
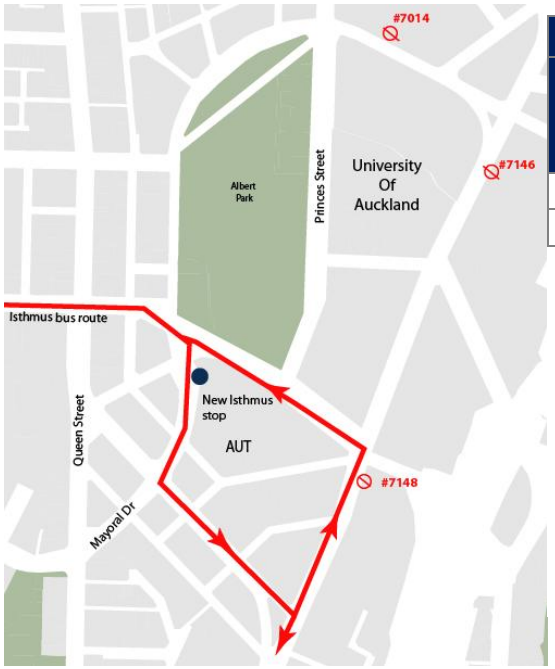


Figure 8-5: Options 1D Mayoral Drive 800m pedestrian catchments

Figure 8.6 includes the LoS for the proposed outbound bus stop location on Mayoral Drive identifying that the existing outbound stop on Mayoral Drive is likely to have adequate space (120m^2) to provide an acceptable PM peak LoS based upon New Network frequencies and would be C/C in 2026.



New Mayoral Drive bus stop			
Test	**Current**	**2016 volumes + New Network**	**2026 New Network**
Do Min	N/A	N/A	
Test 1		**B/C**	**C/C**

(Average passengers/ Maximum passengers)

Figure 8.6: Alternative location of bus stops proposed under Option 1D on Mayoral Drive

Key findings from the analysis of Options 1B and 1D are:

- Stop #7088 (Waterloo Quadrant) can be removed without impacting on the LoS of other stops;
- Stop #7148 (Symonds Street, south of Wellesley Street) is currently at capacity with a LoS of C/C before the New Network has been implemented and would require space of 227m^2 in order to accommodate an increase in outbound Isthmus bus patronage;
- Stop #7088, adjacent to Albert Park (Option 1B) has an acceptable LoS for all the options tested with a LoS of B/B in 2026 if all patrons from existing Symonds Street and Waterloo Quadrant outbound Isthmus stops choose to relocate to this stop;
- The proposed stop on Wakefield Street (Option 1D) would result in a LoS of E/E under 2026 New Network patronage levels; and
- The proposed alternative bus stop on Mayoral Drive (Option 1D) would result in a LoS of C/C under 2026 patronage levels.

From a pedestrian catchment perspective, and as customer catchment of the Learning Quarter is critical for such a key part of the city centre bus network, Option 4D is preferred when compared to Options 1B and 1D as it provides a higher level of accessibility to Isthmus bus services.

8.4 Summary

The LoS analysis has identified that the existing LoS among current Symonds Street bus stops varies from a LoS A/A for stop #7088 to C/C for stop #7148.

9. Waterloo Quadrant capacity considerations

With Option 4D the outbound Isthmus bus services utilise Waterloo Quadrant to access Symonds Street. However, as noted in section 7, Waterloo Quadrant suffers from reliability issues in the evening peak as it is impacted by motorway bound traffic. This may lead to increased operating costs, unreliable journey times for passengers, and uncertain wait times for passengers boarding further along the corridor.

Therefore, options for bus priority along Waterloo Quadrant were investigated through a workshop with Auckland Transport in December 2017, as discussed within Appendix J. The workshop identified that the objective of any Waterloo Quadrant option should be to achieve bus priority between Princes Street and Symonds Street and acknowledged that there may be some disadvantage to other vehicles and that the outbound bus stop along Waterloo Quadrant may need to be removed.

The workshop shortlisted the following interventions to improve bus operations along Waterloo Quadrant for further investigation as part of the DBC:

- Option i: Kerb side bus lane and B phase

  Buses would travel outbound along Waterloo Quadrant via a kerb side bus lane between Princes Street and Parliament Street (Figure 9.1) A signalised intersection (Waterloo Quadrant/ Parliament Street) would be required to allow buses to position for the right turn into Symonds Street on a bus only priority B signal phase. No stopping marking should be provided at the intersection to reduce the likelihood of cars queuing through the intersection and blocking buses from accessing the right turn from the bus lane.

  Providing a bus lane kerb side may affect the driveways along Waterloo Quadrant including access to both the Pullman and Quadrant Hotels. Local access to these driveways will need to be maintained. To enable the bus lane, on-street parking will need to be removed and widening may be required at the intersection with Symonds Street.

- Option ii: Central Bus Lane

  Buses would travel outbound along Waterloo Quadrant via a central running bus lane between Princes Street and Parliament Street (Figure 9.2). As this option correctly positions buses for the right turn into Symonds Street, it negates the need for a signalised intersection at Waterloo Quadrant/ Parliament Street. Due to the central alignment of the bus lane, it would not be feasible to retain the outbound bus stop.

The Symonds Street bus stop #7146 has an acceptable LoS under the New Network and in 2026 to accommodate the passengers from the Waterloo Quadrant bus stop if it was to be removed, as detailed in the Bus Stop Patronage and Level of Service Memo, January 2017 (Appendix I).

With three eastbound traffic lanes along Waterloo Quadrant it may be necessary to ban the right turn from Parliament Street. Both high level options require more detailed investigation including modelling, intersection design, cost and economic appraisal. These options are not included in the IBC's modelling and economic assessment.

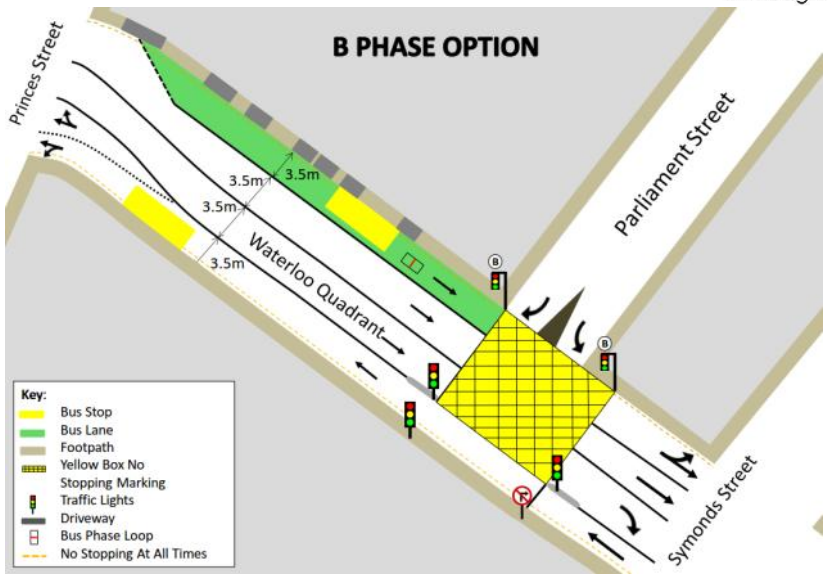


Figure 9.1 : Option i: (kerb side bus lane with B Phase)

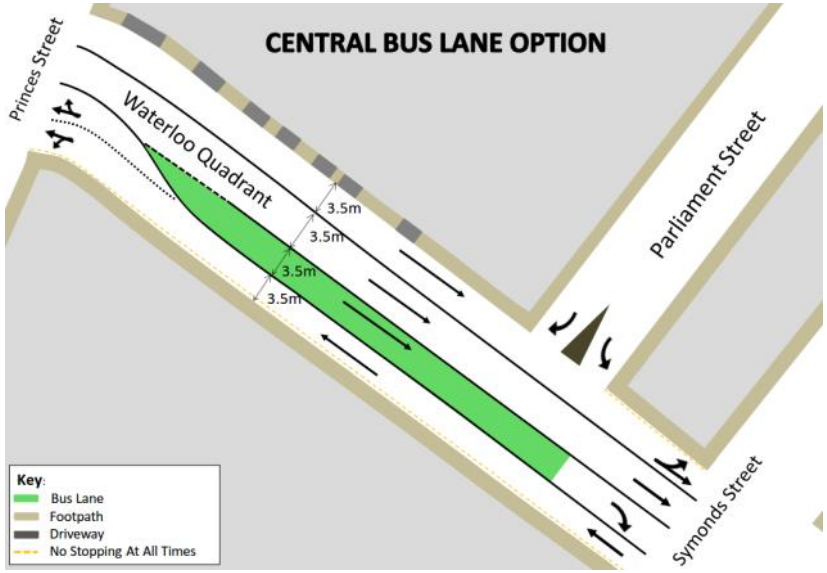


Figure 9.2 : Option ii (central bus lane)

10. Terminal and station considerations

This section provides further details on the terminals and stations required as part of the East-West Midtown PT Link, including the Learning Quarter Gateway Station, Grafton Gully Terminal and the Princes Street terminal.

Table 10.1 provides a summary of which options require a terminal at Princes Street or Grafton Gully and which will include a Learning Quarter Gateway Station.

Table 10-1: Terminal and station locations

Option	Learning Quarter Gateway Station	Grafton Gully Terminal	Princes Street terminal
Do Min	-	-	Yes
Option 1B	Yes	Yes	-
Option 1D	Yes	Yes	-
Option 4D	Yes	Yes	-
Option 4E	-	-	Yes

10.1 Grafton Gully Terminal

The advantage of a Grafton Gully bus terminal location is that it could accommodate layover and vehicle storage during the day. Additional investigations have been undertaken to understand the likely demands and impacts of a Grafton Gully terminal on the adjoining public realm and the Domain. The pedestrian and cycling considerations when connecting from Wellesley Street to the Domain are included within section 11.

10.2 Learning Quarter Gateway Station

The grade-separated infrastructure of the existing Wellesley Street underpass presents a unique opportunity to achieve a Learning Quarter Gateway bus station for North Shore services with proximate stops serving both the University of Auckland and AUT while avoiding the potential for adverse impacts on adjoining campus development.

This can be achieved by providing for in-bound and out-bound stops on Wellesley Street East in the central trenched sections of road to either side of the underpass, with access provided by a set of steps and public lifts from both sides of Symonds Street above, thus enabling easy interchange between Wellesley Street and Symonds Street bus services.

Such a solution, in combination with new and improved shared path walking and cycling connections either through the underpass or along the eastern shoulders beside the University of Auckland, can make a major place-making contribution to the future of the Learning Quarter by transforming the Symonds and Wellesley Street junction into a significant entry point and landmark corner for both universities with the potential to become a truly engaging and celebrated people place as well as a highly convenient and well-located public transport asset. Such an outcome is consistent with the strategic direction of the current Learning Quarter plan, particularly the goal of improving connections and making welcome points of arrival, as well as developing a stimulating environment.

Figure 10.1 provides a typical long section of the Grafton Gully Terminal. Figure 10.2 provides a plan view of the station and the potential location of the bus stops within the underpass, while cross sections are provided in section 12 in relation to how cycle facilities can be provided through the underpass.

Figure 10.3 and Figure 10.4 provide before and after illustrations of the Learning Quarter Gateway Station.

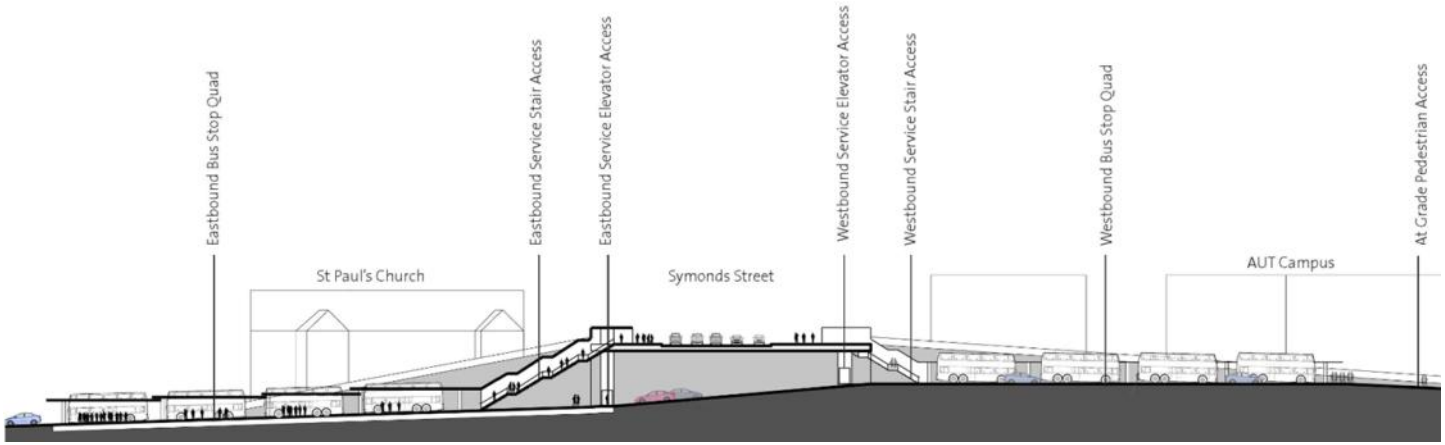


Figure 10-1: Learning Quarter Gateway Station long section

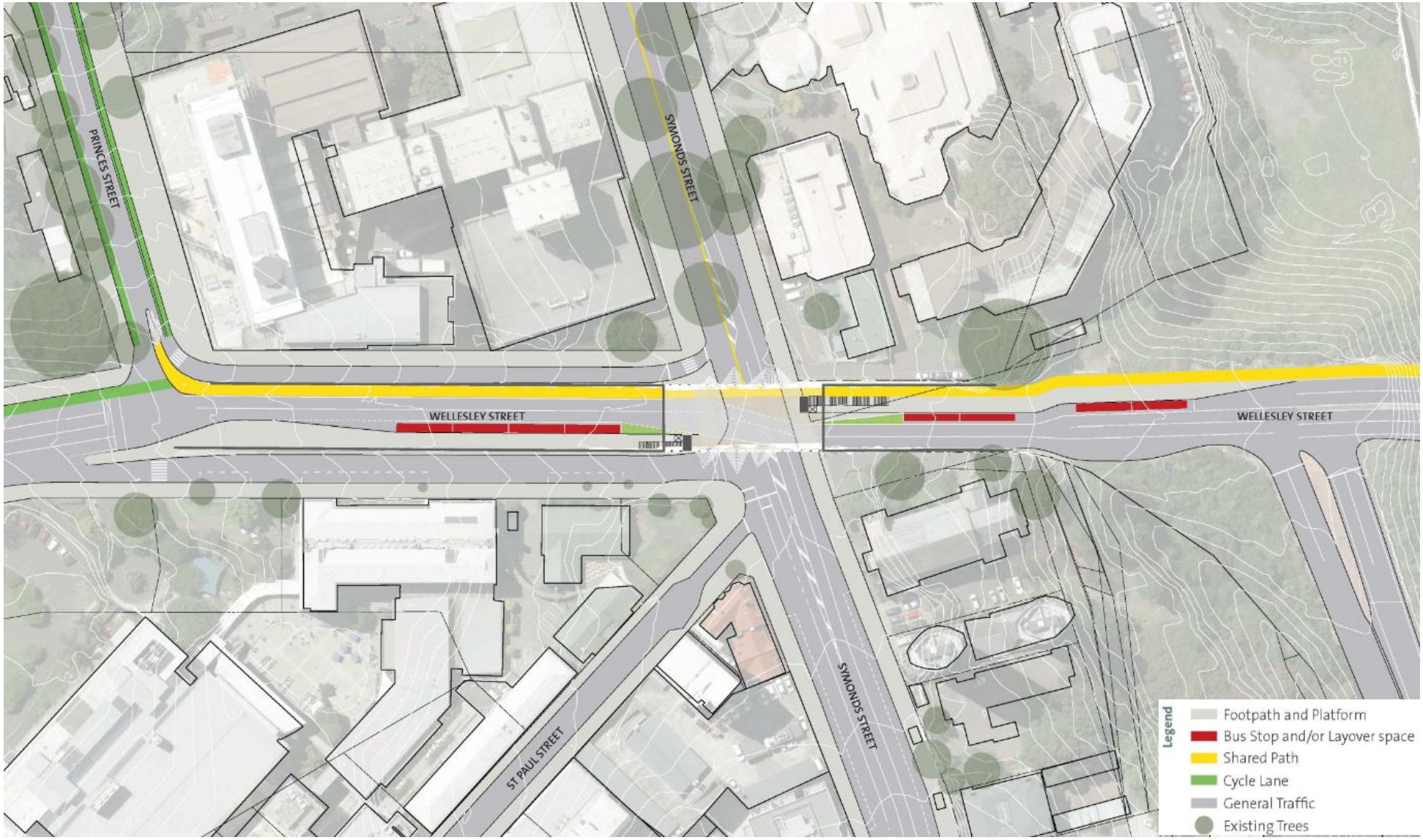


Figure 10-2: Learning Quarter Gateway Station plan view

Figure 10-3: Learning Quarter Gateway Station – existing

Figure 10-4: Learning Quarter Gateway Station – proposed

10.3 Princes Street Terminal

Additional investigations have been undertaken to understand the likely demands and impacts of a Princes Street terminal on the adjoining public realm and adjoining uses on this street that serves as the interface between the University of Auckland and Albert Park.

Figure 10.5 shows the existing Princes Street and Figure 10.6 includes a concept image of how Princes Street could look with bus provision.

The street is wide and currently includes extensive angled parking, a broad flush (painted) median along much of its length between Waterloo Quadrant and Wellesley Street, as well as a traffic lane in each direction.

This presents sufficient space to readily accommodate the required bus stop infrastructure and separated cycle lanes, while retaining an element of on-street parking by switching to parallel parking spaces which occupy less space. While this would reduce the extent of casual on-street parking available in the Learning Quarter, parallel parking will significantly reduce the severance and dominance impacts car-parking currently has on pedestrian movements across the street between the Park and the University.

If a Princes Street terminal option was to be pursued, it would be important to achieve a greater number of pedestrian crossing facilities along the length of the street that align with the major access points within both the Albert Park and the university campus blocks to either side of Alfred Street. This would ensure that safe, convenient and direct pedestrian linkages are provided across the traffic lanes without conflict with manoeuvring and parked buses and cars.

The sets of terminating and departure stops could be accommodated to either side of the Alfred Street intersection, with direct access to the University of Auckland and with a reasonably direct and accessible grade south to AUT across Wellesley Street East.

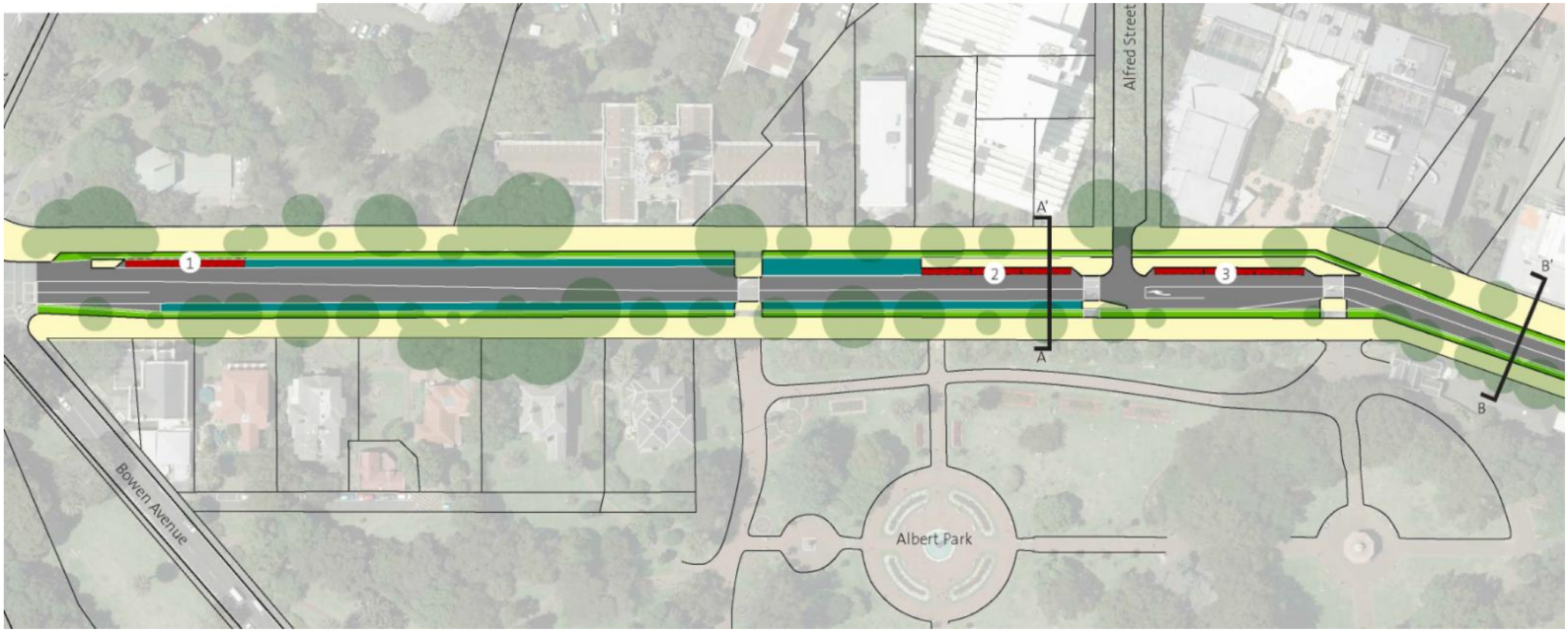
A space for three layover spaces could sensitively be accommodated further north in closer proximity to Waterloo Quadrant, away from the University Clock Tower Building and key pedestrian access points into the university campus that might be sensitive to such bus operations as shown in Figure 10.7. Buses may need to loop the block along Alfred Street, Symonds Street, Waterloo Quadrant and back to Princes Street to access the layover spaces.

The existing cross-section is included in Figure 10.8 and Figure 10.10 Figure 10-10 and potential cross sections are included as Figure 10.9 and Figure 10.11

This option locates the terminal in the city centre, so unlike the other options, there is no need to extend a bus priority lane through the Wellesley Street underpass. The space that would otherwise be used by a bus lane, stairs, and a lift from the upper level can instead be used for a separated shared-use path, as detailed in section 11.

Figure 10-5: Princes Street – existing

Figure 10-6: Princes Street - proposed



Notes:

1. 3 x bus layover spaces
2. 3 x bus terminating stops and adjacent seating
3. 3 x bus departure stops with adjacent bus shelter

Legend

- Footpath and Berm
- Bus Stop and/or Layover space
- Parking
- Cycle lane
- General Traffic lane
- Existing Trees

Figure 10-7: Princes Street terminal plan view

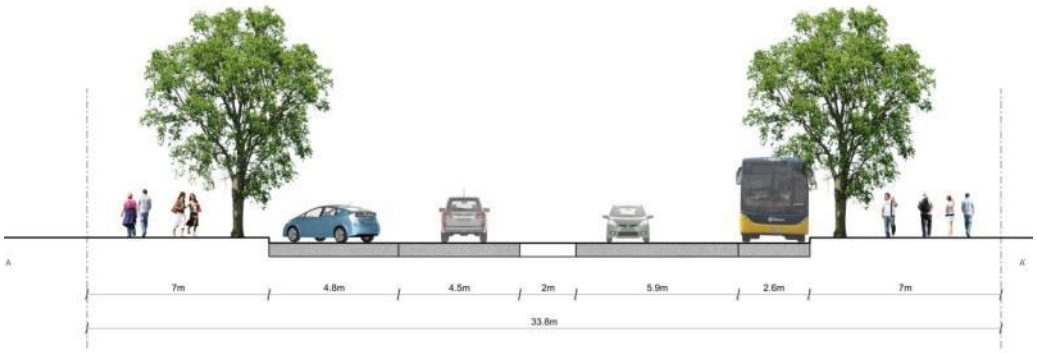


Figure 10-8: Princes Street typical cross section A (existing)

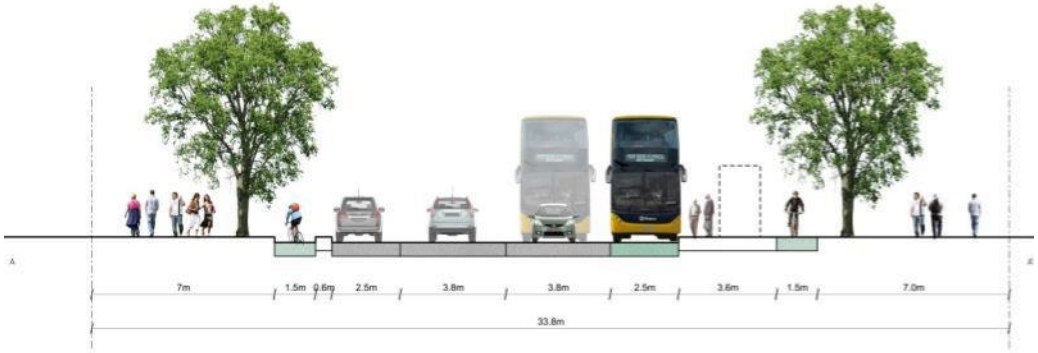


Figure 10-9: Princes Street typical cross section A (Option 4E)

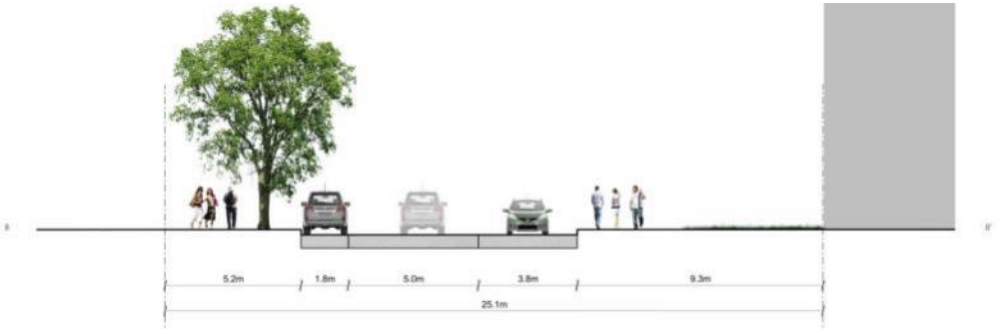


Figure 10-10: Princes Street typical cross section B (existing)

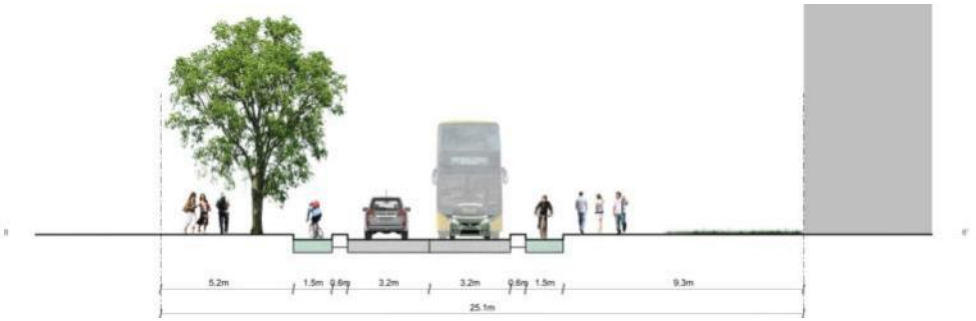


Figure 10-11: Princes Street typical cross section B (Option 4E)

11. Walking and cycling considerations

This section describes the walking and cycling connections along the east-west corridor under the different options and in particular the different alternatives for cycle facilities to be provided at the Wellesley Street underpass and connecting to the Grafton Gully cycleway.

11.1 Victoria Street

Options 1B and 1D avoid conflict with the planned cycleway alignment on Victoria Street West and preserve the opportunity for the future Victoria Street Linear Park by concentrating buses on Wellesley Street in accordance with CEWT.

Under options 4D and 4E Victoria Street West would be reconfigured to consist of an east bound bus lane, a general traffic lane in each direction and a bi-directional cycleway to the south side of the street. This reduction in the number of general traffic lanes does not preclude the Victoria Street Linear Park. The volume of buses would require bus bays at bus stops so this space would need to be provided.

To allow for the construction of the Victoria Street entrance to Aotea Station, the road corridor between Federal and Queen Streets could be reconfigured to a single general traffic lane in each direction, along with a bi-directional cycle way to the south side of the Street.

Figure 11 illustrates the cross section of Victoria Street between Albert and Elliott Street for options 1B and 1D.

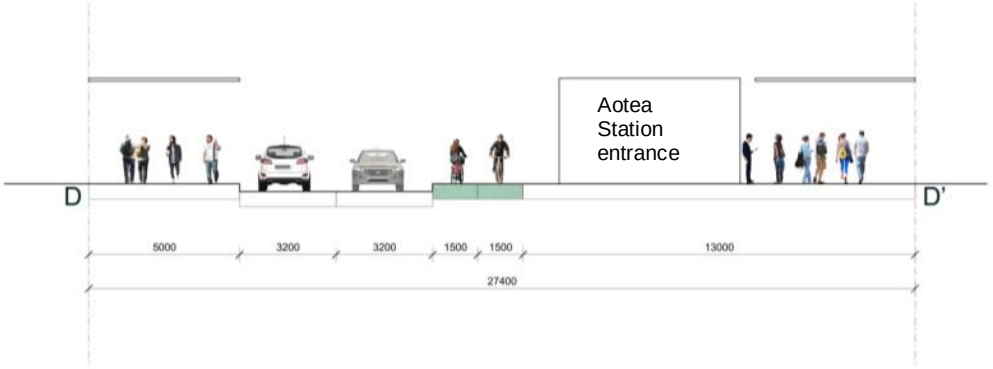


Figure 11-1: Victoria Street typical cross section: Albert to Elliott (option 1B/D)

11.2 Queen Street, Lorne Street and/or Kitchener Street

As noted in section 5.4.3 under all options there is potential for Lorne and Kitchener Streets to operate as a one-way pair for cycling. Given the space constraints on both streets, this would likely require comprehensive streetscape changes for a share with care / shared space environment.

Given the various qualities and access implications of the three north-south routes, whilst no route should be considered unfeasible at this stage there is a clear preference towards Queen Street, with Lorne Street having potential (subject to future streetscape design changes) to offer a secondary, feeder role to areas to the north and south via the Laneway Circuit.

11.3 Princes Street

As per section 10.3, which shows the opportunity for cycle lanes to be provided along Princes Street.

11.4 Wellesley Street

Figure 11.2 provides a typical cross-section for Wellesley Street between Queen Street and Lorne Street. This is typical of the central blocks of Wellesley Street which would be bus only with widened footpaths, which helps to ensure a quality public realm can be achieved.

Figure 11.3 provides a typical cross-section for Wellesley Street between Albert Park and AUT where traffic and bus lanes are provided in each direction, along with a cycleway and wide footpaths.

These cross sections demonstrate that there is sufficient space for a separated bidirectional cycleway to co-exist alongside the bus infrastructure along Wellesley Street East while also retaining sufficient widths for a footpath along the northern side of the street and one lane of general traffic in each direction.

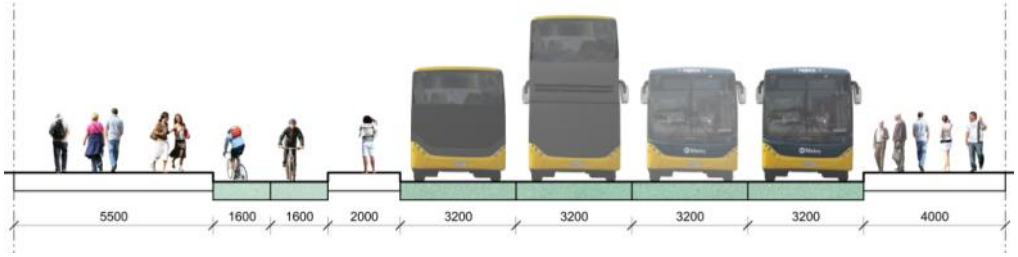


Figure 11-2: Wellesley Street typical cross section: Queen to Lorne

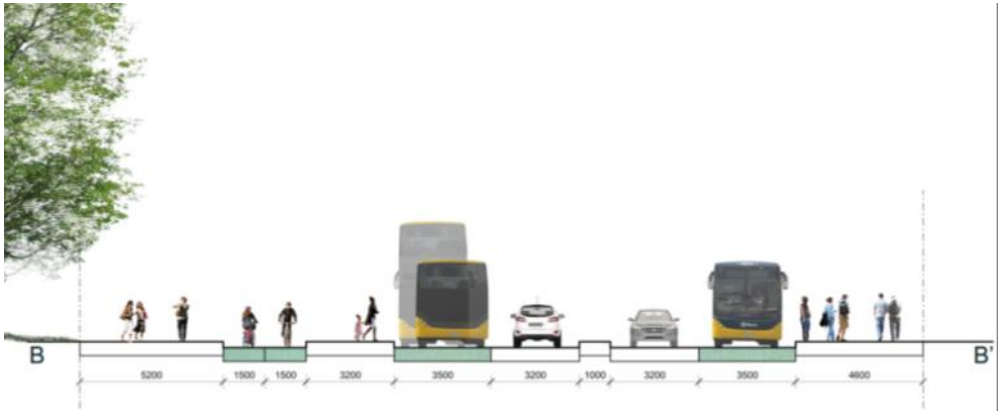


Figure 11-3: Wellesley Street typical cross section: Albert Park to AUT

11.5 Wellesley Street: cycle connections to Grafton Gully Cycleway

There are currently no walking and cycling linkages provided within the existing design of the Wellesley Street underpass, and bridged continuation of Wellesley Street East across the Grafton Gully motorway to Grafton Road. This route could potentially be an important direct connection between the midtown heart of the city and key destinations in the eastern fringe across the motorway, in particular the Auckland Domain, Auckland Museum and Auckland Hospital. Achieving such a connection has been identified in many strategic documents including the City Centre Masterplan and the Auckland Cycling Network Plan.

Integrating clear and readily navigable connections for people on foot and bike through this area is an important outcome that must be achieved alongside any future investment to accommodate the new network for buses through this eastern access corridor. While the cycleway connection has been identified as a project to be delivered as part of the roll-out of the Auckland Cycling Network, it is important to acknowledge that there is currently an absence of a legal pedestrian / cycle connection across the motorway on Wellesley Street and that is a major failing of what should be a useful and well-utilised city centre gateway for people moving about on foot and cycle.

Therefore, it is important that both pedestrians and cyclists are provided for either through or alongside the Wellesley Street underpass and bridging across the motorway to Grafton Road on the other side. The benefit of using the underpass is that it reduces the grade for cyclists.

The alternatives to achieve a connection are affected by whether an option runs buses under or beside the underpass, or avoids it altogether.

Option 4E, which does not use the Wellesley Street underpass for buses presents the best opportunity for walking and cycling connections to continue on the northern side of Wellesley Street through the underpass and linking into either a new standalone bridge structure alongside the existing structure, or through space allocation for walking and cycling on the northern alignment of the existing bridge by removing a traffic lane.

Options 1B, 1D and 4D which use this space for a Learning Quarter Gateway Station, place further space demands on the underpass through the need to accommodate bus stops, platforms and waiting areas and access lifts and stairs. While these options reduce the available width, preliminary investigations suggest that it is possible to achieve a connection for walking and cycling along the northern side of the underpass, in combination with the in-bound bus stops on the eastern side of the underpass. Such a solution can similarly tie in with either a standalone walking and cycling bridge or new space provision on the existing Wellesley Street bridge across the motorway.

Additionally, or alternatively, should such a connection not prove feasible or desirable once more detailed investigation has been undertaken, there is an option for a cycling connection to be made up and over Symonds Street via the existing footpath on the northern shoulder of the underpass beside the University of Auckland Science building. This would necessitate the conversion of the existing 4.6m footpath to a shared path.

A further alternative to avoid clashes with the motorway ramps may be possible by crossing the cycleway via Princes Street, where removing parking may present sufficient space for a dedicated cycleway, and Alfred Street. This has the disadvantages however of an inconsistent alignment and extra crossings at Princes Street and back again at Symonds Street.

These options are depicted on the indicative plan, long section and cross-sections that have been prepared as a result of these preliminary investigations, and in Figure 11.4 to Figure 11.7.

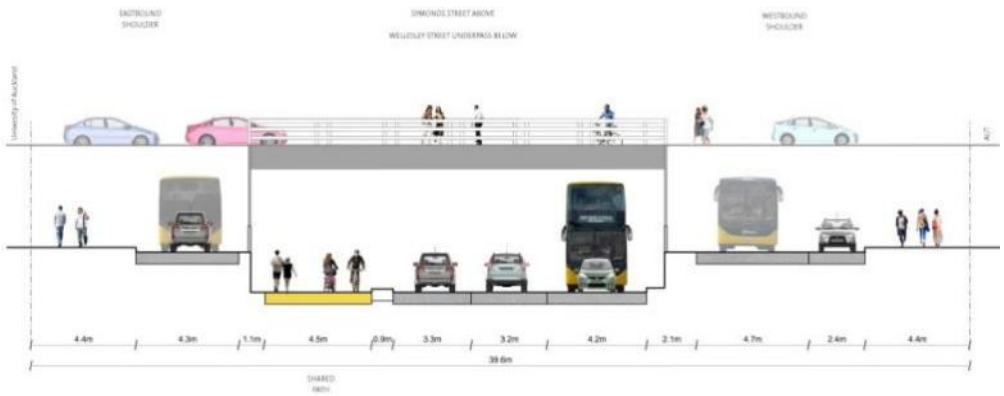


Figure 11-4: Wellesley Street underpass - cycle provision (Option 4E)

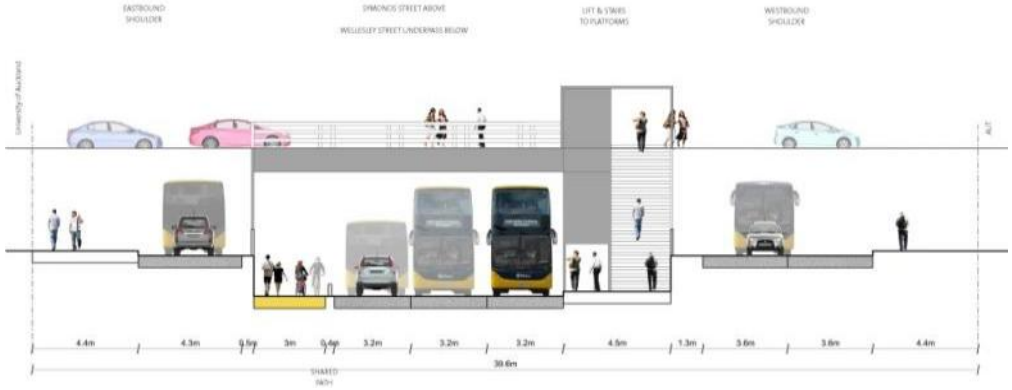


Figure 11-6: Wellesley Street underpass - cycle provision (Options 1B, 1D and 4D)[31]

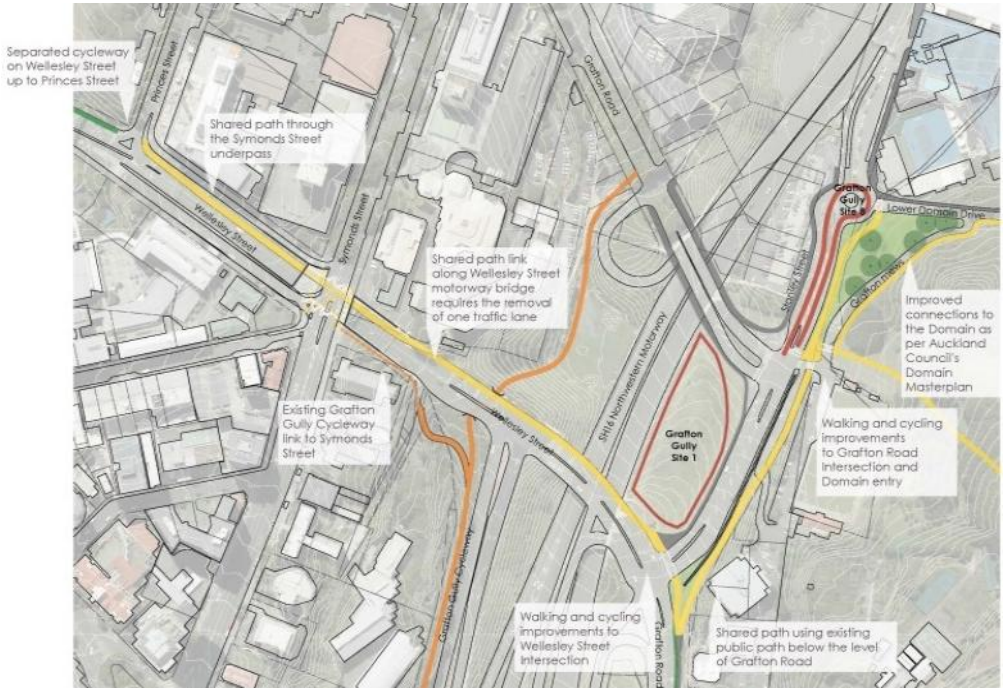


Figure 11-5: Cycle connection through underpass to Grafton Gully

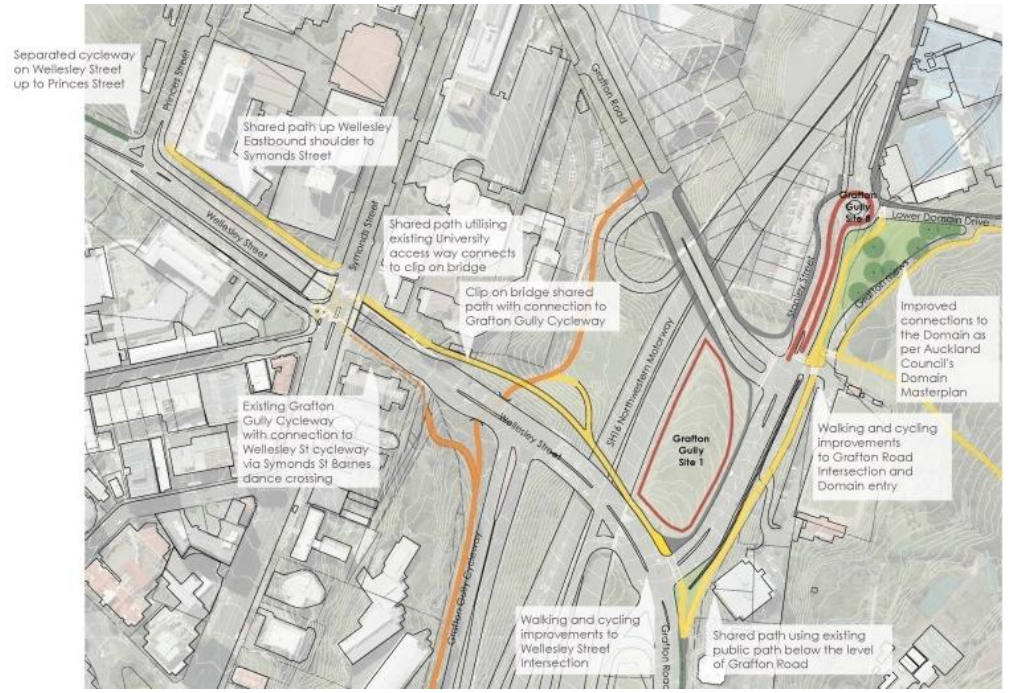


Figure 11-7: Alternative cycle connection using slip lane to Grafton Gully

[31] This cross-section includes minimal widths to include a shared path through the underpass.

12. Modelling

To assess the traffic performance of the shortlisted options, each option was modelled using the micro-simulation traffic modelling software S-Paramics for the AM and PM peak. The modelling showed that of the shortlisted options, Option 1B and Option 1D resulted in the least travel time and delay for buses and have the least impact on general traffic.

For a comprehensive explanation of the modelling assumptions and results, refer to Appendix K.

12.1 Paramics model methodology

The Joint Modelling Application Centre (JMAC) at Auckland Transport undertook the Paramics modelling. The model was run applying the 2023 6:00 - 9:00 AM peak and 3:00 – 7:00 PM peak traffic demand forecast and flow profiles. Results are provided for the AM peak hour 8:00 - 09:00 and PM peak hour 4:00 – 5:00 PM.

Due to the future forecasted traffic congestion JMAC provided models with traffic flows reduced to 90% of the AM or PM demand forecast. The 90% forecast model runs still provide a comparable output that allows assessment of the options. However the 10% reduction means that the full extent of the possible impact on the traffic network for each option is not captured.

LRT construction was assumed to occur within the next decade and therefore LRT was included in the modelling. The AM model assumed a 2.5 minute Light Rail Vehicle (LRV) frequency in each direction on Queen Street and the PM model assumes a 5 minute LRV frequency in each direction on Queen Street.

The PM model was provided at a later date than the AM model and the LRT project assumptions had evolved over that timeframe. Hence the discrepancies between the two models. In both models signal priority is given to LRV over all other vehicles. Running LRVs at 5 minute frequencies, instead of the assumed 2.5 minute frequencies in the AM peak, would likely result in reduced delay for buses as the movement of LRVs is prioritised over bus movements.

12.2 Corridor travel time

The travel times for the Wellesley Street and Victoria Street corridors for each option between Halsey Street and Princes Street are provided in Table 12.1 and Table 12.2. The sections of the corridors that the travel times are reported for are similar in distance, allowing for a comparable travel time comparison. The extent of these sections is shown in Figure 12.1

As a result of the modelling it can be concluded that for the AM peak period, travel times are shorter for buses routing along the Wellesley Street corridor (Option 1B and Option 1D) than along Victoria Street (Option 4D and Option 4E). Similarly, for the PM peak period travel times are shorter along the Wellesley Street corridor (options 1B and 1D).

As shown in Table 12-1 vehicles travelling eastbound on Victoria Street in Option 1B experience the least delay, with the lowest travel time of around 6.3 minutes during the AM peak and 5.1 minutes in the PM peak. The longest eastbound travel time for vehicles was 8.5 minutes in Option 4E in the AM peak and 6.1 minutes for Option 4D in the PM peak. In the westbound direction, Option 4D had the lowest travel time with 8.9 minutes during the AM peak, and 8.2 minutes for Option 1B during the PM peak. Option 4E had the longest travel time with 11 minutes in the AM peak and 12.9 minutes in the PM peak.

Routing buses along Victoria Street impacts on the travel time for general vehicles using the Victoria Street corridor resulting in eastbound vehicles in Option 4D and Option 4E having higher average travel times than Option 1B and Option 1D.

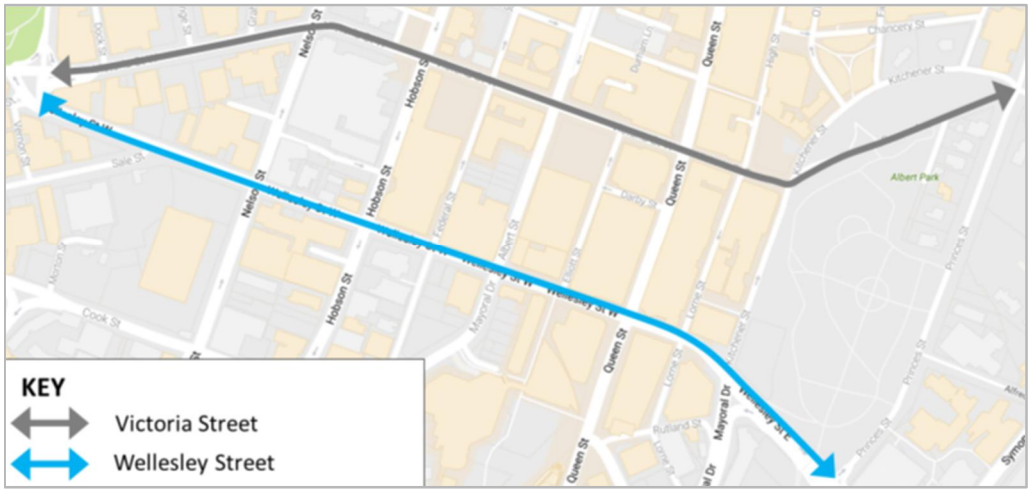


Figure 12-1: Extent of corridor travel times

Table 12-1: Travel time for general vehicles (minutes)

	Corridor	Direction	Do min	Option 1B	Option 1D	Option 4D	Option 4E
AM	Victoria Street	Eastbound	7.1	6.3	6.5	7.6	8.5
		Westbound	11.8	10.2	10.7	8.9	11.0
	Wellesley Street	Eastbound	5.5	N/A[32]	N/A	N/A	N/A
		Westbound	N/A	N/A	N/A	N/A	N/A
PM	Victoria Street	Eastbound	5.2	5.1	5.3	6.1	5.7
		Westbound	10.6	8.2	9.5	9.1	12.9
	Wellesley Street	Eastbound	3.9	N/A	N/A	N/A	N/A
		Westbound	N/A	N/A	N/A	N/A	N/A

Table 12-2 compares the bus travel times for the Victoria Street and Wellesley Street corridors for each option. Eastbound buses on Victoria Street take around 3.5 to 4 minutes longer to

[32] N/A identifies corridors which do not have any general vehicle movements proposed in particular options

travel from the Victoria Street / Wellesley Street intersection to a comparable point at either end of Princes Street during the AM period.

It should also be noted that buses using Victoria Street would incur additional travel time between the intersection of Princes Street and Wakefield Street that is not captured in this analysis.

The longest eastbound travel time for buses was 11.3 minutes in Option 4E. In the eastbound direction on Wellesley Street, Option 4E had the longest travel time with 7.3 minutes during the AM peak period and 6.6 minutes during the PM peak period. Options 1B, 1D and 4D had comparable travel times of around 6.8 minutes during the AM peak period, while during the PM peak period Option 1B had a travel time of 6.1 minutes and Option 1D and 4D had a travel time of 5.2 minutes.

There was negligible difference in westbound Wellesley Street bus travel times, with buses in all options average a travel time of around 6.5 minutes in the AM peak and 5.1 minutes in the PM peak.

Table 12-2: Travel time for buses (minutes)

	Corridor	Direction	Do min	Option 1B	Option 1D	Option 4D	Option 4E
AM	Victoria Street	Eastbound	9.5	N/A	N/A	10.2	11.3
		Westbound	N/A[33]	N/A	N/A	N/A	N/A
	Wellesley Street	Eastbound	7.6	6.8	6.7	6.8	7.3
		Westbound	6.5	6.5	6.4	6.5	6.4
PM	Victoria Street	Eastbound	8.2	N/A	N/A	9.3	8.2
		Westbound	N/A	N/A	N/A	N/A	N/A
	Wellesley Street	Eastbound	6.1	6.1	5.2	5.2	6.6
		Westbound	5.1	5.1	5.1	5.1	5.1

12.3 Intersection LoS and delay

The traffic volumes and delays from the model were used to assess the LoS (Level of Service) of the intersections shown in Figure 12.2.

Generally, all the options have a similar impact on the overall intersection delays and LoS.

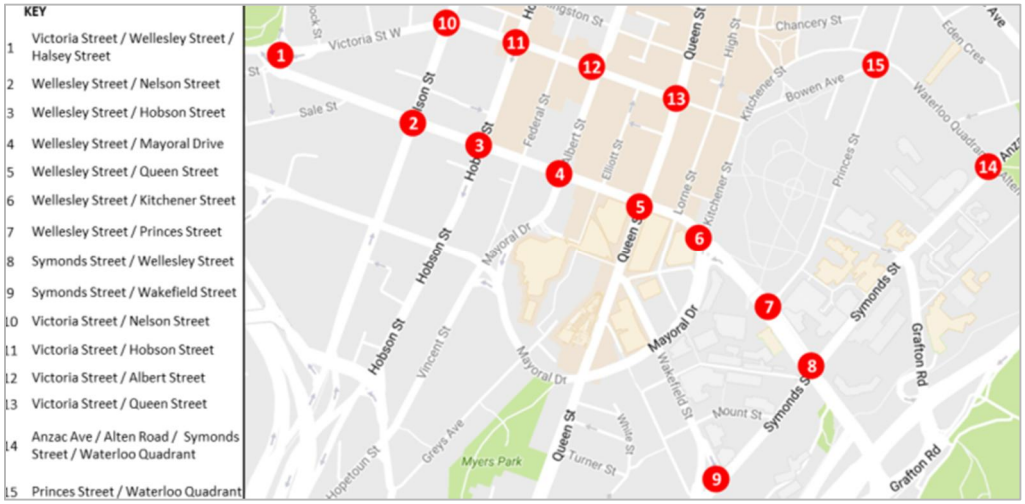


Figure 12-2: Locations of the intersections assessed

In Option 1D, at the Wellesley Street / Kitchener Street intersection (labelled 6 in Figure 12.2), eastbound Isthmus buses turn right from Wellesley Street onto Mayoral Drive. This turn does not occur in any other option. The results of the modelling showed that buses turning right here experienced a delay of around 67 seconds (LoS E) and 62 seconds (LoS E) for AM and PM peak periods respectively. The model shows that having buses turn right at this intersection has negligible impact on the operation of the intersection.

The delay for right turning Isthmus buses onto Symonds Street was compared for each of the options. In Option 1B Isthmus buses turning right from Wellesley Street onto Symonds street experienced around 78 seconds delay during the AM peak period, and 68 seconds during the PM peak period. Option 1D has Isthmus buses turning right onto Symonds Street from Wakefield Street, which results in an average delay to buses of around 67 seconds for the AM peak and 62 seconds during the PM peak. Buses turning right onto Symonds Street from Wakefield Street (Option 1D) experience less delay than buses turning right from Wellesley Street (Option 1B).

However, it is important to note that while Option 1D has an additional right turn than Option 1B to access Symonds Street (including the Wellesley Street to Mayoral Drive turn and the Wakefield Street to Symonds Street turn) the overall Isthmus buses travel time is comparable to Option 1B.

Option 4D has the lowest delay for buses turning onto Symonds Street, with buses delayed by 45 seconds and 57 seconds for AM and PM peak periods respectively, turning right from Waterloo Quadrant. However, the journey time for Isthmus buses routing along Victoria Street is much higher overall. The lower delays at this specific turn onto Symonds Street are negated by the additional time it takes along the entire route.

[33] N/A identifies corridors which do not have any bus movements proposed in particular options

13. Economic Case

An economic analysis was completed to assess the likely costs and benefits of the proposed public transport improvements for the shortlisted options. A concept design estimate was prepared for the shortlisted options, as included in Table 13.1. Appendix L includes the full economic appraisal. The cycleway element of the shortlisted options was not included within the cost estimates as the cycleway will be funded separately.

Section to be updated to include cycleway costs and benefits for along Victoria Street between Queen Street and Grafton Gully

Table 13-1: Capital expenditure cost estimates

Short listed option	Capital expenditure cost estimate
Do Minimum	TBC
Option 1B	TBC
Option 1D	TBC
Option 4D	TBC
Option 4E	TBC

The operating costs have been developed with calculations based on a range of assumptions regarding route lengths, times and frequencies, below sets out the assumptions.

Table 13-2: Operating cost assumptions

Assumptions	Value
Weekdays per year	250
Saturdays	52
Sundays / Holidays	63
Cost / vehicle hour	$30
Cost / vehicle km	$2
Cost / peak vehicle	$60,000

A range of bus operating costs per km have been provided by Auckland Transport ranging from $2.42 to $5.54 which are likely to be an aggregation of the above costs.

Using these assumptions, the estimated annual operating costs are set out in Table 13.3

Table 13-3: Operating costs

	2026				2036			
	ANNUAL TOTALS				ANNUAL TOTALS			
	HOURS	KM	PEAK VEH	COST	HOURS	KM	PEAK VEH	COST
Do Min	448,555	12,984,618	170	49,625,876	508,186	14,673,364	194	56,232,303
Option 1B	448,935	12,944,889	172	49,677,835	508,098	14,617,446	194	56,117,842
Option 1D	448,236	12,927,281	171	49,561,653	507,260	14,596,226	192	55,930,247
Option 4D	453,763	13,091,092	173	50,175,071	513,913	14,793,640	195	56,704,665
Option 4E	444,106	12,871,155	169	49,205,487	502,832	14,537,051	193	55,739,060

The economic assessment is completed over a 40-year appraisal period with a 6% discount rate in line with EEM guidance. Year 1 is assumed to be 2016, and all costs and benefits are discounted to a 2016 net present value (NPV). Values of time and costs are also in $2016.

The appraisal compared the options to the Do Minimum scenario and captured the two main impacts, including change in travel times for public transport users; and a change in travel times for private vehicle users.

The economic assessment focused on modelled travel time benefits. There is assumed to be no change in price or frequency of service between the Do Minimum and the options, and no assumption was made about a change in mode share. Travel time savings for private vehicles are monetised using the Urban Arterial AM Peak value of time from the EEM, which in $2016 is $21.79 per hour. For public transport passengers, a value of time of $14.18 was used[34].

The economic benefit for travel time savings for public transport was calculated using three dimensions; time saving per bus, route patronage (to apply benefits to each passenger) and the value of time.

All options result in improved aggregated travel time for public transport users. The largest improvements in travel time over the Do Minimum result from moving bus routes from Victoria Street to Wellesley Street. The largest increases in delay occur for buses that run on Victoria Street. Some disbenefits apply to private vehicle users in the study area where the reduction in lane capacity impacts the routing and levels of delay for some vehicles.

This evaluation indicates that the travel time savings for public transport passengers are sufficient to balance the incremental costs and private vehicle disbenefits of the Wellesley Street options, options 1B and 1D. Given the assumptions used, options 4D and 4E do not save sufficient time for public transport passengers to balance their costs and negative impacts on vehicle traffic.

[34] As agreed via email between Darren Fidler, Andrew Couch, John Bolland, Daniel Newcombe, and Biserka Stetic.

The use of Victoria Street as an east-west bus corridor, is a major source of travel time disbenefit for public transport passengers. Option 4E is the lowest-cost option, but it results in travel time disbenefits for both private vehicle and public transport users. These results have been produced based on running the model with only 90% of expected 2023 traffic demand. Due to the reduction in traffic capacity available in the future, the full demand caused the model to become unstable and provide unreliable information. It is unknown how the results would change with the full demand.

Table 13.4 shows the incremental costs and benefits above the Do Minimum and the BCR for each project. BCRs have not been reported in cases where they are negative, because negative benefits are effectively costs, and those ratios are not appropriate for comparison.

Table 13-4: Economic appraisal . Costs and benefits are the difference from the Do Minimum.

Option	NPV Cost	NPV Benefit	Benefit Cost Ratio
Option 1B	TBC	TBC	TBC
Option 1D	TBC	TBC	TBC
Option 4D	TBC	TBC	TBC
Option 4E	TBC	TBC	TBC

Option 4D and Option 4E have a TBC BCR because ….

In Option 4D, the North Shore routes still gain large time savings over the Do Minimum from running on Wellesley Street instead of Victoria. However, the southbound Isthmus routes that travel on Victoria Street in this option have large delays (3 to 5 minutes) which negate the benefits of this option, especially during the PM peak when these routes have high patronage.

For Option 4E, the most significant vehicle delays in the AM Peak occur on Victoria Street, particularly between Albert Street and Hobson Street. The public transport benefits are much less than the other options because the North Shore routes, which have very high patronage, use Victoria Street and therefore do not benefit from the time savings of using Wellesley Street and increased queuing on Victoria Street.

To identify the optimal economic solution, an incremental analysis was carried out with each of the options, as included in Table 13-5. The options were ranked in order of cost, and the BCR was calculated for the difference in costs and benefits for each option from the next lowest cost option. The EEM recommends a target incremental BCR of 1.0 to determine whether a higher cost option should be preferred. Incremental costs and benefits are the difference between that option and the next less expensive option.

Table 13-5: Incremental analysis

Total					Incremental			
Option	Cost ($000)	Benefit ($000)	Net Benefit ($000)	BCR	Cost ($000)	Benefit ($000)	Net Benefit ($000)	BCR
4E	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC
1D	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC
1B	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC
4D	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC

From the incremental analysis ….

14. Financial Case

This section reports on estimates of Auckland Transport's share of cost for the project, and the available funding within Auckland Transport to meet these costs. The Financial Case has been undertaken for the short list options.

Section to be updated to include cycleway costs and benefits for along Victoria Street between Queen Street and Grafton Gully

14.1 Projected Costs and Timings

The projected costs and timings are included in Table 14.1 to 14.4.

Table 14-1: Option 1B – Wellesley Street with Grafton Gully Terminal

Table 14-2: Option 1D – Wellesley, Mayoral, and Wakefield Streets with Grafton Gully Terminal

Table 14-3: Option 4D - Wellesley and Victoria Streets with Grafton Gully Terminal

Table 14-4: Option 4E - Wellesley Street, Victoria Street with Princes Street Terminal

14.2 Estimated Maintenance and Operations Costs

Maintenance and operations costs have been estimated at 4% per annum of the capital values of the construction costs for each option. These estimates, as included in Table 14.5, are in line with Auckland Transport's asset management guidelines, benchmarked at 4% for public transport assets.

Table 14-5: Estimated Maintenance Costs

14.3 Auckland Transport Funding Budget

Consequential maintenance and operations costs will be funded from existing operating budgets. Auckland Transport has allocated funding in the 2015 Long Term Plan (LTP) as follows in Table 14.6

Table 14-6: Proposed funding 10 year plan

14.4 Funding Variance

The proposed East-West Midtown PT Link project has 4 shortlisted options which range from a cost of $TBC million for Option 4E to $TBC million for Option 4D.

The Auckland Transport funding budget is $29 million over a 9 year period from 2017 to 2025, which results in a $6 million to $23 million funding deficit, depending on which option is chosen. Table 14.7 includes the funding variance.

Table 14-7: Funding variance

This funding shortfall worsens as it accumulates each year. The bulk of Auckland Transport's funding is currently allocated to 2022 for construction which is not aligned with the expected project spend.

It is assumed this project will be eligible for 51% funding from NZTA as part of the NLTF.

There are several options for dealing with this funding shortfall:

- Re-phase project spend;
- Re-organise current planned capex programme to free-up funding; and
- Work with funders to identify alternative funding mechanisms.

15. Commercial Case

The commercial case outlines the preliminary programming, consenting and procurement considerations. The preferred procurement delivery model will be determined at the DBC stage.

15.1 Investment assessment framework

This section completes the Transport Agency's investment assessment framework taking into account the short listed options; including the assessment profile, included in Table 15.1, and the sixteen question framework. The sixteen questions are designed to enable decision-makers to quickly assess the strength of a completed business case, and therefore whether or not the proposed investment is worth proceeding with and are included in Table 15.2.

Assessment Profile

Options 1B, 1D, 4D and 4E have been assessed using the Transport Agency Investment Assessment Framework profile. The economic evaluation and efficiency assessment uses the methodology defined in the Transport Agency's Economic Evaluation Manual 2012.

The assessment profile results in **TBC** for options 1B and 1D and **TBC** for options 4D and 4E as described below.

- Strategic Fit – High

The benefits of addressing the problems align well with the GPS 2015[35], in particular they align with the following GPS objectives:

  - A land transport system that addresses current and future demand for access to economic and social opportunities; and
  - A land transport system that provides for appropriate transport choices.

The problems and benefits have a high strategic fit with Auckland Transport's strategic plans including the Auckland Plan, the Regional Public Transport Plan, the New Network, the City Centre Public Transport Plan and the City East West Transport Study.

- Effectiveness - Medium[36]

Table 15.1 summarises the effectiveness rating for the East-West Midtown PT link short list options.

Table 15-1: Effectiveness Rating

Component	Rationale	Rating[37]
Outcomes focused	· The East-West PT Midtown Link will provide a tangible and noticeable improvement in the problems as identified in the strategic fit and actualise a range of safety, economic, social and accessibility benefits.	H
Integrated	· The East-West PT Midtown Link is consistent with current and future; transport plans; activities and land uses · The East-West PT Midtown Link provide for excellent integration with the City Rail Link and Rapid Transit.	H
Correctly scoped	· The shortlisted options have been developed following a comprehensive appraisal of all options and are appropriate in scale and cost.	H
Affordable	· The shortlisted options are affordable – however additional funding arrangements may need to be confirmed. · The East-West PT Midtown Link will bring considerable benefits to customers in terms of journey time reliability.	M
Timely	· The shortlisted options will deliver benefits over a long timeframe and the benefits will be realised rapidly upon implementation.	H
Confidence	· The East-West PT Midtown Link risks can be managed and/ or mitigated. Risks are identified in section 16.5.	H
Overall		**M**

- Economic Efficiency – TBC for options 1B and 1D and TBC for options 4D and 4E

The economic efficiency rating is based on the public transport programme benefit cost appraisal[38] rating of High +5; Medium +3; Low +1 and Inefficient <1. As described in the Economic Case (section 12) the options BCR's range from TBC to TBC.

Applying the efficiency rating to options 1B with a BCR TBC and 1D with a BCR of TBC results in a TBC efficiency. Applying the efficiency rating to options 4D and 4E with a TBC BCR's results in an TBC efficiency.

[35] Government Policy Statement on Land Transport 2015/16 – 2024/25
[36] https://www.pikb.co.nz/assessment-framework/effectiveness-2/

[37] A rating of:
- Low effectiveness indicates more work is required to justify the activity.
- Medium effectiveness means that an activity has not achieved the full potential identified in the strategic fit assessment.

[38] https://www.pikb.co.nz/assessment-framework/benefit-and-cost-appraisal/public-transport-programme-benefit-cost-appraisal/

Table 15-2: Sixteen question framework

Strategic case[39]	Programme business case[40]	Indicative business case (this document)	
Problem	**Benefits**	**Strategic response**	**Solution**
Is it clear what the problem is that needs to be addressed (both the cause and the effect)?	Have the benefits that will result from fixing the problem been adequately defined?	Have a sufficient range of strategic alternatives and options been explored (demand, productivity & supply)?	Consistent with the strategic alternatives and options, have a reasonable range of project options been analysed?
Yes Table 3.1 Problem Definition defines the study problems and potential implications if not addressed.	Yes The benefits are defined in Figure 3.1 ILM and Table 3.1 Problem Definition shows the benefits of addressing each problem.	Yes An extensive list of options were considered as detailed in section 5. Options were identified considering location, direction, grade and modes.	Yes (at an IBC level) Short list options consider a range of alternatives for further investigation.
Is there evidence to confirm the cause and effect of the problem?	Are the benefits of high value to the organisation(s) (furthering its/their objectives)?	Is it clear what strategic alternatives and options are proposed and the rationale for their selection?	Is the proposed solution specified clearly and fully (all business changes and any assets)?
Yes Section 3 provides evidence for cause and effect of each problem.	Yes Table 3.1 Problem Definition shows how addressing each problem will address project objectives.	Yes Section 6 provides a summary of the evaluation of the long list options against the project objectives and why options are taken forward to the short list. Further detail is in Appendix H.	Yes (at an IBC level) Short list option infrastructure requirements are identified in section 7.
Does the problem need to be addressed at this time?	Will the KPIs that have been specified provide reasonable evidence that the benefits have been delivered?	Are the proposed alternatives and options the most effective response to the problem (comprehensive and balanced)?	Is the proposed solution the best way to respond to the problem and deliver the expected benefits?
Yes To support the implementation of the New Network and CCPTP.	Yes Measurable measures are identified in Appendix A.	Yes The options were assessed against wide ranging project objectives, costs, benefits and modelling.	Yes To support the implementation of the New Network and CCPTP.
Is the problem specific to this investment (or should a broader perspective be taken)?	Are the KPIs both measurable and totally attributable to this investment?	Are the proposed alternatives and options feasible?	Can the solution really be delivered (costs, risks, timeframes, governance, etc)?
Yes Table 3.1 Problem Definition defines the study problems specific to this investment and potential implications if not addressed.	Yes Measurable measures tailored to this investment are identified in Appendix C.	Yes The options are feasible to IBC level of investigation.	Yes Consenting requirements, staging and project risks are discussed in sections 14.2 and 14.4.

[39] City Centre Public Transport Programme Strategic Case, Auckland Transport, July 2013
[40] City Centre Public Transport Programme Draft PBC, Auckland Transport, November 2014

15.2 Programming / staging considerations

The East – West Midtown PT Link project will be delivered by Auckland Transport with coordination with partners such as the Transport Agency and Auckland Council.

The project is needed as soon as possible to enable and support the implementation of the New Network. It is expected that physical works of the project will commence in 2019.

In order to support the New Network in the short term an interim solution will be required and could include a Princes Street terminal.

The East-West Midtown PT Link study assumes that light rail will be constructed on Dominion Road, Ian McKinnon Drive and Queen Street, replacing all Dominion Road and half of Sandringham Road bus services into the CBD. Thus the overall corridor volumes in the East-West Midtown project are substantially lower than those cited in the Bus Reference Case, which does not include/assume light rail.

This also results in the Isthmus bus volumes in 2018 being higher than those in 2026, the evaluation year for the project, as LRT will replace some of those services when it is delivered.

15.2.1 LRT considerations

There is still some uncertainty about the timing of light rail, and there is a possibility that it may not be in place by 2026. In this case some variations would need to be made to each option to handle the 34 additional Isthmus buses per hour (peak) until LRT is constructed.

This has not been investigated as part of this project; however, there are several possibilities for accommodating the additional buses. These all involve the use of an additional corridor for at least one route, likely Dominion Road. Options include:

- Dominion Road services continue to do what they do now (inbound via Symonds Street, Wellesley Street and Queen Street to terminate outside the St James Theatre; outbound via Wakefield Street);
- Slight variation on the above pattern to avoid a Queen Street terminus (inbound via Symonds Street, Wellesley Street to terminate on Mayoral Drive outside AUT; outbound via Wakefield Street);
- Dominion Road services follow the proposed light rail route via Ian McKinnon Drive, Queen Street and Fanshawe Street to Wynyard Quarter; and/or
- A hybrid of Options 1 and 4D or 1 and 4E where buses are split across Victoria and Wellesley Streets.

Note each of these options would require additional consideration regarding feasibility.

15.2.2 Short term considerations

The planning horizon design year agreed for the IBC is 2026, following the delivery of the City Rail Link and light rail along Queens Street. As noted in 15.2.1, if light rail, for example, is not constructed this would result in additional buses along the corridor. Therefore a high level investigation was undertaken into potential options for accommodating additional buses in the short term for each short list option.

The investigation involved a workshop with AT Metro in December 2016. The workshop resulted in a long list of options including six options for the North Shore services running way, three options for the North Shore services terminal and ten options for the Isthmus services running way.

The long list options were combined into integrated options that are capable of handling the required bus volumes. These are:

- Alternative 1: Fit the additional buses within existing stops in the corridor
- Alternative 2: Provide a different alignment for Dominion Road services
- Alternative 3: Provide a different alignment for other Isthmus services (those which travel through Newmarket)
- Alternative 4: Provide additional stop space (longer and/or more stops) in the corridor (Options 1B/D, 4D)
- Alternative 5: Provide additional westbound stop space in the corridor (Option 4E)

These alternatives are further detailed in Appendix N.

15.3 Access impacts and property acquisition

Efforts during option development have been taken to minimise property impacts and acquisition requirements. Land purchase will be required for a Grafton Gully terminal in order to support the North Shore services in options 1B, 1D and 4D. Minor land take may be required for new bus stop infrastructure and intersection priority which will be further identified through the DBC phase.

All options will entail some level of disruption during the construction phase and a traffic management plan would be required to identify mitigation measures.

15.4 Consenting considerations

The environmental screening and planning assessment undertaken is included in Appendix O and identified that there are only subtle differences between the shortlisted options at this level of investigation.

Due to the complexity and likely technical overlapping of planning controls within the Proposed Auckland Unitary Plan (PAUP:DV), it is considered that a formal proposal to implement a change to bus route/s and add new public transport activity will trigger the need for a resource consent to be sought as either a restricted discretionary or discretionary activity. Such an application would require providing assessments of the actual and potential effects of the activity, in particular those relating to traffic effects. The application would need to consider the relevant provisions (assessment criteria, objectives and policies) associated with the rule not being complied.

For the Grafton Gully terminal options, site 1 has the zoning Business – Mixed Use, with Motorway Interchange Control and Centre Fringe Office controls placed over it. Resource consent would be required to formally establish and operate a bus terminal.

Site 3 would encompass an extension of the Wellesley Street bridge out over the existing motorway and adjacent land area either site of the motorway. In a north-west to south-east direction the zoning for this site is zoned “Business - City Centre”, then “Strategic Transport Corridor”, then “Business - Mixed Use”. Resource consent and approval from the NZ Transport Agency will be required to effectively create a new bridge over the State Highway.

Site 4 is on the corner of Grafton Road and Stanley Street and is occupied by a Wilsons carpark. The site has the zoning “Business - Town Centre” with a “Centre Fringe Office Control” overlay. Resource consent and approval from the New Zealand Transport Agency will be required to effectively establish and operate a bus terminal within their designation adjacent to a relatively busy State Highway.

A sediment detention vault is also located on Site 4 which is covered by resource consent to divert and discharge storm-water (permit 25487).

Site 8 is shown to be located within legal road whereby similar to the above mentioned reasons, formal establishment and operation of a bus terminal will require resource consent to be sought as a public transport activity.

If works are to be undertaken within roads, then it is considered that the National Environmental Standard will likely apply and a preliminary site investigation should be undertaken to accompany the resource consent. If projects works will occur within or across a designation, then written approval for these works will need to be obtained from the designations requiring authority.

If project works extend outside of the legal road boundaries, then the activity will require assessment against the relevant zone, precinct, overlay and/or Auckland-wide provisions.

At the time of writing this planning assessment the PAUP: DV is the prevalent planning document to use to assess the project works. It is however subject to an appeal period, where depending on the potential ramifications of any appeals lodged, Auckland Council will in time confirm which parts or individual sections of the PAUP:DV can be considered fully operative. For this reason it is advised that the findings of this assessment be reviewed again at the time of applications for resource consent are prepared so relevant rules can be considered.

15.5 Procurement

Auckland Transport is developing a procurement strategy to explore potential procurement methods for this project that should be referred to for further details.

16. Management Case

This section outlines how the project team will manage the relevant activities to deliver the DBC.

16.1 Project governance

As described within sections 2 and 3 the East-West Midtown PT Link project was developed through the City Centre Access Programme Strategic Case and the City Centre Public Transport Programme –Draft Programme Business Case.

The IBC included the establishment of a Project Control Group (PCG) to guide the project and ensure linkages with other programmes of work are captured. The PCG includes Auckland Transport representatives from Investigation and Design, Strategy, AT Metro, Walking and Cycling and Property.

Further investigation will be guided by the PCG. The PCG guidance to date is captured in the meetings minutes attached as Appendix P.

16.2 Contract management

The DBC will be managed under a separate contract to the IBC and will be undertaken as per Auckland Transport's procedures.

16.3 Project plan

Figure 16.1 includes the potential timeframes for the East-West Midtown PT Link project.

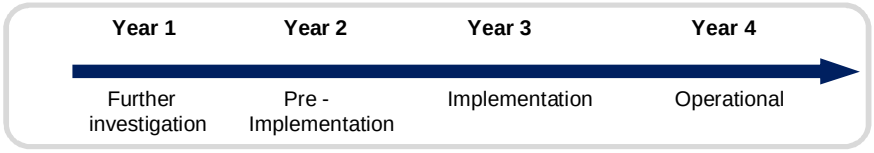


Figure 16-1: Potential project timeline

16.4 Stakeholder engagement and communications plan

A Stakeholder and Engagement Plan, April 2016 was developed to guide stakeholder engagement during the project. It is important to continue the strong working relationship with project stakeholders in particular University of Auckland and AUT.

Risks in relation to stakeholder engagement have been captured in the Risk Register (section 16.5).

Stakeholders were provided with the opportunity to provide feedback on the Draft IBC Rev1 and the feedback received is attached as Appendix Q.

16.5 Risk management

A Risk Register was regularly updated during the development of the IBC and is included in Appendix R. Table 16.1 provides an overview of the current risks and mitigation.

Table 16-1: Overview of identified risks

	Risk	Causes	Impact	Current control	Probability
1	Scope change from network decisions	Modal conflicts	Change of scope	Awareness - communication	5 (Very High » >75%)
2	Externals stakeholders do not agree with project direction	Different viewpoints	Delay, project disruption	Communications / engagement plan	5 (Very High » >75%)
3	Diverting from Business Case process	AT Decisions External to Project	Change of scope	Follow PMF. Escalation to PCG (Project Control Group).	1 (Very Low » <2%)
4	Internal stakeholders do not agree with direction	Different viewpoints	Delay, project disruption	Project workshops, stakeholder engagement	4 (High » 50%-75%)
5	Lose funding for project	Budget priorities	Project does not continue	Solid business case to justify	1 (Very Low » <2%)
6	Cycleway goes in early	External project pressure	Additional cost, waste of money	Engagement of cycling team	2 (Low » 2% to 20%)
7	Bus facilities go in early	Pressure to implement new network	Additional cost, waste of money	Engage with PT team	2 (Low » 2% to 20%)
8	Adverse traffic impacts due to project proposal	Unavoidable project impacts	Lost productivity. General acceptance.	Use of JMAC modelling	4 (High » 50%-75%)
9	Missed opportunities of not delivering cycleway and place making inspirations	Tunnel vision	Two projects instead of one	Work with all stakeholders	3 (Medium » 20%-50%)
10	Challenges of property acquisition	Unavailability of required site	Lose terminal site	Include property team in project	4 (High » 50%-75%)
11	Not meeting project deadlines	Lack of agreement	Adverse impact on new network	Project programme PCG	4 (High » 50%-75%)
12	Preferred option exceeds available funding	Unknown costs of preferred intervention	Inability to finance preferred option	Project programme PCG	4 (High » 50%-75%)
13	Lack of understanding of impact on city centre transport movement during congestion	Lack of strategic plan	Traffic delays , project disruption, effects on project benefits	Project programme PCG	5 (Very High » >75%)

17. Next Steps

Taking into consideration the evaluation against project objectives, peak modelling, and economic appraisal this IBC seeks formal approval to proceed to the DBC for further investigation of the preferred options.

Options 1B and 1D are discounted from being taken forward to the DBC for further investigation due to the potential to reduce patronage volumes as a result of the relocation of bus stops, which would be a reduced customer experience, and new bus routes and due to the use of the slip lane for Option 1B.

Option 4D is the preferred option to proceed to the DBC as it received support and endorsement from stakeholders and provides largest patronage catchment for the Learning Quarter.

The Princes Street terminal (Option 4E) received less support from stakeholders as it does not provide the long-term layover requirements; impacts high turn-over parking on Princes Street and does not provide access to the south of the Learning Quarter. However, it was identified to be taken forward to the DBC to be investigated as a short term solution before a Grafton Gully terminal can be provided.

Taking into consideration the evaluation against project objectives, modelling, economic appraisal and stakeholder liaison; this IBC seeks formal approval to proceed to the DBC for further investigation of options 4D and 4E.

Further investigation is required in the following areas:

- Option 4E Isthmus services;

  It is important to highlight that the Isthmus services route for Option 4D and Option 4E are different, with Option 4D Isthmus services travelling a one way loop along Victoria Street and Wellesley Street and Option 4E Isthmus services travelling along Wellesley Street. Additionally, Option 4E currently utilises the Wellesley Street slip lane which is not supported by Stakeholders and would require an alternative route along Wakefield Street (as per Option 1D Isthmus services). Therefore, additional infrastructure and intersection upgrades are required to provide for the short term Option 4E than is required in the longer term for Option 4D. The DBC should further investigate an alternative route for the Isthmus services under Option 4E which is more aligned with Option 4D.

- Grafton Gully short listed sites;

  The Graton Gully sites have been assessed at feasibility level and require further investigation into bus layout and arrangement and site accessibility, along with constructability.

- Ensure synergy with proposals for Midtown cycleway project as the business case and design of the PT Link progresses;

- There is still some uncertainty about the timing of light rail, and there is a possibility that it may not be in place by 2026. In this case some variations would need to be made for additional infrastructure to handle the additional Isthmus buses until LRT is constructed.

- Implications to on-street parking, in particular along Princes Street; and

- Further investigation of Waterloo Quadrant bus priority options.

  It was identified that without bus priority Waterloo Quadrant could represent a constraint to the bus operation with the potential for delays along Waterloo Quadrant and at the intersection with Symonds Street. Further investigation was undertaken to determine if bus priority could be provided along Waterloo Quadrant for isthmus services under Option 4D.

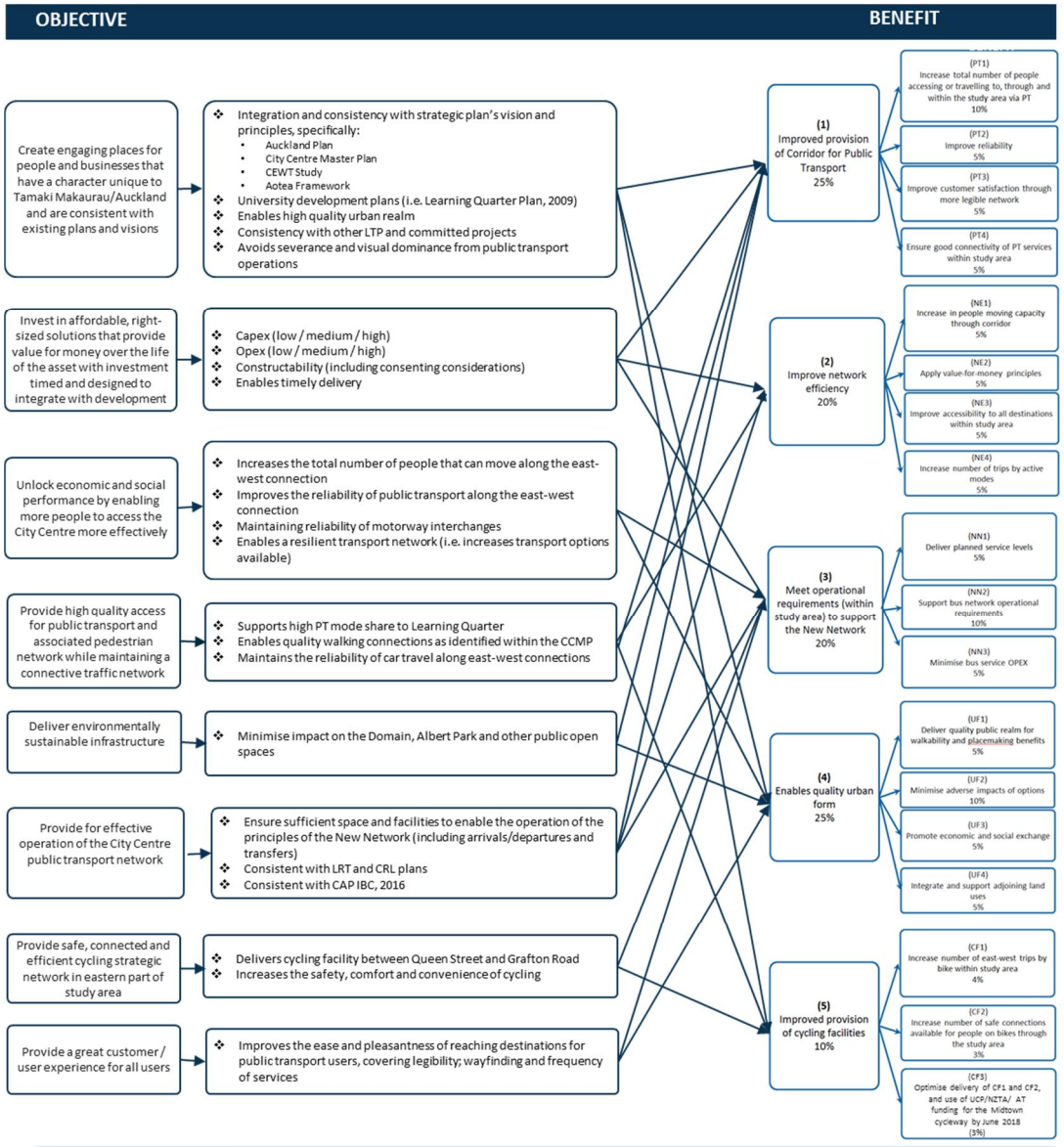
  Two bus priority options were identified and the study concluded that, if Option 4D is taken forward to the DBC then further investigation is required to:

  1. Model these options, including intersection modelling of the Symonds Street and Princes Street intersections to enable various permutations of lane assignment to be tested and to better understand the effects of upon buses and general traffic; and

  2. Undertake design assessment including CAD design, vehicle tracking and signal design to determine the feasibility of the concept options.

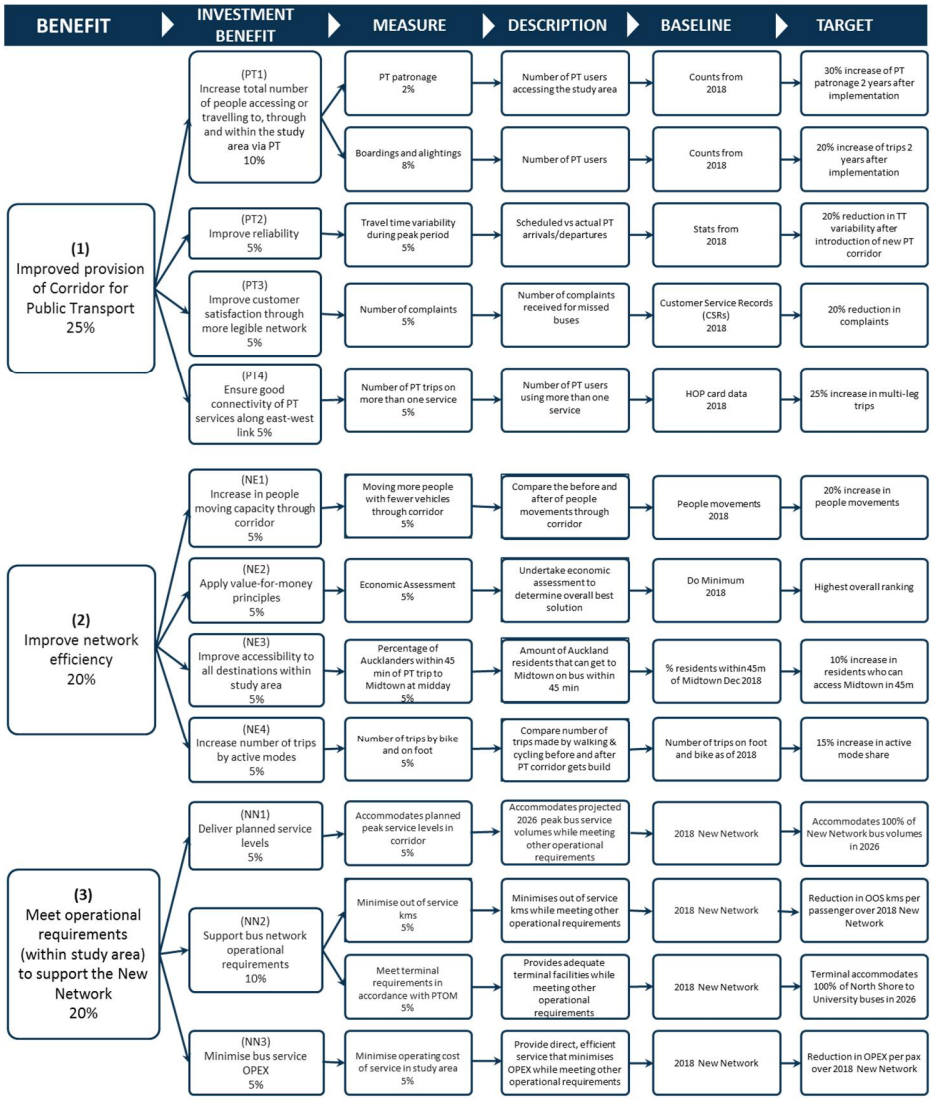
Appendices

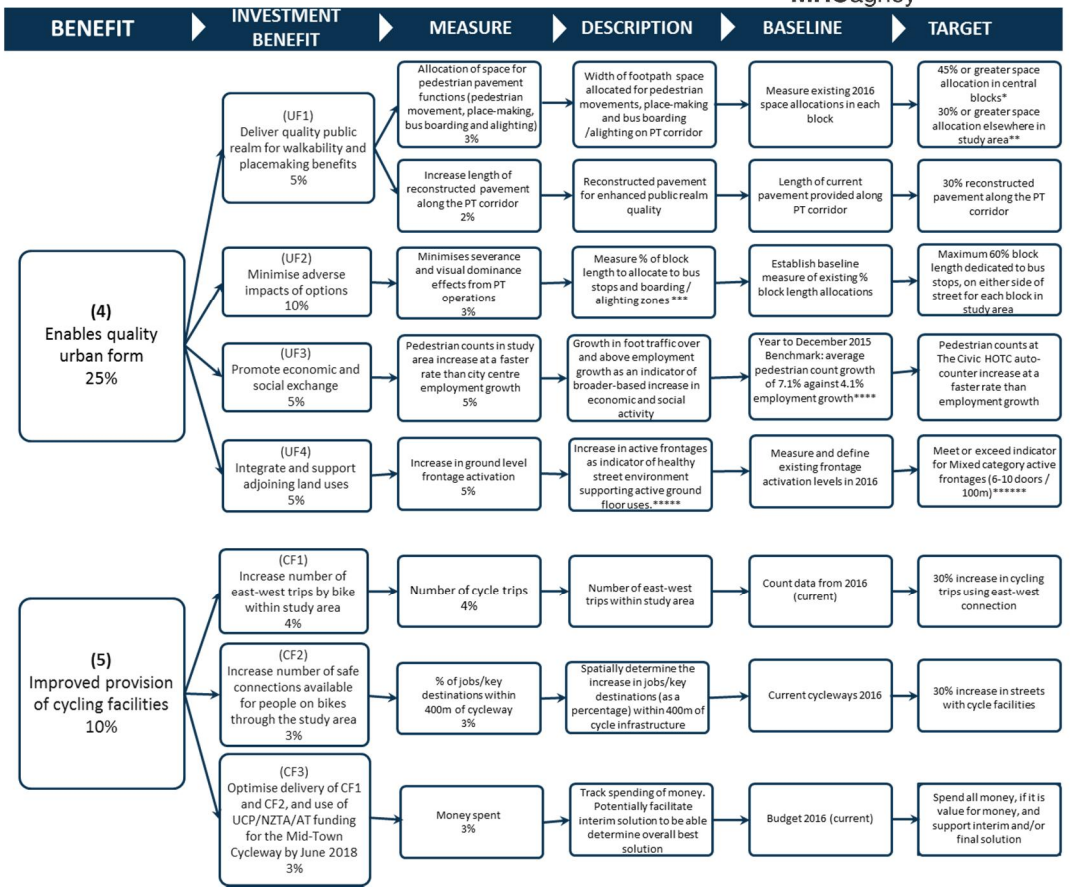
Appendix A. Problem, benefit and performance measures mapping



Business Problem Owner: Auckland Transport
Facilitator: Sam Corbett, Jacobs
Accredited Facilitator: No

Version no: 2
Initial Workshop: 14/06/2016
Last modified by: Terri Collett 26/09/2016
Template version: 5.0





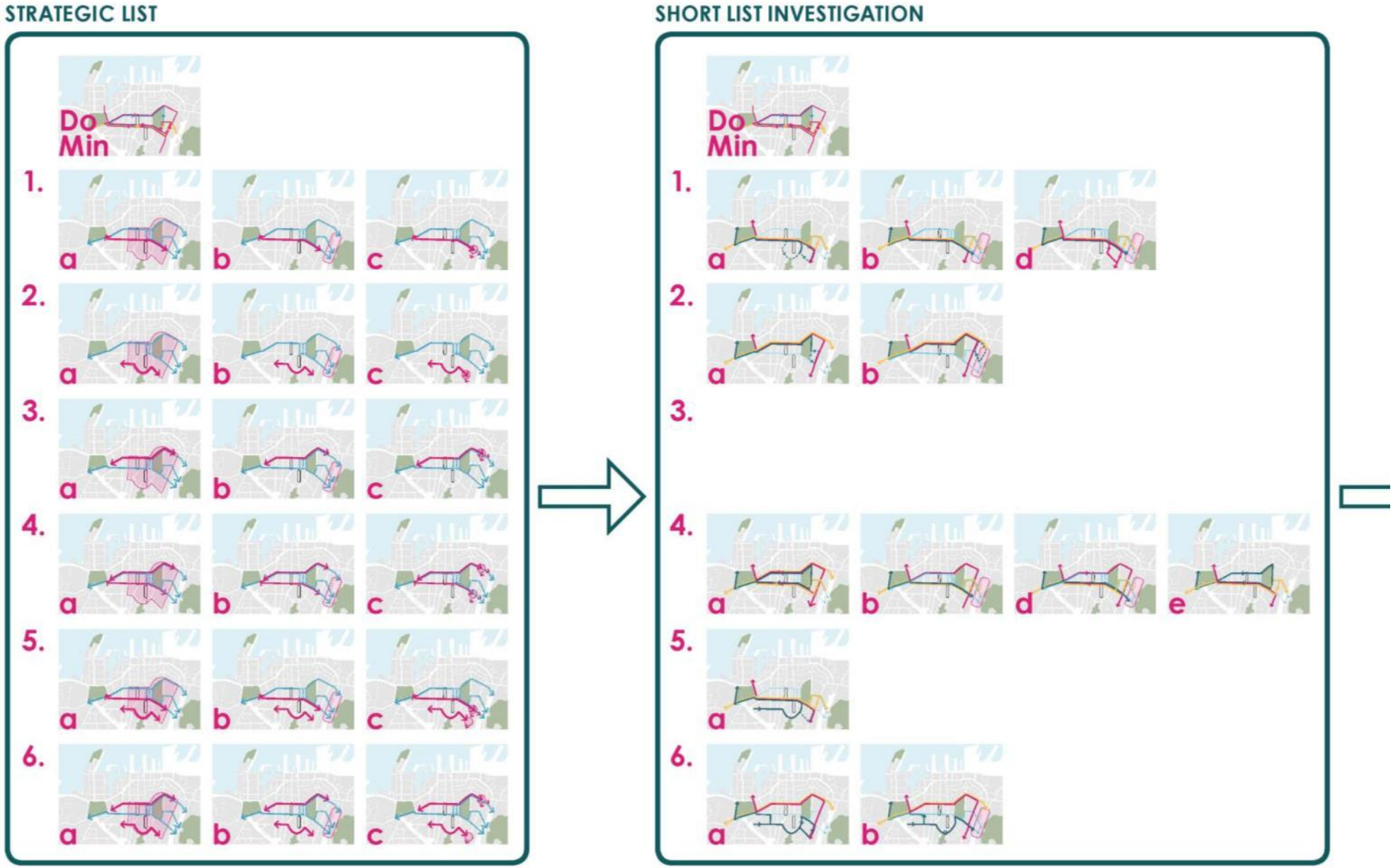
Explanations

*45% or greater space allocation for pedestrians, place-making and bus boarding in central blocks (between Albert Street – Albert Park)
**30% or greater space allocation to pedestrian movement, place-making and bus boarding elsewhere in study area.
***Proxy for extent of dominance of buses on kerbside street environment and corresponding impacts of high bus volumes and occupancy of stops on adjoining public realm and land uses.
****for 3xQueen Street sites, could drill down to 261 Queen St only
*****Proxy for PT operations avoiding or minimising spatial displacement of adjoining land use and public realm activities.
******as defined by Gehl Architects, for full length of public transport corridor/s in study area

Business Problem Owner: Auckland Transport
Facilitator: Sam Corbett, Jacobs
Accredited Facilitator: No

Version no: 6
Initial Workshop: 14/06/2016
Last modified by: Terri Collett 22/07/2016
Template version: 5.0

Appendix B. Option refinement diagram


STRATEGIC LIST
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b
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3.
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b
c
4.
a
b
c
5.
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SHORT LIST INVESTIGATION
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a
b
d
2.
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b
3.
4.
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d
e
5.
a
6.
a
b

PERFERRED SHORT LIST EVALUATION

1. Do Min
2. b
3. d
4. d
5. e
6.

SHORT LIST TO DBC

1.
2.
3.
4. d
5. e
6.

Appendix C. Long list option workshop minutes

Appendix D. Bus and cycle patterns and terminal sites

Appendix E. Long list option maps

Appendix F. Evaluation against project objectives

Appendix G. Short list options infrastructure requirements

Appendix H. Travel time variability Waterloo Quadrant memo

Appendix I. Bus stop Level of Service memo

Appendix J. Waterloo Quadrant option considerations

Appendix K. Modelling results memo

Appendix L. Economic Appraisal

Appendix M. Cost summary

Appendix N. Short-term options memo

Appendix O. Environmental screening and planning assessment memo

Appendix P. PCG Board meeting minutes

Appendix Q. Stakeholder feedback register

Appendix R. Risk Register