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LGWM Programme

Affordable Short List Options Report

MRT and SHI team

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Glossary of Abbreviations

Items	Descriptions
BRT	Bus Rapid Transit
CBD	Central Business District
CC	Congestion Charge
CATi	Carbon Assessment Tool for investment
dBA	A-weighted decibels
DSI	Deaths and Serious Injury
HAIL	Hazardous Activities and Industries List
IP	Indicative Package
LGWM	Let's Get Wellington Moving
LRT	Light Rail Transit
MCA	Multi-Criteria Analysis
MRT	Mass Rapid Transit
PBC	Programme Business Case
PSI	Preliminary Site Investigation
RPI	Recommended Programme of Investment
SLUR	Selected Land Use Register
SHI	Strategic Highway Improvements
VKT	Vehicle Kilometres Travelled
WTSM	Wellington Transport Strategic Model

Executive Summary

Overview

Let's Get Wellington Moving (LGWM) is working with the people of Wellington to develop a transport system that supports aspirations for how the city looks, feels, and functions. As part of the LGWM programme, a Programme Business Case (PBC) was released in June 2019 which documented a package of network-wide transport programmes for Wellington.

A number of investigations into elements of the programme were subsequently progressed in 2020 and 2021. These investigations identified that some of the elements within the Recommended Programme of Investment (RPI) and Indicative Package (IP) are not optimal in terms of delivering benefits. They also identified that the cost is likely to be greater than that estimated at the time of completing the PBC.

Furthermore, since the completion of the PBC, other significant factors have arisen, each with potential to reshape the LGWM programme:

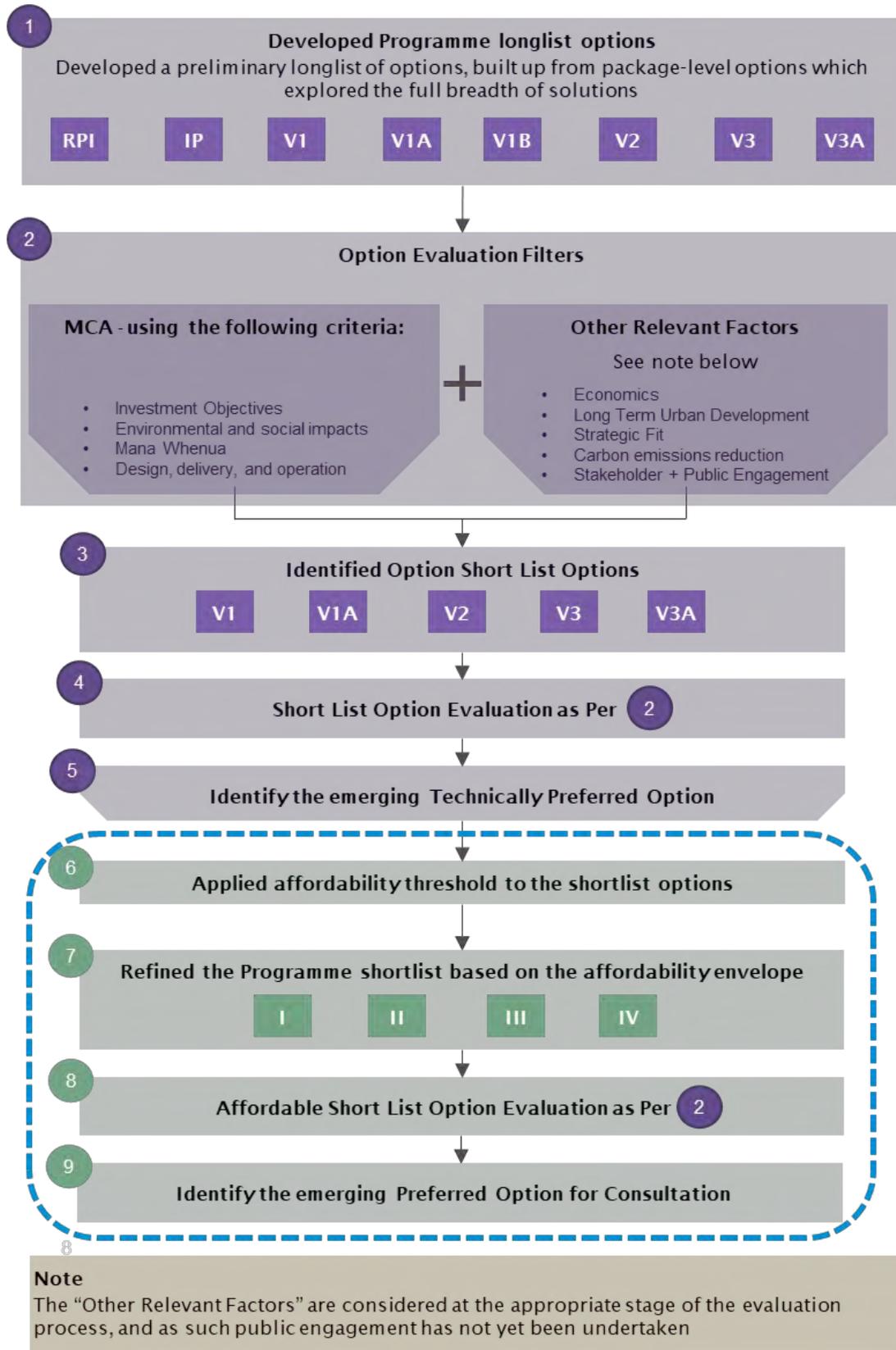
- Greater emphasis on climate change commitments
- Increased focus on addressing housing and development challenges for the city and the wider region. There was also an update to the population projections including increased levels of intensification of land use and residents as a result of improvements related to the LGWM investment
- COVID-19.

In light of these factors, programme partners reviewed and updated the programme objectives. As a result of the updated objectives, the changes in the individual elements and the new external factors, the programme team decided to check that the Indicative Package still represented the best way forward for Wellington.

The LGWM Programme Long List and Short List reports (July 2021) presented the process for evaluating the programme options and identified a technically best performing programme of investment, whilst also noting that this was subject to affordability, public acceptance and value for money considerations.

Subsequent to the Short List process, LGWM confirmed an affordability threshold for the programme's investment. The affordability threshold provides a maximum cost ceiling for options within the broader context of committed and future transport funding.

Some of the options at the Programme Short List stage exceed the affordability threshold. Therefore, the options were refined through the programme to meet the affordability threshold. This refinement has resulted in four 'Programme Affordable Short List' investment options, as shown in Figure 1.



----- This report

Figure 1: Programme affordable short list options process

Through the MCA process, the purpose was to test the range of technical options without being constrained by costs. However, prior to engagement it was important to reconfirm the available funding envelope, and to refine the technical short list options to fit within this affordability threshold. The refined short list options for engagement are presented in this report.

The purpose of this report is to document the assessment of the Programme Affordable Short List options, to identify the technically best performing Programme Affordable Short List option that most aligns with the outcomes sought for the LGWM programme.

Programme Affordable Short List Option Development

MCA assessments documented in the Programme Short List report indicated that programme short list option RPI V1A aligns most favourably with the LGWM programme objectives. This option includes a dual MRT route, improving multi-modal access to and from the CBD and with a focus on active modes. This option does not include the duplicate Terrace Tunnel or the Te Aro trench and city park.

The Programme Short List report noted that before a preferred programme could be adopted, further consideration of a wider range of factors such as affordability, return on investment and land use response was needed.

Accordingly, each Short List option was reviewed to determine whether it was within the affordability threshold or could be modified to fit within the threshold. The LGWM Board has indicated that the affordability threshold should be based on the funding signalled by the indicative package at PBC with an acknowledgement of inflation since that time. Applying the affordability threshold lens to the Short List options indicates:

- RPI V1 is well above the threshold and performed worse than RPI V1A therefore was not progressed further
- RPI V1A is above the threshold, but modifications to the mode or length of MRT route can be made to bring it within the threshold. This has led to Programmes i and ii.
- RPI V2 is above the threshold, but the significant investment in the long tunnel means that no changes can be made to this option whilst still retaining the key elements of the long tunnel and MRT to the south. This option was therefore not progressed further
- RPI V3 and RPI V3A are below the threshold and have been brought forward (with minor modifications). This has led to Programmes iii and iv.

The purpose of this Programme Affordable Short List Options Report is to document the assessment of the Programme Affordable Short List Options. Each stage of the short list optioneering process has been reviewed regularly by the LGWM programme. These reviews have helped the programme to apply robust and comprehensive assurance frameworks and provide acceptance on the range of outcomes proposed by the refined programme affordable short list options. These options will be detailed and included for the consultation undertaken at the end of 2021, and are shown in Table 1.

The affordability threshold is not a financial approval and was not used as a means of assessing and comparing options, rather it provides an upper cost ceiling for considering programme options to be financially viable at this stage. Funding approvals will be subject to partnership board and funding partner approval processes in future phases of the programme when cost certainty is achieved. It is acknowledged that different short list options will have different impacts on future local and regional rates, however this is contained in value for money and economic analysis in the LGWM Programme Report.

Table 1: Programme affordable short list options approved by the LGWM Programme

Option	i	ii	iii	iv
Common elements to all options	<ul style="list-style-type: none"> Golden Mile Thorndon Quay/ Hutt Road improvements Central City pedestrian improvements Cobham Drive crossing and safer speeds City Streets (will vary by programme) Travel demand management, including travel behaviour changes and congestion charging as a sensitivity test across all programmes 	<ul style="list-style-type: none"> Golden Mile Thorndon Quay/ Hutt Road improvements Central City pedestrian improvements Cobham Drive crossing and safer speeds City Streets (will vary by programme) Travel demand management, including travel behaviour changes and congestion charging as a sensitivity test across all programmes 	<ul style="list-style-type: none"> Golden Mile Thorndon Quay/ Hutt Road improvements Central City pedestrian improvements Cobham Drive crossing and safer speeds City Streets (will vary by programme) Travel demand management, including travel behaviour changes and congestion charging as a sensitivity test across all programmes 	<ul style="list-style-type: none"> Golden Mile Thorndon Quay/ Hutt Road improvements Central City pedestrian improvements Cobham Drive crossing and safer speeds City Streets (will vary by programme) Travel demand management, including travel behaviour changes and congestion charging as a sensitivity test across all programmes
Basin Reserve	Grade separated	Grade separated	Grade separated	At-grade
Mt Victoria Tunnel	<p>New diagonal vehicle tunnel including public transport lanes + Active travel in converted existing vehicle tunnel</p> <p><i>or</i></p> <p>New parallel active travel and zero-emission public transport tunnel + Existing vehicle tunnel</p>	<p>New diagonal vehicle tunnel including public transport lanes + Active travel in converted existing vehicle tunnel</p> <p><i>or</i></p> <p>New parallel active travel and zero-emission public transport tunnel + Existing vehicle tunnel</p>	<p>New parallel active travel tunnel</p> <p>+</p> <p>Existing vehicle tunnel</p>	<p>New parallel active travel tunnel</p> <p>+</p> <p>Existing vehicle tunnel</p>
MRT City to South	<p>LRT to Island Bay</p> <ul style="list-style-type: none"> via Cambridge Tce dedicated lanes to Newtown in mixed traffic beyond Newtown with local priority where achievable 	<p>BRT infrastructure</p> <ul style="list-style-type: none"> dedicated lanes to Newtown via Cambridge Tce services extend to Island Bay in mixed traffic with local priority where achievable 	<p>LRT to Island Bay</p> <ul style="list-style-type: none"> via Cambridge Tce dedicated lanes to Newtown in mixed traffic beyond Newtown with local priority where achievable 	<p>LRT to Island Bay</p> <ul style="list-style-type: none"> via Taranaki St dedicated lanes to Newtown in mixed traffic beyond Newtown with local priority where achievable
MRT East	<p>Enhanced Bus</p> <ul style="list-style-type: none"> bus lanes to Miramar town centre via diagonal tunnel existing Metlink fleet and depots services extend to the Airport, Miramar North and Seatoun 	<p>BRT infrastructure</p> <ul style="list-style-type: none"> BRT lanes to Miramar town centre and the Airport via diagonal tunnel new BRT fleet and depots services extend to Miramar North and Seatoun in mixed traffic 	<p>Enhanced Bus</p> <ul style="list-style-type: none"> bus lanes to Miramar town centre via existing bus tunnel existing Metlink fleet and depots services extend to the Airport, Miramar North and Seatoun 	<p>Enhanced Bus</p> <ul style="list-style-type: none"> bus lanes to Miramar town centre via existing bus tunnel existing Metlink fleet and depots services extend to the Airport, Miramar North and Seatoun

Technically Best Performing Option

The strengths and weaknesses of each Programme Affordable Short List option were assessed through an MCA process. The technically best performing option has been identified as Programme Affordable Short List Option ii. Key differentiators include:

- Resilience: Option ii provides slightly greater resilience because the BRT is assumed to be able to divert around or along a different route in operational or Low Impact High Probability events.
- Mana Whenua values: Option ii includes BRT to both the south and east, which provides a network spreading benefits of urban uplift. This option also enables the prospect of expansion to the north (which is unlikely for LRT due to gradients) and west. The proposed diagonal tunnel reduces the likely effect of other options on the Town Belt at Ruahine Street. The Basin Reserve area is grade separated improving outcomes for people walking and cycling as well as for public transport. This option scores best on the sub-criteria of Place, Wellbeing and Just Society.
- Noise and vibration: Options that include the diagonal tunnel (i and ii) are preferred to options (iii and iv) which require a new parallel active mode tunnel because they remove more surface traffic. BRT emits less noise than LRT (6 to 8 dBA at source). Furthermore, where there is LRT shared running to the south, the existing road will be replaced by concrete resulting in an increase in general traffic noise. Therefore, Option ii scored best of the Programme Affordable Short List options.
- Network fit: Overall, Option ii scores very positive for network fit as BRT replaces route 1 and route 2, even though it does not service all of Hataitai and Mt Victoria, due to the route travelling via a new diagonal Mt Victoria tunnel. This option therefore minimises duplication of services and would allow for the through running of core routes 1 and 2, meaning less truncation of services and less need for transfers.

Further sensitivity tests that examined the Programme Affordable Short List options with congestion charging also shows that options perform better than without congestion charging.

However, it is noted that in addition to the MCA assessment outlined above, the option evaluation process requires further assessment and consideration of the options against 'other relevant factors', including value for money, delivery timeframe and staging assessment, the ability of the options and their nominated modes to facilitate and with sufficient capacity, respond to higher urban growth (beyond current projections), and to reflect stakeholder and public engagement.

Next Steps

Feedback from public engagement, together with the analysis contained within this report and considerations of 'other relevant factors' will help decision makers identify and then adopt a preferred option to progress for future stages of the business case.

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1 Introduction

1.1 Overview

Let's Get Wellington Moving (LGWM) is working with the people of Wellington to develop a transport system that supports aspirations for how the city looks, feels, and functions. The LGWM vision for Wellington is a great harbour city, accessible to all, with attractive places, shared streets, and efficient local and regional journeys. To realise the vision the transport system needs to move more people with fewer vehicles.

Purpose

The purpose of this report is to document the assessment of the Programme Affordable Short List options, to identify the technically best performing Programme Affordable Short List option that best aligns with the outcomes sought for the LGWM programme. The remainder of this report is structured as follows:

- Section two provides a summary of work completed to date
- Section three describes the option assessment process
- Section four details the evaluation methodology applied to assess the options
- Section five presents the MCA assessment
- Section six outlines the technically best performing option
- Section seven outlines the next steps.

2 Work Completed to Date

2.1 Summary

Figure 2 provides an overview of the work completed to date and a detailed summary is provided within this section. A number of investigations as part of the LGWM programme were progressed in 2020 and 2021, including:

- Mass Rapid Transit
- Strategic Highway Improvements
- City Streets
- Travel Demand Management
- Golden Mile Improvements
- Central City Pedestrian Improvements
- Thorndon Quay / Hutt Road Improvements.

These investigations also identified that some of the elements of the Indicative Package may not be optimal in terms of delivering the desired benefits, and the expected cost, due to rising escalation in construction and property acquisition costs, is likely to be greater than previously estimated at the time of the LGWM Programme Business Case (PBC) in 2019.

Furthermore, since the completion of the PBC, other significant factors have arisen, each with potential to reshape the LGWM programme:

- Greater emphasis on climate change commitments
- Increased focus on addressing housing and development challenges for the city and the wider region. There was also an update to the population projections including increased levels of intensification of land use and residents as a result of improvements related to the LGWM investment.
- COVID-19.

In light of these factors, programme partners reviewed and updated the programme objectives. As a result of the updated objectives, the changes in the individual elements and the new external factors, the programme team was instructed by the LGWM Board to check that the Indicative Package still represented the best way forward for Wellington.

Work was undertaken to test the Indicative Package against a number of alternative programmes. The LGWM Programme Long List and Short List reports (July 2021) presented the process for evaluating the programme options and identified a technically best performing programme of investment, whilst also noting that this was subject to affordability, public acceptance and value for money considerations.

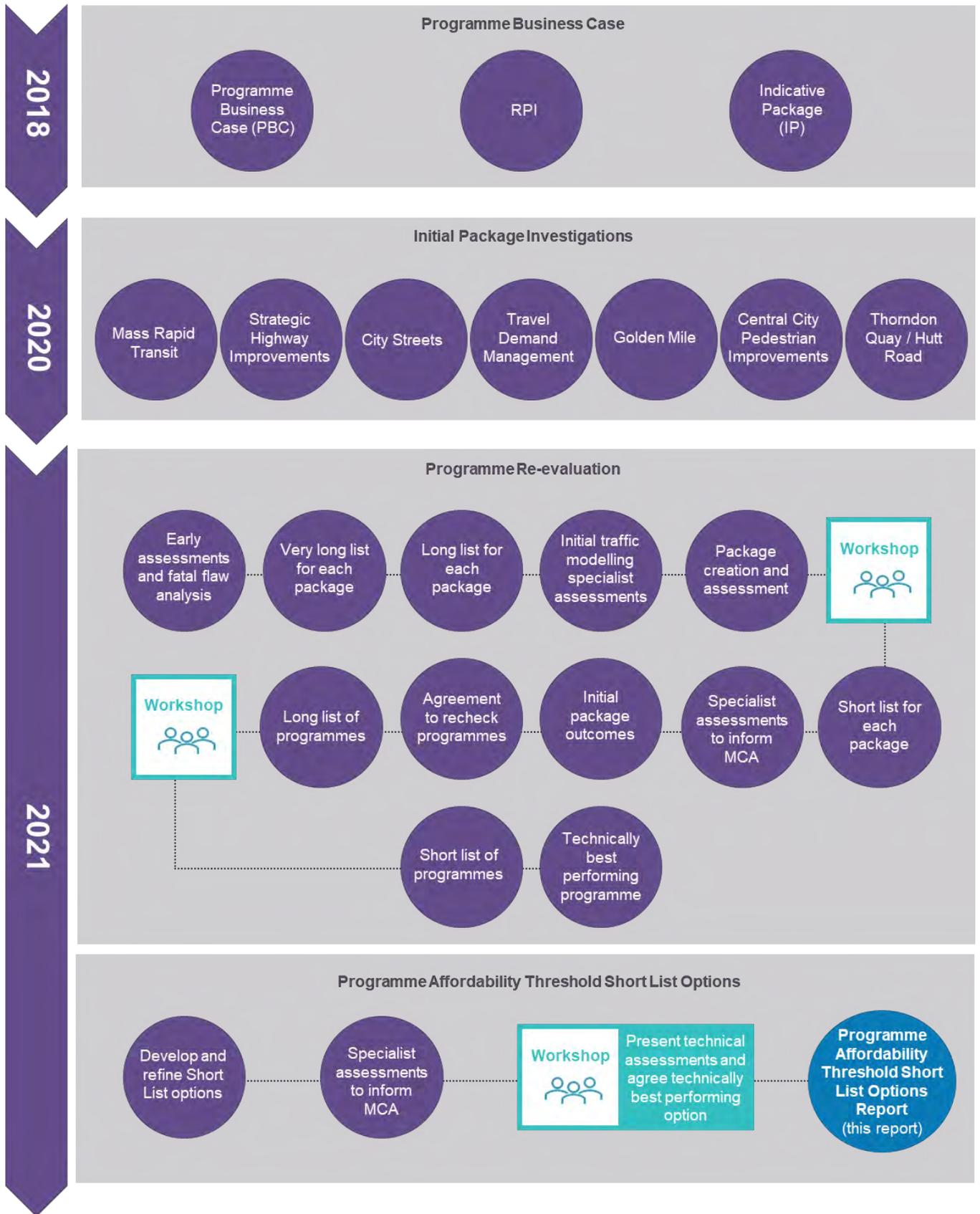


Figure 2: Programme affordable short list option development and assessment process

2.2 Programme Long List Report

The MRT and SHI investigations formed the starting point for the development of the LGWM programme long list as they are the largest components and have the most variability in terms of the options. Each programme long list option was supplemented by elements from the wider LGWM programme.

Several assumptions were applied to limit the variations of options and focus on the key differentiating factors that fulfilled the programme objectives. At the request of LGWM, options were also considered with and without congestion charging to understand the impact this has on the performance of each long list option.

Technical specialists scored each of the 16 long list programme options against the LGWM programme objectives, environmental and social impacts and design, delivery, and operational criterion. This was undertaken using the Multi-Criteria Analysis (MCA) process outlined in the MRT and SHI Multi Criteria Analysis Framework Report and based on their understanding of the options and likely impacts.

The technical specialists worked alongside partner representatives to determine a score for each of the programme options. Two workshops were held to discuss and moderate the scores and to determine the programme short list for further detailed investigation.

In total, five programme options were short listed for further technical analysis and consideration as shown in Figure 3. The five short list programme options were selected as they best align to the programme objectives and the outcomes sought for the LGWM programme.

Programme	PT south	PT east	Basin	Mt Vic	Te Aro & Terrace Tunnel	Long Tunnel
RPI V1	Island Bay 	Miramar 		 	 	
RPI V1A	Island Bay 	Miramar 		 		
RPI V2	Island Bay 	Miramar 				
RPI V3	Island Bay 	Miramar 				
RPI V3A	Island Bay 	Miramar 				

Key:	 - Mass Rapid Transit	 - Enhanced bus services	 - At grade improvements	  - Shared MRT/ general traffic tunnel	  - Covered general traffic trench with active modes above
	 - Grade separation	 - General traffic tunnel	  - Active modes tunnel	 - General traffic tunnel	

Figure 3: Programme short list options

Further detail on the programme long list to short list process is provided in the LGWM Programme Long List Report.

2.3 Programme Short List Report

The programme options summarised in Figure 3 were assessed against the full spectrum of the LGWM programme objectives, environmental and social impacts, and design, delivery, and operation criteria. Technical specialists worked alongside partner representatives for each criterion and scored each of the five short list programme options, based on their understanding of the options and likely impacts.

The MCA assessments indicated that programme short list option RPI V1A (Dual MRT route, improving multi-modal access to and from the CBD and with a focus on active modes) aligns more favourably with the LGWM programme objectives compared to the other programme short list options. The application of congestion charging when applied to all options was deemed to have a high positive impact and should be considered in any implementation.

Additional analysis on the proposed MRT route alignment in RPI V1A was undertaken to consider MRT via Wakefield Street, Cambridge Terrace and Kent Terrace, rather than MRT via Taranaki Street and Haining Street as shown in Figure 4, which was assumed to be the MRT corridor for RPI V1A through Te Aro.

This alternative route analysis was undertaken to mitigate the potential negative impact of short list option RPI V1A on the Te Aro Pā site, towards the southern end of Taranaki Street and to minimise duplication of public transport services. MRT via Wakefield Street, Kent Terrace and Cambridge Terrace would result in less service duplication and offers better service coverage. There would be service duplication in the base option, as a core bus route (serving Mt Cook) runs along Taranaki Street.

As a result of this analysis the MRT route alignment in RPI V1A was amended from Taranaki Street and Haining Street to via Wakefield Street, Cambridge Terrace and Kent Terrace.



Figure 4: Additional MRT route alignment analysis RPI V1A

Further detail is provided in the LGWM Programme Short List Report.

3 Development of Programme Affordable Short List Options

Subsequent to the Programme Short List process, LGWM confirmed an affordability threshold for the programme’s investment. The affordability threshold provides a maximum cost ceiling for options within the broader context of committed and future transport funding.

The affordability threshold was applied to the five programme short list options and this analysis determined that only programme options V3 and V3A were within the affordability threshold. As these are the technically lowest performing options, the technically best performing option, RPI V1A was also modified to be within affordability limits, as summarised in Table 2.

Table 2: Programme Affordable Short List options summary

Short List Option	Affordability Threshold	Outcome	Revised Short List Option
RPI V1	Does not perform well against the objectives, more expensive than RPI V1A. Cost reductions would lead to RPI V1A.	Not progressed	
RPI V1A	Best performing short list programme, but need to reduce costs to meet affordability threshold.	Progressed	<p>Option i: LRT to Island Bay via Kent/Cambridge Terrace, greater opportunity for intensification to the south. Enhanced bus to the east. Grade separated Basin Reserve. Two options for Mt Victoria tunnels which will provide one lane for general traffic and one lane for public transport in each direction, and dedicated active travel facilities.</p> <p>Option ii: BRT solution to Island Bay via Kent/Cambridge Terrace. BRT to the east. Grade separated Basin Reserve. Two options for Mt Victoria tunnels which will provide one lane for general traffic and one lane for public transport in each direction, and dedicated active travel facilities.</p>
RPI V2	Only one major investment (long tunnel or MRT) could be implemented within the affordability threshold. A long tunnel alone would not achieve the desired outcomes. MRT only equates to RPI V3.	Not progressed	
RPI V3	Within the affordability threshold.	Progressed	Option iii: LRT to Island Bay via Kent/Cambridge Terrace, enhanced bus to the east, grade separated Basin Reserve and new active mode tunnel.
RPI V3A	Within the affordability threshold.	Progressed	Option iv: LRT to Island Bay via Taranaki Street, enhanced bus to the east, at-grade Basin Reserve and new active mode tunnel.

All of the Programme Affordable Short List options have assumed common features including:

- Short term programme:
 - Golden Mile improvements
 - Thorndon Quay/Hutt Road improvements
 - Central City pedestrian improvements
 - Cobham Drive crossing and safer speeds
- City Streets (will slightly vary by programme depending on extent of MRT)
- Travel Demand Management:
 - Travel behaviour changes
 - Congestion charging (a sensitivity test for all programmes)

Each of the four Programme Affordable Short List options are summarised in Figure 5, Figure 6, Figure 7 and Figure 8. It is noted that in Options i and ii, a diagonal tunnel is shown at Mt Victoria tunnel however a parallel tunnel has not been discounted.

3.1.1 Programme Affordable Short List Option i

As shown in Figure 5, Option i represents a comprehensive proposal to improve travel choice and performance throughout Wellington City and the eastern and southern suburbs. It offers improvements for all modes of transport, futureproofs networks and provides high quality public transport along corridors identified for potential growth in urban development.

The most significant component of Option i is a new light rail system traveling from the city centre to Island Bay. It will extend the reach of the region’s rail network through connections at Wellington Station and offer improved travel options within the city. Customers will experience faster, more reliable journeys on dedicated lanes along the waterfront quays, Wakefield Street, Cambridge Terrace, around the Basin Reserve and along Adelaide Road to the hospital.

The route then continues south through Newtown, Berhampore and Island Bay, supporting intensified urban development in a corridor prioritised for investment in infrastructure for growth in the short to medium term by WCC’s Spatial Plan. Construction of light rail within this growth corridor will assist with its transformation, providing opportunities to renew underground utilities, strengthen road pavements, redesign intersections and create new facilities for pedestrians and cyclists.

At the Basin Reserve, the Arras Tunnel and Sussex Street will be extended to physically separate local north-south transport movements from east-west movements on State Highway 1. This will provide additional space for light rail and buses to move with priority around the Basin Reserve, along with substantial improvements for pedestrians and cyclists. By doing this, conflicts between different types of users are reduced, increasing safety and improving journey time and reliability.

A new tunnel through Mt Victoria will improve connections to the eastern suburbs, supported by a reconfiguration of Ruahine Street and Wellington Road. Two alignments for the new tunnel are being considered, each with different impacts on properties and the Town Belt.

The first option is via a diagonal tunnel that would relocate traffic out of the existing tunnel, allowing it to be converted for use solely by people travelling on foot and by bike. The second option would be located parallel to the existing tunnel and provide dedicated space for people travelling on foot and by bike. In each option paths would be upgraded at both ends of the tunnel to improve the connection to the local active travel networks, including a connection to the Tahitai path along Cobham Drive.

Both tunnel options include dedicated space for public transport, allowing faster bus services between the Miramar peninsula and the city by bypassing the local streets of Hataitai and Mt Victoria. Local bus routes serving the needs of Hataitai residents would continue to use the existing bus tunnel. Eastern suburb bus services will be further enhanced by continuous, dedicated kerbside bus lanes through Kilbirnie to the Miramar town centre.

Together, these investments will create continuous bus priority lanes from the Miramar peninsula to Wellington Station via the Basin Reserve, supporting the Metlink bus network and the upcoming Airport X express bus service.

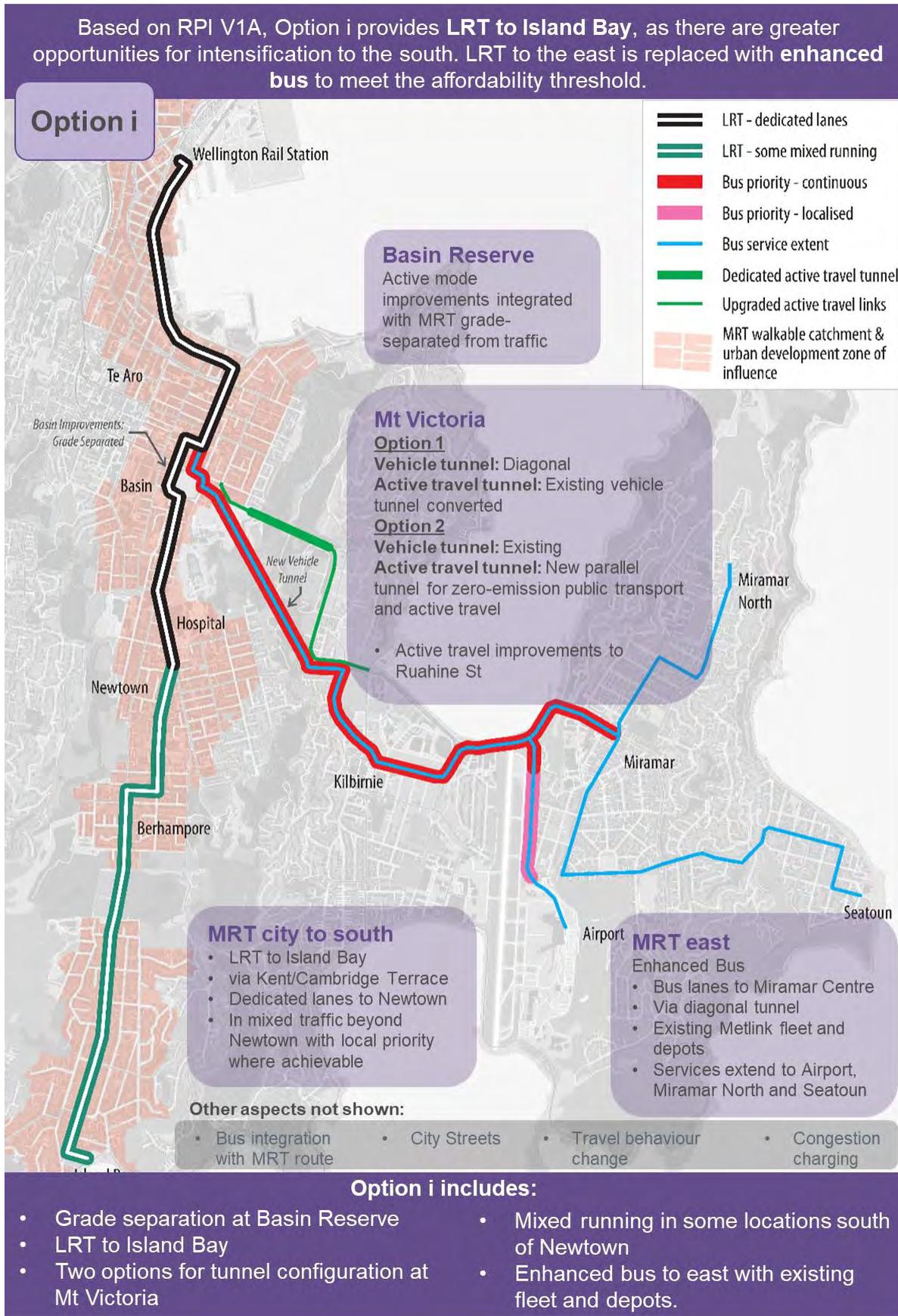


Figure 5: Programme affordable short list option i overview

Key investments included in Option i by location or intervention type are detailed below.

3.1.1.1 Basin Reserve: Arras Tunnel Extension (grade separated)

- Arras Tunnel is extended east towards Cambridge Terrace to provide grade separation of north-south local transport movements over the westbound State Highway movements travelling through the tunnel extension.
- Sussex Street is extended north to pass over the Arras tunnel extension to then connect with Cambridge and Kent Terraces. The street is widened to provide dedicated space for public transport (light rail and buses), walking and cycling, along with local north-south traffic movements.
- Westbound State Highway traffic exiting the Mt Victoria Tunnel is rerouted to the north side of the Basin Reserve to connect to the Arras tunnel extension, providing more direct travel than the current route around the south of the Basin Reserve.
- Substantial new active travel facilities are provided around all sides of the Basin with connections to the west (Pukeahu), north (Kent / Cambridge), east (Mt Victoria tunnel) and south (Adelaide Road).
- Local road connections to the Basin reserve at Rugby Street, Hania Street and Ellice Street are closed to traffic.
- A significant reduction in the amount of traffic in front of the school on Dufferin Street.

3.1.1.2 Mt Victoria Tunnel Options

All options for the Mt Victoria Tunnel provide one lane for general traffic and one lane for public transport in each direction and dedicated active travel facilities.

Option 1: Diagonal Tunnel

- A new twin-bore vehicle tunnel is constructed from the Basin Reserve to Wellington Road and provides for one lane for general traffic and one lane for public transport in each direction.
- The existing tunnel is converted to a dedicated active travel tunnel.
- Ruahine Street is modified to provide new active travel facilities connecting to the converted Mt Victoria Tunnel. Local traffic connectivity on Ruahine Street to Hataitai and Hataitai Park is retained.
- Wellington Road is reconfigured between the new tunnel portal and Cobham Drive to provide prioritised access for public transport to Kilbirnie and active travel facilities that connect the tunnel to the Tahitai pathway along Cobham Drive.
- Traffic connectivity from Hataitai to the city via the Basin Reserve is rerouted via the Hamilton Road / Kilbirnie Crescent intersection, Wellington Road and the new diagonal tunnel.

Option 2: Parallel Tunnel

- The existing tunnel continues to be used for vehicle traffic with pedestrian facilities removed.
- A new tunnel is constructed alongside and north of the existing tunnel, providing one lane in each direction for zero-emission public transport vehicles (light rail and bus), and dedicated active travel facilities.
- Ruahine Street and Wellington Road are widened, with options for the widening to be on either the Town Belt side or residential side of Ruahine Street (or a mixture of both). The

widening provides prioritised access for public transport to Kilbirnie and active travel facilities that connect the tunnel to the Tahitai pathway along Cobham Drive.

3.1.1.3 Public Transport to the South: Light Rail

- 8 km route from Wellington Station to Island Bay.
- Continuous dedicated public transport lanes from the station to Newtown via Waterfront Quays, Cambridge Terrace, Sussex Street, Adelaide Road and Riddiford Street. Dedicated bike lanes are also provided along the route from the Basin Reserve to the hospital.
- Sections of mixed running with general traffic in narrower street sections through Berhampore and Island Bay. Dedicated bike lanes are provided where corridor width allows.

3.1.1.4 Public Transport to the East: Enhanced Bus

- Continuous dedicated bus lanes from Cambridge Terrace via a new Mt Victoria Tunnel to Miramar town centre.
- Bus priority treatment on Calabar Road to the Airport.
- Bus services operated by Metlink travel to the Airport, Miramar North, Seatoun and other locations.
- Buses travel through the city centre via the Golden Mile or waterfront quays.
- Standard Metlink fleet and depots used, as at time of delivery.

3.1.2 Programme Affordable Short List Option ii

As shown in Figure 6, Option ii provides many of the benefits of Option i but presents an alternate approach for improving public transport. It offers increased investment in public transport in the eastern suburbs, and less in the southern corridor beyond Newtown.

Improvements to the Basin Reserve and Mt Victoria tunnel proposed in Option i are also included. Although this option also provides improvements to all modes of transport, it is less focussed than Option i on stimulating intensified urban development in the southern suburbs.

Instead of light rail, investment in public transport would be through a Bus Rapid Transit (BRT) system, tailored specifically for the needs of Wellington. Like the light rail system proposed in Option i, the BRT route would also commence at Wellington Station and travel along the waterfront quays and Cambridge Terrace towards the Basin Reserve. There it splits into two branches: a southern branch that travels to the hospital and Newtown; and an eastern branch via the Mt Victoria tunnel to Miramar town centre.

Within those corridors, the design of the BRT infrastructure would look very similar to the proposed light rail infrastructure. Dedicated lanes would be provided, station layouts would be similar and the same opportunities for refreshing the corridor would be available to renew underground utilities, upgrade road pavements, improve intersections and create new pedestrian and cyclist facilities. The opportunity to deliver significant corridor improvements like these distinguishes this BRT option from an 'enhanced bus' option which has a narrower focus on adding bus priority within existing roads.

Although the dedicated BRT lanes would only be constructed to Miramar town centre and Newtown, the BRT services would continue further to destinations such as the Airport, Seatoun or Island Bay. This is where BRT shows its advantage, allowing services to travel beyond the main corridor into areas where dedicated BRT lanes are not needed if traffic congestion is not a problem, or the infrastructure is too expensive to provide. Minor improvements would still be made along the outer part of these routes but would be targeted to address specific problems and to upgrade bus stops.

Vehicles used for BRT would be of a higher standard than normal buses, more advanced and more comfortable. They would be an articulated design: longer and high capacity, but without the height issues that double decker buses experience. Articulated buses offer better performance than standard buses in inner city areas, providing additional doors to allow faster passenger movement.

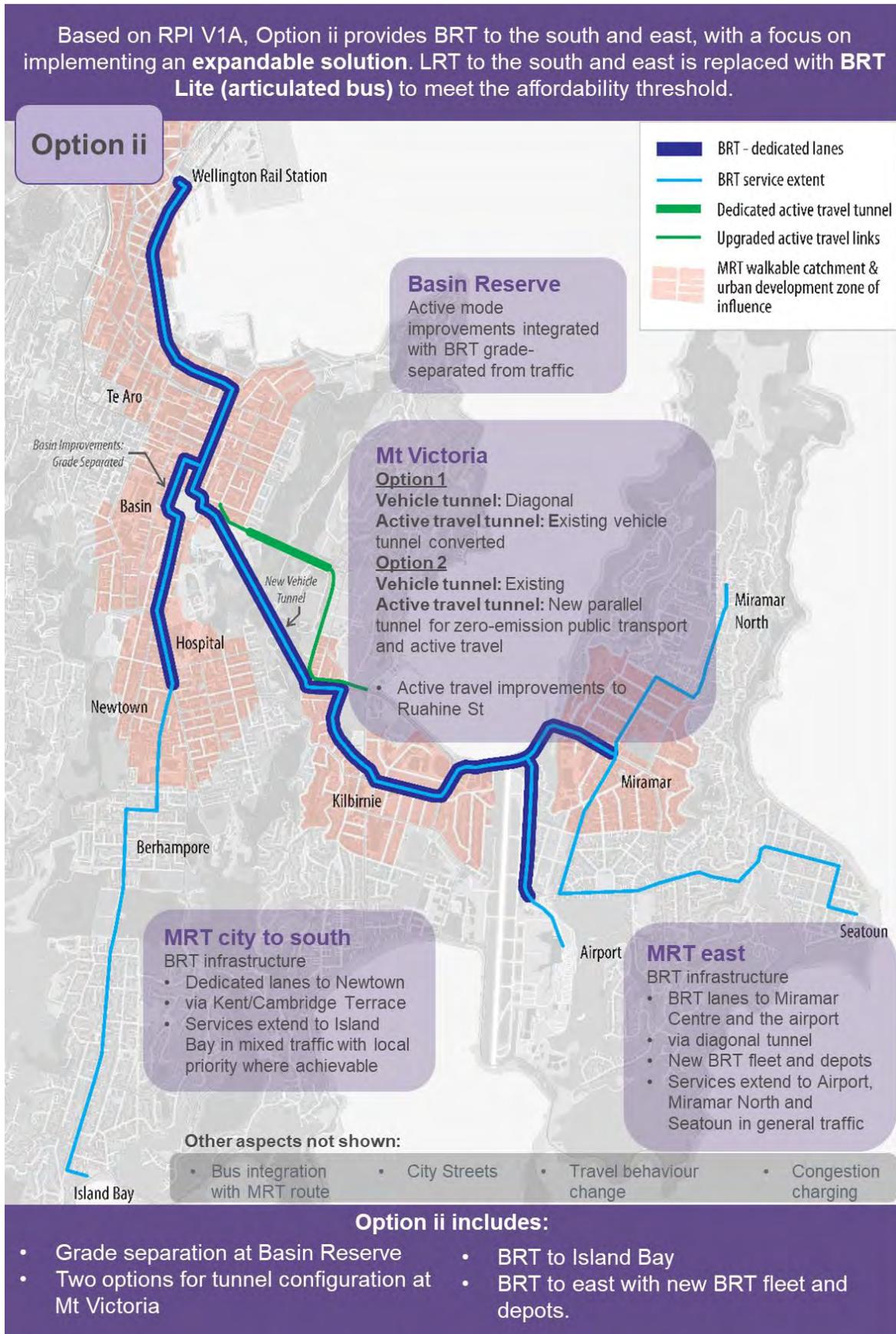


Figure 6: programme affordable short list option ii overview

Key investments included in Option ii by location or intervention type are detailed below.

3.1.2.1 Basin Reserve: Arras Tunnel Extension (grade separated)

- Arras Tunnel is extended east towards Cambridge Terrace to provide grade separation of north-south local transport movements over the westbound State Highway movements travelling through the tunnel extension.
- Sussex Street is extended north to pass over the Arras tunnel extension to then connect with Cambridge and Kent Terraces. The street is widened to provide dedicated space for public transport (BRT and other buses), walking and cycling, along with local north-south traffic movements.
- Westbound State Highway traffic exiting the Mt Victoria Tunnel is rerouted to the north side of the Basin Reserve to connect to the Arras tunnel extension, providing more direct travel than the current route around the south of the Basin Reserve.
- Substantial new active travel facilities are provided around all sides of the Basin with connections to the west (Pukeahu), north (Kent / Cambridge), east (Mt Victoria tunnel) and south (Adelaide Road).
- Local road connections to the Basin reserve at Rugby Street, Hania Street and Ellice Street are closed to traffic.
- A significant reduction in the amount of traffic in front of the school on Dufferin Street.

3.1.2.2 Mt Victoria Tunnel Options

All options for the Mt Victoria Tunnel provide one lane for general traffic and one lane for public transport in each direction and dedicated active travel facilities.

Option 1: Diagonal Tunnel

- A new twin-bore vehicle tunnel is constructed from the Basin Reserve to Wellington Road and provides for one lane for general traffic and one lane for public transport in each direction.
- The existing tunnel is converted to a dedicated active travel tunnel.
- Ruahine Street is modified to provide active travel facilities connecting to the converted Mt Victoria Tunnel. Local traffic connectivity on Ruahine Street to Hataitai and Hataitai Park is retained.
- Wellington Road is reconfigured between the new tunnel portal and Cobham Drive to provide prioritised access for public transport to Kilbirnie and active travel facilities that connect the tunnel to the Tahitai path along Cobham Drive.
- Traffic connectivity from Hataitai to the city via the Basin Reserve is rerouted via the Hamilton Road / Kilbirnie Crescent intersection, Wellington Road and the new diagonal tunnel.

Option 2: Parallel Tunnel

- The existing tunnel continues to be used for vehicle traffic with pedestrian facilities removed.
- A new tunnel is constructed alongside and north of the existing tunnel, providing one lane in each direction for zero-emission public transport vehicles (BRT and bus), and dedicated active travel facilities.
- Ruahine Street and Wellington Road are widened, with options for the widening to be on either the Town Belt side or residential side of Ruahine Street (or a mixture of both). The

widening provides prioritised access for public transport to Kilbirnie and active travel facilities that connect the tunnel to the Tahitai pathway along Cobham Drive.

3.1.2.3 Public Transport to the South: Bus Rapid Transit

- Continuous dedicated BRT lanes from the station to Newtown via Waterfront Quays, Cambridge Terrace, Sussex Street, Adelaide Road and Riddiford Street.
- BRT services extend to Island Bay, supported by new BRT stop infrastructure.
- All-new, high specification articulated BRT buses.

3.1.2.4 Public Transport to the East: Bus Rapid Transit

- Continuous dedicated BRT lanes from Cambridge Terrace to Miramar town centre and the Airport, via a new Mt Victoria Tunnel.
- BRT services extend to the Airport, Miramar North and Seatoun, supported by new BRT stop infrastructure.
- All-new, high specification articulated BRT buses.
- New BRT depot.

3.1.3 Programme Affordable Short List Option iii

As shown in Figure 7, Option iii provides most of the elements of Option i, but does not include a new Mt Victoria vehicle tunnel.

Light rail to Island Bay is again the key component of the proposed investment, along with the improvements to the Basin Reserve that provide benefits to all travel modes.

Bus services to the east are again enhanced through the delivery of extensive bus lanes through Kilbirnie to Miramar town centre. However, between Te Aro and Kilbirnie buses would travel via the existing Hataitai bus tunnel and the local streets of Mt Victoria and Hataitai.

To improve safety and customer experience, streets in Mt Victoria that the route follows would be upgraded with the relaying of pavement, adjustments to kerb positions, improvements to drainage and supporting treatments to intersections. New bus stops and shelters would also be provided.

In Hataitai, similar improvements would be made. Further investment would allow for the creation of bus priority measures in some locations, and adjustment to local traffic movements.

Improved connectivity for pedestrians and cyclists would be provided by the construction of a dedicated active travel tunnel alongside the existing Mt Victoria vehicle tunnel. Paths would be upgraded at both ends of this tunnel to improve the connection to the local active travel networks, including a connection to the Tahitai pathway along Cobham Drive.

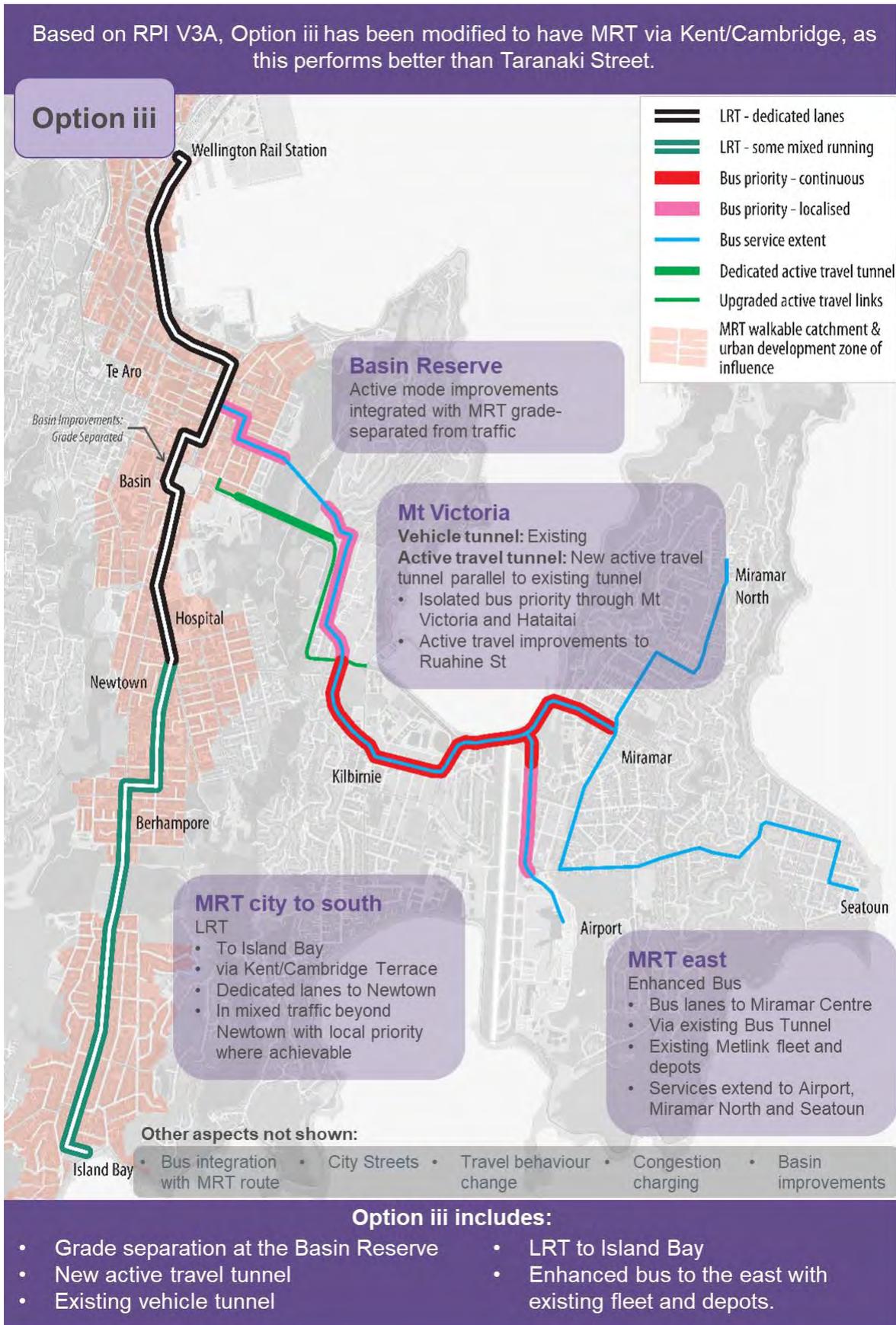


Figure 7: Programme affordable short list option iii overview

Key investments included in Option iii by location or intervention type are detailed below.

3.1.3.1 Basin Reserve: Arras Tunnel Extension (grade separated)

- Arras Tunnel is extended east towards Cambridge Terrace to provide grade separation of north-south local transport movements over the westbound State Highway movements travelling through the tunnel extension.
- Sussex Street is extended north to pass over the Arras tunnel extension to then connect with Cambridge and Kent Terraces. The street is widened to provide dedicated space for public transport (BRT and other buses), walking and cycling, along with local north-south traffic movements.
- Westbound State Highway traffic exiting the Mt Victoria Tunnel is rerouted to the north side of the Basin Reserve to connect to the Arras tunnel extension, providing more direct travel than the current route around the south of the Basin Reserve.
- Substantial new active travel facilities are provided around all sides of the Basin with connections to the west (Pukeahu), north (Kent / Cambridge), east (Mt Victoria tunnel) and south (Adelaide Road).
- Local road connections to the Basin reserve at Rugby Street, Hania Street and Ellice Street are closed to traffic.
- A significant reduction in the amount of traffic in front of the school on Dufferin Street.

3.1.3.2 Mt Victoria Tunnel

- Existing tunnel continues to be used for vehicle traffic with pedestrian facilities removed.
- A new tunnel is constructed alongside and north of the existing tunnel, providing dedicated cycling and pedestrian lanes.

3.1.3.3 Public Transport to the South: Light Rail

- 8 km route from Wellington Station to Island Bay.
- Continuous dedicated public transport lanes from the station to Newtown via Waterfront Quays, Cambridge Terrace, Sussex Street, Adelaide Road and Riddiford Street. Dedicated bike lanes are also provided along the route from the Basin Reserve to the hospital.
- Sections of mixed running with general traffic in narrower street sections through Berhampore and Island Bay. Dedicated cycle lanes are provided where corridor width allows.

3.1.3.4 Public Transport to the East: Enhanced Bus

- Improved bus priority infrastructure between Cambridge Terrace and Wellington Road via the existing Hataitai bus tunnel and upgrades to the streets of Mt Victoria and Hataitai.
- Continuous dedicated bus lanes from Wellington Road to Miramar Town Centre via Kilbirnie.
- Bus priority treatment on Calabar Road to the Airport.
- Bus services operated by Metlink travel to the Airport, Miramar North, Seatoun and other locations.
- Buses travel through the city centre via the Golden Mile or waterfront quays.
- Standard Metlink fleet and depots used, as at time of delivery.

3.1.4 Programme Affordable Short List Option iv

As shown in Figure 8, Option iv is similar to Option iii, but does not include the Arras Tunnel extension to provide grade separation around the Basin Reserve.

Light rail to Island Bay is included, along with the enhanced bus priority infrastructure presented for Option iii to Miramar and the Airport.

However, without the separation of local and highway traffic at the Basin Reserve, light rail would need to follow a different route to the waterfront, travelling via Tory Street and Taranaki Street.

Minor improvements at the Basin Reserve precinct would accommodate light rail and provide minor improvements for pedestrians and cyclists, safety, and traffic flow.

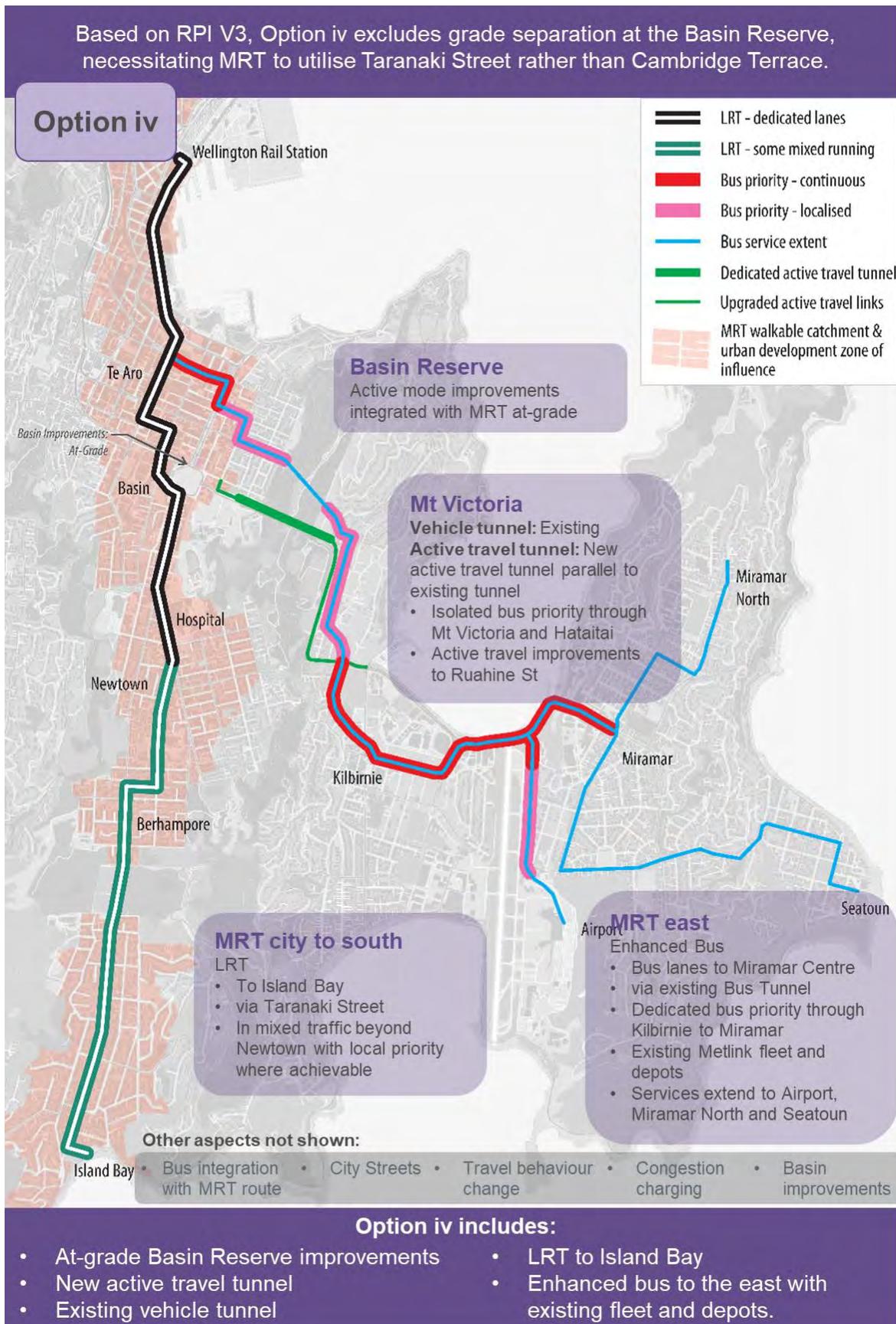


Figure 8: Programme affordable short list option iv overview

Key investments included in Option iv by location or intervention type are detailed below.

3.1.4.1 Basin Reserve: Minor changes (at grade)

- Light rail route effectively bypasses the Basin Reserve, except at the southwestern corner to achieve a route connection between Adelaide Road and Tory Street via Rugby Street and Tasman Street.
- Parking removal and minor changes to general traffic lane configuration required to accommodate the dedicated public transport lanes.
- Improvements for pedestrians and cyclists around the east side of the Basin requiring changes to the layout outside the schools on Dufferin Street.

3.1.4.2 Mt Victoria Tunnel

- Existing tunnel continues to be used for vehicle traffic with pedestrian facilities removed.
- A new tunnel is constructed alongside and north of the existing tunnel, providing active travel facilities for pedestrians and cyclists.

3.1.4.3 Public Transport to the South: Light Rail

- 8 km route from Wellington Station to Island Bay.
- Continuous dedicated public transport lanes from the station to Newtown via Waterfront Quays, Cambridge Terrace, Sussex Street, Adelaide Road and Riddiford Street. Dedicated bike lanes are also provided along the route from the Basin Reserve to the hospital.
- Sections of mixed running with general traffic in narrower street sections through Berhampore and Island Bay. Dedicated cycle lanes are provided where corridor width allows.

3.1.4.4 Public Transport to the East: Enhanced Bus

- Improved bus priority infrastructure between Cambridge Terrace and Wellington Road via the existing Hataitai bus tunnel and upgrades to the streets of Mt Victoria and Hataitai.
- Continuous dedicated bus lanes from Wellington Road to Miramar Town Centre via Kilbirnie.
- Bus priority treatment on Calabar Road to the Airport.
- Bus services operated by Metlink travel to the Airport, Miramar North, Seatoun and other locations.
- Buses travel through the city centre via the Golden Mile or waterfront quays.
- Standard Metlink fleet and depots used, as at time of delivery.

4 Multi-Criteria Analysis Scoring Discussion

4.1 Evaluation Methodology

This section outlines the evaluation methodology that has been applied to assess the Programme Affordable Short List options. This summarised methodology is detailed in the LGWM MRT/SHI MCA Framework Report (August 2021).

Draft analysis and scoring of criteria were initially undertaken by technical specialists familiar with the programme and who have undertaken the previous long list and short list options. A series of workshops were then held with partner representatives in September 2021 to agree the scoring of the Programme Affordable Short List options and establish the technically best performing option. The workshop series provided attendees with an opportunity to review the MCA assessment criteria, scores, rationale and weightings.

4.2 Assessment Criteria

As shown in Figure 9, the Programme Affordable Short List options were assessed against the LGWM programme objectives, Mana Whenua values, environmental and social impacts, and design, delivery, and operation criteria.

Programme Objectives	Mana Whenua	Design, Delivery and Operation
1) A transport system that enhances urban amenity and enables urban development outcomes	Mana Whenua	Engineering Difficulty
2) A transport system that provides more efficient and reliable access for users	Environmental and Social Impacts	Property Difficulty
3) A transport system that reduces carbon emissions and increases mode shift by reducing reliance on private vehicles	Noise and vibration	Scalability of network and services, and fit with other public transport services (MRT only)
4) A transport system that improves safety for all users	Heritage and archaeology	
5) A transport system that is adaptable to disruptions and future uncertainty	Social	
	Business disruption and outcomes	
	Landscape and visual	
	Contaminated land	

Figure 9: MCA programme affordable short list options criteria

4.3 Technical Assessment

Technical specialists were tasked with working with Partner representatives to determine a score for each Programme Affordable Short List option. The scoring was undertaken using the 11-point scale as shown in Table 3. All options were assessed against the 2036 Do Minimum scenario¹.

¹ The Do Minimum is 2036 with the baseline (2019) land use scenario and assumes no additional intensification and assumes crowding and unreliability on the Golden Mile and key arterials. The short term programme elements of LGWM are consistent across all package options, i.e., Golden Mile, City Streets and Thornden Quay/Hutt Road improvements are delivered, along with a second public transport spine, but these interventions are not included in the 2036 Do Minimum scenario.

Table 3: Scoring guide

Score	Scoring Description
5	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / performance benefits
4	High extent of benefits and confidence of benefit being realised and/or medium - long term benefits
3	Good benefits and/or medium term
2	Low or localised benefits and/or short term
1	Very low benefits and/or very short term
0	No change in benefits, impacts or difficulties from current situation
-1	Few difficulties, very low cost or low impact on some resources/values and/or very short term
-2	Minor difficulties, low cost or minor impacts on resources/values and/or short term
-3	Some difficulties, low cost or minor impacts on resources/values and/or medium term
-4	Clear difficulties, high cost or high impact on resources/values and/or medium - long term
-5	Substantial difficulties, very high cost or substantial impacts on resources/values and/or long term/permanent

Options were scored both with and without the application of congestion charging (CC) as summarised in Table 4.

PwC were commissioned by the LGWM programme to undertake a study of congestion charging. The PwC recommended congestion charge assumptions were used to inform a sensitivity test. A congestion charge scenario was assessed by the technical specialists for each option using the following assumptions:

- Cordon inside of SH1
- \$3.50 inbound in AM peak, \$1.75 inbound / outbound in Inter-peak, \$3.5 outbound in PM peak

The approach for modelling assumed that the \$3.50 charge (in 2013 dollars) is applied to all vehicles crossing the cordon. In terms of implementation, the \$3.50 is factored down by 0.76 to 'deflate' to a 2001 price base. Therefore, in reality, a \$3.50 charge in 2013 would (considering inflation) be more like \$5 if implemented today.

Table 4: Programme affordable short list option scores

Option	Investment Objectives						Environmental and Social Impacts						Design, Delivery and Operation		
	Liveability	Access	Carbon Emissions and Mode Shift	Safety	Resilience	Mana Whenua	Heritage and Archaeology	Social	Business Disruption and Outcomes	Landscape and Visual	Noise and Vibration	Contaminated Land	Engineering Difficulty	Property Difficulty	Scalability of Network and Services
2036 Do Minimum	0	-1	-1	-1	-2	-2	0	1	-1	0	0	0	0	0	0
Base Scores															
i	2	3	3	2	1	2	-5	-3	1	-3	2	-3	-4	-5	3
ii	2	3	3	2	2	3	-5	-3	1	-3	3	-2	-4	-5	5
iii	3	2	2	2	0	2	-5	-2	0	-2	1	-3	-4	-5	3
iv	2	2	3	2	-1	1	-4	-3	0	-1	0	-2	-3	-4	3
Sensitivity: Congestion Charging (CC)															
i (CC)	3	3	4	2	1	2	-5	-3	1	-3	2	-3	-4	-5	3
ii (CC)	3	4	4	2	2	3	-5	-3	1	-3	3	-2	-4	-5	5
iii (CC)	4	2	3	2	0	2	-5	-2	0	-2	1	-3	-3	-5	3
iv (CC)	3	2	4	2	-1	1	-4	-3	0	-1	0	-2	-2	-4	3

5 MCA Scoring Discussion

This section provides a summary of the scoring and related commentary of the Programme Affordable Short List options related to the investment objectives, Mana Whenua values, environmental and social effects, and design, delivery, and operational considerations.

A more detailed write up of the scores, and in particular a description of the outcomes for each of the KPIs, are provided in the appendices.

Investment Objective 1 – Liveability

The liveability investment objective assessment considers urban amenity, urban development and attracting traffic off city streets. The combined KPI results show that Programme Affordable Short List Option iii was the highest scoring option.

Key differentiators impacting the overall relative scoring between options for Liveability were:

Urban Amenity

- Grade separated Basin Reserve is positive (Options i, ii, iii)
- MRT and relative level of coverage has a positive influence and due to the highest coverage being in the city all options are effectively equal
- Parallel tunnel option (Options iii and iv) is preferable to the diagonal tunnel
- Haining Street redevelopment opportunity (Option iv) is positive but less than the Basin Reserve.

Option iii scores 2 and Options i, ii and iv have a score of 1.

Urban Development

- Development in the CBD, Te Aro and Newtown has higher potential to lead to a larger quantum of development than to the south and east
- Haining Precinct has the potential to be a comprehensive development area that would make Option iv different to the Kent-Cambridge Terraces route of the CBD, but only if facilitation of a comprehensive development by the public sector were funded and committed to. This has not been assumed for the purpose of these scores
- LRT is assumed to provide more public transport capacity to support the quantum of development generated as a result of the investment in the infrastructure. However, based on the development potential information available at the time of the assessment, this is not enough to warrant a change in scores.
- Enhanced bus improvements are not considered to have a significant effect on development.

Options i, ii, iii and iv all score 3 with marginal differences for this KPI but all are better than the Do Minimum which scores 1.

Attracting Traffic Off City Streets

- Active mode shift is positive but common across options
- Public transport shift is positive but similar across options at a network level

Options i, ii, iii and iv all score 0 with marginal differences for this KPI but all are better than the Do Minimum which scores -2.

Summary

- Grade separated Basin Reserve creates benefits under Options i, ii, iii due to the connectedness this brings to open spaces (Basin Reserve to Pukeahu Park), active mode movements connecting across these spaces, and schools access on Dufferin Street
- MRT extent varies across the options but is effectively equalled between the options when the benefits of the south and east are combined – the central city section is relatively neutral as all options have MRT within. There was no discernible mode differential to the equally positive urban development scores when considering the basis for the assessment of GFA/units of dwellings generated by all of the MRT options
- All options include the Mt Victoria active mode tunnel in one form or another which is both positive for the connections it provides, but also negative to insert it into the existing streets on the west side of Mt Victoria
- The negative differentiators are the diagonal tunnels and the way the diagonal geometry affects the composition of streets on the north side of the Basin Reserve such that there are left over spaces that cannot be readily repurposed for urban development, will leave inactive negative spaces and, together with the extended street widths and flow of traffic, generates wide street spaces causing a severance to people moving between the Basin Reserve and Kent and Cambridge Terraces. The new active mode tunnels are also negative given the impact on [9\(2\)\(b\)\(ii\)](#), [9\(2\)\(j\)](#)
- There was no differentiation from the options to reducing traffic on city streets. This is because urban amenity scored better in Programme Affordable Short List Option iii due to element combinations
- For urban development, Option ii is considered to have greater potential urban development reach with BRT to the south and east, compared with Option i with LRT in combination with enhanced bus.

With congestion charging, all option scores increased by one point. Scoring for liveability is shown in Figure 10.

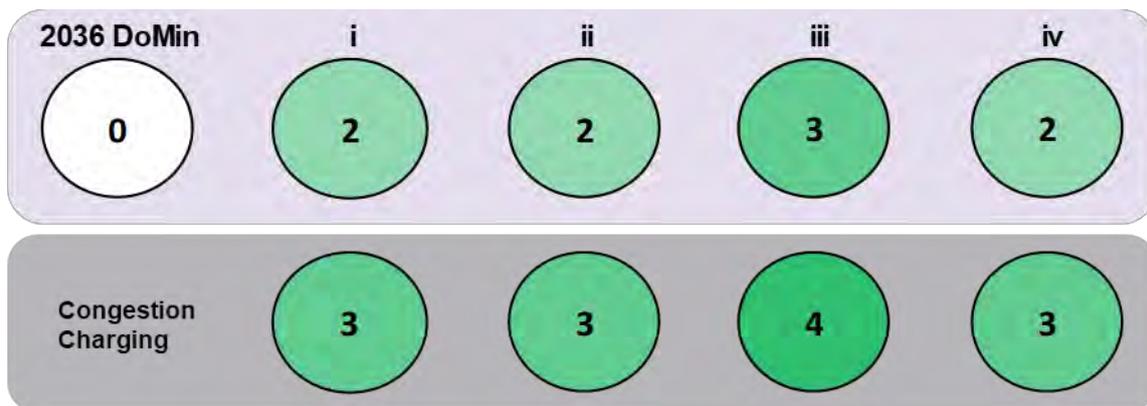


Figure 10: Liveability scoring

Investment Objective 2 – Access

Scores for this investment objective were based on an assessment of access and level of service for all modes within the study area. The key aspects of this included assessment of:

- People living within close proximity of key destinations
- Travel time reliability
- Comparative travel time between modes
- Equitable access for/to transport
- Pedestrian level of service
- Public transport delay
- The quality of cycling facilities.

All Programme Affordable Short List options received a positive score (except the Do Minimum option) reflecting the proposed investment in public transport and active mode infrastructure and resulting improved access.

The key differentiator impacting the overall relative scoring between options for access was the extent to which the public transport network was improved. Options that delivered higher levels of public transport priority were awarded relatively higher scores. As such, Options i and ii performed slightly better than Options iii and iv.

Overall, the congestion charge has a smaller impact on access than it does for other investment objectives as it contributes positively for some KPIs but negatively for others. It has the potential to generate a more positive effect on Option ii where BRT services can operate in mixed corridors to the greatest extent and further capitalise on improved decongested networks beyond the dedicated infrastructure.

All options deliver similar levels of traffic performance; therefore, this aspect is not a differentiator when considered at a network wide scale. Although smaller differences do not have a meaningful enough effect to change the score at a macro level (for example, the different Basin Reserve options) they are worth acknowledging and provide some micro level differentiation which will be investigated further as this project progresses. Analysis of travel times indicate that the changes at the Basin Reserve and the Mt Victoria Tunnel, coupled with mode shift to public transport and active travel, lead to some modest State Highway travel time benefits, particularly for East-West movements. Further detail on this is provided in the investment objective report for Access and the associated Programme Affordable Short List Modelling Report.

Scoring for access is shown in Figure 11.

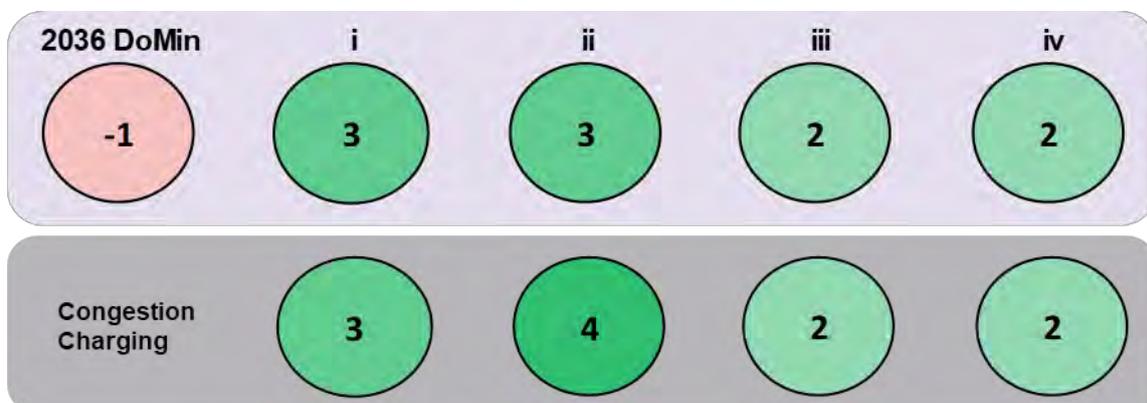


Figure 11: Access scoring

Investment Objective 3 – Carbon Emissions and Mode Shift

The key aspects of the carbon emissions and mode shift investment objective are reducing private motor vehicle reliance, therefore improving mode share (regional and mode share to the central city) and carbon effects (emissions and embodied).

The mode share in the central city assessment involves calculating the number of people travelling across the central city screen-line by mode to determine mode share statistics for each option. It shows the amount of mode shift that could occur to support reductions in private vehicle numbers in the central city and is measured through tests carried out using the Wellington Transport Strategic Model (WTSM).

This measure considers total people crossing the CBD cordon using motorised modes, to cover a range of trip purposes (not just journeys to work). Examining total people movement is important to understand the full extent of mode shift outcomes. Total public transport passenger numbers (not just MRT) are crucial because we should expect that the majority of MRT customers come from existing public transport modes. However, we still want to see an increase in total public transport trips across all modes to be able to measure the success of an option, i.e., a successful MRT spine will improve the performance of bus services on other routes, thus attracting increased patronage.

Enabled Carbon emissions were assessed using the Waka Kotahi Carbon Assessment Tool for investment (CATi). The extent to which the different components of each Programme Option contribute to emissions increases or reductions has been identified. This is a sifting tool, based on the InterAmerican Development Bank transport infrastructure investment categories and services that align with Waka Kotahi project categories.

Key differentiators impacting the overall relative scoring between options included:

- All options are predicted to perform the same on regional mode share.
- Options are predicted to perform similarly on mode share into the central city, although there are slight differences, with Option iii predicted to perform slightly worse than the others.
- Options i, ii and iv are predicted to perform similarly on carbon emissions, with Option iii predicted to score worse.
- Options iii and iv are predicted to score better than Options i and ii on embodied carbon.

Options i, ii and iv were all given the same score of +3. However, Option iii is predicted to score worse than other options on carbon emissions and given the high weighting for this sub-category (as noted in the technical specialist report), and with this option predicted to score slightly worse under mode share to the central city, it was considered reasonable to score Option iii one point worse than the other options, overall.

Congestion charging will result in a one point increase for each option because this will result in decreased emissions. Scoring for carbon emissions and mode shift is shown in Figure 12.

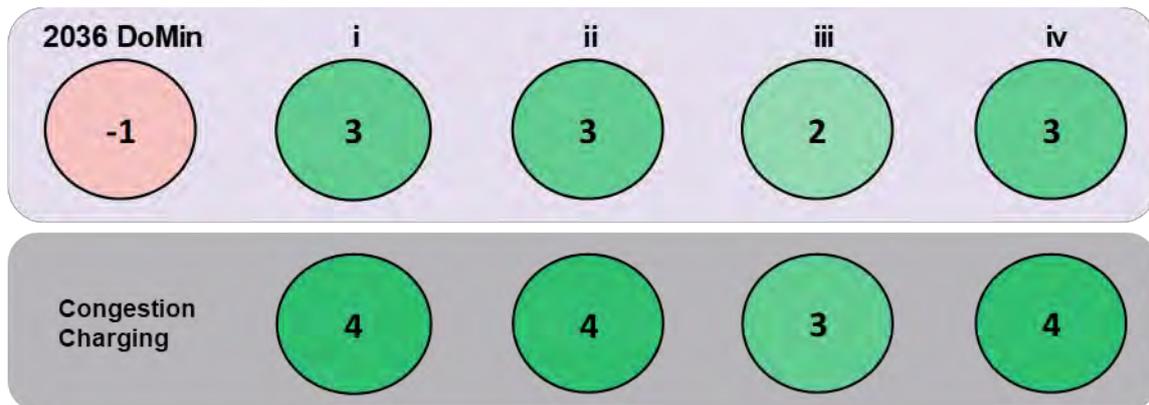


Figure 12: Carbon emissions and mode shift scoring

Investment Objective 4 – Safety

Scores for safety are based on estimated change in risk of deaths and serious injuries for people walking and cycling as well as for all transport users.

All options scored equal for safety with a score of +2 (except for Do Minimum, which scored -1), as there were no differentiators between options that were sufficient enough to move scoring. Safety benefits are also realised through short term programmes across all options (Golden Mile; Thorndon Quay / Hutt Road; Central City pedestrian improvements; Cobham Crossing and safer speeds; City Streets; Travel Demand Management).

Subtle differences for people walking or cycling include:

- Option ii – BRT (i.e. no tracks) has decreased risk for cyclists. Option ii also has fewer benefits south of Newtown, acknowledging that the existing network would be utilised beyond Newtown, therefore less new infrastructure investment and current deficiencies would remain. However, safety benefits are still expected to be significant for areas north of Newtown and to the East.
- Option iv – increased risk due to non-grade separation at the Basin Reserve being less safe for pedestrians and cyclists. Also, LRT at Taranaki Street results in greater exposure for pedestrians.

Subtle differences for all transport users include:

- Option i and ii introduces a relatively complex intersection at southern portal of the diagonal tunnel but is offset with reduction in exposure at other intersections.
- Option ii – less benefit south of Newtown as no MRT infrastructure; However most VKT (exposure) is north of Newtown and is offset by investment in safer systems; Major benefits still achieved for area north of Newtown and to East
- Option iv – At-grade Basin Reserve has a lower level of safety for all users.

Scores are not expected to change with congestion charging. Any reduction in vehicle numbers and reduced congestion could be negated by the increased speeds which are the primary determinant of crash severity, particularly in areas with high volumes of active users.

Scoring of safety is shown in Figure 13.

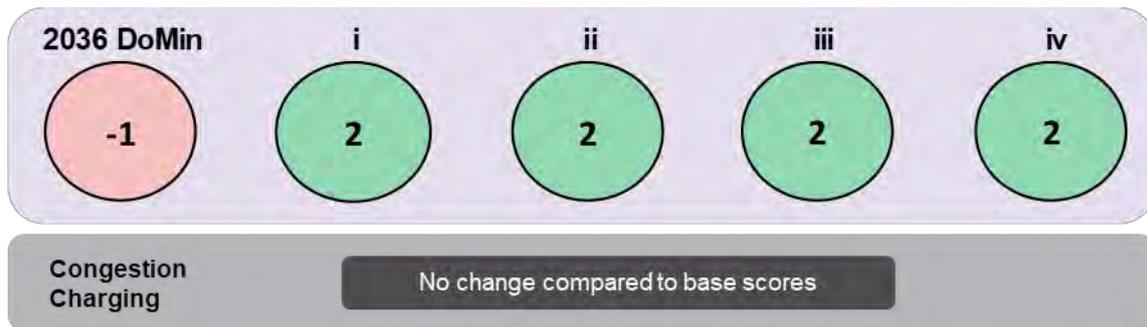


Figure 13: Safety scoring

Investment Objective 5 – Resilience

Resilience is measured based on both functionality of access and time for recovery. This investment objective was scored based on three sub-criteria:

- The ability of a Programme Affordable Short List option to enhance the resilience of land transport access to critical facilities and within the city (operational resilience)
- Resilience to high impact, low probability events and contribution to access for communities
- The ability of a Programme Affordable Short List option to enhance resilience of access, and to provide socio-economic functionality in low impact, high probability events as well as during unplanned events (redundancy). This sub-criterion has the highest weighting in the assessment due to the frequency and cumulative impacts of events to people who use the transport network.

Overall, Option ii scored highest for resilience, with a score of +2. Key differentiators include:

- Option i provides some improvement in resilience due to the diagonal tunnel bypass of critical resilience risks at the approach to the current Mt Victoria tunnel and the Basin Reserve grade separation.
- Option ii provides slightly greater resilience compared to Option i because the BRT is assumed to be able to divert around or along a different route in operational / LIHP events.
- Option iii and iv provide little improvement compared to the present day because the small improvements do not adequately offset the effects of increased population, climate change and deterioration of assets. Option iii is slightly better because of grade separation at the Basin Reserve.

Congestion charging does not change the scores for resilience. Scoring for resilience is shown in Figure 14.

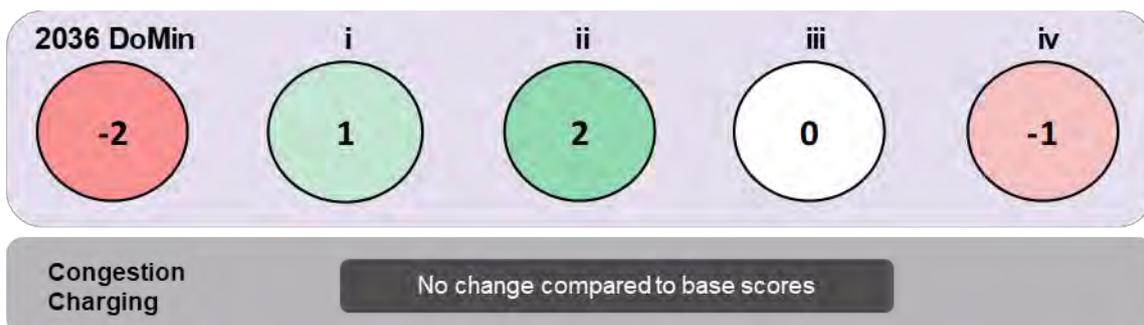


Figure 14: Resilience scoring

Mana Whenua

The Programme Affordable Short List options were all scored against a set of Mana Whenua values developed by iwi partners' representatives, with the authority of the iwi partner organisations Taranaki Whānui and Ngāti Toa. These values are:

- 1 Whakapapa - A sense of place
- 2 Wai-ora - Respect the role of water
- 3 Pūngao-ora – Energy
- 4 Hau-ora – Optimising health and wellbeing
- 5 Whakamahitanga - Use of materials
- 6 Manaakitanga – Support a just and equitable society
- 7 Whakāhuetanga - Celebrate beauty in design.

All of the options were assessed to have a positive impact compared to the existing situation and the Do Minimum. Option ii scored highest for this criterion, with a score of +3.

- Option i includes full LRT to Island Bay via Kent and Cambridge Terrace. But only proposes enhanced bus to the east via a new diagonal tunnel, with the Basin Reserve grade separated. This option scores well on Whakapapa, Hau-ora and Manaakitanga sub-criteria.
- Option ii includes BRT to both the south and east, which provides a network spreading benefits of urban uplift. This option also enables the prospect of expansion to the north (which LRT would struggle to do) and west. The proposed diagonal tunnel reduces the likely effect of other options on the Town Belt at Ruahine Street and the Basin Reserve is grade separated. This option scores best on Whakapapa, Hau-ora and Manaakitanga sub-criteria.
- Option iii includes full LRT to Island Bay via Kent and Cambridge Terrace. But only enhanced bus to the east with a lower potential urban uplift. Grade separation is included at the Basin. This option scores well on Whakapapa, Hau-ora and Manaakitanga sub-criteria. Raw score (unrounded) is slightly inferior to Option I due to only providing a new Active Travel tunnel.
- Option iv scores less well due to LRT routing via Taranaki Street through area of Te Aro Pa. Also only enhanced bus to east with lower potential urban uplift, and the Basin remains at grade. Therefore, scores for Whakapapa, Hau-ora and Manaakitanga sub-criteria are lower than for other options.

Congestion charging did not change the scoring. Scores for Mana Whenua are shown in Figure 15.

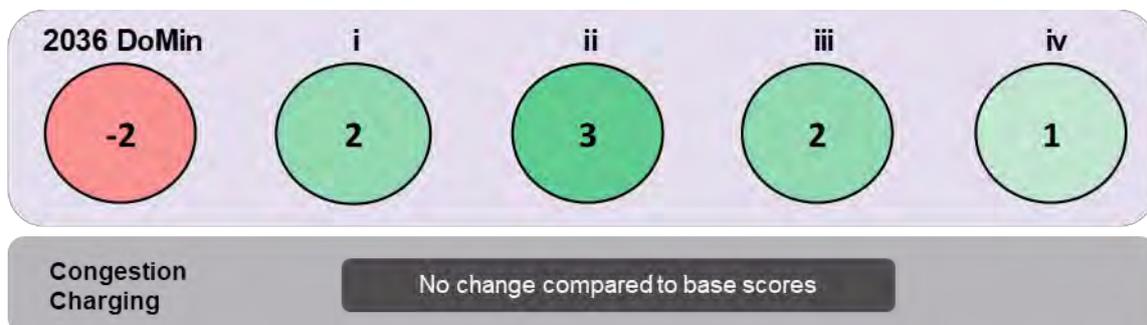


Figure 15: Mana Whenua scoring

Effects – Environmental and Social: Heritage and Archaeology

The effects of the Programme Affordable Short List options on heritage and archaeology were scored by a technical specialist based on the likely impacts on character areas, scheduled heritage building(s) and the Town Belt. In particular, the assessment considered:

- Impact of a new Mt Victoria tunnel on the adjacent character areas
- Impacts of widening around the Basin Reserve on existing pre-1900 area of development and on connectivity between places with heritage value
- Impact of Te Aro trenching through the historic part of city
- Impact of duplicate Terrace Tunnel below the historic part of city.

Based on these key considerations all Programme Affordable Short List options were scored negatively. Key differentiators impacting option scores include:

- 9(2)(b)(ii), 9(2)(j)
- Impacts around the Basin Reserve are worse for Option iii than for Options i and ii 9(2)(b)(ii), 9(2)(j). However, there is no way to differentiate between these options in the scoring as they all have a significant adverse effect and so are all scored -5.
- Option iv avoids some of the impacts around the Basin Reserve because it is at grade, and this is the main differentiator between iv and the other options.
- There are minor differences between the options that use Kent/Cambridge Terrace (i and ii) and the options that use Taranaki Street (iii and iv). However, while the options are not equal, their relative differences do not equate to a point using the 11-point scale.
- Option ii avoids potential impacts from the Hospital south if there are to be no works to this part of the corridor at all, but, as these impacts are presumed to be minor, there is not a point of difference with other options.

Congestion charging does not change the scoring. Scores for heritage and archaeology is shown in Figure 16.

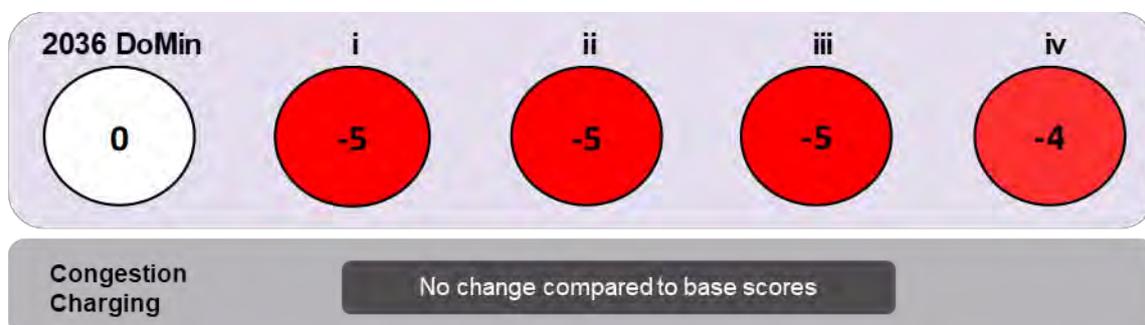


Figure 16: Heritage and archaeology scoring

Effects – Environmental and Social: Social

The assessment of the Programme Affordable Short List options primarily considered negative impacts such as noise, dust, community amenity effects and property acquisition during construction. These impacts were assessed for the following:

- Community facilities and infrastructure such as museums, recreation grounds, parks, libraries, schools, and churches.
- Major facilities such as Wellington Airport, Wellington Regional Aquatic Centre and Wellington Regional Hospital.
- Commercial and residential areas (including identification of where there was a good catchment of population served, but assuming that transport criteria would address increased trips/ catchment in a more quantitative method).
- Private property and parking.
- Businesses providing a social service and parking.

Based on these key considerations all options were scored negatively. Key differentiators impacting the overall relative scoring between options were:

- Option iii has the least social impact due to the scale of potential disturbance as it does not have the associated potential impacts of the Diagonal Tunnel and no Ruahine Street property or Town Belt acquisition would be needed.
- Options i and ii gain a -3 score due to the potential social impact on way of life, sense of place and neighbourhood both during and post construction associated with the extent of associated footprint and the potential social impact on way of life, sense of place and neighbourhood both during and post construction associated the Diagonal Tunnel.
- The potential social impact on way of life, sense of place and neighbourhood both during and post construction associated with demolition, site vacancy and relocation of services and facilities as well as population **9(2)(b)(ii), 9(2)(j)** has led to Option iv scoring -3.

Congestion charging does not impact the social scores. Scores are shown in Figure 17.

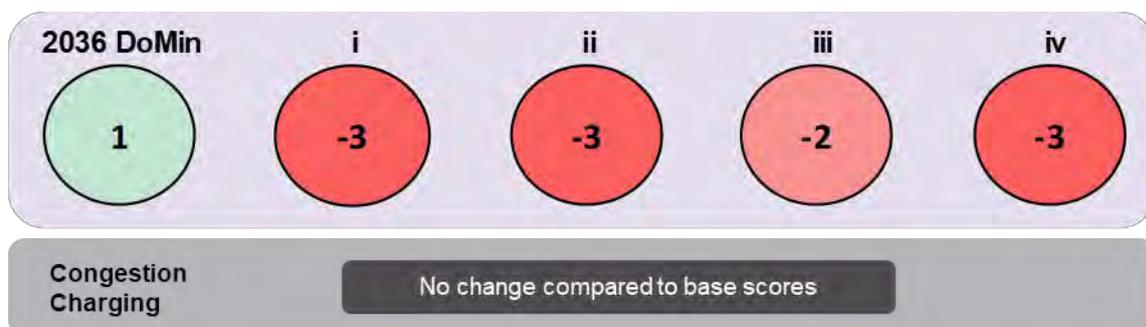


Figure 17: Social scoring

Effects – Business Disruption and Outcomes

This criterion assesses the extent of the effect of accessibility severance introduced by the implementation of the Programme Affordable Short List options to businesses, in addition to property access changes over the construction period and beyond. A measurement methodology has been defined to reflect differentiation for short-term and long-term impacts, as follows:

Short term effects (during construction) is appraised by examining density of affected commercial and industrial properties along frontage, 100m and 200m catchments near corridor investments to reflect where potential changes in accessway / loss of visibility may be introduced during construction. The assessment used spatial data and registry records of commercial and industrial buildings across the region.

Long term effects (post-construction) is appraised by examining improved accessibility change and the long run impacts it has on businesses. This largely reflects the potential long term economic impacts that commercial and industrial properties may experience once the full build-out of investments have been undertaken. The assessment used WTSM/WPTM transport modelling outputs provided by WAU.

Based on these key considerations, Options i and ii scored highest equal. Key differentiators impacting option scores include:

Short term effects: commercial / business disruption

- Extent of public transport priority and dedicated infrastructure - All options have been scored broadly the same given the magnitude of commercial / industrial plots identified along the catchment area of the MRT and SHI interventions (e.g. an estimated c.1000 commercial and industrial plots).
- Extent of roading improvements and use of existing assets - Options iii and iv, which propose an alternative MRT eastern corridor via the existing Hataitai bus tunnel, have the potential to reduce some impacts relative to other options as the assessed area of influence (up to 200m from corridor centreline) avoids commercial plots on the top of Kent/Cambridge Terrace and Ellice Street-Patterson Street, but in overall terms this is unlikely to result in a material relative scoring change as the large eastern concentration of commercial plots in Kilbirnie and Miramar remains the same as Options i and ii.
- A mitigation strategy to minimise the impact on commercial / industrial plots during construction will need to be created as part of future stages of the business case which will highlight plans for construction sequencing to inform this assessment.

Longer term effects: improved public transport accessibility and catchments

- Options i and ii are assessed to provide ‘moderately positive’ impacts based on modelled outputs showing improved accessibility (through a measure of effective density) which provides positive opportunities for commercial activities in the long term.
- Options iii and iv are assessed to score 1 point less relative to Option i and ii as modelled accessibility improvements is lower due to many trips having to travel using the existing Hataitai tunnel. Analysis has shown that whilst these options may increase the public transport catchment in the vicinity of the Hataitai shops, which has a positive impact on businesses, this is generally offset by the increase in overall journey time compared to options which utilises a new diagonal tunnel.

There is the potential for congestion charging to lead to scoring updates for long term effects (i.e. improved accessibility and impact on economic activity) rather than on short term metrics.

A congestion charge is assumed to have minimal effect on the MRT corridor (which has dedicated lanes). Modelled outputs indicate that it may deliver some benefits through traffic reduction (c.8%) but not considered sufficient to change a point score. As a result, no adjustment to scoring has been made at this stage for congestion charging.

Scores for business disruption and outcomes are shown in Figure 18.

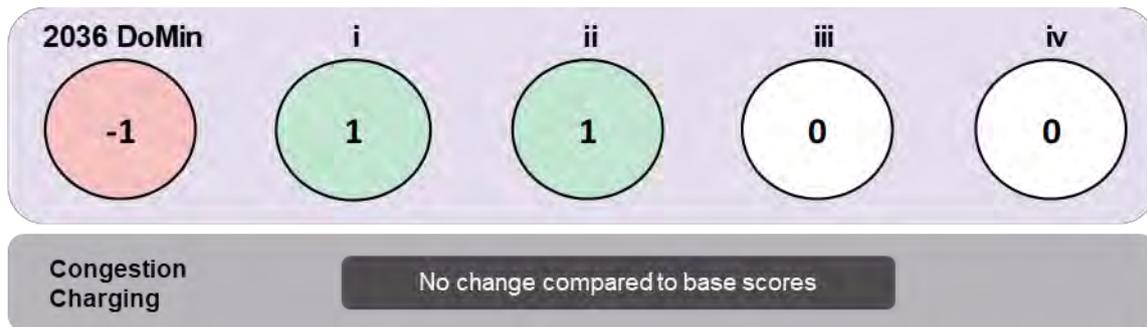


Figure 18: Business disruption and outcomes scoring

Effects – Environmental and Social: Landscape and Visual

For each Programme Affordable Short List option, spatial qualities and the physical nature of the alignment and its component elements has been analysed through a desktop review. This has included consideration of the various ways in which the Programme Affordable Short List options and their elements will potentially affect the landscape characteristics and values inherent to the various character areas identified in the baseline evaluation.

Key differentiators impacting the overall relative scoring between options were:

- Both Option i and ii are expected to result in adverse landscape and visual effects from the new diagonal Mt Victoria Tunnel portals and plant, with a greater extent associated with the town belt. These options would result in loss of open space and change in landscape character due to the portal alignment; some predevelopment character would remain but would be materially changed.
- Option iii has adverse landscape and visual effects from the new active mode tunnel on the Mt Victoria side associated with a portal and cycleway connection along Paterson Street corridor, which erodes established townscape edge and physically and visually widens the infrastructure corridor onto more elevated hill slopes visually prominent across Te Aro to the west. The active mode tunnel minimises landscape and visual effects associated with the eastern portal and Ruahine Street corridor integration, staying outside of the town belt land and not being highly visible beyond immediate surrounds.
- Option iv is the best scoring option, and results in slightly lesser level of effects compared to Option iii, due to less infrastructure in and around the Basin Reserve with an at-grade solution. But the same adverse landscape and visual effects as Option iii associated with a new active mode tunnel on the Mt Victoria side associated with portal and cycleway connection along Paterson Street corridor, which erodes established townscape edge and physically and visually widens the infrastructure corridor onto more elevated hill slopes visually prominent across Te Aro to the west. Active mode tunnel minimises landscape and visual effects associated with the eastern portal and Ruahine Street corridor integration, staying outside of the town belt land and not being highly visible beyond immediate surrounds.
- Congestion charging is not a positive or negative influencer nor is it a differentiator on scoring for landscape and visual. Therefore, no adjustment to scoring has been made.

Scoring for the landscape and visual criteria is shown in Figure 19.

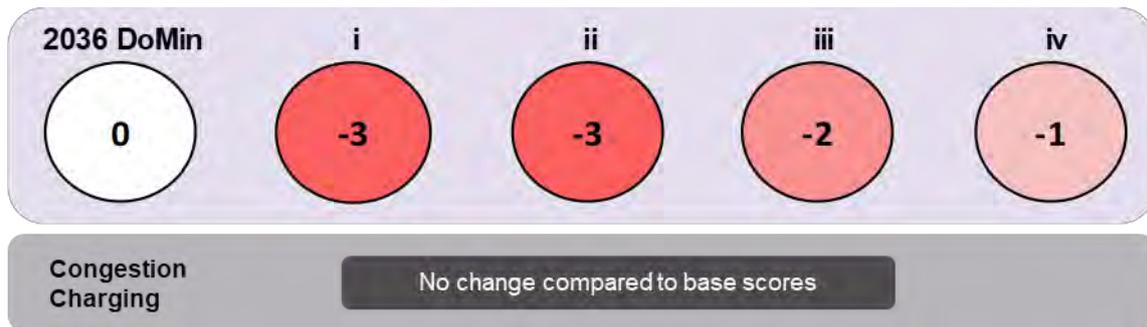


Figure 19: Landscape and visual scoring

Effects – Environmental and Social: Noise and Vibration

A high-level, desktop assessment of noise and vibration involved considering the benefits of each Programme Affordable Short List option, as well as the negative effects. Whereas benefits can be directly realised, negative effects must be able to be appropriately managed. This may involve specific mitigation measures. Therefore, the assessment methodology required two passes over each option. The first determined which geographic areas would benefit from the option relative to the baseline and which would not. The second pass looked only at the areas that may have negative effects and determined the extent and severity of effect and considered whether mitigation is likely to be practicable.

The final MCA scoring for each option was driven mainly by the overall noise and vibration benefit/impact of the project, on a city-wide scale. Where the second pass on effects found that mitigation may be required in specific locations, the MCA scoring could be adjusted slightly to accommodate the localised effects and/or necessity for mitigation. If the second pass revealed highly problematic noise or vibration effects in a specific location that could not be practicably mitigated, this was noted to alert possible consenting and mitigation cost issues downstream if the option were progressed. In such cases, the MCA scoring may have had to be adjusted significantly.

Key differentiators impacting the overall relative scoring between the Programme Affordable Short List options were:

- Relative to the Do minimum, the Programme Affordable Short List options will result in a neutral or positive outcome from noise and vibration perspectives because of a reduction in surface traffic that results from a greater take up of public transport and active travel and removal of private motor vehicle trips from Ruahine Street by the diagonal tunnel.
- The diagonal tunnel options (Options i and ii) are preferred to the parallel active travel tunnel options (Options iii and iv) because they remove more surface traffic away from sensitive receivers.
- BRT emits less noise than LRT (6 to 8 dBA at source). Furthermore, where there is LRT shared running to the south, the existing road will be replaced by concrete resulting in an increase in general traffic noise. Therefore, Option ii scored higher than Option i.
- Construction effects of the active travel tunnel are considered to be more problematic than the diagonal tunnel due to the number and proximity of receivers at both portals.
- At grade Basin Reserve has less impact than grade separated Basin Reserve from a construction perspective but less effective operationally so Option iii scores higher than Option iv.

Congestion charging will have a negligible direct impact on traffic noise as it corresponds to a reduction of less than 1 dB. The threshold of noticeability for most people is typically reported as 3 dB which would

require halving PMV usage. Therefore, congestion charging results in no change to the operation and overall scores.

Scoring for the noise and vibration criteria is shown in Figure 20.

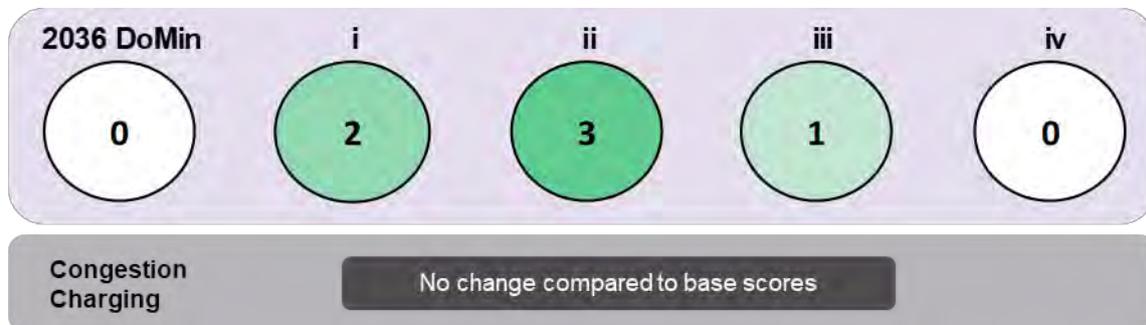


Figure 20: Noise and vibration scoring

Effects – Environmental and Social: Contaminated Land

Wellington City Centre, as a geographically constrained and relatively old urban centre has a spread of known and unknown HAIL (Hazardous Activities and Industries List) sites some of which date to early European immigration to Wellington in the 19th century. Some parts of the city are located on reclaimed land, and others have been significantly modified (e.g., Basin Reserve). The known HAIL sites and expected wider issues have been broadly considered as part of this exercise, however, it is difficult to attribute any further detail to the review prior to a full Preliminary Site Investigation (PSI) or Detailed Site Investigation (DSI) of the chosen area.

The assessment included a cursory review of information extracted from the Selected Land Use Register (SLUR) for HAIL sites nearby the proposed project areas (restricted to an approximately 50 m buffer), that is, sites which are on the ‘Hazardous Activities and Industries List’. These sites, and any further contamination found during the proposed improvements, are likely to require management to avoid effects on human health and the environment, particularly during construction.

Contaminated land has been considered in terms of broad earthworks volumes and therefore disposal/handling/costs. Options likely to result in a larger portion of ‘contaminated’ soil for disposal would score lower than options with less ‘contaminated’ soil.

Contaminated land scores are all negative for the benefit for this assessment. They are negative through broad consideration of total amounts of spoil, cost of disposal and required management of health and safety risks.

Key differentiators impacting option scores include:

- In Option iv the works at the Basin Reserve are at grade where all other options are grade separated and will require more extensive earthworks.
- In Option ii the public transport option to the south is using the existing bus network from Newtown to Island Bay where all other options will require further earthworks.
- All options will result in large quantities of excavated natural and contaminated ground which will require management and disposal/reuse. This will be a cost and sustainability challenge for the project.

Scoring of contaminated land for each of the options is shown in Figure 21. Congestion charging had no effect on the scores.

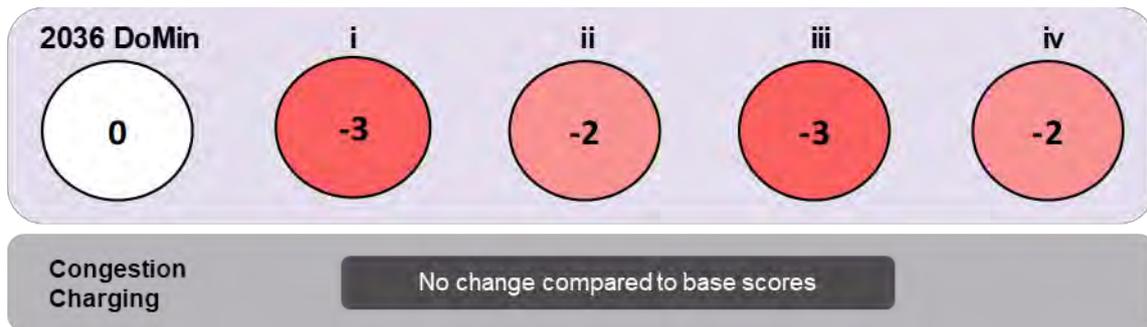


Figure 21: Contaminated land scoring

Design, Delivery and Operation – Engineering Difficulty

The Engineering Difficulty assessment criterion addressed expected difficulties with construction of a route option, including matters such as likely geotechnical considerations, extent of structures, temporary works, access management, risks around ‘unknowns’, additional provisions to address natural hazards such as hydrological impact, flooding, geology and general degree of difficulty in construction. The assessment also considered:

- Special Construction Techniques that require less common construction techniques (e.g., jacked box tunnel construction) or special equipment not readily available in New Zealand.
- Engineering requirements to provide a high degree of resilience for the corridors and critical support infrastructure (e.g., liquefaction resistant depot solution if on the foreshore, local flooding mitigation due to existing limited downstream capacity).
- Finding suitable special solutions for construction which minimises the duration of impact on local businesses.
- Impact of temporary work on transport movements.

This criterion does not include costs as it is considered outside the MCA process, though there is of course some crossover because engineering difficulty is generally resolvable through means that increase costs through identified mitigations.

Based on these key considerations all Programme Affordable Short List options were scored negatively. Key differentiators include:

- Options i and ii results in significant construction disruption associated with MRT, Basin Reserve grade separation (multiple diversions and stages with the Basin Reserve in particular). Moderate duration of construction disruption to the transport system to implement programme. Option ii has shorter MRT route than Option i but not significant enough to change a score.
- Option iii also results in significant construction disruption associated with MRT, the Basin Reserve grade separation (multiple diversions and stages with the Basin Reserve in particular). Moderate duration of construction disruption to the transport system to implement programme. However, Option iii has an active travel tunnel instead of diagonal tunnel, but this was not considered to be significant enough to warrant a change of score.
- Option iv is the best performing option, however, still results in significant construction disruption associated with MRT, but a low duration of construction disruption to the transport system to implement the programme. This option does not have the same level of complexity associated with constructing the Basin Reserve.

Scoring of engineering difficulty for each of the options is shown in Figure 22. The sensitivity test on the effects of congestion charge on the MCA scores also varies by option.

For options i and ii, the reduced car use as a result of a congestion charge is anticipated to result in increased public transport uptake and increased active travel demands, which will in turn need to be accommodated through diversions etc. to accommodate this mode shift, almost effectively 'cancelling out' the result of the congestion charge in consideration of the impact of temporary works. Therefore, there was no change in score for Options i and ii. However, Option iii, by virtue of no inclusion of the diagonal tunnel, and Option iv by virtue of no inclusion of a diagonal tunnel and the Basin grade separation, in combination with a congestion charge, are assessed to improve by a point, as there is more opportunity to accommodate the public transport and active mode uptake via parallel routes for these options.

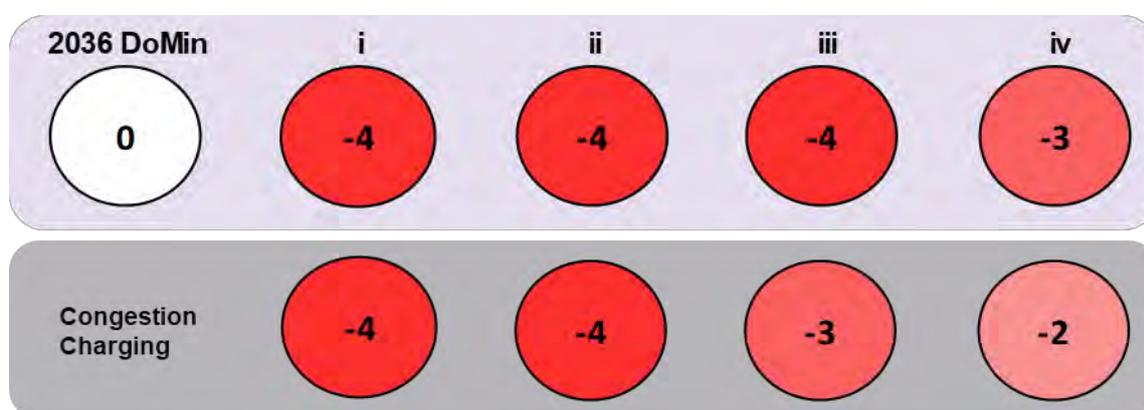


Figure 22: Engineering difficulty scoring

Design, Delivery and Operation – Property Difficulty

The assessment of property difficulty included consideration of the following criteria:

- Direct property impacts
- Subterranean property purchase
- Business disruption (impact of disruption and compensation to business owners due to likely ownership status and title deeds etc.).

All of the Programme Affordable Short List options are expected to have a negative impact on property. Key differentiators impacting option scores include:

Options i, ii and iii all scored -5 as all include a grade separated Basin Reserve with a significant property footprint including multi-unit properties, body corporates, commercial property and potential for business relocations. Complicated by a general lack of alternative sites in an already constrained built environment.

Option iv scores -4 as the Basin Reserve is at grade with some property requirement but significantly less than Options i, ii and iii. Options i and ii include a new tunnel requiring subterranean property rights through Town Belt and new tunnel portal under school property.

9(2)(b)(ii), 9(2)(j)

However, in the context of the overall programme, this is not significant enough to affect the score.

For Option iv, 9(2)(b)(ii), 9(2)(j) results in a score of -4 for MRT, and therefore for Option iv as a whole. Isolated bus priority through Mt Victoria and Hataitai does not affect the overall scores for Options iii and iv.

Congestion charging has no impact on property acquisition requirements. Scores for property difficulty are shown in Figure 23.

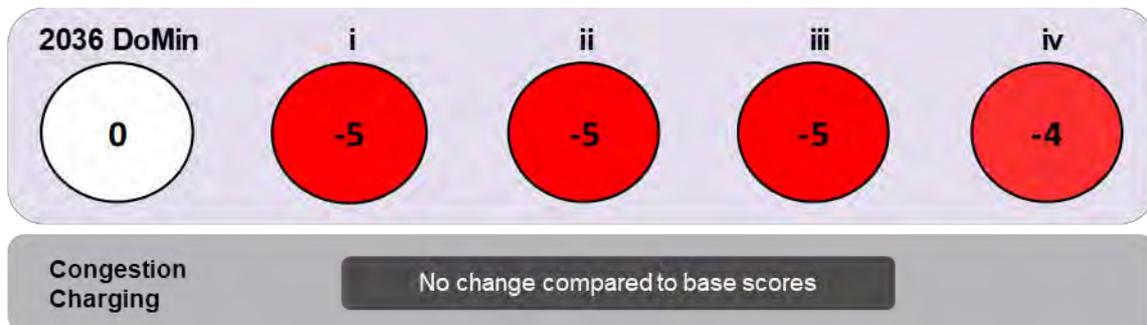


Figure 23: Property difficulty scoring

Design, Delivery and Operation – Scalability of Network and Services

Scores were based on an assessment of expected network fit/performance (once operational) and an assessment of scalability.

Network fit is the degree to which the MRT route(s) would integrate with the wider public transport network on day one of implementation. A good network fit is when MRT replaces whole bus routes or when the remaining bus routes could be joined to form a coherent service. A poor network fit is when MRT replaces part of bus routes and results in service duplication or coverage gaps.

Service duplication is when multiple public transport services overlap in an area and coverage gaps are when areas which previously had a public transport service would become difficult to serve.

Scalability is the degree to which MRT route(s) could be extended to North and/or West Wellington on a date after MRT is operating. Some of the identified factors for scalability are the gradient of the road, corridor width, the horizontal geometry of corners along the corridor and the ease/ difficulty of road widening. Consistent with the assumptions used for the programme short list assessment, the key assumption used in this Programme Affordable Short List option assessment is that the current (2021) bus network is the baseline 2036 Do Minimum with additional bus trips being added to provide sufficient capacity.

Overall, Option ii scores very positive for network fit as BRT replaces route 1 and route 2 but misses Hataitai and Mt Victoria (as it travels via a new ‘diagonal’ Mt Victoria tunnel). BRT on Kent/Cambridge also avoids duplication of route 3. Option ii (and Option i) assumes the retention of a core bus route via the Hataitai bus tunnel to pick up Hataitai and Mt Victoria inner east catchments.

In terms of scalability, Option ii assumes the west can achieve BRT infrastructure upgrades in some areas. However, the extent of these upgrades is likely to be constrained by tighter curves/ horizontal geometry, narrower road corridors (Chaytor/ Glenmore) and Karori tunnel. These are likely to preclude the implementation of fully dedicated BRT system to Karori from Wellington Station without significant property impacts.

There is however significant potential to expand BRT to the north in Option ii to achieve greater travel time savings. Dedicated BRT lanes could be provided to Johnsonville because of good horizontal geometry, road corridors width, and gradients (8%) which are compatible with the largest rubber-tired

type vehicles (e.g. trackless tram/ biarticulated bus). Extendibility past Johnsonville into Churton Park and Grenada Village for dedicated BRT lanes is challenging due to road geometry constraints. The northern corridor is considered the most significant in terms of growth potential and likely most important to serve with an extended MRT.

Options with LRT to Island Bay are considered less extendable due to geometric constraints for rail-based modes north towards Johnsonville. All options score better overall than their equivalent programme shortlist option (LRT) due to bus-based mode to East Wellington under all options.

Congestion charging does not impact the network fit or scalability scores. Scores for scalability of network and services are shown in Figure 24.

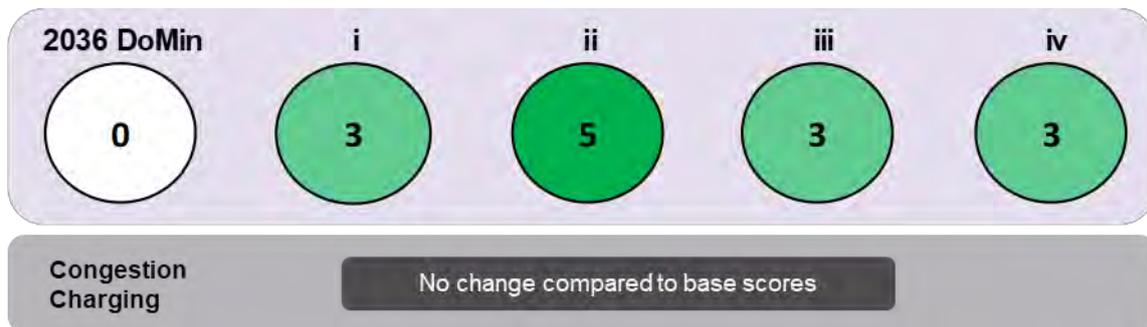


Figure 24: Scalability of network and services scoring

6 Technically Best Performing Option

The purpose of this report is to note the relative performance of each of the Programme Affordable Short List Options against the LGWM programme objectives and MCA criterion. It is noted that all four short list options will progress to public engagement to capture public opinion and views of each option. Feedback from public engagement, together with the analysis contained within this report and considerations of 'other relevant factors' will help decision makers identify a preferred option to progress for future stages of the business case.

Based on the assessment of the raw scores, the technically best performing option is **Programme Affordable Short List Option ii**. The criteria used in the MCA indicates that option i and ii perform similarly and reasonably better than option iii and iv, with option ii performing slightly better than option i. Key differentiators include resilience, mana whenua values, noise and vibration and public transport network fit. Analysis have also shown that this option with congestion charging will perform better overall.

6.1 Multi-Criteria Analysis Assessment

Figure 25 provides an overview of the Programme Affordable Short List options against the weighted programme objectives. It shows that Programme Affordable Short List Option ii provides the highest score against the objectives, followed by Option i, and then Option iv. It also shows that Option iii performs the lowest against the objectives of the four Programme Affordable Short List options against the programme objectives.

Option ii performs slightly better in relation to the project objectives as it provides wider coverage of the city with high quality public transport with BRT to the south and east, compared to a higher quality LRT only to the south in option i. Option ii spreads the improved public transport journey times, reliability, and quality resulting in slightly better service and increased patronage.

Options i and ii score similarly against the weighted programme objectives, with the key differentiator in score relating to resilience. Option ii provides slightly greater resilience compared to Option i because the BRT is assumed to be able to divert around or along a different route in operational and Low Impact High Probable (LIHP) events.

Option iii and iv also score similar, with resilience also the key differentiator between these options. Option iii and iv provide little improvement compared to the present day because the small improvements do not adequately offset the effects of increased population, climate change and deterioration of assets. Option iii is slightly better because of grade separation at the Basin Reserve.

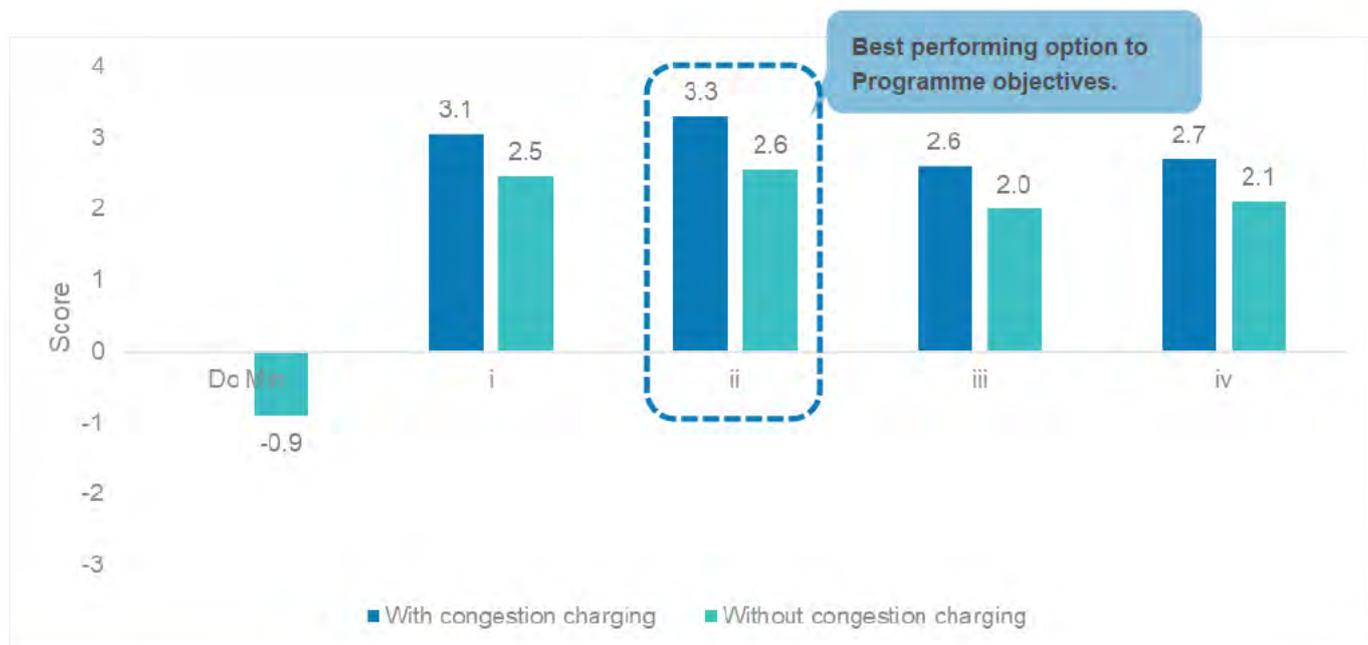


Figure 25: Programme objectives scoring²

Figure 26 provides an overview of the scoring for Mana Whenua, environmental and social impacts. Overall, all Programme Affordable Short List options achieve a negative score, with Programme Affordable Short List Option ii the best ranked option. All other Programme Affordable Short List options are scored equal.

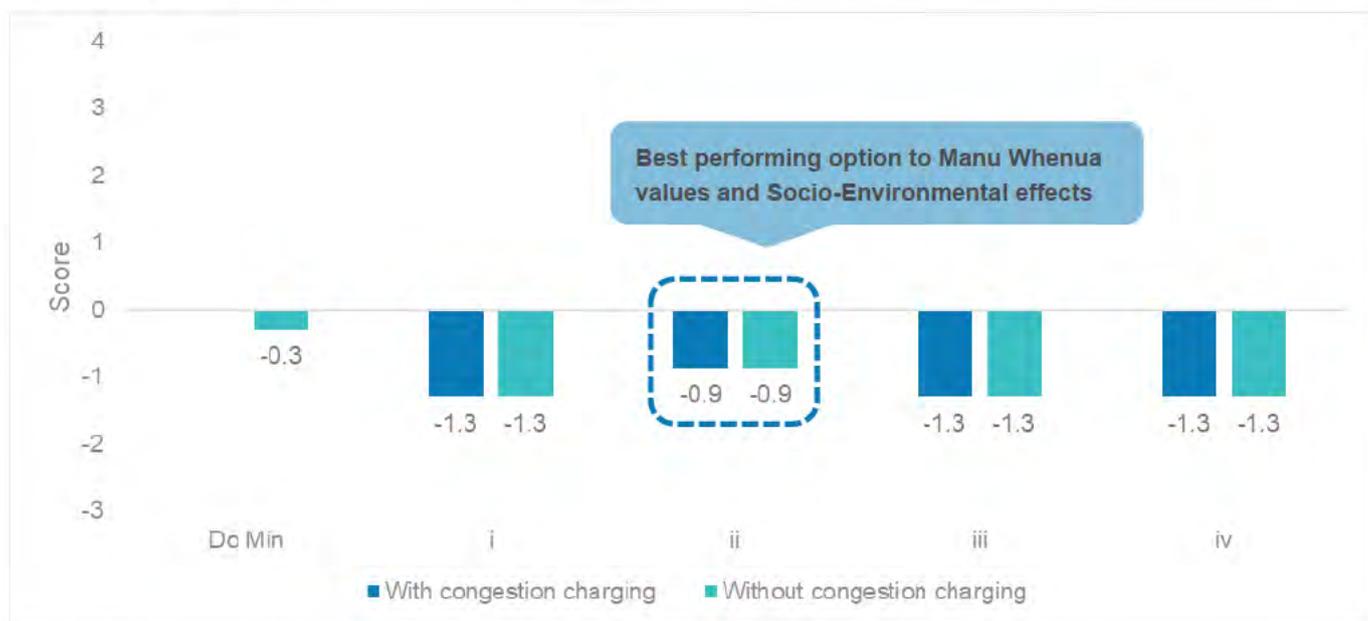


Figure 26: Mana Whenua, environmental and social impact scoring

Figure 27 provides an overview of the scoring for design, delivery and operations. Overall, all Programme Affordable Short List options achieve a negative score, with Option ii and Option iv both the best ranked options without congestion charging. With congestion charging, Option iv scores highest for design, delivery and operations. The lowest scoring option for design, delivery and operations is Option i.

² Note: Do minimum option assessed without congestion charging only

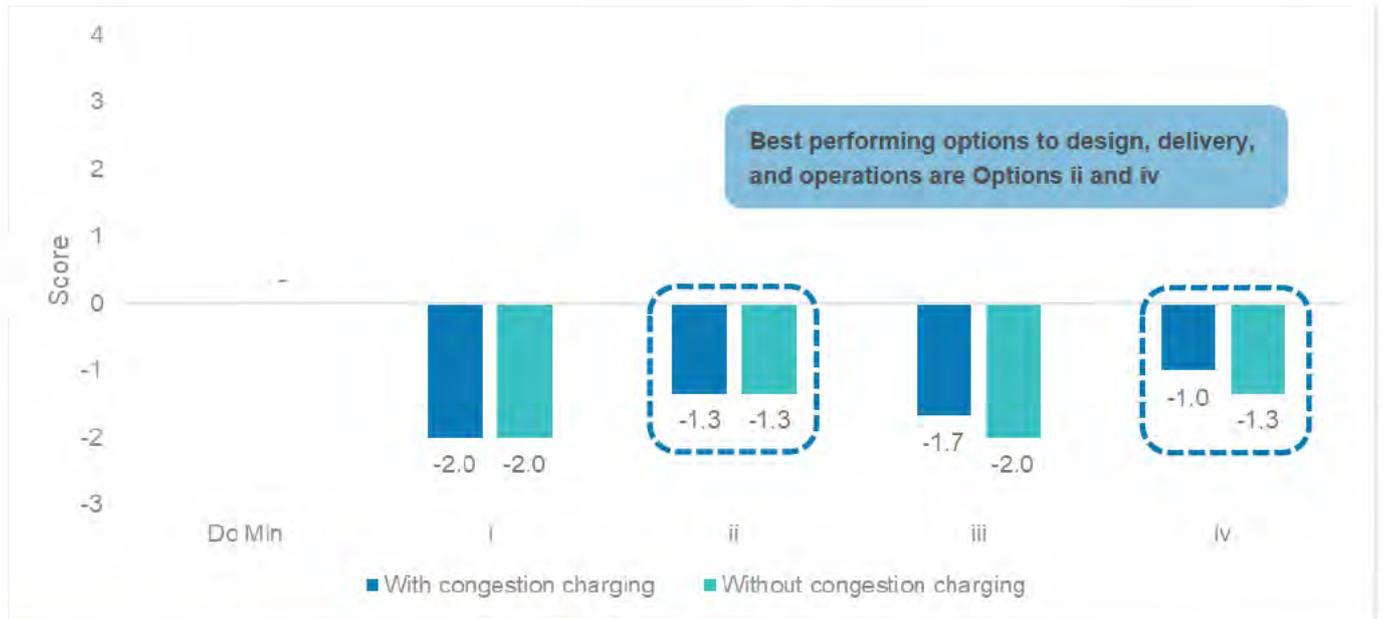


Figure 27: Design, delivery and operations scoring

This analysis is supported by sensitivity testing that has been undertaken. The sensitivity testing considers different weightings for specific criteria as outlined in Table 5.

Weightings represent the relative importance of different objectives and criteria compared to each other and are the same as those used for the Programme Short List. The sensitivity tests provide a basis for further comparative analysis of the performance of the four shortlisted options.

Table 5: Weighting scenarios for sensitivity testing

Weighting Scenario	Programme Objectives					Mana whenua	Environmental and Social Impacts						Design, Delivery and Operation		
	Liveability	Access	Carbon emissions and mode shift	Safety	Resilience		Heritage and archaeology	Social	Business Disruption and Outcomes	Landscape and visual	Noise and Vibration	Contaminated Land	Engineering Difficulty	Property Difficulty	Scalability of network and services
All groups equal, equal within groupings	7%	5%	13%	5%	3%	5%	5%	5%	5%	5%	5%	5%	11%	11%	11%
Programme objectives only	20%	15%	40%	15%	10%										
Mana Whenua, Environmental and Social Impacts only						14%	14%	14%	14%	14%	14%	14%			
Design, Delivery and Operation only													33%	33%	33%
Base weighted (adjusted with Mana Whenua and grouped effects)	9%	10%	22%	4%	4%	10%	5%	4%	5%	7%	4%	4%	4%	4%	4%
Liveability	30%	8%	8%	4%	4%	8%	4%	4%	4%	6%	4%	4%	4%	4%	4%
Mode Share	8%	8%	32%	4%	4%	8%	4%	4%	4%	4%	4%	4%	4%	4%	4%
RMA Part 2	18%	3%	14%	3%	9%	10%	10%	10%	3%	10%	10%				
QBL: Social	18%	6%	8%	6%	6%	8%	5%	20%	2%	8%	8%			5%	
QBL: Economic	10%	25%	10%	7%	3%	3%		3%	9%			2%	15%	8%	5%
QBL: Cultural	10%	6%	12%	6%	6%	20%	10%	15%		10%	5%				
QBL: Environmental	10%		30%			20%	10%			10%	10%	10%			

Figure 28 provides the output of sensitivity testing for all weighting scenarios tested. This shows that under all weighting scenarios tested, Programme Affordable Short List Option ii was the highest scoring of all four Programme Affordable Short List options.

Options i and ii generally perform better relative to Options iii and iv against most criteria, with Option ii performing slightly better than Option i for the key criterion of resilience, Mana Whenua, noise and vibration and contaminated land (plus one point for each) and two points higher for the scalability of network and services criterion.

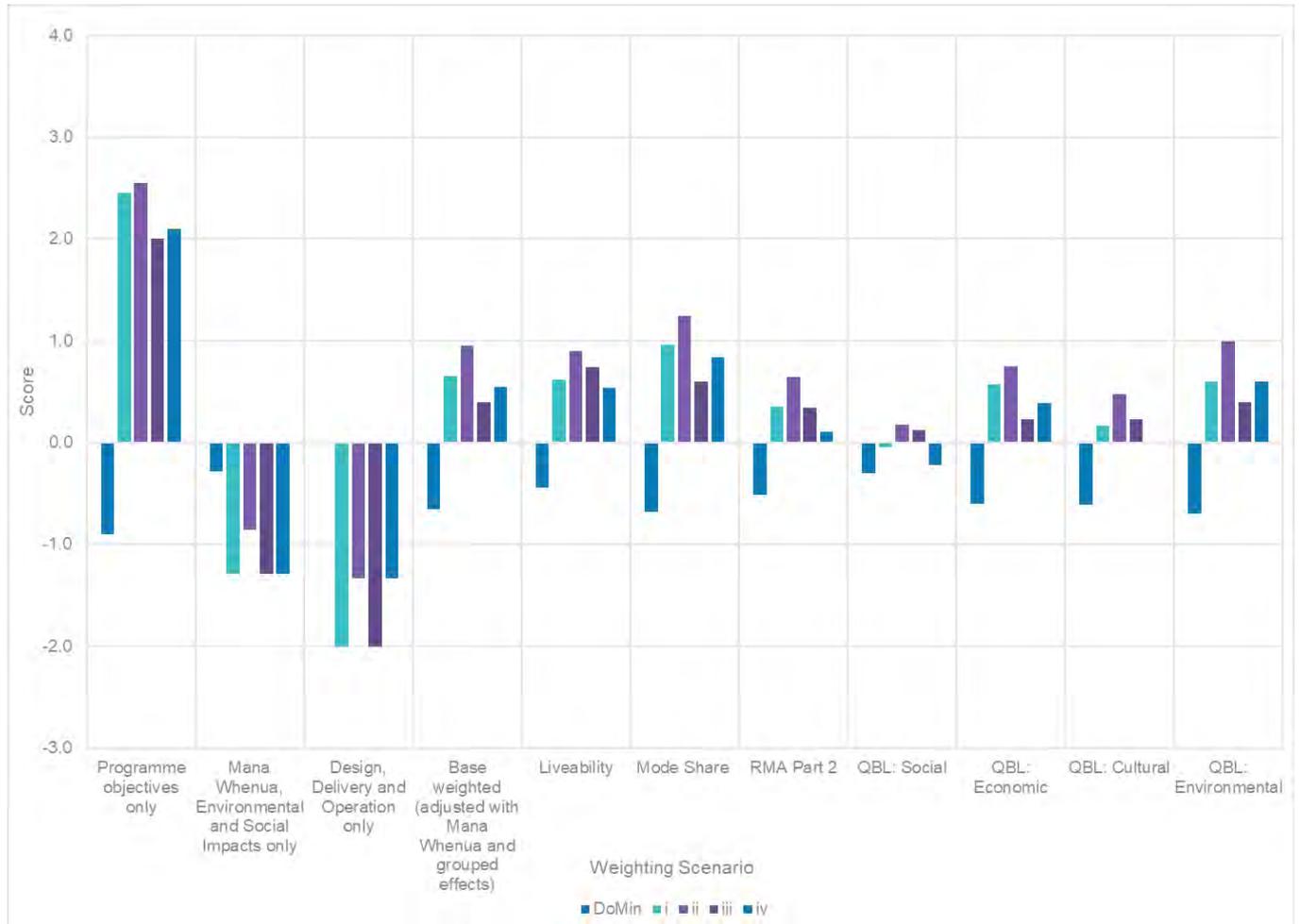


Figure 28: Sensitivity weighting

6.2 Other Relevant Factors

The option evaluation process requires assessment of the options against 'other relevant factors' in addition to the MCA part of the evaluation, including value for money and to reflect public engagement. The current evaluation of the options against the 'other relevant factors' are summarised in Table 6.

Table 6: Other relevant factor performance

Other Relevant Factor	Performance Against Options
Economics	Not complete at this stage, a high level BCR range will be completed prior to engagement. It is expected the BCR range will be similar across the four options.
Risk Assessment	The risk profiles of the options are all relatively similar and high risk. All options require significant consenting, property, funding and construction for successful delivery
Delivery Timeframes	All options time to completion are similar, 8 to 10 years
Stakeholder and public engagement	Engagement has not yet occurred, and will be completed to inform the preferred option decision
'Facilitated' urban development requires additional investment	The LRT options to the south can support growth over the "Planning for Growth" forecast of 11,000 dwellings with MRT in place to enable a total of 16,000 dwellings (indicative). Opportunities to further increase urban development and dwellings beyond 16,000 can be facilitated (depending on the level of intervention and associated investment). However, no decisions have yet been made regarding investment or formalised partnership or delivery mechanism (or statutory approvals) to achieve this additional development. Consequently, the MCA analysis has therefore not considered this increased growth opportunity.
LRT can support higher growth	BRT and LRT can both enable urban development to meet the Spatial Plan settings and NPS-UD requirements for up-zoning, higher density, and land use controls around stations up to 16,000 dwellings. BRT is unlikely to support a higher or denser growth scenario (i.e., above 16,000 and up to 21,000 dwellings or more) due to the smaller carrying capacity of BRT vehicles.
Carbon emissions	The MCA indicates that the Transport options result in similar carbon emission reduction outcomes. Greater carbon emission reductions can be achieved through greater and denser urban development, which is uncertain as outlined above. Sensitivity testing of carbon emission outcomes aligned with potential increased growth needs to be considered. The sensitivity testing is not yet complete, more information is planned prior to public engagement.
Strategic Fit	The MCA criteria assess the LGWM physical scope from Ngauranga to the eastern and southern suburbs, and 30-year growth forecasts. BRT is more easily extendable to the northern and western suburbs, and LRT provides future proofing of the southern corridor from the CBD through Newtown and to Island Bay by being able to accommodate growth above the 30-year forecast.

As outlined in Table 6, potential growth in urban development above the Spatial Plan and District Plan forecast is not factored into the MCA due to the uncertainty of its delivery at this stage of the option assessment. The key factor for consideration is the BRT and LRT modes' ability to support future potential urban development, the level of associated investment or formalised partnership or delivery mechanism (or statutory approvals) to achieve additional development, and the resulting additional outcomes that could be achieved by the options.

6.3 Overall Performance Assessment

Overall, the MCA outcomes indicate that Option i and ii are the better performing options, with option ii slightly better within the MCA constraints due to its ability to meet the current city and regional urban development aspirations and provide better transport accessibility, flexibility and resilience. The majority of the aspects that option ii performs slightly better than option i are not considered key outcomes as sought in the Programme Objectives. For example, option ii is limited by its ability to encourage the highest levels of urban development (specifically additional housing up to and above 21,000 new dwellings) and capacity of the MRT system to operate to the highest standard (level of service). Under this high growth scenario, option i can provide greater future proofing for higher levels of urban development beyond 30 years.

While urban development is an important outcome to support a growing population and housing affordability issues, it also has the potential with greater and denser urban development to deliver increased outcomes in terms of mode shift and carbon emission reductions. The mode shift and carbon emission reductions are the highest weighted MCA criteria by the partners. The scale and intensity of urban development is therefore a key strategic question that public consultation will be undertaken on, as it is a key driver of the decisions on which is the best of the four transport options for the future of Wellington. Sensitivity testing of carbon emission outcomes aligned with potential increased growth will also be undertaken.

It is understood that parties external to LGWM signal interest in committing to greater levels of development, with more work and commitment required to enable this. LGWM partners are working with Kāinga Ora and the Ministry of Housing and Urban Development to investigate the opportunity for transformative urban development that could be enabled with increased investment and partnership for both transport and urban development.

Further to the MCA assessment, a number of the 'other relevant factors' are consistent across the four options in regard to performance and do not provide differentiation to assist decision on preferred option at this time in the process. These include economics, risk, delivery time frames, and stakeholder and public engagement.

7 Next Steps

Figure 29 shows the next steps in blue, this includes undertaking public consultation on all four of the Programme Affordable Short List Options to help identify the preferred option.

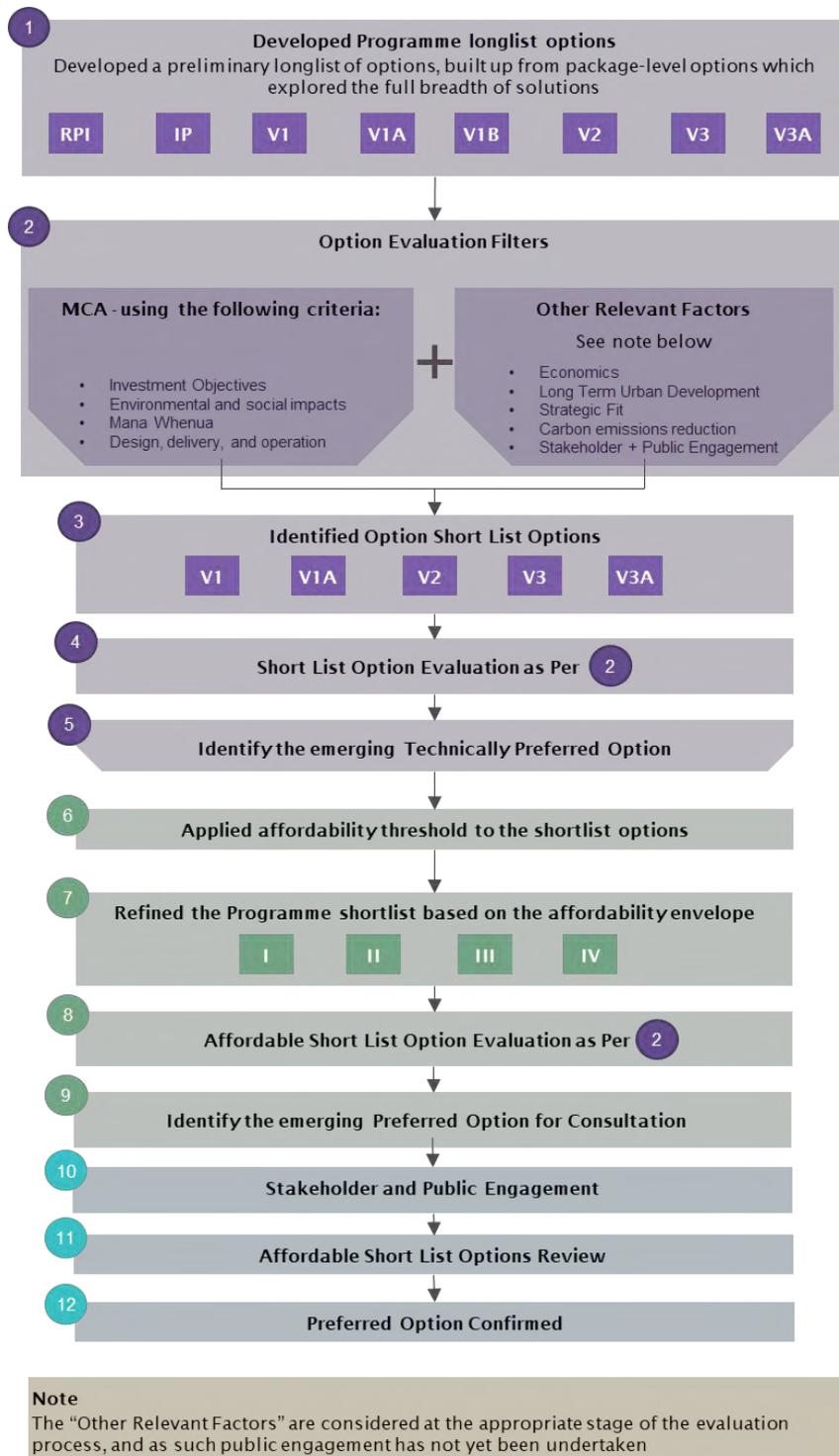


Figure 29: Programme affordable short list options process and next steps

Feedback from public engagement, together with the analysis contained within this report and considerations of ‘other relevant factors’ will help decision makers identify a preferred option to progress for future stages of the business case.



Appendix