



If calling, please ask for Democratic Services

Council

Wednesday 6 July 2022, 9.30am

Taumata Kōrero, Council Chamber, Greater Wellington Regional Council,
100 Cuba St, Te Aro, Wellington

Members

Cr Ponter (Chair)

Cr Staples (Deputy Chair)

Cr Blakeley

Cr Brash

Cr Connelly

Cr Gaylor

Cr Hughes

Cr Kirk-Burnnand

Cr Laban

Cr Lamason

Cr Lee

Cr Nash

Cr van Lier

Recommendations in reports are not to be construed as Council policy until adopted by Council

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Public Business

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Council
6 July 2022
Report 22.227



For Decision

LET'S GET WELLINGTON MOVING: MASS RAPID TRANSIT/STATE HIGHWAY IMPROVEMENTS PREFERRED PROGRAMME OPTION

Te take mō te pūrongo Purpose

1. To advise Council of Let's Get Wellington Moving (LGWM) recommended preferred programme option, as identified in the Preferred Programme Options Report (PPOR) provided in [Attachment 1](#). Identification of the preferred programme option at this stage is for inclusion in the LGWM Mass Rapid Transit (MRT)/Strategic Highway Improvements (SHI) Indicative Business Case, and to take forward for further investigation as part of the Detailed Business Case phase.

He tūtohu Recommendations

That Council:

- 1 **Notes** the conclusions in the Preferred Programme Option Report that Option 1 (Light rail from Wellington Station to Island Bay, enhanced bus from Kent/Cambridge Terrace to Miramar and the Airport, a new Mt Victoria Tunnel¹ and grade separated Basin Reserve) is the best performing Mass Rapid Transit (MRT)/State Highway Improvements (SHI) programme option under the intensified land use scenario against the LGWM Programme objectives.
- 2 **Agrees** that Option 1 is the preferred option to proceed through to the Detailed Business Case.
- 3 **Notes** that the Option 1² endorsement relies on the following conditions to deliver the full Programme outcomes:
 - a Ability to enable or support the delivery of high levels of intensification in the southern corridor
 - b No significant cost escalation or scope change
 - c Current assumptions regarding population growth and travel demand patterns
 - d The ability to integrate with the current and future public transport network

¹ Noting that different tunnel options exist and all add new capacity for public transport and active modes

² This also applies to options 2, 3 & 4 to varying degrees

- e The ability to deliver the infrastructure required, including road space allocation, stabling and power supply.
- 4 **Agrees** that, given the current levels of uncertainty in the above conditions in relation to Option 1 at the current Indicative Business Case stage, and close performance of Option 1 and 2 highlighted in the Preferred Programme Option Report, both Light Rail Transit and Bus Rapid Transit modes should continue to be investigated in the next stage (Detailed Business Case) along with the following:
- a ways of minimising cost risk and ensuring affordability
 - b planning for intensive urban development³ and urban amenity to give greater confidence that the urban development can be delivered over next 30 years and beyond
 - c defining high quality Mass Rapid Transit characteristics required for Wellington City's southern corridor to enable urban development
 - d improvements in Light Rail Transit and Bus Rapid Transit technology and equivalent modes that could better deliver high-quality and sufficient-capacity Mass Rapid Transit.
 - e further ways of optimising carbon-reducing impacts of the programme
 - f impacts of changes in demands and travel patterns (e.g. post-Covid trips patterns and travel behaviour change)
- 5 **Notes** that Options 3 and 4 do not deliver on the LGWM Programme objectives to the extent that Options 1 and 2 do, as concluded in the Preferred Programme Option Report, however they remain open for consideration until the current partner decision making process⁴ in relation to a Preferred Programme Option is complete. At this stage no further work is planned to be undertaken on Options 3 and 4 in the Detailed Business Case phase.
- 6 **Notes** that the uncertainties and assumptions (outlined in recommendations 3 and 4) above should be further investigated in the next Detailed Business Case stage to provide greater certainty before an investment decision to move to implementation phase will be considered by LGWM partners.
- 7 **Notes** that the do-nothing or counterfactual option of dispersed regional urban growth does not deliver the vision and/or achieve the objectives of the LGWM Programme.
- 8 **Notes** the intention to take opportunities to accelerate aspects of the Programme such as early delivery staging and sequencing identified within road reserve, faster approval pathways and early enabling works.
- 9 **Delegates** approval of the final MRT/SHI Indicative Business Case to Council's Chief Executive, subject to it being consistent with the Council's decisions on this paper.

³ Informed by key statutory land use processes (including the Wellington City Council Spatial Plan, District Plan, Housing and Business Capacity Assessment and a Future Development Strategy).

⁴ Varies for partners, noting that councils are required to follow the Special Consultative Procedure under the LGA.

- 10 **Agrees** to fund the Detailed Business Case phase of the MRT/SHI programme (\$120.7 million⁵ total; Greater Wellington Regional Council \$24.1 million; Wellington City Council \$24.1 million), based on the previously agreed interim funding split for business case development and LGWM management costs being 60/20/20 (Waka Kotahi NZ Transport Agency/Greater Wellington Regional Council/Wellington City Council).
- 11 **Notes** the budget for the Detailed Business Case assumed a single preferred mode for the purpose of scope, costs, and timeframes. This budget and associated partner funding requirements may need to be increased to investigate both Light Rail and Bus Rapid Transit modes once more detailed scope and timing requirements are understood.
- 12 **Notes** Council has sufficient budget for its share of the Detailed Business Case in its Long-Term Plan 2021 - 2031 and draft Annual Plan 2022/23. Council's share is debt funded and repaid over 20 years. The central government share will be sought through Waka Kotahi's funding approval process.
- 13 **Notes** that cost allocation and funding mechanisms for implementation of the LGWM MRT/SHI programme will be considered as part of future Annual Plan and Long-Term Plan processes.
- 14 **Notes** the affordable funding envelope for the LGWM Programme is \$7.4b⁶ total.
- 15 **Notes** the Government announcement of 29 June 2022⁷ which aligns with the Preferred Programme Options Report in Attachment 1 by supporting light rail from Wellington Station to Island Bay, a new tunnel through Mt Victoria for public transport, and walking and cycling, and upgrades to improve traffic flow at the Basin Reserve and noting the detailed business case will consider bus rapid transit as an alternative mode option along the Mass Rapid Transit route.
- 16 **Notes** the importance of travel demand management and behaviour change to maximise achieving the agreed programme objectives and preparing for disruption associated with construction of mass rapid transit and other projects in the city (especially the Golden Mile transformation).
- 17 **Endorses** the working objectives for LGWM urban development to guide collective cross-agency work on urban development within the Mass Rapid Transit corridor catchment set out in Attachment 5 to this report.
- 18 **Endorses** the expressions of collective and organisational commitment agreed by cross-agency partners associated with LGWM work on urban development set out in Attachment 5 to this report.
- 19 **Endorses** LGWM on behalf of partners, including mana whenua, preparing a proposal for a Specified Development Project with Kāinga Ora, noting that LGWM will report

⁵ excluding the Waka Kotahi admin fee which is not relevant to the council share

⁶ includes the whole of life cost over a 30-year period to 2049/50 and on-going operational and financing charges for the entire LGWM programme.

⁷ [Wellington's rapid transit option progresses to next stage | Beehive.govt.nz](https://www.beehive.govt.nz/news/wellingtons-rapid-transit-option-progresses-to-next-stage)

back to partners with final recommendations on a Specified Development Project proposal.

- 20 **Notes** that the cost of purchasing and consolidating land parcels and delivering community outcomes around Mass Rapid Transit stations as part of facilitating comprehensive urban development and intensification are not included in any option or programme costs but will be subject to ongoing work including through the Detailed Business Case phase.
- 21 **Notes** that the LGWM Courtenay to Newtown Corridor has been agreed by the Wellington Regional Leadership Committee as one of seven Complex Development Opportunities (priority growth areas) under the Wellington Regional Growth Framework.
- 22 **Notes** that continued investment in the regional rail network is critical to support the LGWM programme outcomes - including the Lower North Island Rail Integrated Mobility package and the Wellington Strategic Rail Plan package, which are yet to be fully funded.

Te tāhū kōrero

Background

2. LGWM is a joint initiative between Wellington City Council (WCC), Greater Wellington Regional Council (Greater Wellington), and Waka Kotahi NZ Transport Agency (Waka Kotahi), with support from mana whenua partners Taranaki Whānui ki Te Upoko o Te Ika and Ngāti Toa Rangatira.
3. The initiative commenced in late 2015 following the High Court's upholding of a Board of Inquiry's decision to decline the Basin Bridge proposal. Mana whenua have been engaged formally as partners in since mid-2020.
4. The focus of the LGWM programme is from Ngauranga Gorge through to Miramar in the east and Island Bay in the south, including the central city, the Wellington Urban Motorway, access to the port, and connections to Wellington Hospital and the airport. Several core multi-modal corridors connecting the central city with suburbs to the north and west are also covered by parts of the programme. This area has an important role for both local and regional journeys.
5. A draft LGWM programme business case was completed in 2018, which identified a Recommended Programme of Investment (RPI). Subsequent discussions with central government about funding, financing, and staging led to the announcement of an Indicative Package with central government funding in May 2019.
6. In June 2019, Council endorsed the LGWM long term vision and RPI, welcomed the government funding announcement as part of the Indicative Package, and agreed to move to the next stage of investigations (Report 19.258 – LGWM programme endorsement, funding and next steps). WCC similarly endorsed the LGWM vision in June 2019 and the Waka Kotahi Board subsequently endorsed the programme's next steps.
7. In December 2019 WCC and Greater Wellington agreed the funding and partnering approach for the next phase (Report 19.485 – Funding and partnering for the next phase

of LGWM). Waka Kotahi similarly endorsed the funding and partner agreement. In early 2020 all three funding partners signed the Relationship and Funding Agreement.

8. In 2020 investigations commenced into the larger elements of the Indicative Package, including for state highway components and mass rapid transit. As a result of these investigations some elements within the Indicative Package were not taken forward due to sub-optimal benefits and greater costs than envisaged by the PBC. The outcome of this work was used as a starting point for the further investigations of the combined MRT/SHI Indicative Business Case.
9. In June 2021, the LGWM programme objectives were reviewed, updated, and confirmed including allocation of weightings, by the LGWM partners (Report 21.228 LGWM Confirming Programme Objectives). These weighted objectives have informed the ongoing development of the LGWM MRT/SHI and Programme options.
10. The key components making up the LGWM Programme and the progress made are summarised below:
 - a. **MRT/SHI:** Comprising the larger programme elements that will help shape future growth, and transform our city, substantially change how we get around, and move more people with fewer vehicles.

Progress - Completion of a draft Indicative Business Case for the Mass Rapid Transit and Strategic Highway Improvements, public and stakeholder engagement on a shortlist of options, and identification of a recommended preferred option (endorsement of which is a key matter for decision in this paper).
 - b. **City Streets:** A 10-year programme of works to improve public transport, active modes, safety and amenity - improving travel options to support construction of the transformational programme - with a strong focus on the central city and effective and efficient connections between the central city and key sub-urban centres
Progress - Completion and approval of an Indicative Business Case, with detailed investigation underway for the first tranche of projects. Single Stage Business Case for targeted improvements for early delivery now complete and in design and delivery phase.
 - c. **3-year programme:** Early improvements to start moving more people with fewer vehicles and improve travel options ahead of larger construction projects to come -including Golden Mile, Thorndon Quay Hutt Road, central city pedestrian improvements, safer speeds and Cobham Drive crossing.

Progress - Completion and approval of single stage business cases (including preferred option identification) for Golden Mile and Thorndon Quay Hutt Road, with detailed design underway. Detailed design and/or implementation is underway for several other projects including Central City Pedestrian Improvements, safer speeds and Cobham Drive crossing.
 - d. **Travel Demand Management:** Investigation of travel demand management pricing (a commuter parking levy and congestion pricing) and non-pricing (combinations of 'soft' behaviour change initiatives) approaches have been progressed.

Progress - Work completed suggests that pricing tools could have a significant positive contribution to LGWM objectives. Further work has commenced on the next stage of investigations into congestion pricing to understand its effectiveness and impacts, including on equity in the Wellington context.

A Travel Behaviour Change single stage business case (SSBC) has been completed, identifying a package of initiatives to support infrastructure improvements, particularly during construction disruption. Approval of the SSBC will be considered by partners in August.

- e **Urban Development** – LGWM is working with mana whenua, Kāinga Ora, Ministry of Housing and Urban Development and other infrastructure providers to explore opportunities to partner to secure quality urban environment outcomes and to facilitate and deliver new forms of denser housing in urban environments along the new mass rapid transit corridor.

Progress: Establishment of a cross-agency Urban Development Steering Group with Kāinga Ora, Ministry of Housing and Urban Development, mana whenua, and development of objectives for urban development, expressions of collective and shared commitment on urban development, confirmation by the Wellington Regional Leadership Committee of LGWM Courtenay to Newtown corridor as a Complex Development Opportunity, and agreement to develop a proposal for a Specified Development Project under the Urban Development Act (subject to final decisions on this in 2023).

Te horopaki

Context

Why transformational change is needed

11. The Wellington Region is growing, with around 200,000 to 250,000⁸ more people expected to live here over the next 30 years. WCC is planning for 50,000 to 80,000 more people to live in the city over than same timeframe. The fastest growing areas will be in/around the central city.
12. Wellington City is New Zealand's vibrant, compact, fast-growing capital; the country's centre of Government; and a hub for high-skilled jobs and creative industries. Wellington has experienced strong economic and population growth in recent years, as more and more people have been drawn to the high quality of life the city can offer⁹.
13. However, this growth also means the city and region face several challenges including infrastructure deficiencies - evidenced by increasingly limited housing stock, the need for seismic strengthening of buildings, a series of burst water and sewage pipes, and increasing pressure on the region's transport network. These issues sit alongside a climate crisis which requires urgent action in terms of mitigation and adaptation.

⁸ Wellington Regional Growth Framework Report July 2021 (wrgf.co.nz). This is lower than the Population forecast 2020 to 2051, completed in April 2022 by Sense Partners, which has up to 300,000 people in the region (75%ile) and 110,000 in WCC (75%ile).

⁹ Let's Get Wellington Moving | Draft Programme Report for Public Engagement, 2021

14. Buses, cyclists, pedestrians, freight, service vehicles and private vehicles all compete for limited space and priority on Wellington's constrained transport corridors. Resulting transport network issues include:
 - a Longer hours of traffic congestion and unreliable journey times
 - b Poor and declining levels of service for all users.
 - c Safety issues, especially when cycling and walking.
 - d Vulnerability to disruption from unplanned events.
15. These issues mean it is becoming harder for Wellingtonians to access key employment, community, and recreation destinations reliably and safely. They also impact on the amenity and liveability of the city's streets, making them less attractive places for people. The role of the central city is likely to continue to evolve with many more people calling it their local neighbourhood or 'backyard' in future, making quality urban amenity increasingly important.
16. Nearly 60 percent of the Region's jobs are concentrated in Wellington City and the majority of those are in the Wellington CBD. The COVID-19 pandemic has been a major disruptor event and may lead to sustained changes to travel patterns, travel behaviours and where people work and live.
17. However, Wellington City is still expected to remain the primary economic hub for the region. Ensuring a high functioning Wellington CBD that is accessible, vibrant and liveable will be important to attract new investment, jobs, talent and visitors to the city and the wider region.
18. Transport is the biggest source of carbon emissions in the Wellington region, accounting for 40 percent of all emissions in the region, and 48 percent of emissions in Wellington city. Total transport emissions have risen by around 14 percent over the past two decades. The need to curb emissions will only continue to grow given the need to meet national, regional and local climate change targets and obligations, and the Wellington region's vulnerability to the effects of climate change. Transition to an electric vehicle fleet is part of the picture but it will take some time and will not contribute to the wider benefits sought for the city and region.
19. Mode shift is critical to easing pressure on the transport system, reducing emissions and improving liveability, but mode shift is constrained by several factors:
 - a Buses caught up in congestion result in slow, unreliable journeys for public transport users in Wellington City. This makes public transport a less attractive choice than the private car for many people when a door-to-door trip is considered.
 - b Lack of safe, connected cycle networks and facilities significantly constrains the potential uptake of more trips by bike and micro-mobility.
 - c Limited footpath space, busy roads, and long wait times at crossings can disincentivise walking trips.
20. Almost half of journeys to work in Wellington CBD from the north and rest of the Region are by public transport, thanks largely to the region's heavy rail network which provides mass rapid transit along two core corridors to the north. However, the proportion of

journeys from Wellington City's southern and eastern suburbs made by public transport is much lower (around 25 percent during the morning peak¹⁰), despite strong walking and cycling mode share in these areas. This suggests a significant opportunity to increase public transport use within our region's largest centre by investing in high quality public transport infrastructure to the south and east.

21. Shaping our cities and towns is also key to improving the overall efficiency of the transport system. Meeting the housing needs of a growing regional population in a way that reduces carbon emissions and improves travel choice and liveability will require a response both within Wellington City and across the region.
22. The more, new housing that can be provided through intensification in Wellington City's central, southern and eastern suburbs along a high-capacity mass rapid transit corridor, the higher the number of trips we can expect to be easily made by walking and cycling and public transport given the proximity and access to the region's largest centre and employment hub, Wellington City CBD.
23. Investment through the LGWM programme will provide a step change in the level of service of public transport and active modes within Wellington City, giving people safe and easy options to move around, with fewer vehicles. The proposed mass rapid transit system will be a catalyst for more intensive urban development in Wellington City and in turn is expected to help deliver extra housing, improve liveability, and contribute to reducing carbon emissions over the longer term.
24. If we do nothing, constraints on mode shift and more dispersed urban growth would lead to increasing emissions and additional pressure on the transport network into the future as the population grows. This is not considered to be an acceptable option for Wellington or the region.

LGWM vision and objectives

25. The LGWM Vision is "A great harbour city, accessible to all, with attractive places, shared streets and efficient local and regional journeys. To realise our vision, we need to move more people with fewer vehicles".
26. The LGWM objectives were initially developed in 2017 and subsequently reviewed and updated by partners in 2021 to reflect changes in context, policy direction and emergent issues (climate change emergency, COVID-19, population growth and housing supply).
27. The LGWM programme objectives are - to develop a transport system that:
 - a **Carbon emissions and mode shift 40%** - Reduces carbon emissions and increases mode shift by reducing reliance on private vehicles
 - b **Liveability 20%** - Enhances urban amenity and enables urban development outcomes
 - c **Access 15%** - Provides more efficient and reliable access for users
 - d **Safety 15%** - Improves safety for all users
 - e **Resilience 10%** - Is adaptable to disruptions and future uncertainty.

¹⁰ Wellington Mode Shift Plan 2020, page 12

28. These objectives were used as one of the central criteria to assess the short list of options and arrive at a preferred option, alongside other factors. The weightings were used to test the performance of options against objectives, alongside other weightings as sensitivity tests.

LGWM alignment with national, regional and local policy direction

29. At the national level, the Transport Outcomes Framework, Arataki (2021-31) and Keeping Cities Moving (Mode Shift Plan), Road to Zero (New Zealand's Road Safety Strategy and Action Plan), the Climate Change Response Act and work supporting the recently released Emissions Reduction Plan all provided important strategic direction that has shaped the LGWM programme objectives and options.
30. The Government Policy Statement (GPS) on land transport 2021/22 – 2030/31 identifies four strategic priorities to guide land transport investment - Safety, Better Travel Options, Climate Change and Improving Freight Connections. LGWM is well aligned with the GPS strategic priorities and is identified in the GPS as one of four specific government investment commitments driven by these strategic priorities.
31. The GPS signals the need for transport investment decisions to give effect to emission reduction budgets as part of the Emissions Reduction Plan. The programme has given a heavy weighting (40%) to its objective 'Carbon emissions and mode shift'. Carbon analysis work done for the programme at the current indicative business case phase has sought to understand the indicative reduction potential of different LGWM programme options as set out in paragraph 84 - 91 of this report. Further work will be needed to investigate ways to reduce emissions through the programme.
32. The Wellington Regional Growth Framework is a spatial plan that describes a long-term vision for how the region will grow, change and respond to key urban development challenges and opportunities in a way that gets the best outcomes and maximises the benefits across the region.
33. The Growth Framework currently expects approximately two-thirds of the housing growth over the next 30 years to occur in existing urban areas through infill, urban renewal and intensification. LGWM is identified as a key growth corridor within the regional framework and provides an important opportunity to support more compact and sustainable urban form and to reduce the amount of greenfield development required to accommodate the region's growth.
34. The LGWM mass rapid transit corridor from Courtenay Place to Newtown has been identified as one of seven 'Complex Development Opportunities' under the Growth Framework. These are projects that are complex and require special partnership arrangements to deliver at the desired pace and scale and have significant potential to contribute to strategic objectives.
35. Wellington's Regional Land Transport Plan (RLTP) 2021 identifies the LGWM programme as a priority investment area for the region and as an important opportunity to shape urban form. The RLTP includes ambitious ten-year headline targets including:
 - a 40 percent increase in active travel and public transport mode share
 - b 35 percent reduction in transport-generated carbon emissions
 - c 40 percent reduction in deaths and serious injuries.

36. Achieving the region's land transport targets for mode shift, carbon emissions reduction and safety set out in the Wellington RLTP 2021 will require contributions from LGWM (particularly the 3-Year Programme and City Streets for carbon) alongside many other investment programmes across the region including but not limited to: rail network investment with associated opportunities for transit-oriented development around stations; Te Ara Tupua shared path, enabling many more active mode trips between our region's two largest cities; major land use/transport integration projects like RiverLink, Access Kenepuru and the Eastern Porirua Regeneration Project.
37. These regional investment programmes and land use planning projects are all required to positively affect access, housing, carbon, safety, resilience and liveability outcomes for the region as a whole. But even these won't be enough and other policies, incentives and tools will be needed to further facilitate urban intensification, manage travel demand, and accelerate uptake of electric vehicles if we are to meet our targets.
38. LGWM is closely aligned with the direction of WCC's Spatial Plan, particularly in relation to objectives around compact urban form, and a more connected, greener, resilient city. WCC's Proposed District Plan (expected to be notified in July 2022) will give effect to the Spatial Plan by setting out the necessary land use rules that shape the growth of the city. The Proposed District Plan already considers the 'core' MRT route to Newtown by extending the City Centre Zone along Adelaide Road, enabling 6 storey buildings in much of Mt Victoria, Mt Cook and northern Newtown, and specific City Centre Zone policies for development around future rapid transit stops. The Proposed District Plan also applies overlays to restrict high density development in northern Kilbirnie and southern Miramar where natural hazard risks apply, made worse by climate change. Once MRT stops/stations are confirmed, a District Plan change will further enable the required intensification along the proposed mass rapid transit corridor.
39. There is also strong alignment between LGWM and Te Atakura - First to Zero, Paneke Pōneke Bike Network Plan, the Green Network Plan and the Wellington City Parking Policy. These policies and programmes seek to support mode shift, emissions reduction, access, amenity and safety.

Consideration of options

Overview

40. A comprehensive option identification and assessment process has been completed to arrive at the recommended preferred programme option for the MRT/SHI Indicative Business Case phase. More detail on the filtering process is provided in Attachment 1 (refer section 4 and Figure 4) to this report.
41. The process started with development of a preliminary long list that was built up from earlier package-level options which explored the full breadth of technical solutions.

42. The long list was then evaluated to identify an initial shortlist¹¹, followed by further analysis and application of an affordability lens (refer paragraph 183 of this report) to identify and assess a refined short list of options for public engagement¹².
43. Multi-criteria analysis (MCA) was used for the evaluation of options at multiple stages throughout the process. The MCA analysis used the following criteria:
 - a Investment objectives: carbon emissions and mode shift, liveability, access, safety, and resilience.
 - b Environmental and social impacts: noise and vibration; heritage and archaeology; social; economic (including business disruption); landscape and visual; and contaminated land.
 - c Mana whenua values (set out in paragraph 211 below)
 - d Design, delivery, and operation: engineering difficulty, property difficulty, and scalability of network and services (network fit).
44. Other evaluation factors included economics, long term transformation, and strategic fit.
45. Following public engagement, technical updates have been undertaken to land use scenarios, transport modelling, carbon analysis and the economic analysis. The outcome of this work is intended to help answer some key remaining questions and is presented alongside the outcomes of the MCA assessment and public engagement feedback to identify a preferred programme option.

Key investment questions

46. These were identified to help inform the determination of a preferred programme option. These questions (below) are discussed in Section 9 of the PPOR in Attachment 1 and are reflected in the rationale for the preferred programme option.
 - a What form of MRT is preferred?
 - b Are large-scale or minor improvements preferred at the Basin Reserve?
 - c Is a new Mt Victoria tunnel needed?
 - d How will the options integrate with the wider transport system?
 - e How can urban intensification be achieved?
 - f Are parking levies or congestion charging proposed?

Short list options for engagement

47. Four options were identified to achieve the objectives of LGWM at a cost that is within the engagement affordability threshold. The four options were presented for public engagement during November/December 2021.

¹¹ Programme Short List Options Report (October 2021): [PSLO Report.pdf](#)

¹² Programme Affordability Options Report (October 2021): [PASLO Report.pdf](#)

48. Common to all options is the LGWM 3-year programme (including Golden Mile, Thorndon Quay Hutt Road, Central City pedestrian improvements, Cobham Drive crossing and safer speeds), City Streets package and Travel Demand Management.
49. The major differences in the programme options are around the type of MRT, the proposed routes, and the level of investment in the Basin Reserve and Mt Victoria Tunnel. The table below highlights the key differences between the four options.

	Option 1	Option 2	Option 3	Option 4
Basin Reserve	Movements grade separated ¹³ with extended Arras tunnel and opportunity for better amenity.	Movements grade separated with extended Arras tunnel and opportunity for better amenity.	Movements grade separated with extended Arras tunnel and opportunity for better amenity.	At-grade (stays as a roundabout with minor improvements).
Mt Victoria Tunnel	New tunnel (diagonal or parallel) for public transport and traffic. Existing Mt Victoria tunnel re-purposed for active modes.	New tunnel (diagonal or parallel) for public transport and traffic. Existing Mt Victoria tunnel re-purposed for active modes.	New tunnel constructed for walking and cycling. Traffic stays in existing Mt Victoria tunnel and public transport stays in existing Hātaítai bus tunnel ¹⁴ .	New tunnel constructed for walking and cycling. Traffic stays in existing Mt Victoria tunnel and public transport stays in existing Hātaítai bus tunnel.
MRT city to South	Light rail, via Cambridge Tce	Bus Rapid Transit, via Cambridge Tce	Light rail, via Cambridge Tce	Light rail, via Taranaki St ¹⁵
MRT/Public Transport East	Continuous Bus Priority ¹⁶ , via new tunnel to be used by most eastern suburbs buses. Remaining eastern suburbs buses continue to use existing Hātaítai bus tunnel.	Bus Rapid Transit, via new tunnel. Remaining eastern suburbs buses continue to use existing Hātaítai bus tunnel.	Continuous Bus Priority, from Kilbirnie to Miramar. Targeted local priority treatments between Kilbirnie and Mt Victoria via Hātaítai bus tunnel.	Continuous Bus Priority, via Hātaítai bus tunnel. Continuous Bus Priority from Kilbirnie to Miramar. Targeted local priority treatments between Kilbirnie and Mt Victoria via Hātaítai bus tunnel.
Total Cost¹⁷	\$7.4 billion	\$7 billion	\$6.6 billion	\$5.8 billion
Construction timeframe	10 to 15 years	10 to 15 years	8 to 12 years	8 to 12 years

¹³ Physically separating movements over/under

¹⁴ The Hātaítai Bus Tunnel remains in its current configuration in all options, but with significantly fewer services using it in Options 1 and 2

¹⁵ This route is needed if the Basin Reserve is not grade separated

¹⁶ Continuous Bus Priority comprises extensive bus priority improvements including long continuous sections of kerbside bus lanes and signal priority. It represents a solution that has lower ride quality and customer experience than bus rapid transit - without pavement upgrades, level boarding stations and other associated infrastructure.

¹⁷ Total LGWM programme cost calculated on the whole of life cost over a 30-year period to 2049/50. This includes investigations, design, construction, and on-going operational and financing charges for the entire LGWM programme.

50. The key elements of the four options are presented in map format in Attachment 2 to this report.
51. A 'do-minimum' (for 2046) option was used throughout the assessment process alongside the programme options for comparative purposes, to understand the potential outcomes with and without the programme investment, as well as differences between the investment options. The assumptions underpinning the do-minimum modelling work were:
 - a Transmission Gully and Peka Peka to Otaki Expressway operational
 - b bus service frequency in Wellington City increases to accommodate growth in passenger demand (with an associated degradation in bus service reliability along the Golden Mile and on core corridors to/from the CBD at peak times due to more bus-on-bus congestion)
 - c no significant bus priority improvements in Wellington City
 - d no investment in longer distance rail rolling stock¹⁸ or increased peak time frequencies on Hutt Valley and Kapiti lines (neither are committed projects).

Community engagement feedback

52. Stakeholder and public engagement were conducted over six weeks from early November to mid-December 2021. Engagement questions were open-ended to gain qualitative feedback rather than to identify a preference for a particular option. A total of 5,692 submissions were received from the public engagement process and over 40 detailed submissions from stakeholder groups and organisations.
53. The responses were well spread across genders, ages, suburbs and typical transport mode. Around 73 percent of respondents were from Wellington City, around 12 percent from the wider Region, and the remainder outside the Region or didn't specify. 85 percent of respondents found the information provided useful for giving feedback.
54. The feedback covered a diverse range of issues, but six key themes emerged around:
 - a Quality urban growth and development
 - b Better environmental, carbon, social and liveability outcomes
 - c Quality public transport
 - d Timeframe, cost and construction disruption
 - e Cyclist/scooter-friendly and walkable city
 - f Access for private vehicles and parking.
55. One of the key questions asked during engagement was 'What do you think is most important to the future of Wellington?'. Rated most important was: reliable public transport with a frequency of at least every 10 minutes and making it easy to get around

¹⁸ Namely the Lower North Island Rail Integrated Mobility (LNIRIM) project which explores options to deliver critical passenger transport services as the aged locomotive-hauled trains of the Wairarapa and Manawātū Lines reach the end of their service lives.

without using a car. The lowest rated factors were connecting people to areas of shopping and socialising and fewer transfers between public transport services.

56. The engagement process sought to understand the preferences of the community in terms of public transport mode options. A total of 53 percent of the respondents supported Light Rail Transit, with the primary reasons being:
 - a High capacity (over 300 people per trip)
 - b Reliability and frequency
 - c Improved carbon performance.
57. However, there was a perception that Light Rail Transit will provide a quiet solution despite information supplied (and the specialist assessment undertaken for the MCA).
58. When asked about Bus Rapid Transit, 23 percent were in support for the following reasons:
 - a Flexibility to be extended to more suburbs in the future
 - b Less investment and is faster to implement
 - c Quicker recovery time from a natural disaster because of its rubber wheels.
59. 24 percent of the respondents did not indicate a preference for Light Rail Transit or Bus Rapid Transit. Of these, most respondents commented that they do not support any type of MRT as a suitable public transport solution for Wellington. Others suggested that Wellington needs both Bus Rapid Transit and Light Rail Transit to create a well-connected quality public transport service.
60. Overall, 69 percent of the 1,616 comments received in relation to the new tunnel were supportive of the new Mount Victoria tunnel due to the focus on public transport and active mode safety, as well as improved connections between the City and Airport. People would like more information about the entry and exit points on either ends of the tunnel.
61. Respondents who were concerned about better access for cars and other vehicles questioned why only a two-lane tunnel is proposed and would like to see four lanes for general traffic (two in each direction) because they believe this would future-proof the investment and support population growth and intensification.
62. Those who support the aim of reducing car reliance felt a new tunnel would be counter-productive to that goal, as it would encourage car use. In addition, people were concerned about the level of disruption from the construction of a new tunnel and the carbon impacts.
63. 61 percent of the 980 comments on the Basin Reserve supported the changes to the Basin, however there were concerns about whether the changes at the Basin would delay investment elsewhere. The reasons for the support of the Basin Reserve were:
 - a People want reduced congestion and improved traffic flow around the Basin Reserve
 - b Enhanced, people-centred, open space

- c Those living in the wider Region think changes will make it easier for them to get to the hospital and the airport.
64. Those who were less supportive of changes at the Basin highlighted the following issues:
- a Question if changes will fix congestion, since traffic merges and bottle necks continue elsewhere in the network
 - b Extension of Arras Tunnel too carbon costly
 - c Arras Tunnel also perceived as incentivizing driving over public transport or active modes.
65. During the public engagement process LGWM also received written feedback from over 40 different stakeholders with a range of different perspectives and insights. These specific comments have been considered alongside the public feedback in the preferred programme option assessment.
66. Overall, there was a strong appetite for change and consistent support to:
- a make it happen sooner
 - b deliver the best value
 - c get public transport right (do it once and do it right).
67. The full engagement report is included in [Attachment 3](#).

Survey feedback

68. To supplement feedback from the community engagement, LGWM commissioned a parallel study to determine a representative view of the Wellington public through an online panel. The survey used identical questions to enable comparison between the two feedback sources.
69. The ten-minute survey involved a representative sample of around 1,230 Wellingtonians, aged 18+. The survey data was weighted by age, gender and region to ensure results are representative of Wellington. The sample included 41 percent Wellington City and 59 percent outside Wellington City – a larger proportion of regionwide feedback than the community engagement.
70. The feedback from the (representative) survey was generally aligned with the (self-selected) community engagement feedback. The survey found that the programme options are well liked as they link closely to what people want to see from the region, particularly improved public transport, better access to the airport and hospital and freeing up the city of traffic, using reliable public transport as a substitute to cars.
71. The key differences between the engagement and online survey were:
- a In relation to what is most important to the future of Wellington, the responses were similar but making it easier to get to key destinations like the airport and hospital featured among the most important for the survey respondents, and safer and connected cycleways among the least important.
 - b In relation to urban development, the survey identified some diverse views about housing density in Wellington city versus the wider region. However, housing was

- a key theme in both sets of feedback and respondents were very aware of the housing shortage in Wellington and want to see it addressed.
 - c The preference of mass rapid transit mode type was more balanced in the survey feedback, with Light Rail Transit preferred by 59 percent and Bus Rapid Transit preferred by 41 percent.
72. Some key geographic and demographic differences highlighted by the survey included:
- a Easy access to key destinations was more important for those who live outside Wellington City, and less important for those who live in Wellington City.
 - b Addressing housing was of heightened importance to younger Wellingtonians (under 35), whilst those over 55 cared more about accessibility to key destinations.

Further technical assessments

73. Following the consultation and engagement period, several additional technical assessments were undertaken to help provide a more detailed understanding of the relative advantages and disadvantages of each of the options. The assessments focussed on:
- a Transport modelling: which projects changes in demand for different transport modes as well as changes in travel time (refer Appendix A of the PPOR in [Attachment 1](#))
 - b Economic analysis: which provides an indication as to whether the programme options deliver value for money (refer Appendix B of the PPOR in [Attachment 1](#))
 - c Carbon analysis: which considers both embodied and enabled carbon emissions (refer Appendix C of the PPOR in [Attachment 1](#))
74. These technical assessments included testing a new 'intensified' land use scenario (outlined in the next section) and were used to inform an updated MCA of the options and other considerations used to determine a recommended preferred programme option.

Land use scenarios

75. A key consideration for this LGWM transformational programme and the option assessments is how the options catalyse and respond to changes in land use.
76. To understand how the options perform under different future growth scenarios, they were assessed in relation to both a 'core' land use scenario that assumes 10,000 new homes in central, southern and eastern suburbs near the MRT (and/or continuous bus priority) corridors by 2046 (the do minimum and reflective of the level and distribution of growth assumed in the WCC Spatial Plan) and an 'intensified' land use scenario that assumes 26,000 new homes near these corridors by 2046.
77. These are considered as two 'bookend' scenarios that have been used in the technical analysis. The Urban Development Summary Report presented two scenarios that fall within these bookends (16,000 and 21,000 new homes). The agreed LGWM Urban Development objectives are aiming for between 18 - 21,000 new homes (which may be adjusted as decisions are made and further work advances on urban development).

78. The Wellington City Commercially Feasible Residential Capacity Assessment (June 2022) estimates demand for 31,300¹⁹ more homes across Wellington City and 75,000 more homes in the Wellington Region over the next 30 years, using a medium growth projection. In the LGWM housing scenarios above, 50–84 percent of construction to meet this City housing demand, or alternatively 21–35 percent of housing in the Wellington Region, would be concentrated near future MRT (and/or continuous bus priority) corridors in the MRT suburbs and the preference for apartments would need to increase significantly from current demand (based on past preferences and availability of supply) for this dwelling type (of around 22 percent).
79. In both core and intensified land use scenarios, a relatively high-level assumption has been made regarding the distribution of development across the region. This is not intended to be a forecast of the level of development that will occur, instead it provides a representation of what could occur, should differing levels of intensification be realised.
80. Further detail about the land use scenarios developed as part of the options assessment process is provided in Section 7.1 of **Attachment 1**.

Demand Management pricing tools

81. The Programme has considered both priced and non-priced Travel Demand Management approaches to support and lock in the benefits of LGWM infrastructure improvements. The two 'priced' approaches that have been investigated include a commuter parking levy and congestion pricing.
82. Transport modelling sensitivity tests have been run to understand the impact of these types of tools on the performance of the options in relation to the investment objectives. The benefit of congestion pricing or parking levies is significant regardless of the programme option.
83. The use of future pricing tools needs further investigation and will involve further engagement with Wellingtonians. The timing of any scheme alongside other elements of the LGWM Programme will be important to ensure people have good viable alternatives to driving.

Carbon

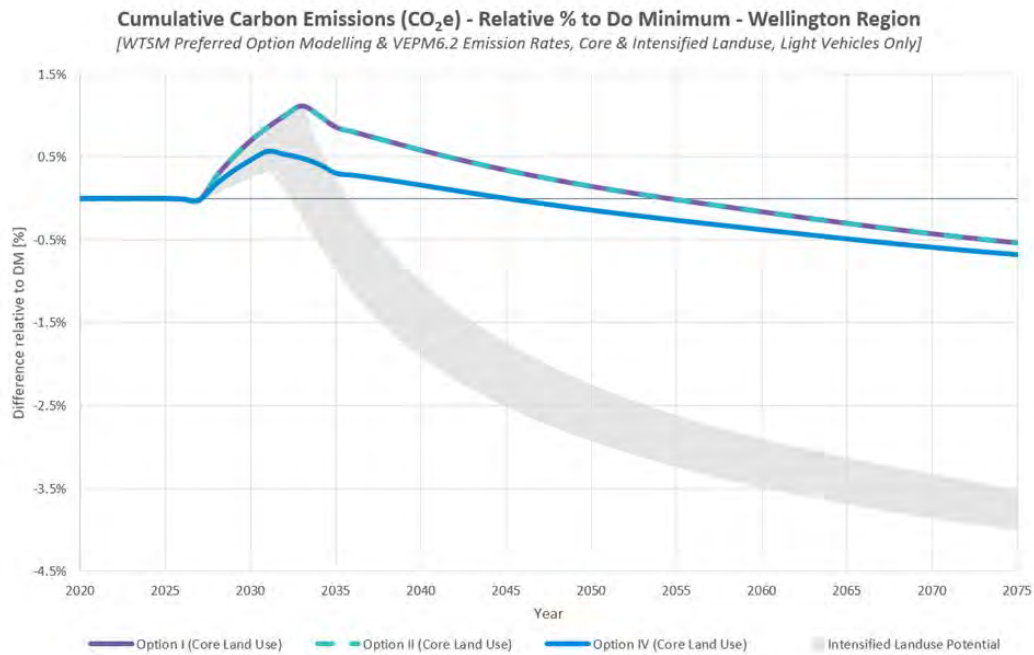
84. Carbon analysis was undertaken to understand the potential impact of investment on emissions at both a programme level and comparatively across the four options compared to the do minimum.
85. The transport modelling which underpins this analysis focused firstly on Option 1 and Option 4 as 'bookends' from a cost and infrastructure footprint perspective under the core land use scenario. Then, an intensified land use scenario was created to test the impact of high density residential and commercial development occurring along the MRT corridor.
86. It is important to note that bespoke land use scenarios were not developed for each option. This meant some necessary assumptions about the ability of the different programme options to enable the intensified land use scenario and support significant

¹⁹ 36,621 with NPS UD competitive margin

mode shift. For this reason, the carbon analysis for the intensified land use scenario was based around Option 1 (because it is considered most likely to support the intensified scenario). After applying some amendments based on professional judgement, it is also considered to be broadly representative of the performance of Option 2 in a similar situation. These two options indicatively provide the upper and lower range of potential enabled carbon savings under the Intensified Land Use Scenario presented in the figure below. There was less confidence about the ability of Options 3 and 4 to enable the intensified land use scenario and therefore where they would sit in relation to the upper and lower range of potential carbon savings under this scenario.

87. Under the Core Land Use Scenario there is little difference between the options when considering levels of enabled carbon emissions. All options have a positive impact in terms of reducing daily vehicle emissions and traffic volumes within Wellington City (five percent reduction in VKT) and across the Region (two percent reduction in VKT) relative to the Do Minimum option.
88. Under the Intensified Land Use Scenario, further reductions in regional VKT could be expected (around seven percent reduction) as a result of shifting growth from outside of Wellington City to the CBD, Te Aro and Newtown with relatively low associated levels of car dependency and high public transport and active mode trip rates. This would mean more development/people living in Wellington City and greater uptake of low carbon modes of travel on a per capita basis, but a lower VKT reduction overall within Wellington City itself²⁰.
89. The options with more large new infrastructure elements will have higher levels of embodied carbon, although in all cases enabled carbon savings exceed embodied emissions over the analysis period. This is shown in the figure below for Options 1, 2 and 4.

²⁰ Based on modelling analysis from the Wellington Transport Strategic Model to inform the PPOR.



90. In summary, the carbon analysis shows that the degree of urban intensification achieved, followed by the level of mode shift enabled, is likely to be the key differentiator between programme options.

- a Option 1 is likely to support the highest levels of intensification along the southern corridor and provides for direct public transport journeys and increased public transport capacity to the east to support mode shift to public transport and intensification.
- b Option 2 is assumed to provide less capacity and less urban development than the options with Light Rail Transit. While this option includes Bus Rapid Transit to both south and east it is likely to support lower levels of intensification overall.
- c The lower public transport level of service and capacity limits to the east under Options 3 and 4 are likely to constrain the degree of intensification and mode shift in the east, and hence the ability of these options to deliver as much carbon reduction.

91. While Options 1 and 2 are estimated to have higher embodied carbon than Options 3 and 4, in the long run the level of urban density achieved matters significantly: under the Core Land Use Scenario, net zero carbon does not occur until beyond 2050, however under the Intensified Land Use Scenario, greater urban density produces significantly greater carbon savings than the carbon produced in construction, with net zero carbon projected in the period 2033 – 2036.

Costs

92. The cost of each option (95th percentile) is summarised in the table below. The total investment cost summary includes all investment costs up to the end of construction, including inflation but excluding the impact of financing and operating costs. The Whole of Life Cost summary is calculated over a 30-year period to June 2050 and includes on-going operational and financing charges for the entire LGWM programme.

Options	Option 1	Option 2	Option 3	Option 4
Mass Rapid Transit - South	\$2,044m	\$1,215m	\$2,057m	\$2,139m
Mass Rapid Transit / PT - East	\$388m	\$902m	\$697m	\$703m
SHI - Mt Vic Tunnel	\$1,408m	\$1,412m	\$398m	\$401m
SHI - Basin Reserve	\$774m	\$775m	\$779m	\$27m
TDM - Travel Behaviour	\$66m	\$66m	\$66m	\$66m
TDM - Parking Levy	\$10m	\$10m	\$10m	\$10m
City Streets	\$531m	\$532m	\$534m	\$539m
3-year prog - Golden Mile	\$93m	\$93m	\$93m	\$94m
3-year prog - Thorndon Quay & Hutt Rd	\$55m	\$55m	\$55m	\$56m
3-year prog - Central City Walking Imp.	\$6m	\$6m	\$6m	\$6m
3-year prog - Cobham Crossing	\$5m	\$5m	\$5m	\$5m
Total Investment Cost	\$5,379m	\$5,072m	\$4,700m	\$4,047m
Whole of Life Costs	\$7,370m	\$6,984m	\$6,603m	\$5,815m

93. Some options are closer to the \$7.4 billion affordability threshold than others. If costs escalate at the next stage, then either the affordability threshold would need to be increased or the scope of the option reduced. The lower cost options will have more buffer against cost uncertainty and escalation risks.
94. Experience suggests that the likelihood of cost escalation is high and this needs to be rigorously explored in the early phases of the Detailed Business Case.

Economics

95. The monetised benefits for the options have been calculated for both the Core Land Use Scenario and Intensified Land Use Scenario. For the intensified scenario, benefits analysis focused on Option 1 as the option likely to facilitate the highest level of intensification, with Option 2 and 4 assessed as sensitivity tests²¹ to understand the MRT mode differences and the 'book-end' range.
96. The benefits cover public transport benefits (travel time and fare revenue), private vehicle travel benefits (travel time, reliability, vehicle operating costs), safety benefits, environmental benefits (pollutants and carbon emission reductions), health benefits (for additional walking and cycling trips), and agglomeration benefits.
97. Under the Core Land Use Scenario Option 1 and 2 deliver similar benefits (around \$2.4b), and Option 3 and 4 deliver similar benefits (around \$2b).

²¹ Not directly comparable to the Option 1 assessment

98. The cost benefit analysis for options under the core scenario indicates that all options deliver very similar benefit cost ratios (BCRs) in the range of 0.5 to 0.7. In other words, costs outweigh the benefits. As all BCRs are very similar, this indicates that increased levels of investment will result in proportional increases in benefits.
99. Under the Intensified Land Use Scenario, the benefits for Option 1 increase by 80 percent to around \$4.2b with a BCR range of 0.9 - 1.2.
100. Sensitivity tests run for Options 2 and 4 show that Option 1 delivers significantly more benefits than Options 2 and 4 under the intensified land use scenario. In the case of Option 4 this is due to less public transport travel time benefits without the new Mt Victoria tunnel and Arras Tunnel extension at the Basin Reserve. In the case of Option 2, it is due to the assumption that Bus Rapid Transit has less capacity to stimulate growth than the Light Rail Transit based options (assumed at 20 percent less based on international literature review).
101. Under the intensified land use scenario, the BCR ranges are:
 - a Option 1 intensified land use – 0.9 to 1.2
 - b Option 2 intensified land use – 0.8 to 1.0
 - c Option 4 intensified land use – 0.9 to 1.1
102. Wider economic benefits are an important component of the cost benefit analysis. Under the core land use scenario, wider economic benefits make up near a third of benefits for Options 1 and 2, and approximately a quarter for Option 4. Under the intensified land use scenario, wider economic benefits make up a smaller portion of benefits, as transport benefits grow at a faster rate with the increasing population around the MRT corridor. In the intensified land use scenario, wider economic benefits consist of approximately one quarter of total benefits for Options 1 and 2, but only 15 percent of benefits for Option 4. Wider economic benefits will be considered further at the Detailed Business Case stage.

Importance of land use intensification

103. A key finding from the further technical work and updated assessments was the importance of urban intensification to the LGWM investment story. The performance of options under high levels of intensification were found to better deliver on carbon and mode shift objectives and to maximise value for money (achieve a BCR above 1). Therefore, the ability of options to enable significant intensification was a key consideration in determining a preferred option.
104. The level of intensification expected along the MRT corridors influences the characteristics (such as quality and capacity) required of the MRT mode type. Conversely, the MRT mode type will potentially influence the level of intensification that is catalysed by the transport investment. In relation to MRT mode the following should be noted:
 - a Analysis indicates that both Bus Rapid Transit and Light Rail Transit modes have capacity to accommodate forecast demand up to 2046 under the core land use scenario.

- b However, under a demand scenario of 3,900 passengers per hour²² per direction along the southern MRT route (i.e. the upper range under the intensified land use scenario in 2046) a 43m Light Rail Transit vehicle (300 passengers) around every 4 minutes can cater comfortably for demand, whereas an 18m articulated Bus Rapid Transit vehicle (110 passengers) would need to run every 1.5 minutes at which service reliability would be affected, customer experience impacted and cost efficiency degraded.
 - c If necessary, the Light Rail Transit vehicle size could be increased to meet higher demand, with relatively minor changes to the design of the system. The ability of urban block lengths to accommodate stations for larger Light Rail Transit vehicles would need be a consideration.
 - d Larger, double articulated Bus Rapid Transit vehicles could be utilised but would require significant additional infrastructure investment to allow their use beyond the core Wellington Station to Island Bay corridor, and larger stops along the core corridor.
 - e A specialist literature review of comparable land value uplift from MRT systems globally indicated that a general land value uplift of 11.5 percent could be achieved for Light Rail Transit, and five percent for Bus Rapid Transit.
105. In summary, Light Rail Transit (or similar) can serve much higher demand and patronage growth in the long-term and would support demand effectively and reliably under the intensified land use scenario. For the core land use scenario, both MRT modes considered would provide adequate capacity and performance for the forecast patronage demand. Given there is still much uncertainty about the likely growth scenario and the level of intensification that can be delivered, along with potential behaviour change post-Covid, a flexible approach to MRT mode is indicated at this stage. It is also why more certainty is needed around future urban development in the Detailed Business Case stage.

Performance of the short list options - MCA

106. The table below shows the result of the multi-criteria analysis undertaken for the four short list options (and the do minimum option) against the Programme objectives - under the core and intensified land use scenarios.
107. Section 8 of **Attachment 1** provides more detail on the key points of differentiation and the LGWM Programme Affordable Short List Options Report²³ provides further detail on the MCA scoring.

²² Per direction

²³ [2021-10-22-LGWM-PASLO-Report.-Final_Redacted.pdf \(amazonaws.com\)](#)

	Core Land Use					Intensified Land Use				
	Liveability	Access	Carbon emissions and mode shift	Safety	Resilience	Liveability	Access	Carbon emissions and mode shift	Safety	Resilience
Do Min	0	-1	-1	-1	-2	0	-1	-1	-1	-2
Option 1	2	3	3	2	1	4	3	4	2	1
Option 2	2	3	3	2	2	3	3	3	2	2
Option 3	3	2	2	2	0	4	2	3	2	0
Option 4	2	2	3	2	-1	4	2	3	2	-1

108. A summary of the weighted scores (based on the weighted LGWM Programme objectives) outlined in paragraph 27 of this report, are provided in the table below:

Options	Core Land Use scenario	Intensified Land Use scenario
Do-Min	-0.90	-0.90
1	2.45	3.25
2	2.55	2.75
3	2.00	2.60
4	2.10	2.50

109. The key change in the MCA summary scores between the two land use scenarios is that Option 1 sees a significant increase in score under the intensified land use scenario compared to the core land use scenario. This reflects the assumed characteristics of the MRT mode in Option 1 which has the highest level of capacity and quality (Light Rail) to the south and a significant public transport improvement to the east which supports mode shift and additional intensification.

110. The table below shows the result of the multi-criteria analysis undertaken for the four short list options (and the do-minimum option) against the other “Effects” criteria under the core and intensified land use scenarios.

	Mana whenua	Heritage and archaeology	Social ²⁴	Business Disruption and Outcomes	Landscape and visual	Noise and Vibration	Contaminated Land	Engineering Difficulty	Property Difficulty	Scalability of network and services
Core Scenario										
Do-Min	-2	0	1	-1	0	0	0	0	0	0
Op1	2	-5	-3	1	-3	2	-3	-4	-5	3
Op2	3	-5	-3	1	-3	3	-2	-4	-5	5
Op3	2	-5	-2	0	-2	1	-3	-4	-5	3
Op4	1	-5	-3	0	-1	0	-2	-3	-4	3
Intensified Scenario										
Op1	3	-5	-3	3	-3	2	-3	-4	-5	3
Op2	3	-5	-3	2	-3	3	-2	-4	-5	5
Op3	2	-5	-2	1	-2	1	-3	-4	-5	3
Op4	1	-5	-3	1	-1	0	-2	-3	-4	3

111. The main change to the Effects scores between the core and intensified land use scenarios was in relation to the “Business Disruption and Outcomes” score. Options 2, 3 and 4 were all awarded an extra point reflecting the benefits of intensification on businesses (increased demand for services, better access for employees, increased footfall etc). Option 1 was awarded two extra points as it is the option that facilitates the most development across the network.
112. Mana whenua awarded Option 2 the highest score under the core land use scenario as it was considered beneficial to provide a broader spread of urban uplift benefits and the prospect of expansion of Bus Rapid Transit to the north and west was considered advantageous. There were significant positives associated with Options 1, 2 and 3 in relation to keeping MRT away from the Te Aro Pā site at the northern end of Taranaki Street. Mana whenua gave Option 1 an additional point under the intensified land use scenario as the option likely to catalyse the most development.
113. Overall, Options 1 and 2 score similarly to each other and better than Options 3 and 4 under the core land use scenario. Option 2 performs better in terms of noise vibration, scalability and resilience compared to Option 1 and on balance was identified as the technically preferred option through this assessment.
114. However, Option 1 provides greater capacity than Option 2 (noting that an alternative version of Bus Rapid Transit could deliver higher capacities) and it is therefore better able to respond to growth under the intensified land use scenario, maximising mode shift and decarbonisation benefits.

²⁴ Primarily considered negative impacts such as noise, dust, community amenity effects and property acquisition during construction.

115. Although Options 3 and 4 generally received lower negative scores against some of the “effects” criteria, they also received lower positive scores against the investment objectives.

Option 3 and 4 conclusions

116. Neither Option 3 or Option 4 include a new Mt Victoria tunnel, and only Option 3 includes the Basin Reserve grade separation.
117. As a result, Options 3 and 4 cost significantly less (whole of life costs of \$6.6 billion and \$5.8 billion compared to \$7.4 billion for Option 1) and have greater flexibility for cost increases within the affordability threshold. Options 3 and 4 can also be delivered with less infrastructure in shorter timeframes, therefore having less impact in terms of embodied carbon and greater impact on emissions reduction in the short term.
118. Option 3 includes the Basin Reserve grade separation only, which has a wide range of benefits compared to retaining the existing layout with minor improvements. However, the ongoing long-term benefits for carbon emission reduction and mode shift are limited unless it is paired with the Mt Victoria tunnel to enhance public transport travel times and capacity to the east.
119. As the only option without the Basin Reserve grade separation, Option 4 doesn't include the same degree of urban amenity improvements at the Basin Reserve. It also includes a different CBD route for MRT, via Taranaki Street rather than via Kent/Cambridge Terrace, as it relies on the existing Arras Tunnel infrastructure to separate Light Rail Transit movement from state highway traffic. Mana whenua scored Option 4 less well than other options due to Light Rail Transit routing via Taranaki Street through the area of Te Aro Pa. While MRT via Taranaki Street is a more central alignment through the central city/Te Aro, work was completed to look at the site-specific opportunities within walking catchments of Taranaki Street and Kent/Cambridge concluded both routes were likely to support similar urban development levels.
120. In terms of performance against objectives, Option 1 in comparison to Option 4 provides: more people living near key destinations; improved public transport travel time and travel time reliability (including better comparative travel times with car journeys); and reduced car mode share. These outcomes become even more pronounced when considering the intensified land use scenario.
121. While the BCR range for Option 4 is similar to Option 1 under the intensified land use scenario (see paragraph 101 of this report), Option 1 has an incremental BCR over Option 4 of 1.1 - 1.4 under the intensified land use scenario because of better public transport services and walking and cycling interventions around the Basin Reserve and through Mt Vic Tunnel which result in significant increases in public transport and health benefits. Better connectivity to the east because of these components also results in a large uplift in agglomeration benefits.
122. The Basin Reserve and new Mt Victoria tunnel components were supported through public engagement.
123. Options 3 and 4 would not deliver the improved public transport level of service and mode shift to the eastern suburbs required to achieve the transformational change sought by the Programme.

124. It is therefore recommended Options 3 and 4 be removed from further investigation. However, removing the options at this stage would not preclude them to be fall back positions if circumstances (such as forecast land use) change, as only moderate additional work would be required to the MRT investigations to change from the other options.

Comparing Options 1 and 2

125. Options 1 and 2 both include the Arras Tunnel extension at the Basin Reserve and new Mt Victoria Tunnel but provide different forms of MRT or public transport improvements to the south and east.

126. Under the core land use MCA, Options 1 and 2 perform similarly. Option 2 performed slightly better in terms of resilience (also mana whenua values, noise vibration, and scalability effects) but otherwise the scores were similar. However, when considering the intensified land use scenario, Option 1 outperforms Option 2 in relation to Liveability (urban amenity and urban development) as well as Carbon and Mode Shift which are important programme objectives.

127. Exact performance metrics are not available for Option 2 as that option has not been modelled to the same extent as Options 1 and 4. However, the land use assessment work and comparative city analysis concluded that Bus Rapid Transit is likely to catalyse less development than Light Rail Transit due to the perceived permanence of the infrastructure and the potentially lower levels of service.

128. Option 2 (\$7.0 billion) costs slightly less than Option 1 (\$7.4 billion). Under Option 2 there is more opportunity to descope the project (and reduce cost) both in terms of the Bus Rapid Transit mode being more flexible and in relation to public transport treatment to the east, but this is likely to reduce the benefits delivered.

129. The BCRs for Options 1 and 2 are similar under the core scenario, but the BCR range for Option 1 is higher (0.9 – 1.2) under the intensified land use scenario compared with Option 2 (0.8 – 1.0). An incremental BCR has been calculated to determine whether the additional benefits gained outweigh the additional costs and shows that the incremental BCR of Option 1 over Option 2 is greater than 3, meaning that the additional infrastructure in Option 1 is a good investment.

130. Option 2, as modelled, did not provide the same ability to respond to demand under the intensified land-use scenarios when compared to Option 1, particularly in the long term. However, other Bus Rapid Transit systems which have not been modelled, do have greater capacity and these systems would perform better. Bus Rapid Transit systems also have more flexibility to respond to changing MRT vehicle technology.

131. Public engagement highlighted a preference for Light Rail Transit over Bus Rapid Transit for reasons outlined in paragraph 56 of this report, although the gap narrowed for the online panel research, particularly when considering those who live in Wellington City.

132. Consideration of MRT mode options concluded that, under the intensified land use scenario, Wellington needs the capacity and permanence of a system with the characteristics of Light Rail Transit but noted the benefits associated with Bus Rapid Transit based systems and emerging technology in this space.

133. Overall, the PPOR recommended that both options proceed through to the Detailed Business Case phase. Light Rail Transit has benefits over Bus Rapid Transit in terms of facilitating urban intensification but internationally, Bus Rapid Transit systems are improving in this space.
134. The PPOR also noted it was important to define the ideal characteristics that MRT should have for the Wellington situation as the basis for further investigation. The desired MRT characteristics are outlined in Section 11.4.8 of the PPOR in **Attachment 1**.

Preferred programme option

135. Investigations into the packages, and how these best combine to form an overall programme, have identified that:
- a there is a good investment case for MRT in Wellington City, subject to realising intensification near MRT corridors that is close to the intensified land-use scenario
 - b focusing the highest quality MRT through the CBD to Newtown and then south to Island Bay has the greatest potential to both drive and support intensification
 - c the priority to the east is fast and reliable public transport journeys to drive mode shift, urban development and access, including for trips to the Airport by public transport. This does not require MRT but does require new infrastructure through Mount Victoria and grade separating the Basin Reserve to provide additional public transport lanes
 - d a solution at the Basin Reserve has been identified that can deliver transport benefits by separating and prioritising MRT and enhanced public transport to both the south and the east, whilst also delivering urban development and urban amenity benefits
 - e new public transport lanes are required through Mt Victoria to provide more direct and reliable access for public transport to the east, but there are different tunnel options to provide those lanes
 - f there is support for and benefits associated with a dedicated active mode facility through Mt Victoria
 - g there is strong public support for change and for investment in MRT, a new Mt Victoria Tunnel and for grade separated improvements at the Basin Reserve. There is also a strong appetite to make it happen sooner, deliver the best value and get public transport right.
136. However, there is a lot that needs to be considered during the next phase of planning, as outlined in the Next Steps section of this report.

The recommended Preferred Programme Option

137. The PPOR in **Attachment 1** recommends that the preferred option that should be progressed to Detailed Business Case stage is “a high quality, high capacity MRT solution along the southern corridor from Wellington Station to Island Bay with a new tunnel through Mt Victoria to improve facilities for active modes and public transport and a grade separated solution at the Basin Reserve”. This is Option 1, but it is recognised that

Bus Rapid Transit could provide similar outcomes to Light Rail Transit if appropriately specified and designed.

138. Option 1 is the preferred programme option as:

- a **It best enables, and responds to, intensified land use.** Bus Rapid Transit as modelled as part of Option 2 may not meet Level of Service expectations to the south in the long term and new public transport lanes are required to the east. Only the capacity provided in Option 1 can provide this certainty.
- b **It enables the most mode shift away from private cars.** Providing Light Rail Transit and the Mt Victoria tunnel creates the most comprehensive mass transit network, thereby enabling the most intensification which then leads to the best mode shift for the region.
- c **It has the best reduction in enabled carbon.** With mode shift comes a significant reduction in enabled carbon emissions.
- d **It enables improved movement to and from the Airport and the east.** The Basin Reserve improvements and the Mt Victoria tunnel ensures that many more people can live within 60 minutes of the Airport by public transport services.
- e **It best enhances urban amenity²⁵ and active travel around Te Aro.** The Basin Reserve improvements and the Mt Victoria tunnel provide a step change in safe, attractive and efficient facilities for pedestrians and cyclists wanting to travel through this part of Te Aro to connect north, south, east or west. The surrounds to the Basin Reserve will also be beautified to make this a place people will want to be, connecting Pukeahu, the Basin Reserve facilities and the surrounding schools and catalysing adjacent development.
- f **It has the best return on investment.** The BCR for Option 1 is above 1 and the largest of all the options considered. It also returns a positive incremental BCR when compared to other options.
- g **It contains elements that received the most positive response from engagement.** Respondents replied most positively to Light Rail Transit, the Basin Reserve and Mt Victoria Tunnel improvements compared to the alternative options.

139. However, the preferred option does not come without issues or risks:

- a **It has the highest cost.** It is therefore closest to the funding threshold and has the highest risk of exceeding this value.
- b **It has the highest embodied carbon.** Constructing more infrastructure results in higher levels of embodied emissions. This means it won't contribute to Wellington's short-term emission reduction targets, but it does support continuous long-term reductions in enabled emissions through intensification and mode shift.

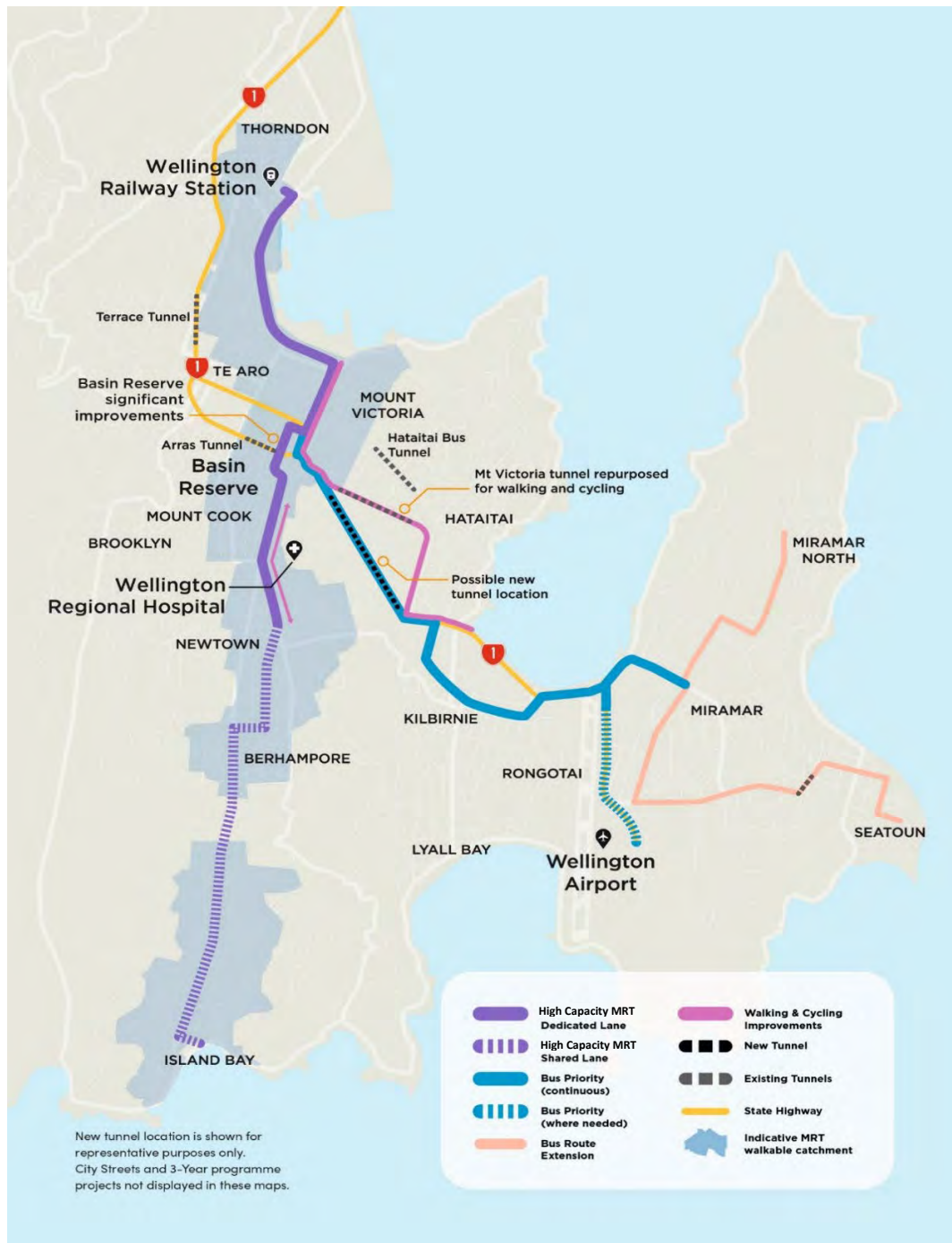
²⁵ Noting that amenity outcomes still need to be confirmed and developed through further design work during the Detailed Business Case stage to ensure the LGWM Programme delivers on its Liveability objective.

- c **It has the highest level of effects.** Newtown, Mt Victoria and The Basin Reserve are all sensitive areas and construction through them will require comprehensive consideration and detailed management plans to minimise impacts on people and the environment.
- d **Light Rail Transit has less flexibility and extendibility.** Due to the in-ground infrastructure, Light Rail Transit services cannot deviate from the route or extend past where the tracks finish. This makes it harder for services to extend, for example, to Johnsonville. Likewise, it is not as easy to stage construction. Accordingly, Bus Rapid Transit alternatives will continue to be considered.
- e **It has lower resilience to unexpected events.** In earthquakes, floods or even when crashes occur, light rail vehicles cannot take a different route to avoid affected sections of the network. Again, Bus Rapid Transit alternatives will continue to be considered.
- f **It relies on acceptability and market delivery of very high-density urban development in the MRT corridor.** The National Policy Statement on Urban Development (NPS UD) and the new Medium Density Residential Standards require various levels of medium to high density to be enabled in most of Wellington's existing urban areas. The public acceptability and commercial attractiveness of intensification, and the number of existing opportunities for more dispersed development may limit the intensified land use scenario that was modelled for the purpose of assessing the options, and the outcomes that can be achieved.

140. In addition, there are other factors to consider:

- a **There are still a lot of** uncertainties. These include different land use scenarios, sub-surface risks, future investment in rail network capacity, future ways of working, the ongoing impact of COVID-19, future MRT technologies and additional policy changes in relation to climate change.
- b **This is not a decision to build yet.** The decision now should determine what is the best way of achieving the best outcome for Wellington, but still enabling flexibility for the key determination at the end of the Detailed Business Case phase.

141. The recommended preferred programme option is presented in the figure below. This is fundamentally the same as Option 1 with the exception that the 'light rail transit' mode element of the MRT system is not specified and instead the requirement is for a high-quality high-capacity system to the south.



Risks and uncertainties associated with the Preferred Programme Option

142. The key risks and mitigation in relation to the recommended Preferred Programme Option in this report are set out below:

- a **Cost escalation** - The programme is still at an early stage the overall project lifecycle and therefore costs have a degree of uncertainty.

Mitigation: has included undertaking parallel estimates, reporting on the 95th percentile estimated costs and the development of an affordability threshold. Cost risk could be further mitigated by selecting an option well below the affordability threshold or by reducing the scope of the preferred programme option later. Bus Rapid Transit has a greater ability to reduce scope compared to Light Rail Transit, particularly in terms of the level of infrastructure provided to the east.

- b **Level of land use intensification** – The PPOR shows the importance and impact of high levels of intensification to deliver the programme objectives. The preferred programme option recommendation is based on option performance under the “intensified land use scenario” with 26,000 additional dwellings, so levels of intensification towards this scenario are needed. However, the level of intensification that can be realised is still very uncertain. Work to date has shown that continuation of a BAU approach to land use, or even adopting the ‘core’ land use scenario, has significantly fewer benefits compared to the intensified land use scenario. Not facilitating high land use could result in consenting risks (as the transport solution will have to show ‘need’) not achieving the expected outcomes and/or over-investing in a transport solution.

Mitigation - To ensure intensification is not limited, Option 1 provides the necessary capacity south and east. The PPOR outlines the measures LGWM are undertaking to help facilitate growth, but more will be needed by WCC, Kāinga Ora, Wellington Regional Leadership Committee and others. If significant intensification is not able to be achieved there could be consenting risks (as the transport solution will have to show ‘need’), expected outcomes may not be achieved and/or there could be over-investing in a transport solution. If intensification levels greater than those represented in the “core land use scenario” are not able to be achieved, roll out of any form of MRT system may not provide value for money. In this case a ‘Continuous Bus Priority’ network may provide appropriate outcomes and a lower cost, although issues such as the impact on urban amenity would need to be considered. This needs to be reviewed during the Detailed Business Case phase.

- c **Pricing tools** - The addition of congestion pricing and/or a parking levy will reduce the amount of travel by private car and increase the demand on the public transport system. The availability and/or timing of these tools is uncertain.

Mitigation: Pricing could have a similar impact to greater land use intensification and therefore this is best managed by implementation of Option 1 which provides the greatest public transport capacity.

- d **Future MRT technologies** - Several different companies around the world are developing rubber tyre-based MRT vehicles that will have similar characteristics

as light rail such as multiple car units, low-floor walk-through units, driverless services etc. This means that Bus Rapid Transit could provide the same/similar capacity and customer experience as Light Rail Transit, whilst having the other benefits of Bus Rapid Transit such as flexibility, extendibility, and resilience.

Mitigation: Not restricting the MRT mode at this stage would enable these future technologies to be investigated further during the Detailed Business Case phase.

- e **COVID 19 and future ways of working:** The pandemic has resulted in significant periods of lower travel demand, a reluctance to use public transport due to proximity to others and an increase in employees working from home. This could result in a lower demand for travel.

Mitigation: The Detailed Business Case phase should monitor these effects over the next two years to enable this trend to be understood further before a funding decision is made

- f **Climate change policies** - There is an understanding that further climate change policies will be enacted soon. As the modelling has shown, the best way to enable ongoing emission reductions is to facilitate intensification and implement pricing.

Mitigation: As above, intensification and pricing will result in additional demand for public transport to both the south and east, which is best enabled by Option 1.

- g **Other changes** - The preferred option decision is not a decision to build now. That decision comes at the end of the Detailed Business Case phase. The decision now should allow flexibility to determine how to achieve the best outcome for Wellington, but still enable flexibility for the key determination at the end of the Detailed Business Case.

Mitigation: The best way to enable flexibility but not impact on programme if circumstances do change, is to investigate all components through the Detailed Business Case. That would mean investigating both Light Rail Transit and Bus Rapid Transit as well as Basin Reserve and Mt Victoria tunnel.

Sequencing and timeframes

143. Work is currently underway to identify the best way to sequence all the programme elements through development of the System Plan Stage 1 Report, April 2022. Council officers have been involved in this work to ensure integration with wider networks, utilities and events planning.

144. Although just an initial indication, the specific elements of the 'base' scenario from the System Plan are:

- a Potential for City Streets Featherston Street project to be delayed if required to help manage disruption in the CBD whilst the Golden Mile works underway
- b Continuous Bus Priority to the east delivered as early as possible to realise the benefit of this part of the MRT scheme and make use of the City Streets project (CBD to Kilbirnie and Miramar Town Centre)

- c MRT substantive works in two to four stages, first stage from Wellington Station to the Basin Reserve, which would provide an opportunity (subject to stabling yard location) to be able to operate this stage earlier.
- d MRT, Basin Reserve and Mt Victoria tunnel investigations, design and consenting to start as soon as possible which would enable construction start in 2027. Mt Victoria tunnel construction would follow the Basin Reserve construction and both would happen in parallel with MRT construction.

145. Overall, this would result in the programme implementation being complete in 2032.

Peer Reviews

Independent Peer Review of PPOR

146. An independent peer review of the Preferred Programme Option Report and appendices was commissioned in April 2022 on behalf of the LGWM partners. The peer review report was issued on 5 May 2022 and is provided in Attachment 6 to this report.
147. Overall, the peer reviewer acknowledged the conclusions of the PPOR are understandable but recommends that further work is undertaken in the Detailed Business Case phase to confirm the approach, particularly due to the current uncertainties around the level of housing intensification that could be achieved.
148. The peer reviewer also noted that further work will be required during completion of the final Indicative Business Case and in the next Detailed Business Case phase on risk management to ensure that the programme can be delivered successfully. The report authors and programme team agree with these comments and are ensuring the future phases are appropriately scoped to include these elements.

Partner Technical Advisory Group

149. Peer review and technical assurance has also been provided by the partner technical advisory group (TAG) throughout the optioneering process and in developing the PPOR. From GW this included representatives from Council's Metlink and Regional Transport Strategy areas. The TAG provided feedback on several drafts of the PPOR and attended meetings with the consultant and programme team to clarify and discuss feedback raised, prior to issue of the final PPOR. In general, TAG feedback was either resolved or identified to be addressed at the next Detailed Business Case stage.

Review of carbon and economics assessments

150. As a part of the review process for the Preferred Programme Option Report, Te Waihanga / New Zealand Infrastructure Commission were requested to undertake a brief review of the economic and carbon assessment methodologies deployed by the LGWM Programme Team.
151. Te Waihanga focused its review on the results of the carbon assessment rather than the methodology. It noted the importance of aligning the LGWM programme with Rautaki Hanganga / New Zealand Infrastructure Strategy. The key theme of Te Waihanga's advice was that the scale of the carbon reduction challenge facing New Zealand is such that the most efficient use of existing infrastructure must be prioritised ahead of any further investment in new infrastructure.

152. Te Waihanga noted it believed that Programme Option 4 was the best option from a carbon reduction perspective. The LGWM Programme Team noted the advice from Te Waihanga. Carbon is an important objective and consideration for LGWM but must be considered alongside the other agreed programme objectives including liveability, mode shift (which has carbon and wider benefits), access, resilience and safety.
153. While there were some areas in Te Waihanga's advice that the Programme Team did not agree with, it has provided a sound base for the advancement of the Detailed Business Case.

Integration of LGWM with the regional transport network

154. The scope of the LGWM programme is focussed on investment within Wellington city, however this investment needs to be considered in the context of the wider regional transport network.
155. Integration of a new mass rapid transit system with the existing Wellington city bus network will be critical. Through the Indicative Business Case phase this integration consideration has included defining some high-level public transport network integration principles and assumptions, assessing the 'network fit' and 'extendibility' of mass rapid transit options to the north and west as part of the multi-criteria assessment, and considering issues like how standard bus services might share lanes and facilities with different mass rapid transit modes.
156. Full public transport network design and integration investigations will be required as part of the Detailed Business Case phase. This will enable a better understanding of the implications of a new mass rapid transit system on city-wide bus service and wider regional connections including service re-routing, the extent of any hubbing/transfers required, and potential impacts for bus routes across the wider network.
157. Continued investment in the Region's rail network has been identified as a critical dependency to deliver the LGWM programme outcomes. It is needed to encourage mode shift and provide travel choice for journeys to/from Wellington city from the north/rest of the region and to provide sufficient capacity as road space within the city is re-allocated to active mode and public transport through the LGWM programme initiatives. Key rail packages (yet to be fully funded) include the Lower North Island Rail Integrated Mobility²⁶ package and the Wellington Strategic Rail Plan package²⁷ which identifies further investment to facilitate and drive mode shift.
158. Progressing investigation of the key interchange at Wellington railway station between the existing heavy rail system and a new mass rapid transit system will be an important part of the next Detailed Business Case phase (in addition to 'stabling' for mass rapid transit) to ensure onwards journeys by public transport south of the railway station are easy and attractive for customers.

²⁶ A \$762 million dollar investment in a fleet of 22 four-car, hybrid electric trains, and associated infrastructure to deliver critical passenger transport services as the aged locomotive-hauled trains of the Wairarapa and Manawatū Lines reach the end of their service lives. It will also increase service frequency and add to the capacity of the metro rail network.

²⁷ With an estimated cost of around \$7b - \$11b of capital investment over 30 years, with around \$2.5b in the first 10 years.

159. A regional lens has been applied to the LGWM Travel Behaviour Change business case and future investigation of congestion pricing options will consider the impacts across the regional transport network context and for the region's communities.
160. Development of the LGWM System Plan Stage 1 has also specifically considered the implications on timing and sequencing of a number of significant projects in the wider transport system, including the Inter-Island Resilience Connection (iReX) project and enhanced port access, Transmission Gully, Northern Rail Upgrade Programme, Te Ara Tupua and Riverlink.

Urban development context considerations

161. LGWM provides an important opportunity to shape land use patterns and enabling denser housing along a new mass rapid transit corridor is a key factor informing the recommended preferred programme option in this report. This is expected to help the region and city address critical challenges such as increasing housing supply, affordability and choice, liveability and climate change.
162. As highlighted earlier in this report, a critical part of the next Detailed Business Case stage will be improving our understanding of the potential for comprehensive high quality mixed-use development around the MRT stations, including high density housing, employment opportunities, pedestrian connections and public spaces. In particular, how much of this urban intensification is realisable and can also achieve the City's Spatial Plan goals.
163. The context for delivering more, denser housing aligns with the NPS-UD. The NPS-UD's intensification policies are scheduled to be implemented with legal effect in Wellington City's Proposed District Plan by November 2023. The policies require district plans to enable building heights of least 6 storeys within a walkable catchment of rapid transit stops, city centre zones and metropolitan centre zones, building heights and density to maximise density within the city centre zone, and other building heights and densities around the other centres zones.
164. However, the distribution, location and timing of that intensification is uncertain, particularly because the Resource Management Amendment Act 2021 introduces medium density residential standards which permit three storeys, three houses per lot, and medium density building standards. This increases feasible residential capacity in Wellington City and in the Region. This will encourage housing growth in suburban areas of the Wellington Region, which risks watering down of intensification around commercial centres and key public transport nodes.
165. The process for providing more certainty around the distribution of future growth in Wellington City and the wider region will through development of the Future Development Strategy (FDS) under the NPS UD. The Wellington Regional Leadership Committee has agreed to undertake a regional FDS as required for Tier 1 and Tier 2 councils in the region. It will replace the current Wellington Regional Growth Framework and is required to be complete to inform 2024 Long Terms Plans.
166. The regional FDS will spatially identify the broad locations where development capacity will be provided, the infrastructure that support and service that capacity and its integration with RMA planning decisions. The regional FDS will be informed by results

of the Intensification streamlined planning processes being undertaken in 2022/23, the current Wellington Regional Growth Framework, local growth strategies/plans (including Our City Tomorrow - A Spatial Plan for Wellington City), updated housing and business development capacity assessments, and other relevant studies and work to be completed. The FDS is conducted under a special consultative procedure; and includes engagement with relevant local authorities, government agencies, hapū and iwi, infrastructure providers, and the development sector.

167. Other factors that will influence the potential for/feasibility of high density, comprehensive development with multi-story buildings along mass rapid transit corridors - such as commercial feasibility, infrastructure provision, market demand and conditions, and developer appetite/capacity - are yet to be tested under these new policy settings.
168. Future work will need to reconcile the scale of urban development and intensification that is realistically achievable, while creating high amenity, desirable urban environments in a way that is commercially feasible and incorporates affordable housing for low to medium income households.
169. The Wellington City District Plan is the statutory enabler of land use changes in the Spatial Plan for Wellington City. The District Plan directs the future form of the urban environment by how zones, height limits and other rules and guidelines allow for urban development.
170. The District Plan will be changed, to enable high-density mixed-use redevelopment around the future MRT stations once the station locations are confirmed. The Proposed District Plan already enables six storey buildings within most of the walking catchments around the core route from the Railway Station to the Hospital. The City Centre Zone's policies already support comprehensive development around MRT stations and much higher buildings, especially if buildings have city outcome contributions (for example, assisted housing, public spaces, accessible housing).
171. Urban areas within walking catchments of MRT stations outside the areas identified in the paragraph above will be zoned to allow people to build six storeys or more, except where limiting matters apply, once MRT station locations are confirmed.
172. To increase urban development towards the intensified scenario, land use rules need to enable building heights greater than 6 stories near future MRT stations in areas where constructing 5-8 storey buildings is typically not commercially feasible, and because some tall apartment towers would be needed to maximise housing around MRT stations.
173. Infrastructure upgrades prioritised under the Spatial Plan are aligned with urban development along the southern MRT corridor. Infrastructure capacity (pipes, cables, transport, community facilities) will need to be increased further to move towards the intensified land use scenario. However, this may be off-set by fewer infrastructure upgrades in other locations.
174. To increase urban development towards the intensified scenario, the facilitation and delivery of urban development would need to be significantly increased. In particular: acquisition and amalgamation of land near MRT stations, development of LGWM

partner and Crown land, partnerships with developers, iwi authorities and Kāinga Ora, and facilitating good urban design, public space and community outcomes.

175. LGWM is working with mana whenua, Kāinga Ora, the Ministry of Housing and Urban Development and infrastructure providers to explore opportunities to partner to secure quality urban environment outcomes and facilitate and deliver housing and transit-orientated development alongside MRT. The focus, as appropriate for this stage in the process, has been on providing confidence that there is a shared commitment and includes:

- a **Development of Urban Development Objectives** (set out in [Attachment 5](#)) - to expand on the LGWM 'liveability' objective and articulate shared goals for growth and housing in the MRT corridor catchment. They summarise the collective view (across LGWM partners, including mana whenua and Kāinga Ora and HUD) as 'working objectives' that will be refined as work on urban development progresses.
- b **Development of expressions of ongoing commitment on urban development.** These statements (set out in [Attachment 5](#)) reaffirm the commitment of LGWM partners, including mana whenua, and Kāinga Ora and HUD to continue working together to achieve desired urban development outcomes, both what the cross-agency parties will do together and what each will individually commit to in the short term. These are intended to give confidence that investment in transport is supported by progressive steps to develop our approach to, and case for investment in, urban development.
- c **Development of a Specified Development Project (SDP) proposal.** The change required by the LGWM MRT/SHI Transformational Programme and the supporting investment in sub-surface infrastructure, social infrastructure, and housing across the spectrum are of such significance and complexity to warrant a much more coordinated approach than a traditional consenting pathway may provide. Developing a joint SDP proposal would demonstrate the partners' level of ambition for an integrated transport and urban development approach to be used for LGWM and the desire for more formal involvement from Kāinga Ora in achieving this. Any decision to proceed with an SDP will require separate approval of partner organisations following the completion of further work.

176. The cost of facilitating comprehensive urban development and intensification through the purchase and consolidation of land around mass rapid transit stations still needs to be worked through during the Detailed Business Case phase and are not included in any option or programme costs.

Ngā hua ahumoni Financial implications

177. To ensure the programme options engaged on could be credibly funded if a series of assumptions held true, a maximum cost constraint was agreed in August 2021 by the LGWM Board. The engagement affordability threshold was set at \$7.4 billion based on the funding scenario which supported the 2019 Cabinet paper plus inflation. This has subsequently been supported by the Minister of Transport, the Mayor, and the Chair of

Greater Wellington. All the programme options being considered are within this threshold.

178. The programme is following the Waka Kotahi Business Case Approach, which is based on the New Zealand Treasury's Better Business Case process with a series of decision points as options are progressively refined. Each stage provides progressively more detail and therefore more accurate cost estimation.
179. As the major elements of the programme are currently at Indicative Business Case stage there is cost uncertainty, including potential for scope changes and cost escalation. To mitigate this, capital costs have been developed by professional cost estimators and these estimates have been peer reviewed. Forecasts have been developed using the upper range cost estimate (P95) with inflation applied. Benchmarks have been applied to build up whole of life costs, including financing costs, to capture, both the up-front capital investment and, the longer-term impact on funding partner budgets. Whole of life costs are calculated for a 30-year period to June 2050.
180. The next stage, the Detailed Business Case, will provide significantly more design detail, with a higher cost associated with the detailed investigations required for this phase. Cost estimates based on Detailed Business Case design will be much more accurate, although uncertainty will still remain and will be further refined in the pre implementation phase where detailed design will be completed. This greater cost certainty will inform the funding partners long term funding plans and decision making.

Partner cost sharing and affordability

181. In May 2019 a Cabinet paper set the expectation of a 60:40 central/local split for the LGWM Programme. This did not set an expectation of the split of funding between the Council partners.
182. In February 2020 a Relationship and Funding Agreement was approved by partners, agreeing an interim cost share.
183. In August 2021 the LGWM Board agreed an engagement affordability threshold of \$7.4 billion²⁸ (\$4.2 billion central, \$3.2 billion local) based on the funding scenario which supported the 2019 Cabinet paper plus inflation. All the programme options being considered are within this threshold. This affordability threshold has subsequently been supported by the Minister of Transport, the Mayor, and the Chair of Greater Wellington but it has not been formally adopted by funding partners.
184. Cost share cannot be set by the LGWM programme, it is a decision for funding partners. To support funding partners to make this decision LGWM has considered options for approaching cost share. This has been tested with relevant officers and officials and the LGWM Board and the proposed approach is set out below.

²⁸ To cover the whole of life cost over a 30-year period to 2049/50. This includes investigations, design, construction, and on-going operational and financing charges for the entire LGWM programme.

Costs and proposed cost sharing for the next phase – Detailed Business Case (DBC)

185. The Detailed Business Case cost represents around 2.5%-3.5% of the total MRT/SHI improvement package depending on the option selected. Given the transformative scale of the package this is a significant investment at \$120.7 million over three years. This includes the direct costs of the Detailed Business Case, costs of operating the programme office, and supporting workstreams such as programme communications and engagement, funding and financing, consenting strategy, corridor planning and programme wide economics.
186. An assurance process was undertaken to ensure this budget is robust. Initial Detailed Business Case cost estimates were developed by professional cost estimators using industry standard benchmarks. An internal review process was undertaken to test the assumptions with the cost estimators, and the estimate was independently reviewed by an external expert.
187. The Detailed Business Case cost and timing estimate was based on a single preferred option being investigated in detail. If the preferred programme option includes continuing with investigations on both Light Rail Transit and Bus Rapid Transit (as recommended) the scope of work will be revisited. If this has a material impact on cost this may require a request for additional funds.
188. It is proposed to continue with the current interim cost sharing approach (agreed in the 2020 Relationship and Funding Agreement) for the Detailed Business Case development and for LGWM management costs. This is a 60:40 split between central and local government, and a 50:50 split of the 40% local share between the two local government partners (WCC and Greater Wellington).
189. The forecast breakdown of costs (including indicative estimations for the key components) is as follows:

DBC components	2022/23	2023/24	2024/25	Total
Mass rapid transit	\$9.1m	\$19.7m	\$9.1m	\$37.9m
Basin Reserve	\$2.3m	\$6.1m	\$2.3m	\$10.7m
Mt Vic tunnel	\$4.3m	\$11.4m	\$4.3m	\$20.1m
Other ²⁹	\$1.5m	\$3.0m	\$1.5m	\$6.0m
Total direct DBC costs	\$17.2m	\$40.2m	\$17.2m	\$74.7m
Programme office and supporting workstreams	\$14.6m	\$16.4m	\$15.0m	\$46.0m
Total	\$31.8m	\$56.6m	\$32.2m	\$120.7m

190. Under the cost sharing arrangement agreed in the Relationship and Funding Agreement the cost share between the partners for the Detailed Business Case is:

²⁹ Specified Development Project and travel demand management pricing investigations

	Cost share	2022/23	2023/24	2024/25	Total
Greater Wellington	20%	\$6.4m	\$11.3m	\$6.4m	\$24.1m
WCC	20%	\$6.4m	\$11.3m	\$6.4m	\$24.1m
Waka Kotahi	60%	\$19.1m	\$34.0m	\$19.3m	\$72.4m

191. Council has sufficient budget to cover the Detailed Business Case phase in its Long-Term Plan 2021. Council's share is debt funded and repaid over 20 years.

Proposed approach to cost sharing for Pre-Implementation and Implementation phases

192. Enduring cost shares do not need to be confirmed at this stage, however an agreement, or agreed assumptions, will be required for the Long-Term Plan. The proposed approach for agreeing the cost sharing for the pre-implementation/implementation phases acknowledges that changes in current assumptions are likely, but:

- a provides key bottom lines to balance back to
- b enables scenarios to be run to understand potential funding impacts (for example: council rates increase and impacts on the National Land Transport Fund)
- c is flexible enough to revisit as better information is available.

193. A six-step cost share approach has been developed to provide increased certainty on funding requirements from each partner, and a pathway to agreeing final shares:

- a Establish preferred programme option & cost estimate
- b Establish principal driver of cost allocation
- c Confirm funding envelope
- d Confirm baseline cost shares for preferred option (based on a and b above)
- e Use 'levers'³⁰ to align with funding envelope
- f Review and retest cost shares in the case of material changes.

194. The approach is based on several key assumptions including:

- a The principal driver of cost allocation is based on the existing Financial Assistance Rate (FAR) precedent
- b Funding envelopes are to be agreed, including the starting position that any land value capture and demand management pricing revenue would fall to the local share.

³⁰ This entails firstly allocated new funding sources if relevant (e.g. TDM pricing); then funding partner(s) provide capital contribution to fund another partner's capex to balance funding shares.

- c Business case costs will continue to be funded on a 60 percent Waka Kotahi, 20 percent WCC, and 20 percent Greater Wellington basis.
 - d Any costs beyond the project completion and asset handover would follow normal funding arrangements (FAR).
 - e Project cost risk is assumed to be held in same ratio as the cost share.
195. Other key considerations include:
- a There is no current precedent for mass rapid transit funding, outside heavy rail and busways, in New Zealand
 - b Funding for urban development is a critical issue which still needs to be worked through.
196. LGWM has considered several possible approaches for splitting the local share. Only two were identified as both workable and likely to deliver an overall circa 60:40 split. These include:
- a a calculation based on equal rates increases, or
 - b equal dollar funding contributions from WCC and Greater Wellington.
197. Analysis based on these cost share approaches, including a number of scenarios, was presented to a joint Council workshop on 6 May 2022.
198. As the value of total rates is less for Greater Wellington than WCC the difference between the equal rates increase and equal dollar funding contribution will shift cost between the two council partners. The additional cost depends on the programme option selected but is in the range of \$0.5 billion (Option 4 – lowest cost option) and \$0.7 billion (Option 1 – highest cost option), with Options 2 and 3 in between these ranges.
199. No formal agreements about enduring cost share have yet been made. However, to provide Councils with the potential impacts of different cost sharing arrangements, the table below shows two indicative cost sharing scenarios:

Funding partner	Central Share	WCC	Greater Wellington	Wgtn. City ratepayers	Non Wgtn. city ratepayers
Equal rates increase	\$4.2b 57%	\$2.3b 31%	\$0.9b 12%	\$2.7b 37%	\$0.5b 6%
Equal dollar contribution	\$4.2b 57%	\$1.6b 22%	\$1.6b 22%	\$2.3b 32%	\$0.8b 11%

200. Key assumptions for these scenarios are: costs based on programme option 1 based on the recommendations in this paper, the 2021/22 rates base (pre three waters reform), no change in the cost share as a result of potential alternative funding sources, the Greater Wellington funding policy for LGWM uses capital values (current LGWM approach), the central/local split is the same as the engagement affordability threshold (57:43).

201. Under the equal rates increase the indicative rates increase required would be 1.5% per annum each year for 12 years for each council if LGWM was funded by rates alone. Under a funding scenario including alternative funding tools (road pricing and value capture) this could reduce to 1.0%.
202. Under the equal dollar contribution, the indicative rates increase required would be 1.1% per annum each year for 12 years for WCC, and 2.5% for Greater Wellington, if LGWM was funded by rates alone. Under a funding scenario including alternative funding tools (road pricing and value capture) this could reduce to 0.6% for WCC and 1.7% for Greater Wellington.
203. For Greater Wellington, the equal rate increase option (including alternative funding tools) is aligned with what is currently planned for in the 2021 Long-Term Plan. The equal dollar contribution would involve significant rate and debt increases above what is planned.
204. If the central local split was revised to 60:40 this would mean a transfer of cost from the local to central share of approximately \$0.2 billion.
205. Cost shares will be monitored as the programme progresses and the recommended approach envisages the specific cost share details will be reviewed as key decisions are made and better information becomes available.

Funding Plans

206. Each funding partner will need to determine how they will fund their share of LGWM. With the uncertainty surrounding the overall cost, and cost sharing, at this time the funding sources have not been agreed and a range of options are still being considered.
207. Central Government share: The most likely source for the central government share will be the National Land Transport Fund administered by Waka Kotahi the New Zealand Transport Agency. Other Crown funding sources may also be used for all or part of the Crown share.
208. Local Government share: Local funding is expected to come from city council and regional rates within Wellington City, and regional rates only for the rest of the region. However, some groups are likely to receive specific benefits, funding approaches are being considered to reflect this. The key options are listed below and if implemented these would reduce the general rates funding requirement.
 - a Council Rates: If the local share were to be funded from rates alone, cumulative annual increases of between 1.1% and 1.5% could be expected each year for over a decade for LGWM depending on the preferred programme option (assumes equal rates increase cost share). This would be in addition to increases for other council cost pressures.
 - b Value Capture Targeted Rate: International experience is mass rapid transit solutions improve the attractiveness of areas where they operate and increase property values. Those who receive increased property values may be asked to contribute through a targeted rate (or similar levy).
 - c Travel Demand Management Pricing: Consideration of road pricing tools for transport network users is part of the LGWM programme. While pricing tools are

likely to be focused on demand management, they are expected to generate a surplus after administration costs.

- d Public Transport Fares: Public transport users contribute to operating costs through fares. While fare increases to contribute to LGWM investment are not planned, more public transport users are expected which will increase total fares.
- e Urban Development: LGWM is expected to stimulate an increase in construction activity. There may be opportunities to work with developers at mass rapid transit stops and there will be development contributions for the infrastructure which supports new buildings.

209. Completion of the final Indicative Business Case, including the management case, and development of the delivery model as part of the Detailed Business Case phase will also inform funding and financing arrangements.

Ngā Take e hāngai ana te iwi Māori Implications for Māori

210. To make sure mana whenua perspectives, rights and interests shape the programmes work, local representatives participate in the governance of LGWM and are engaged through the LGWM Governance Reference Group and Iwi Partnership Advisory Group.

211. A set of Mana Whenua values have been developed by our mana whenua representatives, with the authority of the iwi partner organisations Taranaki Whānui and Ngāti Toa to help guide the programme in its consideration of implications for mana whenua and Māori. These values are:

- a Whakapapa: a sense of place
- b Wai-ora: respect the role of water
- c Pūngao-ora: energy
- d Hau-ora: optimising health and wellbeing
- e Whakamahitanga: use of materials
- f Manaakitanga: support a just and equitable society
- g Whakāhuatanga: celebrate beauty in design.

212. Mana whenua have been actively involved in the MRT/SHI Indicative Business Case process through the LGWM Iwi Partnership Advisory Group with attendance at workshops, specific briefings and through the multi criteria analysis assessment of options, using the above values as the framework for assessing the options.

213. In relation to the matters subject to decision in this report, mana whenua hui have occurred at the Pipitea Marae on 28 April 2022 and a virtual hui for Taranaki Whānui on 3 May 2022 as well as other hui with the Port Nicholson Block Settlement Trust and Ngāti Toa Boards throughout May and June 2022.

214. The Urban Development Act establishes a strong expectation that Māori aspirations are identified and supported in urban development, including throughout the Specified Development Process which is signalled in this report. LGWM will continue to engage with iwi partners on an objective for Māori housing and papakāinga, and partner

commitments in relation to delivering on urban development associated with the programme.

Te huritao ki te huringa o te āhuarangi Consideration of climate change

215. Consideration of climate change has been a key focus of the LGWM programme, with a 40% weighting given to the programme objective 'Reduces carbon emissions and increases mode shift by reducing reliance on private vehicles'.
216. LGWM has completed specific carbon analysis appropriate to the current Indicative Business Case phase to improve understanding of the likely carbon emission impacts of the MRT/SHI options and inform the matters for decision in this report (refer Appendix C **Attachment 1**).
217. The earlier 'Carbon' section of this report discusses the specific carbon considerations as they relate to the programme, options, and the determination of a preferred option.
218. At this current phase, there remains significant uncertainty about design considerations that will substantially affect the level of carbon consumed (embodied emissions) and carbon saved (reduced enabled emissions) by LGWM programme options. However, the programme carbon analysis shows that facilitating high levels of intensification in central Wellington City and along mass rapid transit corridors is more likely to deliver an urban form that supports ongoing mode shift and is lower carbon than the alternative of enabling urban growth across greenfield sites.

Ngā tikanga whakatau Decision-making process

219. The matters requiring decision in this report have been considered by officers against the requirements of Part 6 of the Local Government Act 2002 (the Act).

Te hiranga Significance

220. Officers have considered the significance (as defined by Part 6 of the Local Government Act 2002) of the matters, taking into account Council's Significance and Engagement Policy and Decision-making Guidelines. Officers recommend that the matters requiring decision are of medium to high significance.
221. The LGWM programme and matters referenced in this report have a high degree of importance and interest to the regional community. The views and preferences of the community have been well canvassed through recent engagement on the LGWM MRT/SHI Transformational Programme options and the feedback from that engagement has fed into the recommendations and matters for decisions in this report.
222. However, the decisions sought through this report are just an interim step as part of a longer process to identify and assess options, and a future decision on whether to invest. This is not a decision to build.

223. The current decision will help to inform the completion of an Indicative Business Case. Further investigation will be completed at the next Detailed Business Case phase, and this will provide a more definitive view about the programme option to take forward to detailed design and implementation. These decisions will be part of future engagement and decision-making processes, including as part of Council's annual plan and long-term plan processes.

Te whakatūtakitaki Engagement

224. Comprehensive public and stakeholder engagement was carried out over six weeks from early November to mid-December 2021, on the largest components of the LGWM programme as part of the MRT/SHI draft Indicative Business Case. A summary of the engagement methods and feedback received is set out in paragraph 52 to 72 of this report. Communications and engagement planning continues for this programme.

Ngā tūāoma e whai ake nei Next steps

225. Following consideration of, and decisions on, the recommended Preferred Option by partners the key next steps are:

- a LGWM Programme completes work to finalise the MRT/SHI Indicative Business Case.
- b LGWM Programme commences early enabling work and procurement planning for the Detailed Business Case.
- c Partner chief executive officers approve the final MRT/SHI Indicative Business Case under delegation and agree that the Detailed Business Case phase can proceed.

226. The next Detailed Business Case stage for the MRT/SHI components will then commence. Section 13.3 of the PPOR in **Attachment 1** identifies a number of key questions for this next phase.

227. The investigation and planning at next stage will cover:

- a agreeing intensified land use distributions that should be used in the assessment of the programme and how best to assist in delivering urban intensification
- b ensuring that urban amenity enhancements are recognised and provided for in the public realm and the way in which urban development is delivered
- c assessing different MRT vehicle types and enabling infrastructure to deliver high quality, high capacity MRT to the south in a resilient way that is scalable to address different growth scenarios and strong growth to the north
- d more detail regarding the infrastructure required to enable public transport corridors to the south and east including road space allocation, stabling and power supply

- e integration with the wider transport network and how best to maximise the benefits of the MRT infrastructure and other public transport improvements across the wider public transport network.
 - f determining the alignment and configuration of existing and new tunnels through Mt Victoria to provide better facilities for walking and cycling and two new public transport lanes
 - g identifying opportunities to reduce costs, limit environmental effects, and constrain embodied carbon
 - h determining how best to assist in delivering the urban development outcomes along the southern corridor
 - i addressing public concern around social impacts and construction disruption; and
 - j determining how to further support giving life to Mana Whenua values and aspirations.
228. Further work will be completed to inform cost share decisions and identify funding mechanisms for the implementation phase of the LGWM MRT/SHI package and these will be considered as part of future Annual Plan and Long-Term Plan processes.
229. While this next phase of planning work continues, the programme will continue to deliver the 3-year programme elements of Golden Mile, Thorndon Quay and Aotea Quay, the first tranche of City Streets improvements, and will be looking for opportunities to accelerate elements of the MRT/SHI package, such as a second public transport 'spine' along the waterfront quays in preparation for MRT.
230. In addition, the wider programme will be delivering important bus priority walking, cycling and amenity improvements and travel behaviour change initiatives to lock in early benefits and minimise disruption once construction begins on the larger elements of the programme.

**Ngā āpitihanga
Attachments**

Number	Title
1	LGWM Preferred Programme Option Report – June 2022
1	Appendix A - Modelling Appendix to PPOR June 2022
1	Appendix B – Economics Technical Report
1	Appendix C – Carbon Analysis Technical Report
2	Short List Engagement Option maps
3	Engagement Report
4	Online Survey Report
5	Urban Development objectives and commitments
6	Independent Peer Review - PPOR

**Ngā kaiwaitohu
Signatories**

Writers	Natasha Hayes – Senior Strategic Advisor Dave Humm – Greater Wellington Partner Lead for LGWM
Approvers	Luke Troy – General Manager, Strategy Sarah Gardiner – Programme Director, LGWM

He whakarāpopoto i ngā huritaonga Summary of considerations
<i>Fit with Council's roles or with Committee's terms of reference</i> Full Council is the current decision-maker on LGWM matters relating to Greater Wellington.
<i>Contribution to Annual Plan / Long Term Plan / Other key strategies and policies</i> LGWM is a key programme identified in Council's draft Annual Plan, Long Term Plan, and in the Regional Land Transport Plan 2021.
<i>Internal consultation</i> Council has an internal LGWM working group to ensure oversight of the programme across the relevant parts of the organisation including representation from Strategy, Metlink, Wellington Analytics Unit, Communications and Legal teams.
<i>Risks and impacts - legal / health and safety etc.</i> The risks/uncertainties and mitigations associated with the matters for decision are set out in section 142 this report. External legal support has been engaged to review the Preferred Programme Option Report. Greater Wellington's legal team has reviewed this report to ensure legal risks are mitigated. There are no health and safety considerations.



June 2022

LGWM Programme

Preferred Option Report

MRT and SHI team



Document control record

Document control						
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0.3	5/5/22	Draft responding to feedback		LGWM Prog team and SHI/MRT team		
1	10/6/22	Final for Board		LGWM Prog team		
1.1	28/6/22	Post Board Update		LGWM Prog team		
Current revision		1.1				



Glossary of Abbreviations

Items	Descriptions
BAU	Business As Usual
BCR	Benefit Cost Ratio
BRT	Bus Rapid Transit
CBD	Central Business District
DBC	Detailed Business Case
GWRC	Greater Wellington Regional Council
HLU	High Land Use
IBC	Indicative Business Case
IP	Indicative Package
LGWM	Let's Get Wellington Moving
LIHP	Low Impact High Probability
LoS	Level of Service
LRT	Light Rail Transit
MCA	Multi-Criteria Analysis
MRT	Mass Rapid Transit
NPS UD	National Policy Statement Urban Development
PASLO	Programme Affordability Threshold Short List Options
PBC	Programme Business Case
PT	Public Transport
RLTP	Regional Land Transport Plan
RMA	Resource Management Act
RPI	Recommended Programme of Investment
SDP	Specified Development Project
SHI	Strategic Highway Improvements
TDM	Travel Demand Management

Attachment 1 to Report 22.227



UDA	Urban Development Act
UDS	Urban Development Summary Report
VKT	Vehicle Kilometres Travelled
WCC	Wellington City Council
WRGF	Wellington Regional Growth Framework



Executive Summary

Background

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.

A review of the programme of activities to achieve this vision was initiated to reflect policy changes, refreshed programme objectives, new regional and city plans, and the outcomes of some of the detailed investigations into the programme's elements.

Four short listed options have been identified that seek to achieve the objectives at a cost that is within the affordability threshold of the partners. All the programme options have common elements in terms of short-term projects, corridor treatments and travel behaviour change opportunities, but differ in the form and placement of Mass Rapid Transit (MRT) and larger enabling infrastructure at the Basin Reserve and Mt Victoria.

These options were presented to the public for their feedback at the end of 2021. This report takes that feedback, plus further technical assessments that have been undertaken in relation to an intensified land use scenario, transport modelling, carbon analysis and economic analysis to inform the selection of a preferred programme option.

The options were considered against the project objectives and weightings that were developed by Councillors and decision makers to ensure that the recommended option delivers meaningful changes in liveability, access, carbon and mode shift, safety and resilience.

A key aspect of this assessment, and indeed transformational programmes of this nature, is how the options respond to, and catalyse, changes in land use. Accordingly, the options were assessed in relation to both a "core" land use scenario, and an "intensified" land use scenario, which anticipates significant number of new homes along the MRT corridors.

Investigations have identified that:

- there is a good investment case for MRT in Wellington City, subject to realising the intensified land use scenario;
- focusing our highest quality MRT along the southern corridor has the greatest potential to both drive and support intensification;
- the priority to the east is fast and reliable public transport journeys to drive mode shift, urban development and access, including for trips to the Airport by public transport. This does not require MRT, but does require new infrastructure through Mount Victoria and grade separating the Basin Reserve to provide additional public transport lanes;
- a solution at the Basin Reserve has been identified that can deliver transport benefits by separating and prioritising MRT and enhanced public transport to both the south and the east, whilst also delivering urban development and urban amenity benefits; and
- there is strong public support for change and for investment in MRT, a new Mt Victoria Tunnel and for grade separated improvements at the Basin Reserve. There is also a strong appetite to make it happen sooner, deliver the best value and get public transport right.

The preferred option that should be progressed to detailed business case is a high quality, high capacity MRT solution along the southern corridor from Wellington Station to Island Bay with a new tunnel



through Mt Victoria to improve facilities for active modes and public transport, and a grade separated solution at the Basin Reserve. This is the same as Option 1 but it is recognised that Bus Rapid Transit (BRT) could provide similar outcomes to Light Rail Transit (LRT) if appropriately specified and designed. Option 1 has an estimated cost of \$7.4B and yields a BCR of up to 1.2 if delivered alongside an intensified land use scenario.

But there is a lot that needs to be considered during the next phase of planning, including:

- agreeing intensified land use distributions that should be used in the assessment of the programme and how best to assist in delivering urban intensification;
- ensuring that urban amenity enhancements are recognised and provided for in the public realm and the way in which urban development is delivered;
- identifying how embodied carbon can be reduced as much as possible during construction;
- assessing different MRT vehicle types and enabling infrastructure to deliver high quality, high capacity MRT to the south in a resilient way that is scalable to address different growth scenarios and strong the growth to the north;
- more detail in regard to the infrastructure required to enable MRT to the south and east including road space allocation, stabling and power supply;
- developing more detail in regard to the layout and form of the Basin Reserve solution;
- determining the alignment and configuration of existing and new tunnels through Mt Victoria to provide better facilities for walking and cycling and two new public transport lanes;
- integrating the preferred option with the wider transport network (across the city and region);
- identifying further opportunities to reduce costs and limit environmental effects; and
- how to further support giving life to Mana Whenua values and aspirations

These elements will be progressed during the Detailed Business Case and once further certainty is available, the programme team will undertake a re-check of the programme to ensure that optimal outcomes, in relation to the programme objectives and value-for-money, are being achieved.

While this next phase of planning work continues, the programme will continue to deliver the 3-year programme elements of Golden Mile, Thorndon Quay and Aotea Quay and will be looking for opportunities to accelerate elements of the MRT/SHI Transformational Programme, such as a second public transport 'spine' down the waterfront in preparation for MRT.

In addition, the wider programme will be delivering important bus priority walking, cycling and urban amenity improvements to lock in early benefits and minimise disruption once construction begins on the larger elements of the programme.



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1 Introduction

1.1 Overview

Let's Get Wellington Moving (LGWM) is a joint initiative between Wellington City Council (WCC), Greater Wellington Regional Council (GWRC), and Waka Kotahi NZ Transport Agency (Waka Kotahi), with support from Mana Whenua, to develop a transport system that supports the city's aspirations for how the city looks, feels and functions.

A draft Programme Business Case (PBC) was released in 2019 which identified a preferred way forward for Wellington's transport network and since that time LGWM has been developing several Indicative Business Cases and Single-Stage Business Cases for elements of the programme.

Recently, the need for a refreshed programme-level view has become apparent to reflect policy changes, new regional and city plans, and the outcomes of some of the detailed investigations into the programme's elements.

1.2 Purpose

The purpose of this report is to recommend a preferred programme option that best aligns with the outcomes sought for the LGWM programme. The identification of the preferred programme option is based on assessments undertaken prior to stakeholder and public engagement as well as more recent updates that are documented within this report. These aspects are shown in Figure 1.

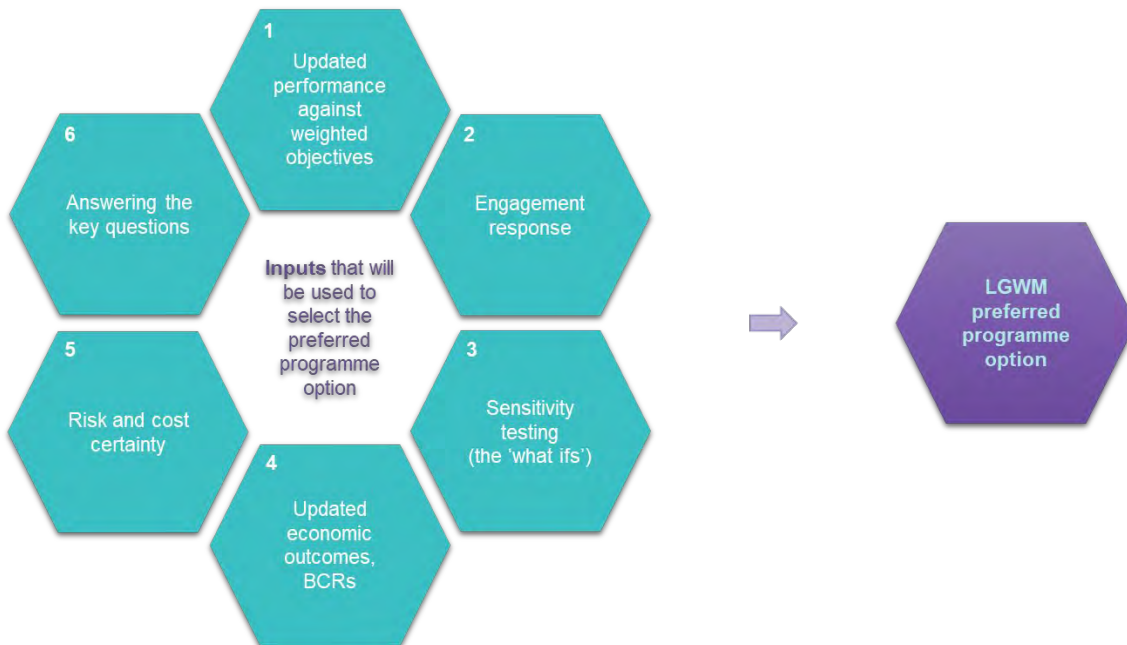


Figure 1: Key inputs used in the programme assessment process

Following stakeholder and public engagement, technical updates have been undertaken to urban development forecasts, transport modelling, carbon analysis and the economic analysis. The outcome of this work is intended to help answer some key remaining questions and is presented alongside the outcomes of the Multi Criteria Analysis (MCA) assessment and public engagement feedback to identify a preferred programme option.

Whilst this report recommends a preferred programme option, the case for investment in the Mass Rapid Transport (MRT) and Strategic Highway Improvement (SHI) elements of the programme will be provided



in an Indicative Business Case (IBC), which is due to be completed this year. The MRT and SHI IBC will fully document the case for investment and detail the assessment process.

The MRT and SHI IBC will also outline the next steps to be completed through the Detailed Business Case (DBC) phase. Wider elements of the LGWM preferred programme option will be reflected in parallel business cases, which continue to be developed and finalised¹.

The remainder of this report is structured as follows:

- Section 2 outlines the problems, objectives and regional context of LGWM
- Sections 3 and 4 provide a summary of the work completed to date and the work undertaken to develop the programme options
- Section 5 outlines the four programme options that were consulted on through the stakeholder and public engagement phase
- Section 6 provides a summary of the stakeholder and public engagement feedback
- Section 7, 8 and 9 documents the additional analysis that has been undertaken on the four options following the community engagement, including new work on land use scenarios, transport modelling, carbon analysis, cost and economics
- Section 10 addresses key questions
- Section 11 presents the current uncertainties and risks
- The identification of the preferred programme option, how it will be delivered and next steps (Sections 12 to 15).

This report focusses primarily on the transport solutions in the context of a still developing case for investment in urban development rather than combined urban development and transport solution investment. It is recommended that a combined urban development and transport solution is taken through (or alongside) the Detailed Business Case phase.

¹ See section 2.1 for wider programme elements



2 Strategic Context

2.1 Partner Environment

LGWM is a joint initiative between, Wellington City Council (WCC), Greater Wellington Regional Council (GWRC), and Waka Kotahi NZ Transport Agency (Waka Kotahi). These organisations are supported by Mana Whenua partners Taranaki Whānui and Ngāti Toa.

LGWM's role is to provide a way to work together, so that decisions are balanced and consider what else is going on in the city and region. As a group, LGWM discuss each project, agree the best way forward and make sure it is delivered.

To make sure Mana Whenua perspectives, rights and interests shape this work, local representatives participate in the governance of the LGWM programme and are consulted through a Governance Reference Group and an Iwi Partnership Advisory Group.

A set of Mana Whenua values have been developed by Mana Whenua representatives, with the authority of the Iwi partner organisations Taranaki Whānui and Ngāti Toa, with the expectation that LGWM will give life to these values and Mana Whenua aspirations. These values are:

- Whakapapa - A sense of place
- Wai-ora - Respect the role of water
- Pūngao-ora – Energy
- Hau-ora – Optimising health and wellbeing
- Whakamahitanga - Use of materials
- Manaakitanga – Support a just and equitable society
- Whakāhuatanga - Celebrate beauty in design
- Arotutuki – Ongoing monitoring of design and outcomes.

2.2 Why Transformational Change is Needed

Wellington is New Zealand's vibrant, compact, fast-growing capital city. It is the country's centre of Government and a hub for high-skilled jobs and creative industries. Wellington has experienced strong economic and population growth in recent years, as more people have been drawn to the high quality of life the city can offer². However, the city and region are facing several challenges including infrastructure deficiencies, evidenced by:

- Increasingly limited housing supply, choice and affordability
- A series of burst water and sewage pipes
- Declining levels of service on the region's transport network
- A climate crisis which requires an urgent response to both mitigate and adapt.

Buses, cyclists, pedestrians, freight, service vehicles and private vehicles all compete for limited space and priority on Wellington's constrained transport corridors. Resulting transport network issues include:

- Traffic congestion and unreliable journey times

² Let's Get Wellington Moving | Draft Programme Report for Public Engagement, 2021



- Poor and declining levels of service for all users
- Safety issues, especially when cycling and walking
- Vulnerability to disruption from unplanned events.

These issues mean it is becoming harder for Wellingtonians to access key employment, community, and recreation destinations reliably and safely. Easing pressure on the transport system and moving more people in fewer vehicles is critical, but mode shift is constrained by several factors:

- Buses (often full during peak times) caught up in congestion can result in slow, unreliable journeys for public transport users in Wellington City. This makes public transport a less attractive choice than the private car for many people when a door-to-door trip is considered.
- Lack of safe, connected cycle networks and facilities significantly constrains the potential uptake of more trips by bike.
- Limited footpath space, busy roads, and long wait times at crossings can disincentivise walking trips.

Transport is the biggest source of carbon emissions in the Wellington region, accounting for 40% of all emissions in the region, and 48% of emissions in Wellington City. Total transport emissions have risen by around 14% over the past two decades. The need to curb emissions will only continue to grow given the need to meet national, regional, and local climate change targets and obligations, and due to the region's vulnerability to the effects of climate change.

Within the context of population growth and limited housing supply, choice and declining affordability, there is a need to accommodate growth and enable greater housing capacity in Wellington, to meet current and future community needs, including for Māori. The opportunity to provide for a significant share of that growth focussed close to the central city, and along key public transport corridors with good travel choice and access is a key move identified in the regional growth plan.

Investment through the LGWM programme aims to provide a step change in the level of service of public transport and active modes within Wellington, giving people safe and easy options to move around. It will be a catalyst for more intensive urban development enabling more housing, improving liveability, enabling the movement of more people with fewer vehicles, and helping reach city, regional and national carbon emission reduction goals.

2.3 LGWM Vision

LGWM has developed a vision for Wellington, based on transport and city goals and urban design principles identified through stakeholder and community consultation in 2016, and the programme partners' priorities for the region's future. LGWM's vision is:

"A great harbour city, accessible to all, with attractive places, shared streets, and efficient local and regional journeys."

To realise this vision, the Programme needs to move more people with fewer vehicles.

2.4 Programme Objectives

In early 2021, the programme partners reviewed and updated the programme objectives. This was undertaken in response to a number of factors including:

- The need for greater emphasis on climate change commitments



- The need for 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 related to LGWM investment
- COVID-19.

The updated objectives, and associated weightings is shown in Figure 2.



Figure 2: LGWM Objectives

2.5 Policy Context

Wellington, like the rest of New Zealand, is grappling with a number of challenges. House prices have risen sharply since 2019, with housing becoming unaffordable for many. The potential impacts of climate change are well documented and there is a need to act now.

Central and Local Government policy has developed within, and is responding to, this context. Commitments to address these issues include:

- Recent amendments to the Climate Change Response Act 2002
- Introduction of the National Policy Statement on Urban Development in 2020
- Government Policy Statement for Land Transport 2021-24
- Finalisation of the Wellington Regional Growth Framework 2021
- The Wellington Regional Land Transport Plan 2021.

This means the wider policy and planning environment LGWM sits within has evolved since the Programme began in 2016. LGWM has not remained static in response, instead its direction and focus has shifted to reflect New Zealand’s current priorities. This collective shift means that LGWM is closely aligned with the major regional policy and strategy documents including:

- Regional Land Transport Plan (GWRC, 2021)

Contains a vision of “A connected region, with safe, accessible, and liveable places – where people can easily, safely, and sustainably access the things that matter to them – and where goods are moved efficiently, sustainably, and reliably.” It also has strong carbon, safety and mode share targets.



- Regional Public Transport Plan (GWRC, 2021)

Focusses on mode shift and decarbonisation as well as improving customer experience.

- Regional Mode Shift Plan (Waka Kotahi, 2020)

Focuses on increasing development density near public transport, making active modes more attractive and influencing travel demand and transport choices.

- Regional Climate Emergency Action Plan (GWRC, 2019)

Confirms the need for key projects and programmes to meet emission reduction targets.

- Wellington Regional Growth Framework (WRGF, 2021)

Includes objectives to improve access utilising multi-modal transport and encouraging sustainable, resilient and affordable settlement patterns/urban form. It identifies rapid transit as a key enabler of regional growth that enables a high degree of transport and land use integration through intensification around stations. The framework also includes the 'key move' of fully unlocking the urban development of current and future rapid transit orientated corridors particularly those proposed by the LGWM programme.

- Regional Housing Action Plan 2022-2027 (WRGF, 2022)

Focuses on housing related interventions to 2027. It is focused on taking action to support the WRGF objectives noted above, focusing on non-District Plan mechanisms that can increase housing supply and improve housing affordability and choice, improving regional access to data, driving regional collaboration, and encouraging new technologies and smarter ways of building.

- Our City Tomorrow: Spatial Plan for Wellington City (WCC, 2021)

Outlines what Wellington might look in the future. It aims to maintain areas of special significance while enabling greater capacity for new housing for the growing Wellington City community. The Spatial Plan addresses affordability, accessibility, resilience, and effects from climate change. Regarding infrastructure, it highlights a staged approach that links investment with growth area priorities. The overarching goals for the city are compact, resilient, vibrant and prosperous, inclusive and connected, greener, and in partnership with Mana Whenua.

- Green Network Plan (WCC, 2022)

Outlines the direction and goals for a greener Wellington central over the next 30 years to address the current deficit of green space, enable growth and to respond to the climate and ecological emergency declared in 2019. The key objectives include treasure and protect what is important, celebrate the value of green with partners, grow the number of trees and public green, and manage what we create and what we already have.

- Te Atakura First to Zero (WCC, 2019)

Outlines how to make Wellington City a zero-carbon capital by 2050. It includes key initiatives that can help lower emissions in four target areas: transport, building energy and urban form, advocacy, and the Council.

In terms of the strategies detailed above, it is vital that the preferred programme option for LGWM contributes to the success of the region to the fullest extent possible. LGWM is one of the flagship investments in the region and has the ability to make a step change towards climate change and mode shift goals.



2.6 Why LGWM Matters in the Regional Context

The Wellington region is growing, with around 200,000 to 250,000³ more people expected to live here over the next 30 years. WCC is planning for 50,000 to 80,000 more people to live in the city over than same timeframe. The fastest growing areas will be in and around the central city.

Approximately 60% of the region's jobs are concentrated in Wellington City and the majority of those are in the Wellington City Centre. The COVID-19 pandemic has been a major disruptor event and may lead to sustained changes to travel patterns, behaviours and where people work and live. However, Wellington City is expected to remain the primary economic hub for the region. Enabling a high functioning Wellington City Centre that is accessible, vibrant, and liveable will be important to attract new investment, jobs, talent and visitors to the city and the wider region and continue to drive regional economic development by building local capability and capacity and a regional pipeline of activity.

Shaping urban growth is critical to delivering on transport outcomes. Meeting the housing needs of a growing regional population in a way that reduces carbon emissions and improves travel choice and liveability will require a response both within Wellington City and across the region. The WRGF identifies LGWM as a key part of the regional growth picture. It expects approximately two-thirds of the housing growth over the next 30 years to occur in existing urban areas through infill, urban renewal, and intensification. With approximately one-third of the growth in greenfield areas, extending the current urban footprint of the region.

The LGWM Programme will provide the foundations for a fundamental change to the way urban form develops within Wellington City over the medium to long term. LGWM provides an opportunity for a more compact and sustainable growth pattern for the region, requiring less greenfield development than what is currently envisaged. A new MRT system and associated infrastructure provides the important city shaping catalyst for this change.

The more new housing that can be provided in Wellington City's central, southern, and eastern suburbs along a future MRT corridor, the higher the number of trips that can easily be made by walking and cycling and public transport given the proximity and access to the region's largest employment hub, Wellington City centre. There are established rail services to the two main growth corridors in the north and therefore a high mode share, but mode share for trips from the south and east could be improved.

Wellington's Regional Land Transport Plan (RLTP) 2021 includes ambitious ten-year headline targets including:

- 40 percent increase in active travel and public transport mode share
- 35 percent reduction in transport-generated carbon emissions
- 40 percent reduction in deaths and serious injuries.

LGWM is a central part of the RLTP activity, that connects to other key programmes/projects such as:

- Regional Rail Plan improvement package that will link LGWM's MRT with the wider rapid transit (regional rail) network and like LGWM facilitate and drive mode shift with associated opportunities for more intensive transit-orientated development (TOD) around railway stations. This focusses on the rail network from Wellington to the north, whereas LGWM focusses to the south and east.

³ Wellington Regional Growth Framework Report JULY 2021 (wrgf.co.nz). This is lower than the [Population forecast 2020 to 2051](#), completed in April 2022 by Sense Partners, which has up to 300,000 people in the region (75%ile) and 110,000 in WCC (75%ile).

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- Te Ara Tupua that will connect to the extensive walking and cycling networks including Thorndon Quay/Hutt Road and Golden Mile, planned as part of LGWM's Three-Year Programme as well as the 10-Year City Streets Programme and WCC's Bike Network programme
- Other significant activities in the RLTP including Riverlink, Access Kenepuru, Eastern Porirua Regeneration Programme

Together LGWM and these programmes/projects are expected to positively affect access, housing, carbon, safety, resilience and liveability outcomes for the region and enable the region to achieve its ambitious targets for mode shift, carbon emissions reduction and safety as set out in the RLTP 2021.



3 Work Completed to Date

Figure 3 below 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 PBC programme 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 PBC in 2019.

In parallel, WCC finalised its Spatial Plan, and released a draft District Plan for engagement in December 2021, with a Proposed District Plan to be notified in July 2022.

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 additional analysis to understand the implications of different population projections on the outcomes sought from 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.

Following the Programme Long List and Short List reports, an affordability threshold was identified, and the short list options were further refined to align with the affordability threshold. As noted in the Programme Affordability Threshold Report (2021), four programme options were presented to the public for their input in November 2021. The community engagement and feedback, along with some technical updates detailed in this report will now be used to help select a preferred programme option.



Once selected, the preferred programme option will form the basis for finalising the MRT and SHI IBC elements of the programme. Further detailed investigation and assessment will then be undertaken for the MRT and SHI elements through the DBC phase.

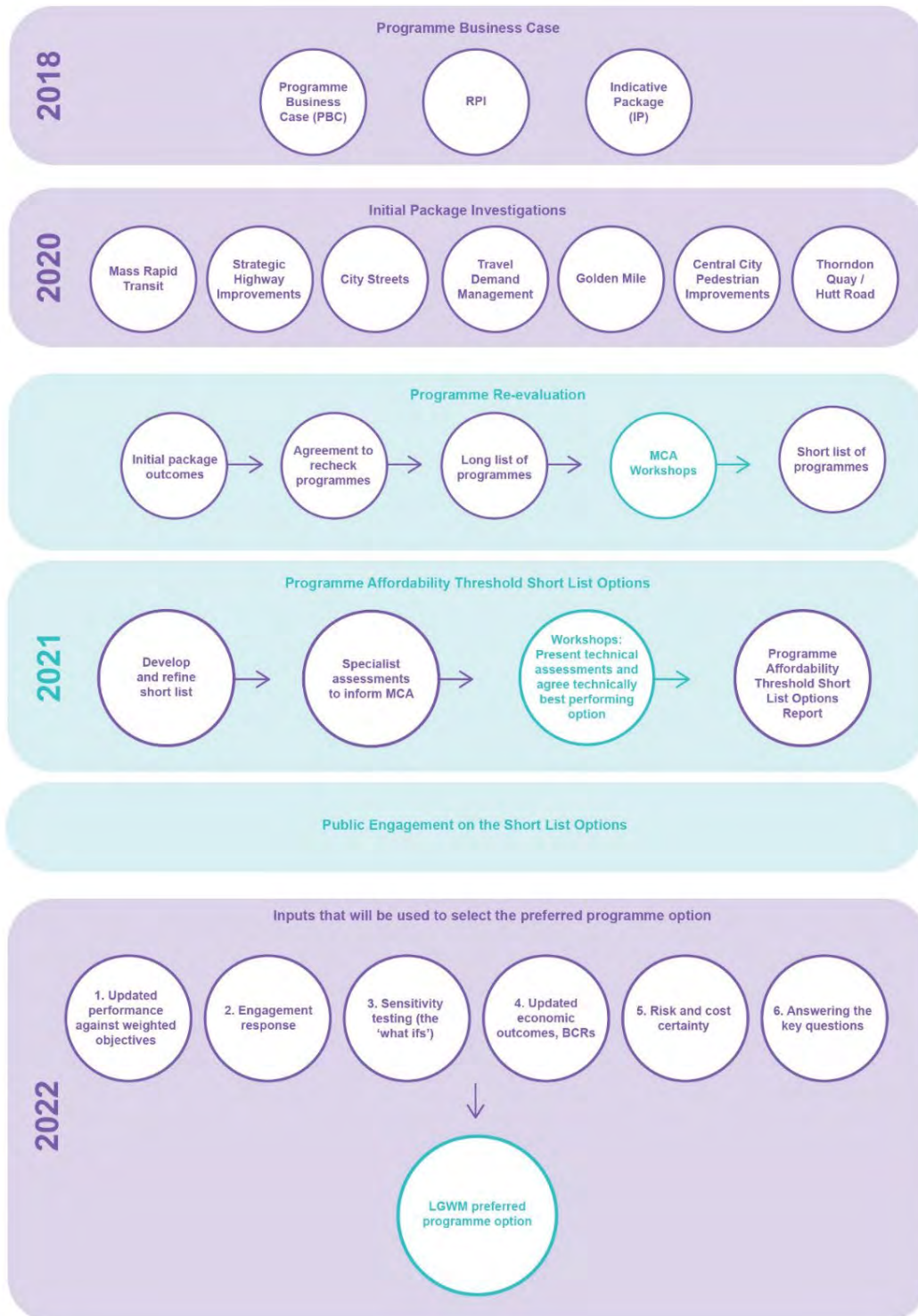


Figure 3: Indicative Programme option development and assessment process



4 Development and Assessment of Programme Options

The programme option development process has been undertaken over several months and options have been assessed at different levels to enable a robust and transparent outcome. A summary of the filtering process is presented in the diagram below. Further information on the process can be found in each of the programme option reports referenced in the diagram.

Key preceding reports include:

- LGWM Programme Report draft (October 2021): [Draft Programme Report.pdf](#)
- Programme Short List Options Report (October 2021): [PSLO Report.pdf](#)
- Programme Affordability Options Report (October 2021): [PASLO Report.pdf](#)
- Engagement Report (March 2022): [Mass Rapid Transit Engagement Report.pdf](#)

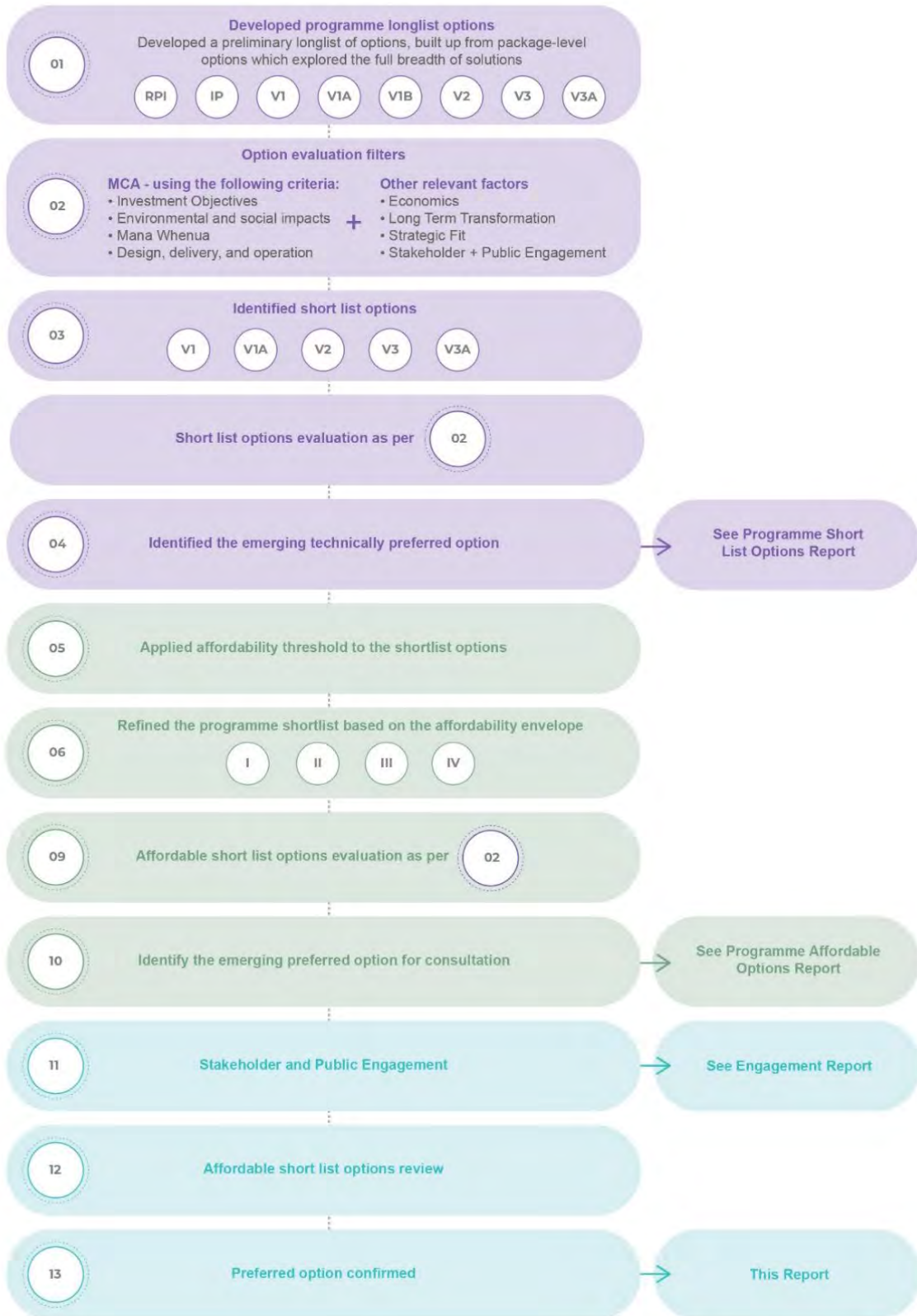


Figure 4: Assessment process



This report discusses and analyses the Programme Affordable Short List options which were presented to stakeholders and the public at the end of 2021. As presented earlier in this report, the decision on a preferred programme option will be undertaken by considering a range of different inputs as shown below:

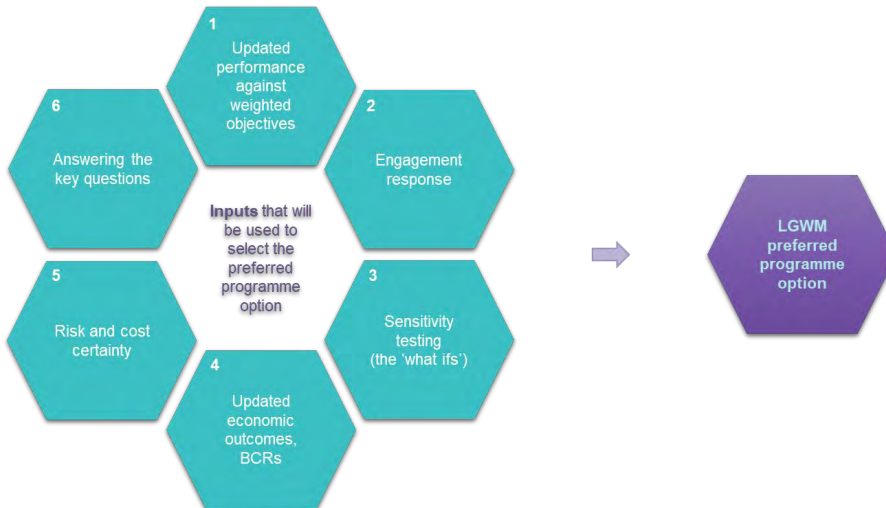


Figure 5: Preferred Programme inputs

The performance against the objectives (see Figure 2), and their likely effects, was assessed through an MCA process to understand how the programme options perform for the different land use scenarios. However, it is not the MCA alone that will be used to decide on a preferred programme option. This is because there are only a few significant differentiators and as they are inter-related, they also need to be discussed and debated holistically rather than through a structured, sometimes mathematical, process.

The preferred programme option will be the one that best achieves the vision for Wellington, whilst providing value for money. It will be the option where any outstanding risks (such as uncertainties, costs, environmental effects) can be minimised.

As part of the process, and to help inform decision makers, several key questions have been considered. These questions have come from within the LGWM team, the programme partners, stakeholders and the public and have been the focus of the most recent investigations, as they need to be understood to make a choice on a preferred option. These questions are outlined below and are discussed and answered later in this document.

- What form of MRT is preferred?
 - If light rail, why would this not go to the Airport?
- Are large-scale or less effective minor improvements preferred at the Basin Reserve?
 - If large-scale, why does it have such a large footprint?
- Is a new Mt Victoria tunnel needed?
- How can urban intensification be achieved?
- How will the options integrate with the wider transport system?
- Are parking levies or congestion charging proposed?



5 Programme Options

Four programme options have been identified to achieve the objectives of LGWM at a cost that is within the affordability envelope of the PBC. These were initially reported in the PASLO report and have been the subject of stakeholder and public engagement. All the Programme Affordable Short List options have common elements including:

- Short term programme:
 - Golden Mile improvements
 - Thorndon Quay & Hutt Road improvements
 - Central City pedestrian improvements
 - Cobham Drive crossing and safer speeds
- City Streets – improving connections for people on buses, bike or walking on 19 key routes between the central city and suburban centres (will slightly vary by programme depending on extent of MRT)
- Travel Demand Management including travel behaviour change initiatives

The major differences in the programme options are around the type of MRT, the proposed routes, and the level of investment in the Basin Reserve and Mt Victoria Tunnel. The short-listed options are outlined in the table and images below.



Table 1: Programme option summary

	Option 1	Option 2	Option 3	Option 4
Basin Reserve	Movements grade separated with extended Arras tunnel and opportunity for better amenity	Movements grade separated with extended Arras tunnel and opportunity for better amenity	Movements grade separated with extended Arras tunnel and opportunity for better amenity	At-grade (stays a roundabout with minor improvements)
Mt Victoria Tunnel⁴	New tunnel (diagonal or parallel) for public transport and general traffic. Existing Mt Victoria Tunnel re-purposed for active modes	New tunnel (diagonal or parallel) for public transport and general traffic. Existing Mt Victoria Tunnel re-purposed for active modes	New tunnel constructed for walking and cycling. Traffic stays in current Mt Victoria Tunnel and public transport stays in Hataitai bus tunnel	New tunnel constructed for walking and cycling. Traffic stays in current Mt Victoria Tunnel and public transport stays in Hataitai bus tunnel
MRT city to south	Light rail, via Cambridge Tce	Bus rapid transit, via Cambridge Tce	Light rail, via Cambridge Tce	Light rail, via Taranaki St ⁵
MRT east	Continuous Bus Priority ⁶ , via new tunnel to be used by most eastern suburbs' buses. Remaining eastern suburbs' buses continue to use existing Hataitai bus tunnel	Bus rapid transit, via new tunnel. Remaining eastern suburbs' buses continue to use existing Hataitai bus tunnel	Continuous Bus Priority from Kilbirnie to Miramar. Targeted local priority treatments between Kilbirnie and Mt Victoria via Hataitai bus tunnel	Continuous Bus Priority from Kilbirnie to Miramar. Targeted local priority treatments between Kilbirnie and Mt Victoria via Hataitai bus tunnel
Other	Short Term Programme, City Streets and Travel Demand Management common across all programme options			
Cost⁷	\$7.4 billion	\$7 billion	\$6.6 billion	\$5.8 billion
Construction timeframe	10 to 15 years	10 to 15 years	8 to 12 years	8 to 12 years

⁴ The Hataitai Bus Tunnel will remain in its current configuration in all options, but will have significantly fewer services in Options 1 and 2.

⁵ This route is needed if the Basin Reserve is not upgraded.

⁶ Continuous Bus Priority comprises extensive bus priority improvements including long continuous sections of kerbside bus lanes and signal priority. It represents a solution that has lower ride quality and customer experience without pavement upgrades, level boarding stations and other associated infrastructure.

⁷ Total LGWM programme cost calculated on the whole of life cost (WoLC) over a 30-year period to 2049/50. This includes investigations, design, construction, and on-going operational and financing charges for the entire LGWM programme.

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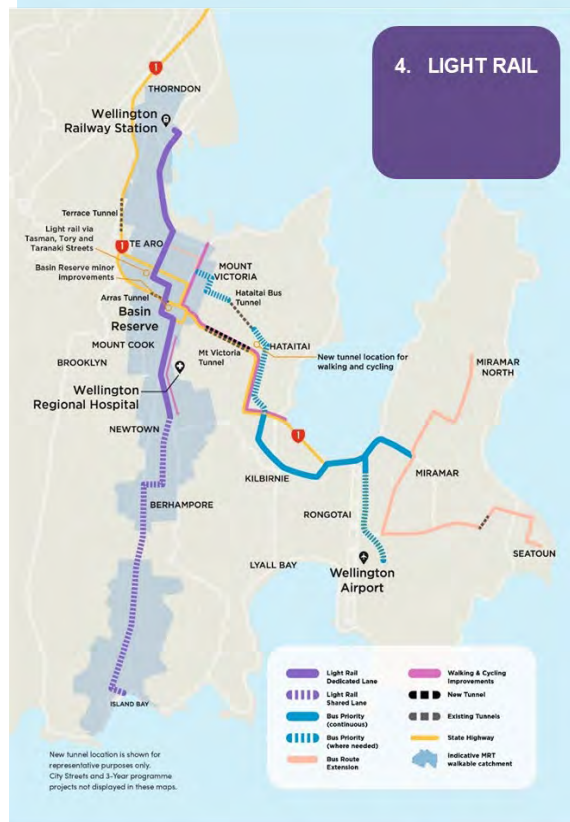
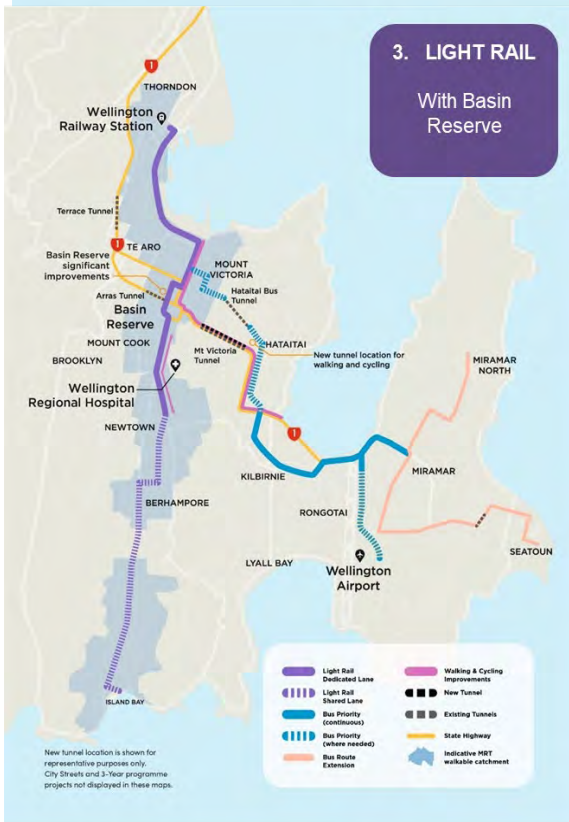
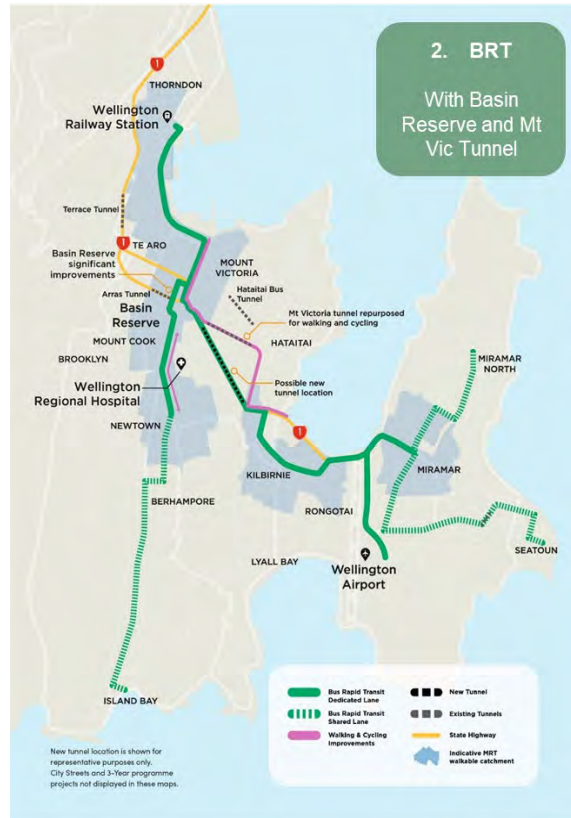
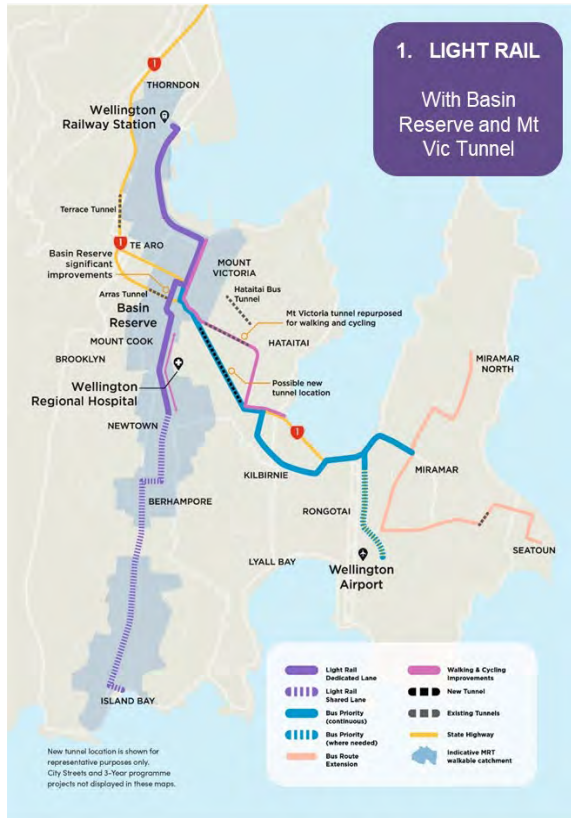


Figure 6: Programme option summary



6 Outcomes from Stakeholder and Public Engagement

This section presents the feedback and findings of the stakeholder and public engagement process conducted over six weeks from early November to mid-December 2021, during which time the four programme options were presented. The full engagement report is available online⁸.

Understanding community views will help the LGWM partners gauge appetite for change, what changes the community would like to see and provides direction for future engagement. A total of 5,692 submissions were received from the public engagement process and 41 detailed submissions from stakeholder groups and organisations. Despite the diversity of feedback, six key themes emerged:

- Quality urban growth and development
- Better environmental, carbon, social and liveability outcomes
- Quality public transport
- Timeframe, cost and construction disruption
- Cyclist/scooter-friendly and walkable city
- Access for private vehicles and parking.

One of the questions asked during engagement was 'What do you think is most important to the future of Wellington?'. People were asked to rank a series of statements in level of importance, one being most important and nine being the least. The top two responses for the most important was reliable public transport with a frequency of at least every 10 minutes and making it easy to get around without using a car. The lowest rated factors were connecting people to areas of shopping and socialising and fewer transfers between public transport services.

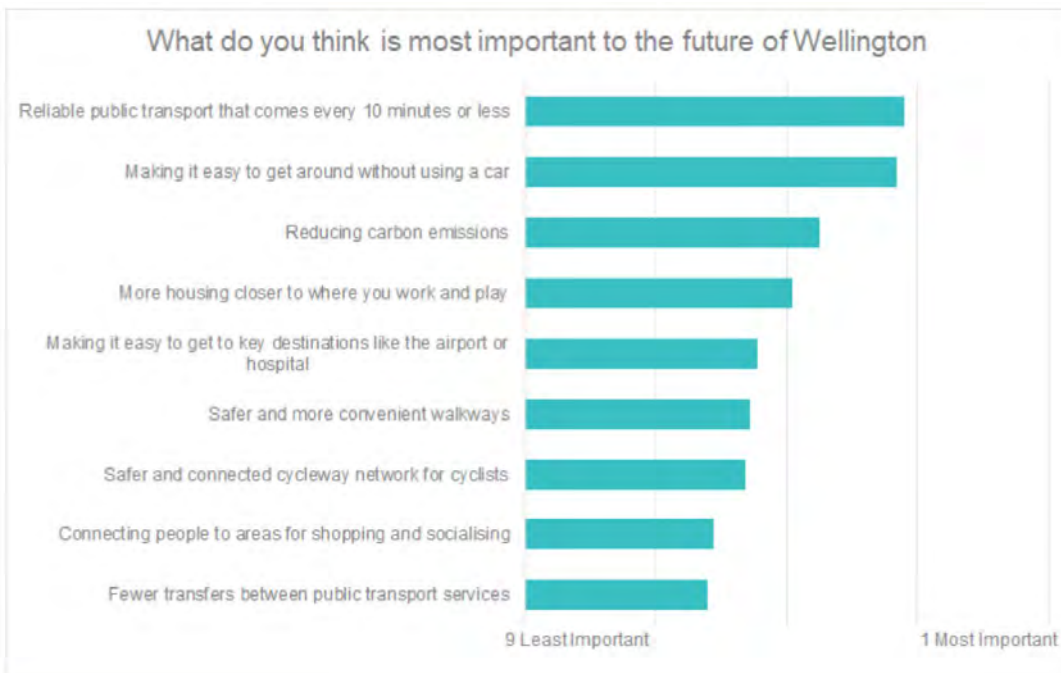
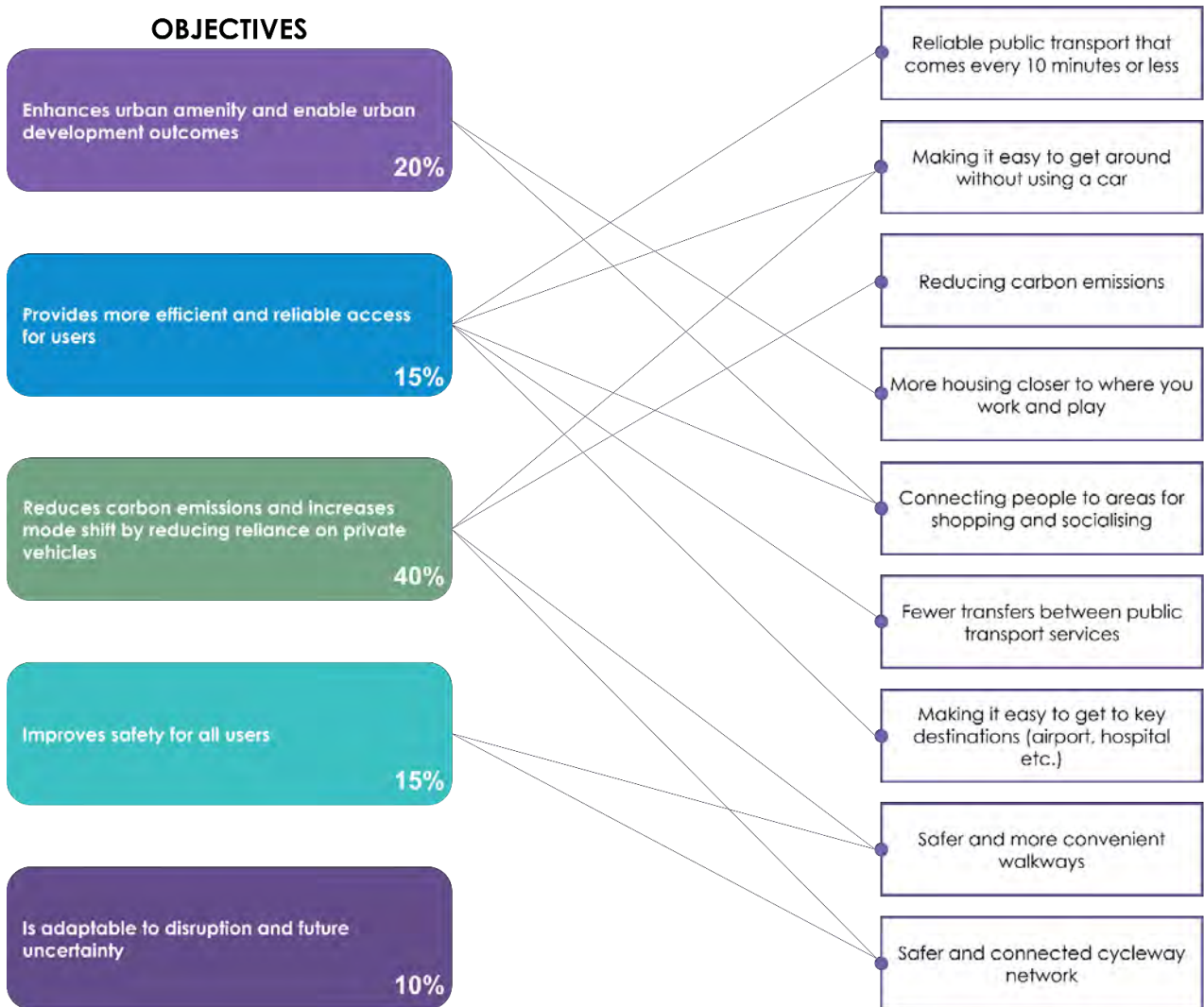


Figure 7: Number of responses to "What do you think is most important to the future of Wellington?"

⁸ <https://lgwm-prod-public.s3.ap-southeast-2.amazonaws.com/public/Projects/Mass-Transit/Mass-Rapid-Transit-Engagement-Report.pdf>



The most important elements relate well to the programme objectives as can be seen from the image below:



The engagement was very useful in terms of helping to answer the key outstanding questions and provided the following key insights.

The engagement process sought to understand the preferences of the general public in terms of public transport mode options. A total of 53% of the respondents supported LRT, with the primary reasons being:

- High capacity (over 300 people per trip)
- Reliability and frequency
- Improved carbon performance.

There was a perception that LRT will be quiet to operate despite information supplied (and the specialist assessment undertaken for the PASLO MCA). When asked about BRT, 23% were in support for the following reasons:



- Flexibility and ability to be extended to more suburbs in the future
- Less investment and is faster to implement
- Quicker recovery time from a natural disaster.

24% of the respondents did not indicate a preference for LRT or BRT. Of these, most respondents commented that they do not support any type of MRT as a suitable public transport solution for Wellington. Others suggested that Wellington needs both BRT and LRT to create a well-connected quality public transport service.

Overall, 69% of the 1,616 comments received in relation to the new tunnel were supportive of the proposed new Mount Victoria tunnel due to the focus on MRT and active mode safety, as well as improved connections between the City and Airport. People would like more information about the entry and exit points on either ends of the tunnel.

Respondents who are concerned about better access for cars and other vehicles questioned why only a two-lane tunnel is proposed and would like to see four lanes for general traffic (two in each direction) because they believe this would future-proof the investment and support population growth and intensification.

Those who support the aim of reducing car reliance felt a new tunnel would be counter-productive to that goal, as it would encourage car use. In addition, people were concerned about the level of disruption from the construction of a new tunnel and the carbon impacts.

A total of 61% of the 980 comments on the Basin Reserve supported the changes to the Basin, however, there were concerns about whether the changes would delay investment elsewhere. The reasons for the support of the Basin Reserve were:

- People want reduced congestion and improved traffic flow around the Basin Reserve
- Enhanced, people-centred, open space
- Those living in the wider region think changes are needed to make it easier for them to get to the Hospital and the Airport.

Those who were less supportive of changes at the Basin Reserve highlighted the following issues:

- Question if changes will fix congestion, since traffic merges and bottle necks continue elsewhere in the network
- Extension of Arras Tunnel too carbon costly
- Arras Tunnel also perceived as incentivising driving over public transport or active modes.

During the public engagement process LGWM also received written feedback from over 40 different stakeholders with a range of different perspectives and insights. These specific comments have been considered alongside the public feedback in the preferred programme option assessment.

6.1 Online Panel Survey

To supplement feedback from public consultation, LGWM commissioned a parallel study to determine a representative view of the Wellington public through an online panel. This comprised a 10-minute survey amongst a sample of approximately 1,230 Wellingtonians.

The panel had very similar thoughts to the public in terms of what they considered was most important for Wellington.

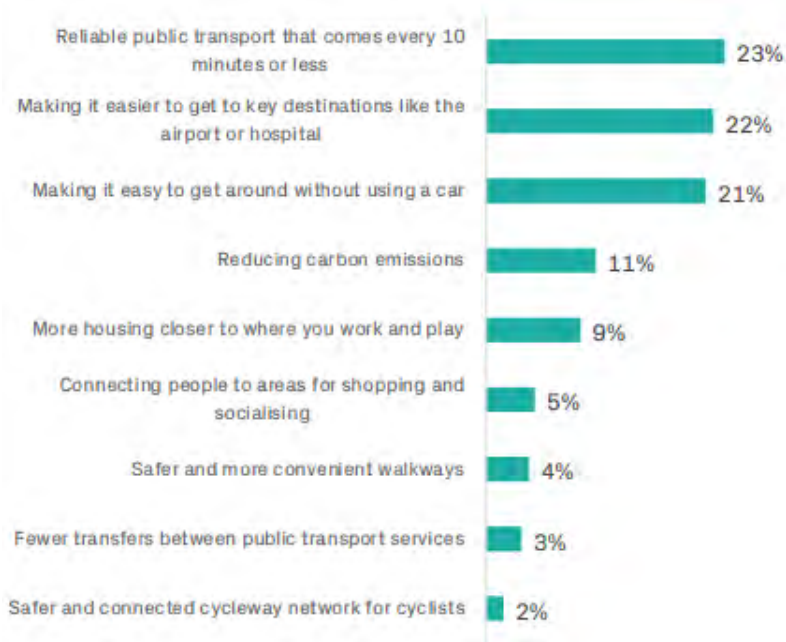


Figure 8: General public survey results - most important for Wellington

The research⁹ determined that the programme options are well liked as they link closely to what people want to see from the region, particularly improved public transport, better access to the Airport and Hospital and freeing up the city of traffic, using reliable public transport as a substitute to cars.

One area where the online research gave a slightly different result to the public engagement was in relation to the form of MRT. LRT was preferred by 59% of respondents, compared to 41% for BRT, which is closer than that identified through the public engagement. When considering the responses from only Wellington City residents, the preferences are even closer with 52% preferring LRT and 48% preferring BRT.

Further engagement will be undertaken during the DBC phase to help inform the development of the preferred option.

⁹ [LGWM TRA Engagement Study](#)



7 Technical Assessments

A number of additional technical assessments have been undertaken to help provide a more detailed understanding of the relative advantages and disadvantages of each of the options. The assessments have focussed on:

- Transport modelling: which forecasts changes in demand for different transport modes as well as changes in travel time
- Economic analysis: which provides an indication as to whether the programme options deliver value for money
- Carbon analysis: which forecasts both embodied and enabled carbon emissions.

The technical assessments have been used to inform an MCA which will be discussed in the next section of this document. This technical assessments will feed into updated MCA assessments of the options, but as presented above, it is not the MCA alone that will be used to decide on a preferred programme option.

7.1 Land use scenarios

A key consideration of a transformational programme of the scale envisaged by this programme is how it catalyses and responds to changes in land use. A successful programme will enable changes in land use patterns, urban form and urban amenity relative to a situation where no programme is implemented (described below as a “do minimum” scenario).

MRT will support new forms of denser housing within the walkable catchments of rapid transit stops along the MRT corridor. Enabling greater intensification can help the region and city address critical challenges such as increasing housing supply, affordability and choice, and reducing emissions; and deliver on city and regional objectives including those in the WRGF.

All options, regardless of either LRT or BRT mode support intensification in line with (or in excess of) the WCC Spatial Plan estimates and with additional Transit-Orientated Development around MRT stations. A range of land use scenarios have been developed by LGWM that consider the nature and location of future growth. For the purposes of the analysis, all future year scenarios have assumed the same total quantum of growth across the Wellington region but have adjusted the distribution of future growth using a sliding scale between dispersed growth across the region and intensified growth along the MRT corridor. This is shown in the following diagram.

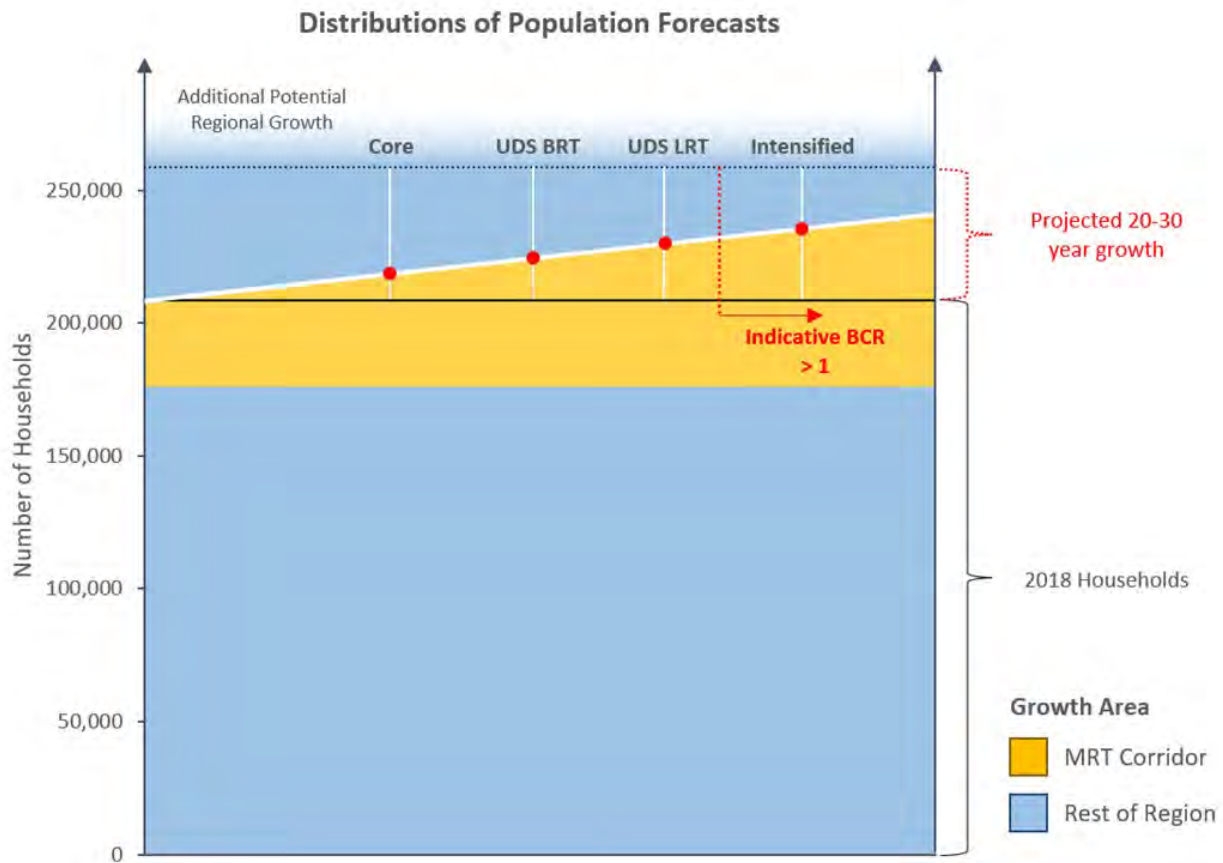


Figure 9: Land use scenarios: Distribution of Population Forecasts

The diagram indicates a total increase of approximately 50,000 households between 2018 and 2046 across the Wellington region. This is based on levels of growth agreed between GWRC, WCC and the other Territorial Local Authorities across the region in November 2019. It also highlights the two “bookend” scenarios that have been used in the technical analysis (namely, ‘core’ and ‘intensified’).

The land use scenarios are:

- Core – this reflects business as usual growth and was the level of development distribution that was agreed in November 2019. This scenario has assumed 10,000 new dwellings within an indicative MRT walkable catchment. It was developed in advance of the publication of the draft WCC Spatial Plan however it is reflective of the level and distribution of growth indicated in the Spatial Plan. This represents the do minimum assumption.
- Urban Development Summary Report: Bus Rapid Transit option (UDS BRT) – this assumes up to 16,000 new households across the indicative walkable catchments associated with the BRT option (13,000 plus an additional 3,000 facilitated and/or delivered via additional investment in urban development). The number of dwellings for BRT is slightly less reflective of a lower Land Value Uplift (4.9% for BRT compared to 11.5% for LRT).
- Urban Development Summary Report: Light Rail options (UDS LRT) – this assumes up to 21,000 new households along the LRT option corridors (16,000 plus an additional 5,000 facilitated and/or delivered via additional investment in urban development).



- Intensified – this reflects a level of intensification that might be commercially feasible under a MRT based programme, where intensification is focused close to the assumed MRT station locations. This is a more intensive scenario than those identified in the Urban Development Summary Report and can be considered a ‘what if’ scenario that would likely require a very intensive urban form and significant investment in urban development to facilitate and/or deliver high density along the corridor¹⁰. Intensification has been assumed to result in an additional 26,000 households along the MRT corridor and a consequent reduction in growth in the wider region.

In both core and intensified land use scenarios, a relatively high-level assumption has been made regarding the distribution of development across the region. This is not intended to be a forecast of the level of development that will occur, instead it provides a representation of what could occur, should differing levels of intensification be realised. It is recognised in the programme investment objectives that alongside urban development, there is an imperative to deliver enhanced urban amenity (that will in itself be a critical factor to attracting more people to live in the area). It is also assumed that development would proceed in tandem with delivery of the LGWM programme.

Table 2 provides a summary of the land use changes assumed in these scenarios.

Table 2: Land use changes and growth scenarios

	2018 Estimate Households	Modelled	UDSR Scenario	UDSR Scenario	Modelled
		2046 – Core Households	2046 – UDS BRT	2046 – UDS LRT	2046 - Intensified
CBD / Te Aro	8,000	12,500	15,000	18,000	21,500
Southern corridor¹¹	11,000	15,000	17,500	19,500	21,500
Eastern corridor	12,000	13,500	14,500	14,500	14,500
Sub-total additional to 2018	0	+10,000	+16,000	+21,000	+26,500
Western suburbs	11,000	12,000	12,000	12,000	11,500
Northern suburbs	27,000	33,500	32,500	31,000	30,000
WCC other	15,500	17,000	17,000	16,500	16,500
Rest of Region	124,000	154,500	150,000	147,000	142,000
Region	209,000	257,500	257,500	257,500	257,500

¹⁰<https://lgwm-prod-public.s3.ap-southeast-2.amazonaws.com/public/Documents/Nov-1-MRT/2021-10-29-LGWM-Urban-Development-Summary-Report.pdf>

¹¹ Less than 20% of growth in the southern corridor is assumed to be located in Berhampore or Island Bay with the majority assumed to occur between the Basin Reserve and Newtown (inclusive)

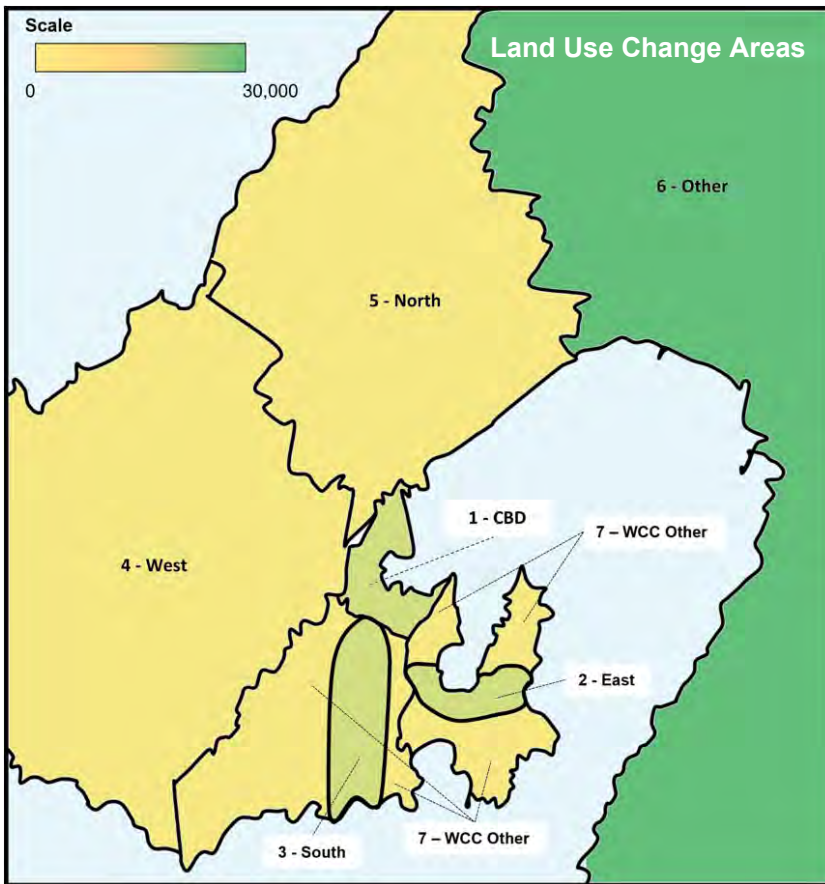


Figure 10: Land use change areas

It is noted that not all the options enable this development to the same extent. Options 3 and 4 in particular do not provide additional infrastructure to the east to enable high quality public transport services to support new development, this could affect both the 'East' and 'WCC other' areas.

It is also noted that the assumption regarding total growth across the region is a simplification using a 2019 estimate.

The Wellington Regional Growth Framework is planning for up to 90,000 new households over 30 years in the Wellington Region (+ Horowhenua District), compared to the 48,000 new regional households used in the table above.¹² Population projections have very wide ranges, depending on future immigration rates, positive effects from new housing supply, and the transformational programme. This will be investigated further at the DBC stage, aligning with ongoing work through the Wellington Regional Leadership Committee and input from the WCC housing capacity model.

7.2 Transport Modelling

This section presents the key finding of the transport modelling work undertaken between September 2021 and April 2022 to support the identification of a preferred option. It is important to note that revisions to the modelling scenarios occurred during this period. Model outputs and results have consequently been updated over time. Following the completion of the engagement period, further modelling was undertaken to provide a more granular understanding of the differences between the

¹² Ref WRGF [Wellington Regional Growth Framework Report JULY 2021 \(wrgf.co.nz\)](http://wrgf.co.nz)



options in a couple of key areas (mode share and accessibility) as well as to provide input to other workstreams (carbon and economics) and understand the performance of the network should higher levels of intensification occur.

Where relevant, modelling results are presented for the core and intensified land use scenarios to demonstrate the range of potential outcomes.

The full modelling report can be found in Appendix A.

7.2.1 Mode Share

The transformational programme provides a step change in public transport provision to the south and east. Figure 11 shows the performance of the options in terms of car and non-car mode share for the southern and eastern suburbs. This demonstrates that Options 1 and 2 deliver a 42% increase in non-car mode share relative to the do minimum under the core land use scenario and Options 3 and 4 deliver a 38% increase in non-car mode share.

Analysis of the difference between the two pairs of options indicates a lower level of public transport uptake from the eastern suburbs under Options 3 and 4 (a 17% increase in public transport patronage compared to a 34% increase under Option 1 and 2). Options 1 and 2 provide faster and more reliable travel times due to the increased capacity under Mt Victoria and this encourages a greater amount of mode shift away from private cars.

More detailed analysis of the modelled public transport travel times between Miramar and the railway station indicate that the infrastructure provided in Options 1 and 2 would reduce the travel time by three minutes (or 13%) during peak periods.

The graph also shows the potential increase in non-car mode share attributable to the intensified land use scenario. As this scenario is intended to be reflective of what could be achieved under Option 1, only results for Option 1 have been presented. It is noted that in addition to the change shown to the south and east on the figure below, this scenario also reduces private vehicles travel from the north and west (due to lower levels of growth in these locations).

This analysis indicates an increase in public transport ridership of 110% compared to the do minimum. Most of the increase is attributable to the assumed growth in residential development in the CBD, Te Aro and to the south, however intensification also results in increased ridership from the east as an assumed increased concentration of employment in the CBD will encourage more people to take public transport.



Figure 11: Car and non-car mode share, AM peak, traveling to CBD from south and east suburbs (WTSM April 2022 preferred option modelling)

7.2.2 Public Transport Demand and Capacity

Uplift in public transport demand is a key measure of the successfulness of the programme. Outputs from the Wellington public transport model have been used to understand public transport ridership on the southern (Newtown – Island Bay) and eastern (Mt Victoria – Miramar/Airport) corridors. Ridership is presented as a range (determined through running a number of model tests using different variables – levels of working from home, active travel uptake and degree of travel demand management) and covers bus and MRT services.

Figure 12 shows the projected public transport demand for the southern corridor (on the approach to the Basin Reserve) in the morning peak hour in 2046. The lighter coloured bar provides an indication of the range. This demonstrates how investment in PT infrastructure, coupled with intensification delivers a step change in use of the PT network. Ridership is forecast to increase by up to 72% following the introduction of MRT services under the core land use scenario with minimal differences in patronage between programme options. This increase rises to 200% if the MRT service is accompanied by the intensified land-use scenario

Figure 13 shows the equivalent projected public transport demand for the eastern corridor (passing under Mt Victoria, through the Hataitai bus tunnel and/or through the new Mt Victoria tunnel, depending on the option). This shows there is a stronger demand, in the order of 500 passengers, under Option 1 and 2 where there is a new Mt Victoria Tunnel compared to Options 3 and 4 where buses use the existing Hataitai bus tunnel. Under the Intensified land use scenario, public transport demand increases further with total patronage forecast to be around **35%** higher than under the equivalent core land use scenario.



Although the assumed residential intensification to the east is not as significant as it is to the south, there is an increase in patronage in the intensified scenario due to the assumed increase in employment density in the CBD. This means that the CBD becomes a more attractive destination for jobs and as such stimulates an increase in PT ridership.

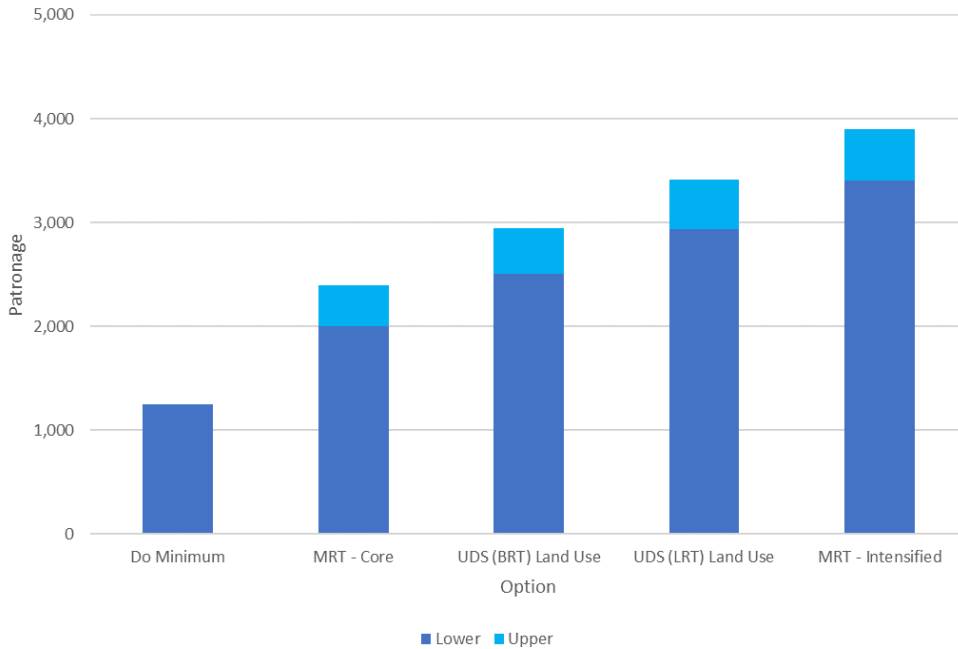


Figure 12: Southern corridor PT line loading 2046, inbound AM peak (preferred option modelling WTSM, 1-hr volumes at peak loading point – approaching BR)

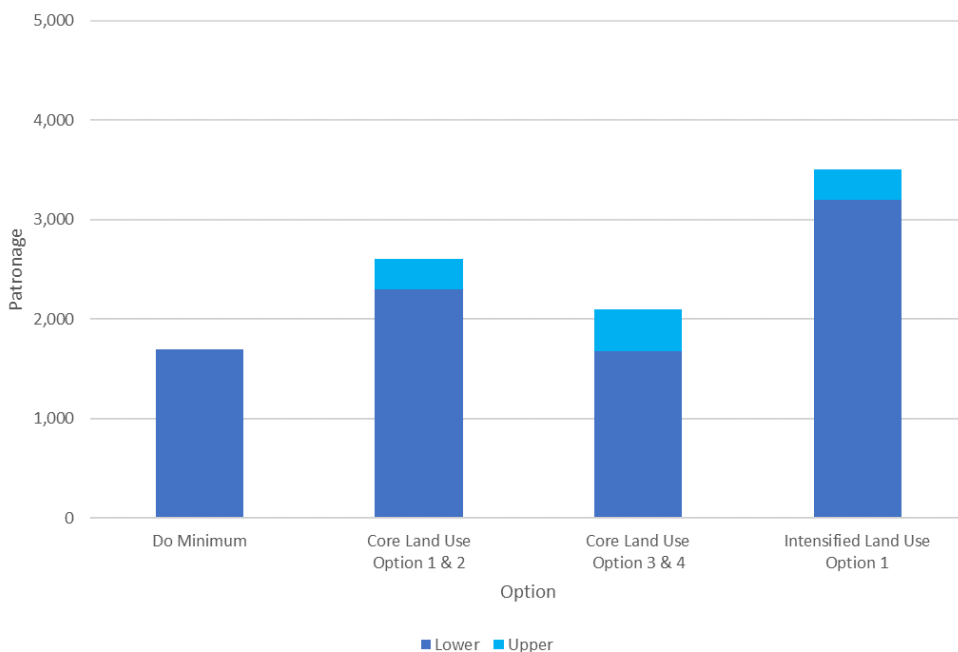


Figure 13: Eastern corridor PT line loading 2046, inbound AM peak (preferred option modelling WTSM, 1-hr volumes at peak loading point - approaching BR)



In order to cater for these demands, particularly under the Intensified land use scenario, a substantial increase in the frequency of buses is required. In total the demand forecast under the Option 1 or 2 intensified land use scenario in 2046 equates to almost 60 standard rigid buses an hour or around 40 articulated buses per hour. Compared to the southern corridor however, the demands to/ from the east are more diverse and cover a range of specific sub-geographies and markets which would be catered for by different service patterns and vehicle types. As such a mixed bus fleet is assumed to serve the eastern corridor in all programme options with higher capacity buses (either double deckers or articulated buses) used on the busier trunk routes resulting in a total of around 50 buses per hour in the highest demand 2046 scenario.

Further assessment has been undertaken to understand the degree to which additional capacity can be provided to cater for growth beyond the 2046 forecasts in a way which is reliable and attractive. Analysis into mode options undertaken for the business case suggests that up to 60 vehicles per hour is an acceptable upper limit for high quality street-based mass rapid transit corridors with exclusive lanes. This limit however is at a whole of corridor level, where multiple sub-corridors each with multiple services, converge. In order to deliver a high quality MRT product with a high level of signal pre-emption to minimise bunching of services and maximise travel time reliability, an upper target of an MRT service about every 3 minutes is considered reasonable.

- To the south, under Options 1, 3 and 4, 33m LRT vehicles could be operating up to every 3 minutes (20 vehicles per hour) or a 44m LRT up to every 4 minutes (15 vehicles per hour) to cater for 2046 modelled forecast demands under the intensified land use scenarios. Additional capacity to cater for growth post 2046 could be achieved through a combination of increased frequency or longer vehicles and still operate at good levels of reliability.
- To the south under Option 2, 18m BRT vehicles would need to be operating up to every 1.5 minutes (40 vehicles per hour) to cater for 2046 modelled forecast under the intensified land use scenario. Whilst feasible, a single MRT service operating at this high level of frequency is likely to experience some bunching and delays with reduced travel time reliability compared to Options 1, 2 and 4. Capacity for growth beyond these 2046 forecasts will be limited with the need to consider larger BRT vehicles combined with different network solutions which retain a larger number of supplementary bus services on the corridor. This could result in the southern corridor rapidly approaching or exceeding 60 vehicles for hour which could result in sub-optimal network outcomes both on this corridor itself and within the two central city spines.
- To the east, a bus every 1 to 1.5 minutes (around 50 buses per hour) is required to cater for 2046 modelled forecast under the intensified land use scenario. Under Options 1 and 2, buses are able to use two parallel corridors through Mt Victoria (including a new tunnel with dedicated bus lanes) ensuring volumes on each discrete corridor are well below the desirable 60 vehicle threshold at the corridor level. This provides significant additional capacity to cater for growth in population and resulting bus volumes with good service reliability. However, under Options 3 and 4, all buses must use the Hataitai Bus Tunnel which does not enjoy exclusive lanes on its approaches as well as having significant side friction, and therefore will be less likely to be able to reliably cater for even 60 buses per hour. As such, capacity for growth on the eastern corridor beyond 2046 under Option 3 and 4 will be more constrained. Additional public transport capacity under Mount Victoria to accommodate future growth in public transport passengers in a fast, attractive and reliable manner, is therefore likely to be essential in achieving desired future mode shift targets. Without this link, the level of growth assumed for the east may not be achievable.

North of Basin Reserve where both the southern and eastern corridors converge, the mix of vehicle types (bus, BRT, LRT) and allocation to inner city corridor (Golden Mile versus Waterfront) becomes a critical consideration in overall network capacity for growth. However, there are multiple potential



network options which will need to be investigated to get the optimal mix of services across the two corridors.

7.2.3 Accessibility

The modelling indicates that the new Mt Victoria Tunnel delivers significant accessibility improvements, particularly for PT and active modes, through improving capacity and reliability for the eastern suburbs and Airport. Accessibility analysis has been undertaken using the modelling suite and this indicates that public transport accessibility is significantly improved for Option 1/2 relative to Option 3/4 to the east, driven by the Mt Victoria tunnel duplication and the Basin Reserve grade separation. The airport has been chosen as a reference point because it is a key regional destination (along with a significant attractor and generator of trips). Over 230,000 people live within one hour of the Airport by PT under Options 1 or 2 in the core scenario. This drops to around 190,000 under Options 3 or 4 and just over 160,000 in the do minimum. In the intensified scenario, over 270,000 people live within one hour of the Airport by PT under Option 1. This is shown in Figure 14 below.

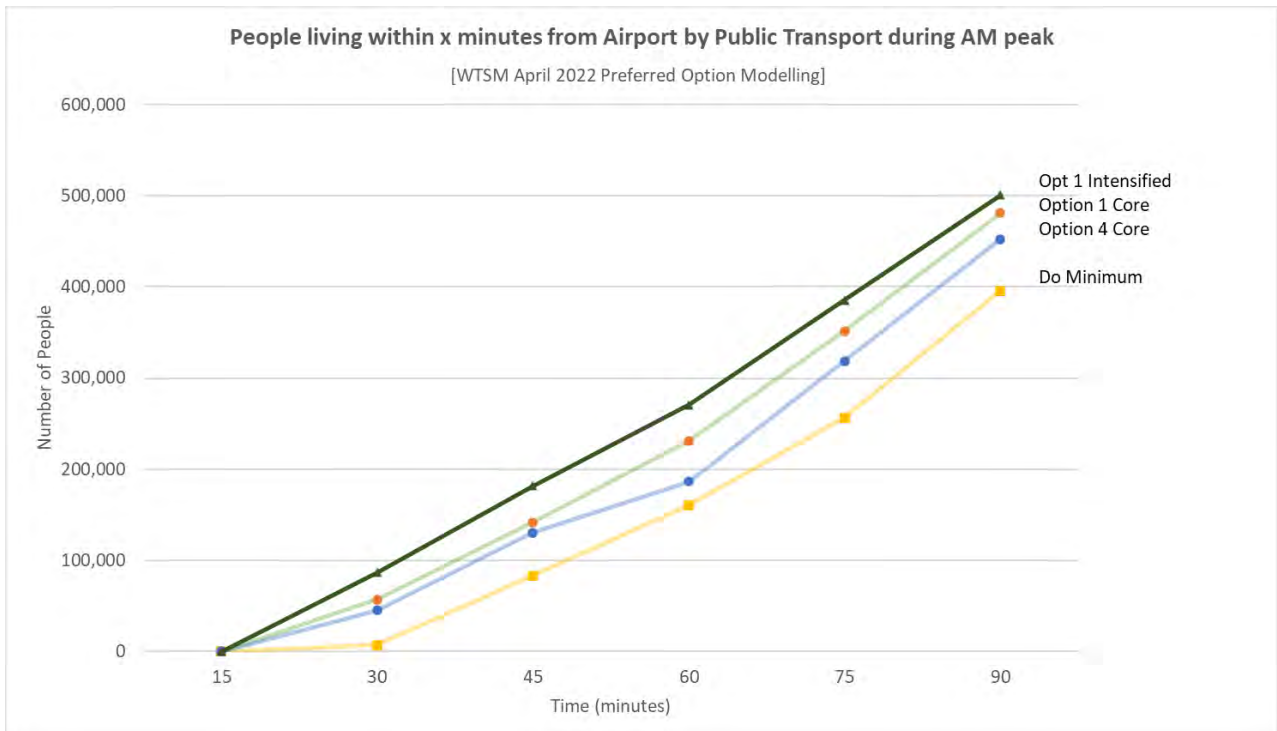


Figure 14: Population catchment analysis for the Airport by PT in 2046



7.2.4 Network Assessment

More detailed analysis of the network has been undertaken to show changes in travel times and any - wider network effects caused by the changes. Table 3 below provides a summary of the key travel time changes for public transport and general traffic for key routes.

Table 3: Sample travel time routes (travel times in minutes)

Route	Do Minimum	Option 1	Option 4
PT Miramar – Station (AM)	30	21.7	25
PT Station – Newtown (PM)	23.3	15	15
Traffic Miramar – CBD (AM)	11.7	8.3	11.7
Traffic SH1 – CBD (AM)	13.3	16.7	16.7
Traffic CBD – Karori (PM)	10	10	12.5

The implications of the network changes can be seen in the modelling density maps shown in Figure 15 below – areas of red and orange indicate where congestion is predicted. For the purposes of illustration, model outputs for Option 1 (left image) and Option 4 (right image) are presented side by side. As shown in the image on the right, if MRT runs along Taranaki St, it becomes a more constrained corridor for public transport and general traffic compared to Kent / Cambridge. This is predicted to result in greater congestion at intersections along Taranaki St and in the environs in Option 4, compared to Option 1.

The modelling indicates that this will have a knock-on effect across the network and would influence wider public transport (as well as general traffic) reliability. This results in increased travel time of up to 2 minutes 30 seconds (25% increase) for trips between Karori and Te Aro. This indicates that grade separation at the Basin Reserve delivers some wider network benefits by allowing MRT to operate on the preferred Kent/Cambridge corridor, reducing multi-modal conflict on Taranaki Street and enabling the public transport benefits provided by the Mt Victoria Tunnel.

It is worth noting that the Option 1 model indicates some increased congestion for traffic leaving the Mt Victoria suburb. This reflects the amount of priority provided to public transport along Kent/Cambridge Terraces and will need to be investigated further to minimise potential delay of buses from Hataitai.

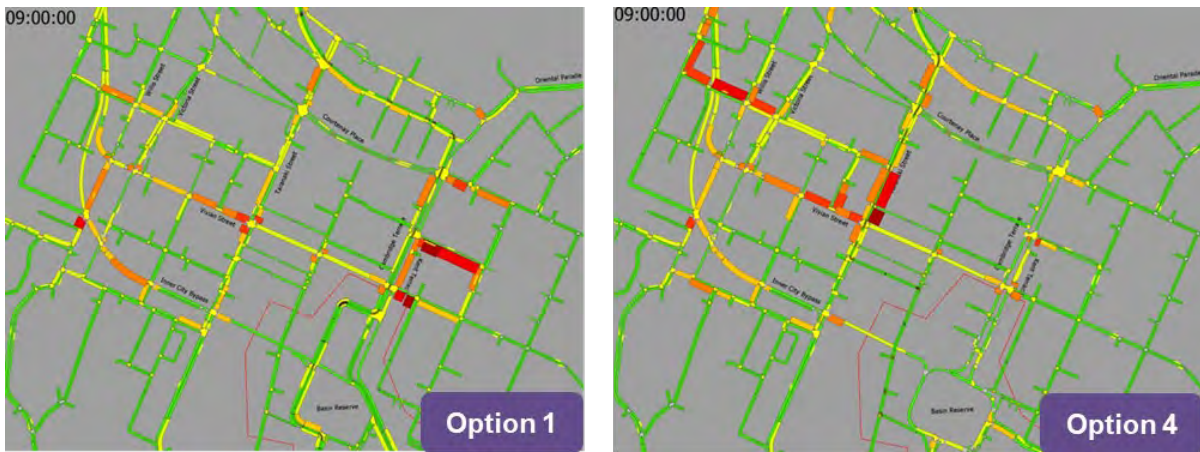


Figure 15: Aimsun models (2046) of the Kent/Cambridge area AM Peak (hotter colours are more congested)

7.3 Cost

The 95%ile cost of each option is summarised below in Table 4. The cost summary is composed of investment costs which includes all costs up to the end of construction, including inflation but excluding the impact of financing and operating costs. These are assumed to be paid as they occur and includes infrastructure operations and maintenance, costs of new MRT service net of revenue, and an estimate of the lost revenue from WCC for items such as on-street car parking revenue for Wellington City Council.

Table 4: Option cost estimates

Options	Option 1	Option 2	Option 3	Option 4
Mass Rapid Transit -South	\$2,044m	\$1,215m	\$2,057m	\$2,139m
Mass Rapid Transit / PT Improvements - East	\$388m	\$902m	\$697m	\$703m
SHI - Mt Vic Tunnel	\$1,408m	\$1,412m	\$398m	\$401m
SHI - Basin Reserve	\$774m	\$775m	\$779m	\$27m
TDM - Travel Behaviour	\$66m	\$66m	\$66m	\$66m
TDM - Parking Levy	\$10m	\$10m	\$10m	\$10m
City Streets	\$531m	\$532m	\$534m	\$539m
3-year prog - Golden Mile	\$93m	\$93m	\$93m	\$94m
3-year prog - Thorndon Quay & Hutt Road	\$55m	\$55m	\$55m	\$56m
3-year prog - Central City Walking Imp.	\$6m	\$6m	\$6m	\$6m
3-year prog - Cobham Crossing	\$5m	\$5m	\$5m	\$5m
Total Capital Cost	\$5,379m	\$5,072m	\$4,700m	\$4,047m



Options	Option 1	Option 2	Option 3	Option 4
Whole of Life Costs	\$7,370m	\$6,984m	\$6,603m	\$5,815m

It is noted that there is still uncertainty of costs due to a range of factors, including, but not limited to:

1. Costs are based on IBC/SSBC level designs
2. Cost escalation and inflation, in general, has recently increased materially
3. Increased scope (as further design work is completed) would increase build requirements and overall costs
4. On-going costs (O&M and renewals) were based on capex spend and do not have as well-developed benchmarks
5. The estimated property costs are a material element (16-19% of capital costs). Land values can be volatile and transaction costs will differ based on the purchase approach (for example market sale vs compulsory acquisition).

The following mitigations have therefore been used in the above estimates:

1. The higher cost estimates (P95) were used for funding requirements (Economic analysis uses expected (P50) estimates)
2. Cost estimates followed Waka Kotahi cost estimate processes (SMO 14) and were priced by quantity surveyors using available design detail
3. Parallel cost estimates were sought for most project capital cost estimates
4. On-going costs were benchmarked to available information from council asset management registers
5. Interest costs were agreed, and are different, for each funding partner to align with their LTPs for councils for the first 10 years and using Waka Kotahi provided information
6. Property cost estimates at the P95 level were used and provided by 3rd party experts.

There is different affordability threshold “headroom” between programme options. That is the difference between programme cost and the affordability threshold (\$7.4b). No decision has been made if this affordability threshold (\$7.4b) could be increased.

If this threshold represents a cap for funders, then the lower cost programmes will have an additional buffer. Funders have a range of choices to address breaching the affordability threshold, including providing more funding or reducing the scope of delivery.

7.4 Economics

Updated economic analysis has been undertaken and this is reported in the economics technical report (Appendix B).

Figure 16 shows the monetised benefits for the options. The first four columns show the results for Options 1 to 4 using the core land use scenario. This is also summarised for Options 1 and 4 in tabular form in Table 5. The analysis shows that Option 2 delivers similar benefits to Option 1 under the core land use scenario, and Option 3 delivers similar benefits to Option 4. The cost benefit analysis for the core scenarios indicates that all options deliver very similar BCRs in the range of 0.5 to 0.7. In other words, costs outweigh the benefits. As all BCRs are very similar, this indicates that increased levels of investment will result in proportional increases in benefits.

The economic analysis has been re-run for an alternative growth scenario using the output from the modelling of the intensified land use scenario. This shows that the intensified land-use scenario has a significantly positive effect on the benefits for all options. The benefits for Option 1 increase by 80% under the intensified scenario and this will increase the BCR range to 0.9-1.2.

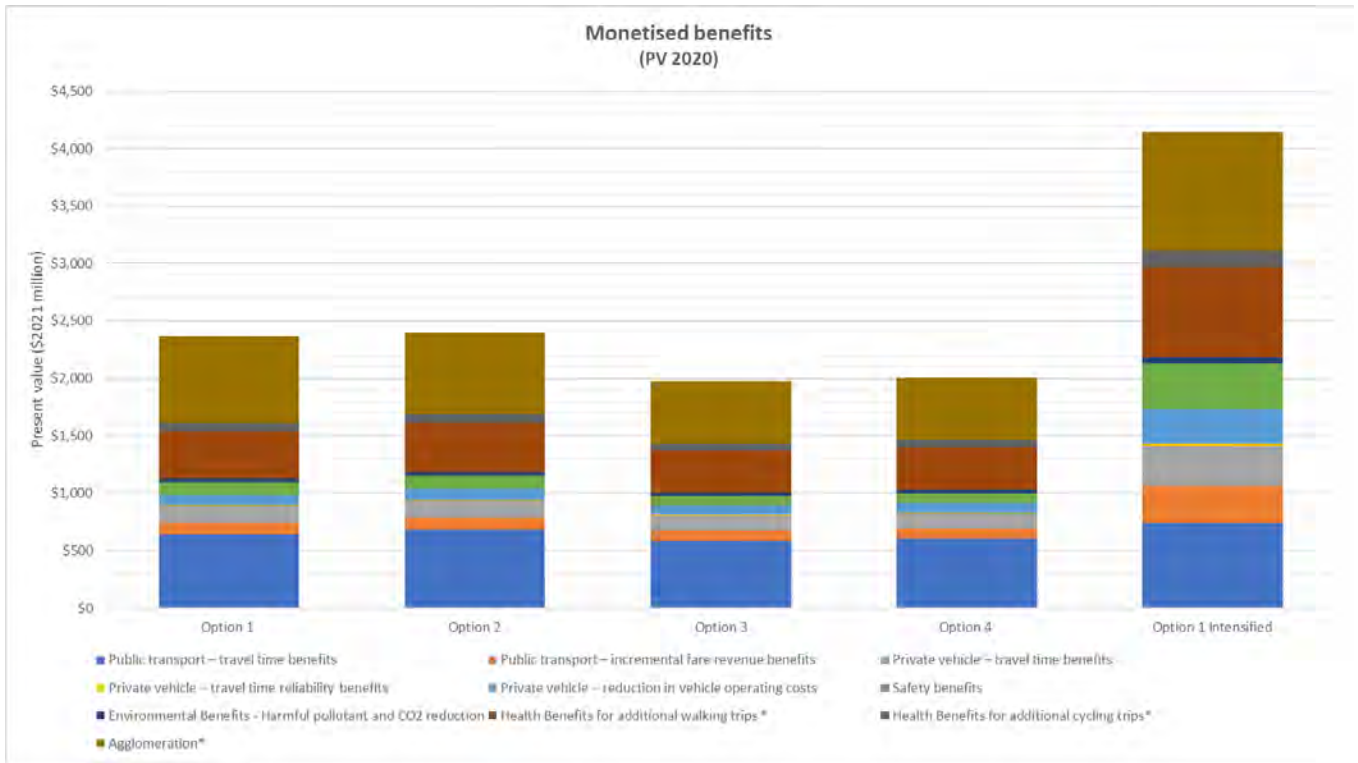


Figure 16: Monetised benefits

Table 5: Summary breakdown of economic benefits (present values, 2021)

	Option 1 Core	Option 4 Core	Option 1 Intensified
Public transport	\$741m	\$690m	\$1059m
Private Vehicles	\$245m	\$225m	\$676m
Active Travel	\$478m	\$435m	\$943m
Safety	\$109m	\$85m	\$391m
Environmental	\$31m	\$27m	\$97m
Agglomeration	\$759m	\$537m	\$1,031m
Total	\$2,363m	\$2,001m	\$4,197m

Sensitivity tests have also been run for intensified versions of Options 2 and 4. These show that Option 1 delivers significantly more benefits than Options 2 and 4 under the intensified land use scenario. In the case of Option 4 this is due to increased PT travel time benefits resulting from the diagonal tunnel and grade separated Basin Reserve. In the case of Option 2, it is due to assumed reductions in development capacity attributable to the version of BRT assumed under Option 2.

In summary, the BCR ranges for the intensified options are as follows:



- Option 1 intensified land use – 0.9 to 1.2
- Option 2 intensified land use – 0.8 to 1.0
- Option 4 intensified land use – 0.9 to 1.1.

It should be noted, however, that the Options 2 and 4 assessments are not directly comparable to the Option 1 assessment. The Option 2 analysis reported here has been developed based on an assumption that the assumed BRT option has less capacity to stimulate growth than the LRT based options – 20% less intensification has been assumed (this assumption has been developed based on a study of comparable cities globally that have implemented MRT). Although international literature supports the assumption that on average, BRT stimulates lower levels of growth, further analysis will be required at the DBC to quantify this in the Wellington context. Nevertheless, it does highlight the importance of the intensified land-use scenario to achieve a BCR above one.

The assessment undertaken for Option 4 has assumed that the level of intensification assumed for Option 1 to the south is achievable in this option. As outlined above, capacity constraints on the network mean that the level of intensification assumed for the east will not be achievable under Option 4 and therefore the BCR range has reflected this through reduced benefits to the east. Further work is required to determine the realistic total quantum and location of intensification along the corridor, however this analysis provides an indication as to the level of development required to achieve a BCR above 1. Should lower levels of intensification be delivered, the economic performance of the programme will be more muted.

A high-level incremental analysis of the difference between Option 1 and Option 4 has been undertaken. Depending on the level of intensification achievable to the east, the incremental BCR is in the range of 1.1 to 1.4 (under the intensified land use scenario). Under the core land use scenario, the incremental BCR reduces to 0.5 further emphasising that intensification is required to maximise the benefits of the transformational programme.

A preliminary analysis of wider economic benefits has indicated that it may be possible to claim additional benefits under the intensified land use scenario as the project develops. These have not been quantified and will be considered further at the DBC stage.

7.5 Carbon

The carbon analysis was undertaken to understand the potential impact of investment on emissions at both a programme level and comparatively across the four options compared to the do minimum (as reported in the Carbon technical report, Appendix C). Transport modelling was central in the estimation of carbon emissions.

There is comparatively little difference between the programme options when considering levels of enabled carbon emissions reduced under the core land use scenario. Detailed examination of the transport modelling illustrates the following key points:

- All options have a positive impact in terms of reducing daily vehicle emissions within Wellington City and across the Region relative to the Do Minimum
- Option 1 results in a marginally greater reduction in daily emissions compared to Option 4, primarily due to higher modal shift from the east.
- All options reduce daily traffic volumes (expressed as vehicle kilometres travelled, VKT) across the Region (2%) and Wellington City (up to 5%) in the core scenario. Option 1 will result in a slightly greater reduction in VKT, compared to the other options, due to the greater level of PT improvements to the east delivering mode shift.



- In the intensified scenario, the region as a whole would see a reduction in VKT of 7% as a result of shifting growth from outside of Wellington City to the CBD, Te Aro and Newtown with relatively low levels of car dependency and high PT / active mode trip rates. If the intensified scenario is achieved, there is a greater amount of development in Wellington city. Although this results in greater uptake of sustainable modes on a per capita basis, additional development will result in more car travel (albeit at a lower rate). Therefore the VKT change for Wellington city changes to a 1.5% reduction in the intensified scenario.

The options with larger amounts of infrastructure will have higher levels of embodied carbon, although in all cases enabled carbon savings exceed embodied emissions over the analysis period. This is shown in Figure 17 below for Options 1 and 4. This diagram also shows the potential range of enabled carbon savings under the intensified scenario.

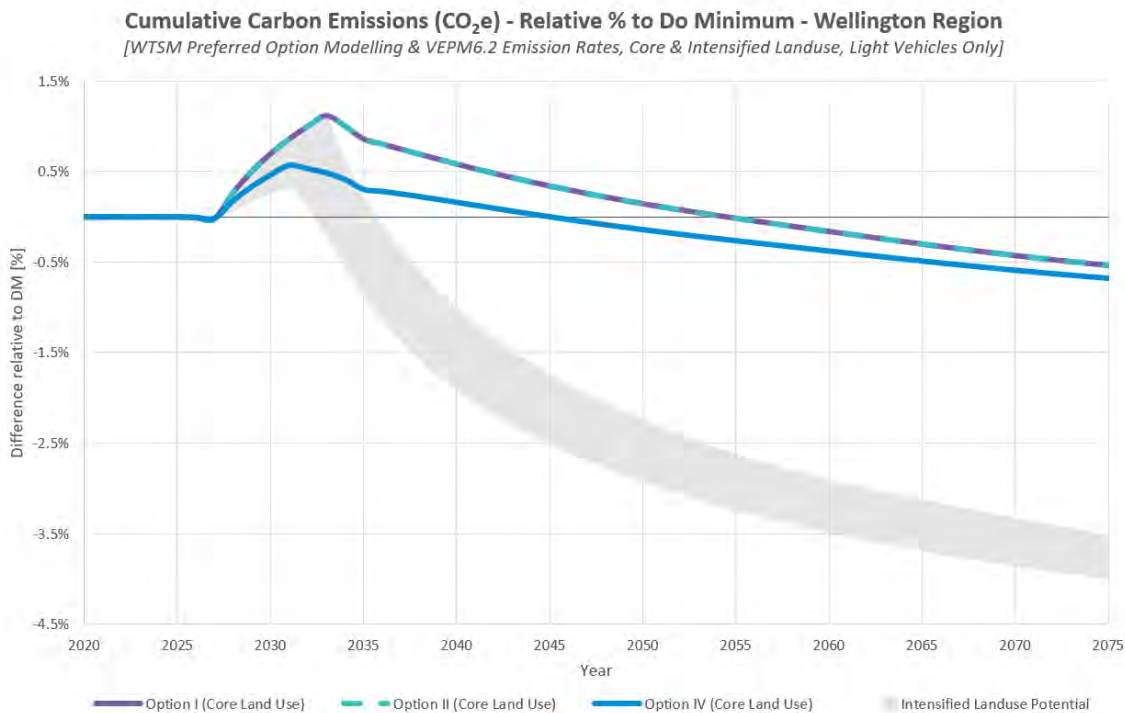


Figure 17: Construction and vehicle emissions

The LGWM 3-year programme will make travel by public transport and active modes much more attractive, supporting mode shift to low or no-carbon modes. The LGWM investment in MRT, however, will provide the foundations for a fundamental change to the way urban form develops in Wellington City, with associated significant and sustained reduction in carbon emissions. The level of carbon reduction and mode shift enabled is, however, not sufficient to meet the City’s and the Region’s immediate carbon reduction goals: other investments and initiatives to reduce travel by private vehicles and facilitate mode shift to zero-carbon options will still be required.

In the long run, embodied carbon emissions are less important than enabled emissions. Furthermore the level of land use intensification each option enables is likely to have a greater effect on carbon savings than the option itself - greater urban density produces significantly greater carbon emissions savings than the carbon produced in construction. This aligns with the LGWM objectives, which seek both carbon reductions and mode shift away from private vehicles. Mode shift to public transport and active modes also has wider benefits, such as liveability enhancement, journey time reliability, travel choice, etc.



Option 1 is likely to enable the highest levels of urban intensification. The high quality MRT corridor to the south will support very high levels of intensification, especially in the sections with dedicated running. Furthermore, improved public transport journeys and increased capacity to the east will support mode shift, growth and intensification, and this isn't available in Options 3 and 4.

The capacity and vehicle type assumptions for the bus-based form of MRT currently included in Option 2 will be able to accommodate less growth and enable less urban development than the assumed light rail-based MRT assumed in Options 1, 3 and 4¹³. It is important to note that Option 2 includes bus-based MRT both south and east and is likely to support intensification across both these areas, however not to the level forecast for Option 1. The lower public transport level of service and capacity limits to the east under Options 3 and 4 are likely to constrain the degree of mode shift and intensification in the east. These 'secondary' benefits are an important component of the analysis – as can be seen from the substantially better performance of the intensified land use scenario. The DBC will need to explore what actions will be required to deliver these potential benefits.

Intensification is the most important contributor to carbon emissions savings compared to the do minimum. More growth occurring along the MRT route concentrates people and trips around infrastructure supporting non-car modes, and consequently makes car-based transport less attractive. This is seen from the significant drop in VKT in the region compared to the VKT drop in Wellington City: More people living in Wellington City compared to the Do Minimum concentrates trips in Wellington City; the corollary is that there will be less people living further out of Wellington city compared to the Do Minimum¹⁴.

Further analysis has indicated that timing of construction is important – reductions in carbon can be realised more quickly (and to a greater extent overall) if the infrastructure is constructed more quickly. Delivering an option earlier or later can be more significant than the difference between Option 1 and Option 4, therefore the DBC needs to focus on opportunities for faster delivery

It is noted that even under the Intensified Land Use scenario assessment, the total carbon payback date is not expected until around 2035, and so other investment and initiatives (for example, travel demand management, pricing, bike network improvements) will also be needed to address the more immediate climate targets.

¹³ It is important to draw a distinction between Option 2 and BRT. A higher capacity form of BRT could be delivered using larger vehicles, however this is not part of Option 2.

¹⁴ the total population is the same under the do minimum, core and intensified land use scenarios – the difference comes from where we assume those people live



8 Programme Options Analysis

MCA has been used to inform the option comparison throughout the programme development process as it provides a legible summary of performance against the objectives as well as identified effects. The criteria used in the MCA were agreed during the PBC stage by LGWM and have been kept as consistent as possible whilst incorporating changes in objectives and items of importance.

The PASLO MCA assessment was undertaken towards the end of 2021 assessed all four programme options against the core land use scenario. As further work has progressed on potential urban development outcomes, an additional assessment was undertaken to determine if these scores would change with an intensified land use scenario. Both of these scenarios are reported in this section.

The programme options were assessed against the full set of criteria including the revised programme objectives, environmental and social impacts, mana whenua values, and design, delivery, and operations. This is documented in The LGWM Programme Affordable Short List Options Report¹⁵. The results for the programme objectives are shown in Table 5 below. The programme objective scores have been produced based on technical analysis that has informed a series of sub-criteria and key performance indicators. Further detail on these is provided in the Programme Affordable Short List Options Report.

In addition to the four programme options, a “do minimum” option has been assessed. In this case, the “do minimum” assumes no network changes in Wellington, other than those committed and funded through other projects. It assumes growth in line with the “core” land use scenario described above. The results for the do minimum therefore provide an indication as to the outcomes if LGWM is not implemented.

The key points of differentiation for the programme objectives analysis can be summarised as follows:

PO1: Liveability

- All programme options perform well against the investment objectives and significantly better than the do minimum (which received neutral or negative scores against all investment objectives).
- Option 3 was awarded a slightly higher score for liveability on the basis that it doesn't feature the road/PT tunnels under Mt Victoria. The additional portals were considered to have an impact on urban amenity in a relatively sensitive area close to the town belt. Although Option 4 also has this characteristic, it wasn't awarded the same score as Option 3 as it doesn't include the same degree of urban amenity improvements at the Basin Reserve.
- The intensified land use scenario results in improved development potential, particularly along the southern corridor. Therefore, the urban development component of the liveability score has been increased to reflect this.
- There is also an opportunity to enhance urban amenity through urban change in the public realm. Where urban development is being enabled by MRT it too can result in enhanced urban amenity where its enablement comes with a process that requires buildings, open space, heritage and street space allocation to work together to make the city more liveable. At this time, and with the level of planning for this phase of programme development, the ability to deliver greater urban development GFA potential is the primary motivator of the increase in scores for the intensified land use scenario. There remains a need for urban amenity outcomes to be amplified and provided for in the Detailed Business Case when more concepts can be

¹⁵ [2021-10-22-LGWM-PASLO-Report.-Final_Redacted.pdf \(amazonaws.com\)](#)



developed for how preferred options will provide the desired enhancement.

- The opportunity remains throughout the affected corridors and at key points such as the Basin Reserve for urban amenity enhancements too, but the detail needed to confirm the quality of outcomes for urban amenity will be generated in subsequent phases of the design/Business Case process. The urban amenity scores remain relatively modest to reflect the stage of design the project is at.
- The Liveability MCA score is the combination of urban development and urban amenity factors (as per the Investment Objective). In the intensified scenario, the overall Liveability score increased two points for Options 1 and 4 and 1 point each for Options 2 and 3. The reasons for the change are that all options will contribute to greater urban development in the central to southern corridor. The score reflects that MRT together with the other tools needed to enable intensified development will result in much more intensification than either one alone¹⁶.
- No urban amenity score changed as no new information was to hand, so they remained conservatively low. Option 2 remained relatively lower due to less urban development enablement of BRT.

PO2: Access

- Options 1 and 2 scored better than Options 3 and 4 for the access investment objective due to the multi modal improvements to the east. As indicated above, modelling indicates sizeable improvements in accessibility attributable to the Mt Victoria Tunnel and Basin Reserve improvements.
- Overall, the access investment objective scores didn't change under the intensified land use scenario, although there were some changes to the sub criteria. The scores for all options improved for the "access to key destinations" and "journey time variability" sub criteria, however the difference wasn't sufficient to change the overall scores.

PO3: Carbon and Mode Shift

- This objective considered mode share to central city, regional mode share, carbon emissions and embodied carbon. For the core land use scenario, Options 1, 2 and 4 received the highest scores, albeit for slightly different reasons. Options 1 and 2 achieve the highest levels of mode shift due to the combined improvements to the south and the east. Option 4 has the lowest level of embodied carbon (a direct reflection of the level of investment in physical infrastructure). Option 3 does not achieve the same mode shift and has increased embodied carbon compared to Option 4.
- The intensified land-use scenario results in improvements to the scores for three of the four sub criteria for the carbon emissions and mode shift investment objective (mode share to the central city, regional mode share, and carbon emissions). This has resulted in the score for this investment objective for Option 1 increasing from 3 to 4 as this is the only option that is the best for both mode shift and enabled carbon emissions. All other options achieve a score of 3 overall.

¹⁶ Whilst this score may reflect more than just enablement, it was considered vital to reflect the significant impact of MRT in contributing to high levels of intensification, and that these could only be realised in the high intensity land use scenario.



PO4: Safety

- All options score the same for safety as there are no differentiators between options that were sufficient enough to change scoring. All project elements have good safety outcomes.

PO5: Resilience

- Option 2 received the highest score for resilience as it is more flexible to respond to day-to-day disruption on the network. Furthermore, it is also more resilient to higher impact lower probability events. Although LRT track can be engineered to respond well in seismic events, it will be more influenced by falling masonry and ground movement, or day to day network disruption than a rubber tyred mode (which can take an alternative route to bypass obstacles).
- The scores for the resilience investment objective do not change.

Table 6: Programme objective MCA scores (+5 = good performance, -5 = poor performance)

	Core Land Use					Intensified Land Use				
	Liveability	Access	Carbon emissions and mode shift	Safety	Resilience	Liveability	Access	Carbon emissions and mode shift	Safety	Resilience
Do Min	0	-1	-1	-1	-2	0	-1	-1	-1	-2
1	2	3	3	2	1	4	3	4	2	1
2	2	3	3	2	2	3	3	3	2	2
3	3	2	2	2	0	4	2	3	2	0
4	2	2	3	2	-1	4	2	3	2	-1

As shown in section 2.4, the programme objectives have been weighted using the criteria weightings agreed by Waka Kotahi and WCC and GWRC elected members. A summary of the weighted scores is provided in Table 8.

Table 7: Programme objective MCA summary

	Core Land Use	Intensified Land Use
DoMin	-0.90	-0.90
1	2.45	3.25
2	2.55	2.75
3	2.00	2.60
4	2.10	2.50



The key change in this MCA summary between the two land use scenarios is for Option 1 which sees a significant increase in score for the intensified scenario compared to the core scenario. This is a reflection of the assumed characteristics of the MRT mode in Option 1 which has the highest level of capacity and quality (LRT) to the south and a significant public transport improvement to the east.

The results of the effects assessment are shown in Table 8. Overall, although all options have some significant impacts reflecting the scale of the transformational programme, none were deemed to be fatally flawed by the specialists and mitigation measures for the selected option will be considered as part of the DBC. High levels of effects should be expected given the transformational nature of the programme. The key points of differentiation from the effects assessment are:

- mana whenua gave Option 2 the highest score on the basis that scores well in respect of Whakapapa (place), Hau-ora (wellbeing) and Manaakitanga (just society). It was considered beneficial to provide a broader spread of urban uplift benefits and the prospect of expansion of BRT to the north and west was considered advantageous. There were significant positives associated with Options 1, 2 and 3 in relation to keeping MRT away from the Te Aro Pā site at the northern end of Taranaki Street. mana whenua awarded Option 1 an additional point under the intensified scenario as it was deemed to be the option likely to catalyse the most development.
- Option 4 has a slightly less negative score for heritage and archaeology on the basis that it has reduced impacts at the Basin Reserve.
- Options 3 and 4 have the least social impact as they have reduced Town Belt and property acquisition requirements, but Option 3 has benefits associated with the Basin Reserve upgrade.
- Options 1 and 2 received a positive score for business disruption and outcomes on the basis that they deliver the highest levels of accessibility improvement, offsetting the construction effects. Options 3 and 4 received a neutral score.
- The intensified land-use scenario results in a change to the “Business Disruption and Outcomes” score. Options 2, 3 and 4 were all awarded an extra point reflecting the benefits of intensification on businesses (increased demand for services, better access for employees, increased footfall etc). Option 1 was awarded two extra points as it is the option that facilitates the most development across the network.
- Options 1 and 2 were awarded a more negative score for landscape and visual on the basis of the impacts at the Mt Victoria tunnel portals.
- Option 2 received the highest noise and vibration score as it features BRT – the specialist assessment noted that LRT can experience “wheel squeal”, which can be avoided with a rubber tyred based option.
- Option 4 was given slightly less negative scores for engineering difficulty and property difficulty, mainly due to the lower impact at the Basin Reserve and Mt Victoria Tunnel.
- Option 2 was awarded the highest positive score for scalability of network and services reflecting the flexibility of a rubber tyred mode. BRT services could be extended to the north and west at a later date without forcing a change of mode.



Table 8: Effects Assessment MCA scores

	Mana whenua	Heritage and archaeology	Social ¹⁷	Business Disruption and Outcomes	Landscape and visual	Noise and Vibration	Contaminated Land	Engineering Difficulty	Property Difficulty	Scalability of network and services
Core Scenario										
DoMin	-2	0	1	-1	0	0	0	0	0	0
1	2	-5	-3	1	-3	2	-3	-4	-5	3
2	3	-5	-3	1	-3	3	-2	-4	-5	5
3	2	-5	-2	0	-2	1	-3	-4	-5	3
4	1	-5	-3	0	-1	0	-2	-3	-4	3
Intensified Scenario										
1	3	-5	-3	3	-3	2	-3	-4	-5	3
2	3	-5	-3	2	-3	3	-2	-4	-5	5
3	2	-5	-2	1	-2	1	-3	-4	-5	3
4	1	-5	-3	1	-1	0	-2	-3	-4	3

Overall, Options 1 and 2 scored similarly to each other and better than Options 3 and 4. In terms of the differences, Option 2 provides slightly greater flexibility and scalability compared to Option 1. This is an important consideration as it provides opportunities to extend MRT services to the north and west at a later date. Furthermore, 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, it is deemed to be a more resilient mode. Option 1, however provides greater capacity than Option 2 (noting that an alternative version of BRT could deliver higher capacities) – it is therefore better able to respond to growth under the high land use scenario, maximising mode shift and decarbonisation benefits. Although Options 3 and 4 generally received lower negative scores against some of the effects criteria, they also received lower positive scores against the investment objectives. On balance, therefore, Option 2 was identified as the technically preferred option through this assessment.

As outlined in the PASLO report, a number of sensitivity tests were undertaken with a key focus on the impact of congestion charging/forms of travel demand management. These sensitivity tests show that interventions that serve to reduce the traffic demand entering the central city have a positive impact on the performance of the options against the investment objectives. The conclusion in the previous PBC report was that a combination of infrastructure investment, service improvement and travel demand management was required to deliver on the overall investment objectives. That conclusion remains the same.

¹⁷ Primarily considered negative impacts such as noise, dust, community amenity effects and property acquisition during construction.



8.1 Updated Analysis - Summary

Whilst MCA analysis is a very helpful tool, should not be used alone to decide a preferred option. In this case it has been used to identify areas of differentiation and help decision makers weight these against the objective weightings. Consideration needs to be given to all of the analysis undertaken to understand the relative performance of the options. These include transport modelling, economic analysis, an assessment of emissions and a MCA. Overall, the analysis indicates that Options 1 and 2 outperform Options 3 and 4 reflecting the benefits of improving the transport network to the east. The most significant finding, however, is that the intensified land-use scenario is a key part of the investment story:

- Intensification along the MRT corridor better delivers on the carbon and mode share objectives
- Intensification along the MRT corridor is required to maximise BCR (and achieve a BCR above 1)
- The degree of intensification along the corridor influences specifications/characteristics of MRT mode
- Based on the limited information provided in the consultation documentation, the public have responded positively to the concept of intensification.

Without a high degree of intensification, none of the transformational programme options have a BCR above 1. While achieving a BCR above 1 isn't the only element in decision making, it does indicate that a transformational programme will need more than the infrastructure investment outlined in this document to deliver value for money. If a high degree of intensification is not palatable, there may be better ways to invest in the transport network.

However, high levels of intensification maximise the ability of the programme to deliver on the programme objectives. On the assumption that development intensification is desirable, and based on modelling results that show that increasing levels of intensification result in increasing levels of performance against the investment objectives, the MRT service with the highest capacity and quality will both support and cater for this. Of the four options, Option 1 delivers on this best. The analysis indicates that, once intensification is taken into account, a higher capacity service is required for the southern corridor in the long term than has been assumed for Option 2.

LRT, if planned appropriately, can serve much higher patronage growth in the long-term as it is easier to add services and carriages to LRT¹⁸, whereas BRT is unlikely to support the same level of intensification. A specialist literature review of comparable land value uplift from MRT systems globally indicated that a general land value uplift of 11.5% could be achieved for LRT, and 4.9% for BRT. This is relevant to the key strategic question of whether a more intensive urban development scenario is pursued around MRT stations (building on requirements under the National Policy Statement on Urban Development).

¹⁸ As long as there is planned capacity at the depot, terminals and stops



9 Key Questions

To help inform a decision on the preferred programme, there are a number of key questions that need to be answered. These questions have come from within the LGWM team, project partners, stakeholders and the public and have been the focus of the most recent investigations. These questions are outlined below.

- What form of MRT is preferred?
 - a. Why does MRT not go to the Airport?
- Are large-scale or minor improvements preferred at the Basin Reserve?
 - a. If large-scale, why does it have such a large footprint?
- Is a new Mt Victoria tunnel needed?
- How will the options integrate with the wider transport system?
- How can urban intensification be achieved?
- Are parking levies or congestion charging proposed?

9.1 What form of MRT is preferred?

The two forms of MRT being considered are LRT and BRT. The Mode Report¹⁹ contains details on the specifications and assumptions of these modes and the process used to get to this short list. BRT could be provided to both the south and east, but due to the affordability threshold, the higher cost of LRT means that it would only be able to be provided on the southern corridor, where urban intensification has the potential to be greater, and so a high level of bus priority (Continuous Bus Priority) would be provided to the east.

LRT is provided in Options 1, 3 and 4. BRT is provided in Option 2.

The key differences between outcomes for each of the two options are summarised in the table below assuming that the intensified land use scenario is adopted.

Table 9: MRT Mode Summary Assessment

	Option 1: LRT to the south with bus priority to the east	Option 2: BRT to the south and east
IO1: Liveability: Urban Development	Catalyses an 8,500 increase in households on the southern corridor to 2046 Potential 11.5% increase in value uplift Further capacity available to support additional long term growth	Catalyses a 6,500 increase in households on the southern corridor to 2046 Potential 5% increase in value uplift
IO2: Access	Available capacity in 2046 with vehicles at 5 minute frequencies	Limited ability to increase the frequency to account for growth beyond 2046 compared to LRT.
IO3: Mode Shift and Carbon	Best mode shift due to highest intensification Best enabled carbon outcome	Slightly reduced patronage compared to LRT due to less development enabled to the south
IO4: Safety	Good safety benefits, however presence of tracks is a safety risk for cyclists.	Good safety benefits
IO5: Resilience	Slight improved resilience as additional transport mode	Significantly improved resilience as BRT can divert around issues or along a different route if needed

¹⁹ Report yet to be published



Other differentiators		Slight noise benefit compared to LRT as no rails Significant network benefits as BRT is flexible Ability for staged implementation.
Stakeholder and Public Engagement	53% support LRT (public) 59% support LRT (online panel)	23% support BRT (public) 41% support BRT (online panel)

The key differentiators and other items for discussion are outlined below.

9.1.1 Urban Development and Urban Amenity (Liveability)

MRT has a significant effect on development feasibility by increasing land values and demand for housing and commercial space near MRT stations. But within this, LRT and BRT deliver different levels of benefits.

The comparative cities work (presented in the Mode Report) determined that ‘rails on the ground’ presents a permanence the development market responds more positively to than BRT. However, the ongoing enhancements in BRT technologies and the multiple city contextual variations these modes have been retrofitted into makes this difficult to quantify. The flexibility of BRT offers some network resilience and is operationally quieter than LRT, which may have a positive impact on the noise environment and thus amenity.

The need with either BRT or LRT to rebuild complete streets with redeveloped sites along them and within walkable catchments generates a significant opportunity for public space amenity improvements. Within the street itself reconstruction will be required and would enable new stops and street crossings (which assist connectedness), additional street edge building redevelopment around stops which would assist with activation, connectedness to anchors spaces along the routes like open spaces/parks, and increased comfort from customer experience infrastructure at stops, street trees and new footpaths and active mode infrastructure. The opportunity to generate redeveloped sites that are designed for good quality urban living has the potential to make a city with enhanced amenity along with the diversification of living options and affordability. It is very important for urban amenity that there is provision made to both enable positive outcomes by (a) aligning infrastructure to leave viably shaped and fronted streets (i.e. not ‘left over bits’); (b) to require comprehensive development ‘master plans’ or the like so the areas are designed to reveal positive outcomes (from integrated design for open space, connections through blocks, street edge relationships, energy efficient built form etc); (c) that the market is incentivised to deliver the redevelopment expediently so there are not potentially large areas of dormant vacant land in the city.

There are contemporary studies and reports that present a forward-facing future city form which includes street space and the way in which these can be reconfigured to both enable specific modes (including MRT) but also to link with city-making opportunities. These opportunities, such as Te Ngākau Civic Square for example, are not expected to be delivered by LGWM, but the integration in design processes with next stages of the Business Case process enables mutual benefits for urban amenity and development to be optimised. To this end, LGWM’s Spatial Integration Study (2022) prepared with LGWM stakeholders consolidates a range of the contemporary studies and reports by Council and others (such as GEHL Architects) as they apply to the central city and identifies a range of city making opportunities area by area. This Spatial Integration Study will assist direction to the DBC as a ‘brief’ of key urban amenity and development considerations to be worked through.

Ensuring the opportunity for good urban development enablement and ‘density done well’ will require an investment in planning, design and implementation – the models for delivering on these different needs



(planning may be different than implementation) should have the objective see to integrate the multiple influences on amenity where multiple buildings, streets and open spaces and existing values such as heritage are being designed and delivered comprehensively across a wide area.

9.1.2 Capacity

The line loading analysis undertaken as part of the modelling indicates that both modes have capacity to accommodate forecast demand up to 2046 in the core land use scenario. However, under the intensified land use scenario, BRT on the southern route exceed the current modelled capacity by 2046 (based on the assumed frequencies and vehicle capacities) – see Figure 12 and Figure 13.

The model inputs have assumed five-minute service frequencies for LRT (220 capacity vehicle per service) and three minute frequencies for BRT (110 capacity vehicle per service). For both modes, vehicle size and frequency could be increased, however there is less ability to do so for BRT in the longer term and Levels of Service will deteriorate more quickly in the future.

Also, any additional services on the southern route then need to merge with services from the east to go through the CBD with an appropriate Level of Service. Overall, this means that BRT, with the already higher service frequency, has less ability to cater for increased demand in the longer term, without compromising network performance.

9.1.3 Cost and Economics

The estimated 95%ile cost of the two MRT options, as described in Option 1 and Option 2 are as follows:

- Option 1 LRT – \$2.43B
- Option 2 MRT - \$2.12B

As presented earlier, the more intensive land use scenarios have better economic outcomes, therefore, with all other elements being the same (e.g. Basin Reserve, Mt Victoria Tunnel, other pricing), LRT can deliver more intensification and therefore a higher BCR.

- Option 1 (High Land Use) – 0.9 to 1.2
- Option 2 (High Land Use) – 0.8 to 1.0

As noted above, higher capacity BRT could be provided to increase the carrying capacity and benefit streams for Option 2. This would, however, increase the cost of the option and would therefore require reassessment.

An incremental BCR has been calculated to determine whether the additional benefits gained outweigh the additional costs. This calculation has shown that the incremental BCR of Option 1 over Option 2 is greater than 3, meaning that the additional infrastructure in Option 1 is a good investment.

9.1.4 Carbon

In a similar manner to economics, the more intensification that can be enabled, the better the outcome for carbon. This is due to both shorter trips being required and a greater proportion of those trips using active or public transport modes.

Whilst these changes haven't been modelled, enabling land use intensification significantly outweighs any small embodied carbon benefit of BRT over LRT, which would be present due to reduced pavement construction requirements.



9.1.5 Engagement

A total of 53% of respondents support LRT, with the primary reasons being:

- High capacity (over 300 people per trip²⁰)
- Reliability and frequency
- Improved carbon performance.

However, most people have the impression that LRT will provide a quiet solution despite information supplied. When asked about BRT, 23% were in support for the following reasons:

- Flexibility and ability to be extended to more suburbs in the future
- Less investment and is faster to implement
- Quicker recovery time from a natural disaster.

The online panel research gave a slightly different result to the public engagement in relation to the form of MRT. LRT was preferred by 59% of respondents, compared to 41% for BRT, which is closer than that identified through the public engagement. When considering the responses from only Wellington City residents, the preferences are even closer with 52% preferring LRT and 48% preferring BRT.

The LRT preference was noted as being due to it feeling more novel, reliable and greener. There were, however, concerns with what a light rail system could mean for the city including the expense and low expectations around resilience, which made some participants feel it is not worth the investment. It's inflexibility in relation to extendability and the time it would take to implement was also concerning. The impact earthquakes may have on the rail system also a raised concern to its practicality within the region.

9.1.6 Resilience and Scalability of Network and Services

A major benefit BRT has over LRT is its flexibility in terms of routes and the extent of services. For the LGWM project, this presents itself in a number of ways:

- Potential for extending MRT services to the north (e.g. Churton Park, Johnsonville) to connect northern growth areas, while likely reducing the need to transfer
- Potential to improve network resilience – particularly for high probability/low impact events and network disruptions such as breakdowns, crashes, utilities maintenance
- Potential to stage delivery so benefits can be realised sooner, with the least amount of disruption
- Ability for stabling to be located away from the routes gives more flexibility in terms of available land and cost.

The resilience score for Option 2 did not change under the intensified land use scenario.

9.1.7 Why does MRT not go to the Airport?

The Programme Business Case recommended a route to the Airport via Newtown, a new tunnel under Mt Albert, Kilbirnie and Miramar. Further assessment of this route raised a number of concerns regarding its viability, including the indirectness of the route, slower travel speeds than previously envisaged, the need for many customers to transfer from shuttle buses and lower than expected demand

²⁰ Vehicle capacity was modelled at 220 people, but actual capacity can be larger.



from the airport. Additionally, the feasibility of the route was further impacted by the cost of tunnelling under Mt Albert and reduced urban development potential in the eastern suburbs due to resilience issues.

Due to the wide geographic footprint of the eastern suburbs, effective public transport needs to provide multiple routes to achieve the necessary coverage, as evidenced by the existing bus network. Consequently, it was determined that the most appropriate investment in the eastern suburbs would be through BRT or bus priority capable of supporting multiple routes. This formed the basis for developing options for the eastern suburbs, all of which would deliver significant improvements to travel speeds and reliability for BRT or bus services, including to the airport.

Although the issues listed above relate to the outer route section east of Newtown, the core route section between Wellington Rail Station and Newtown was found to align well with project objectives. This route was then extended from the hospital to Island Bay via Berhampore as it provides greater potential for increased urban development and population growth.

All four options would provide frequent, reliable access to the Airport via public transport. This includes MRT in Option 2 and dedicated bus lanes in Options 1, 3 and 4.

9.1.8 Mode Question Summary

The investigations have shown that Wellington needs a high quality MRT system with quality, capacity and permanence characteristics similar to LRT to successfully encourage, and then service, intensified land use in the CBD and southern corridor.

However, there are many benefits associated with rubber tyred vehicles that should not be ruled out at this early stage of system development, such as resilience, flexibility and stageability.

As BRT technology is constantly evolving, it is recommended that LGWM define the expectations for an MRT system that has enough capacity and permanence but reserve a decision on the type of system until the DBC stage or later, when more detailed information can be sourced on the latest and emerging MRT systems.

9.2 Are large-scale or minor improvements preferred at the Basin Reserve?

The two options being considered for the Basin Reserve are a minor upgrade that retains the current configuration or a major upgrade that extends the Arras Tunnel thereby grade separating north-south transport movements from east-west.



Figure 18: Arras Tunnel extension option



The Arras Tunnel extension option is included in Options 1, 2 and 3. Option 4 retains the current configuration.

The key outcomes for each of the two options are summarised in the table below assuming that the intensified land use scenario is adopted.

Table 10: Basin Reserve Summary Assessment

	Retain current configuration with minor upgrade	Extension of Arras tunnel and grade separation of movements
IO1: Liveability	Current poor amenity will remain. Some urban development outcomes due to redevelopment on the western side, but more limited intensification to the east.	Positive amenity outcomes due to substantive development and better connectivity. Good urban development outcomes due to redevelopment south of Haining Street. Enables intensification to the east.
IO2: Access	Adds congestion for all modes onto Taranaki Street. Some improvement for walking and cycling trips.	Enables new Mt Victoria Tunnel and PT improvements to the east. Reduces congestion for all modes around the Basin Reserve. Significant improvement for walking and cycling trips. Enables MRT to the south on the preferred corridor (Kent/Cambridge)
IO3: Mode Shift and Carbon	Lowest embodied carbon	Enables PT improvements and intensification to the east which assists mode shift and better long term carbon outcomes.
IO4: Safety	Minor improvements to safety	Significant local benefits through separation of traffic and more walking and cycling facilities.
IO5: Resilience		Positive effects due to improved access
Other differentiators	Very minor impacts	Significant construction disruption and greater environmental effects
Stakeholder and Public Engagement		61% of 980 comments support major changes

The key differentiators and other items for discussion are outlined below.

9.2.1 Impacts on MRT routes

The Arras Tunnel extension option facilitates better MRT routes in two main areas:

- It enables MRT to travel down Kent Terrace/Cambridge Terrace rather than Taranaki Street. This is preferred for a number of reasons including better travel time performance for all modes, less PT service duplication, better safety outcomes and less impact on the culturally rich area of Te Aro Pā.



- Allows MRT to traverse the Basin Reserve and therefore enables the Mt Victoria Tunnel project to proceed, thereby supporting improved public transport services and frequencies, and urban intensification to the eastern suburbs.

Without the major improvements at the Basin Reserve, MRT would be prevented from accessing the eastern suburbs via Mt Victoria Tunnel. It also makes it very difficult to achieve this in the future due to the MRT route utilising Taranaki Street.

9.2.2 Carbon and Mode Shift

The Arras Tunnel extension option does have significant embodied carbon associated with the construction. However, if delivered as part of the intensified land use scenario, this is offset by the changes in enabled emissions.

There is some perception that large scale improvements at the Basin will encourage more people to drive, but as capacity limitation on all approaches is retained then this is unlikely. This has been confirmed in the modelling that shows similar levels of public transport patronage from the south regardless of the Basin Reserve option chosen.

Any difference here is significantly outweighed by the change in mode shift to the east which is enabled if both the Basin Reserve and Mt Victoria tunnel projects are progressed.

The Arras Tunnel extension option results in reduced congestion on the urban road network in this location, which enables private vehicles and public transport to flow more freely and also encourages through traffic to use the state highway rather than rat-running through other city streets which should be prioritised for non-car modes.

However, whilst the option will reduce congestion, large travel time savings for private vehicles that would counter mode shift are not expected with this option. The greatest saving is likely to be a 3 minute saving in an otherwise 10 minute journey for trips from Miramar to Taranaki Street.

9.2.3 Urban Development and Urban Amenity (Liveability)

The three options that provide for an extension of the Arras Tunnel enable a significant opportunity for comprehensive urban development of adjacent sites and including any residual land generated from acquisition to enable movement/transport infrastructure. The scale of change if well planned enables urban amenity enhancement for the Basin and supporting public space. Opportunities include:

- Improved connectivity across the Basin area for walking and cycling which will assist movement east/west and north/south but also importantly the destination aspects of the Basin and the many educational facilities in this context.
- Increased open space 'park' land that can support higher density residential living in the context of the Basin reserve as an extension of Pukeahu and its connection to the Basin space – this can also act as 'game day' or event support/spill over space.
- Enhanced Basin operational spaces and better accessibility with extensions to the Basin Space footprint especially at the north side.

There remain several key urban amenity and development considerations that will need a comprehensive urban design process to address which include the relationship to the Kent and Cambridge Terrace and releasing opportunity for this well recognised heritage and connectivity pathway to the waterfront, as well as the design of the new streets to address these as 'complete' streets that deliver amenity as well as their desired movements by the multiple modes.



9.2.4 Environmental and Social Effects

The Basin Reserve is an area with strong heritage, social, cultural and environmental significance and this has been highlighted through the [Basin Bridge Project's Board of Inquiry decision in 2014](#). The Arras Tunnel extension option has significantly reduced effects compared to the previous Basin Bridge proposal, particularly in relation to the urban amenity and visual relationship between the heritage values of the Basin Reserve and the canal reserve down Kent/Cambridge Terraces. However, further work needs to be undertaken to minimise the heritage effects of the proposal and maximise heritage, social, cultural and environmental opportunities.

Retaining the roundabout with only minor upgrades has little to no environmental and social effect.

9.2.5 Walking and Cycling

The extension of the Arras tunnel will result in a step change in facilities for pedestrians and cyclists.

The Basin Reserve is currently an unattractive place for active modes, with few facilities, all of which are narrow. The Basin Reserve itself surrounded by a three lane road with only three crossing facilities. This is a particular concern due to the importance of local destinations including the many schools in this area, Pukeahu National War Memorial Park and the walking and cycling facility through Mt Victoria.

The Arras tunnel extension option provides full connectivity to all these locations with significantly improved width and amenity for all users.

9.2.6 Cost and Economics

The estimated 95%ile cost of the two Basin Reserve options, as described in Option 1 and Option 4 are as follows:

- Basin Reserve Arras tunnel extension – \$770M
- Basin Reserve Minor upgrades - \$27M

As economic evaluation has not been undertaken for Option 3, the incremental BCR for the Basin Reserve itself cannot be presented²¹. However, the economics has been run for Option 4 and Option 1 which shows that there is an economic case for doing the Basin Reserve and Mt Victoria Tunnel together. This is presented in Section 11.3.2 this report.

9.2.7 Stakeholder and Public Engagement

The Basin Reserve received a stronger percentage of support with 61% of the 980 comments on the Basin Reserve supporting the changes however there were concerns about that the changes at the Basin would delay investment elsewhere. The main reasons for the support of the Basin Reserve are:

- People want reduced congestion and improved traffic flow around the Basin Reserve
- Enhanced, people-centred, open space
- Those living in the wider region think changes will make it easier for them to get to the Hospital and the Airport.

The reasons for people being less supportive are:

- Question if changes will fix congestion, since traffic merges and bottle necks continue

²¹ Previous preliminary economic analysis showed that the Arras tunnel extension option in isolation delivers a BCR of around 0.6 but this did not take into account the benefits associated with Mt Victoria Tunnel or MRT. The at-grade improvements would deliver a BCR of less than 0.2.



- Extension of Arras Tunnel too carbon costly
- Arras Tunnel also perceived as incentivizing driving over public transport or active modes.

9.2.8 Why does the Arras Tunnel extension option have a large footprint?

The footprint of the Arras Tunnel extension option has been determined by a number of factors:

- The desire to create a good urban amenity outcome and facilitate appropriate urban development in the immediate area.
- The Sussex Street extension needs to tie back to ground at Cambridge Terrace at an appropriate grade and angle to allow MRT and active mode users to traverse this portion of the network safely and with minimal discomfort. To ensure this design requirement was met, additional space and distance was required increasing the footprint north of Buckle Street.
- The Sussex Street footprint enables the provision of two MRT/PT lanes, two traffic lanes and active modes, while the current configuration is three lanes only with minimal active mode provision.
- The footprint around Rugby Street is currently controlled by MRT requirements, as MRT stations should be accommodated along straight sections, extending the footprint south beyond Rugby Street.
- The northeast corner footprint is extended beyond the existing to maximise the space for active mode connections to/from the south and east.

It is expected that the footprint of the Basin Reserve will be refined during the DBC.

9.2.9 Basin Reserve Summary

The investigations have shown that the Arras Tunnel extension option provides a wide range of benefits in relation to the project objectives. It can significantly improve development opportunities and amenity in the area, it improves both public and private vehicle times and provides much improved routes for walking and cycling. Safety and resilience are also improved through the upgrade.

It is also fundamental to facilitating two new public transport lanes through Mt Victoria, without which services to this part of the city reach capacity before 2046, even under normal growth conditions. This also future proofs this corridor for future MRT expansion.

It is noted that the costs of the improvements are large, there are greater environmental effects, and it does result in an increase in embodied carbon compared to a minor upgrade. The DBC should therefore focus on opportunities to reduce these impacts and to enable the opportunities for urban development and urban amenity to be delivered.

However, as a standalone project it is unlikely to provide significant benefits in relation to all investment objectives without being delivered alongside the Mt Victoria Tunnel as together they allow MRT to traverse through the Basin Reserve and Mt Victoria to provide significant benefits in terms of access, carbon and mode shift for the Eastern Suburbs. This is discussed further in the next section.

Future design considerations relating to urban integration for the Basin Reserve include amplifying the sense of green belt to green belt connections, enhancing active mode connections for increased comfort, and integration between active mode facilities, the street space, and the built form. The DBC will further explore future design considerations relating to embodied carbon, amenity, and improvements for integration with any new Mt Victoria tunnel.



9.3 Is a new Mt Victoria tunnel needed?

Two options are being considered for the Mt Victoria Tunnel, a new tunnel for just walking and cycling or a new tunnel that, along with the existing tunnel, will have provision for two public transport lanes, two general traffic lanes, and much improved walking and cycling facilities through Mt Victoria. There are different possibilities in terms of the alignment of any new tunnel or which modes share in which tunnel, but this level of detail will be determined at the DBC stage, should this programme element be taken forward.

A walking and cycling tunnel is only included in Options 3 and 4 whereas a new tunnel enabling two new PT lanes as well as better walking and cycling facilities is included in Options 1 and 2.

The key outcomes for each of the two options are summarised in the table below assuming that the intensified land use scenario is adopted.

Table 11: Mt Victoria Tunnel Summary Assessment

	Walking and Cycling Only Tunnel	New Tunnel enabling two new PT lanes
IO1: Liveability	Has some local urban amenity effects at tunnel portals Does not enable intensification in the eastern suburbs.	Has greater local urban amenity effects at tunnel portals. Enables intensification to the east therefore overall scores better than other option.
IO2: Access	Improves access for walking and cycling. PT services through the Hataitai Bus Tunnel reach capacity before 2046.	Significantly improves public transport access by expanding route capacity and enabling PT priority routes to the east and the Airport. Improves access for walking and cycling
IO3: Mode Shift and Carbon	Improved mode share for walking and cycling. Lower levels of embodied carbon	Enables PT improvements and intensification to the east which assists mode shift and carbon outcomes. Improved mode share for walking and cycling
IO4: Safety	Minor improvements to safety, particularly for pedestrians and cyclists	Minor improvement to safety for pedestrians and cyclists as well as other modes.
IO5: Resilience		Significant improvement in resilience, particularly if a diagonal tunnel as existing Mt Victoria tunnel portals are in a high risk area.
Other differentiators	Fewer impacts	Reduced noise for local residents, particularly if diagonal tunnel. More difficulty in relation to property and construction. Greater visual impacts due to two new tunnel portals
Stakeholder and Public Engagement		69% of 1616 comments support

The key differentiators and other items for discussion are outlined below.



9.3.1 Public Transport capacity

Although analysis has shown that the Hataitai bus tunnel itself has sufficient capacity to accommodate growth (albeit with some unreliability due to tunnel signal operations), the physical and network constraints either side of the tunnel will result in significant deterioration of journey times and reliability. This is the case under both the core and intensified land use scenarios. This will limit mode shift and potentially limit sustainable development to the east and the ability to provide a high frequency public transport service to the Airport.

A new Mt Victoria Tunnel with MRT/PT lanes delivers significant accessibility improvements through improving capacity and reliability for the eastern suburbs and Airport and will provide three times the PT lane space between the eastern suburbs and CBD leading to increased PT mode share and improved PT travel times.

The number of people living within an hour of the Airport by public transport in 2046 increases from 160,000 in the Do-Minimum scenario to 190,000 for Options 3 and 4

Providing additional PT capacity enables an additional 80,000 people to live within a 60-minute public transport journey to the Airport, compared to only providing a walking and cycling tunnel (see Figure 14).

9.3.2 Urban Development and Urban Amenity

The eastern suburbs have less urban intensification potential due to a number of constraints including coastal inundation and Airport noise. Nevertheless there is still potential for an additional 1,000 households along a potential MRT corridor over and above what would be expected under the core land use scenario. This would be much more difficult to achieve without more regular PT services. The insertion of the new tunnels into an existing urban context will require careful attention to the urban amenity outcomes of the public realm and the values in the receiving environment given the schools, heritage values in Mt Victoria and also the town belt open space, residential context and local movements in the Wellington Road context.

Furthermore, most of the scope for additional development is in central Kilbirnie and on the Miramar peninsula. Due to the distance to the CBD, commuting from this location is best served by public transport (the distance will deter pedestrians and some cyclists). Despite the relatively modest levels of intensification assumed for the east in the intensified land use scenario, the modelling shows an increase in public transport demand of around 40%. This is because of intensification of employment in the CBD reducing reliance on the private car and encouraging a greater mode shift to public transport.

9.3.3 Carbon and mode shift

As outlined above, the provision of the new Mt Victoria Tunnel will facilitate a step change improvement in PT uptake from the east. As it will be a dedicated PT tunnel, it provides a high degree of reliability and makes a very strong statement about the modal hierarchy. Increased PT ridership will contribute to reduced enabled carbon emissions. Over time, this will offset the significant embodied carbon emissions during construction.

9.3.4 Resilience

The current Mount Victoria tunnel is one of the identified high-risk elements on the transport network due to the stability of the tunnel portals. If this tunnel was to fail, all traffic would need to travel east via Constable Street or Oriental Parade.

Providing an additional Mt Victoria tunnel that was able to be used by public transport and general traffic would mean that safe and efficient routes were available during any event.



9.3.5 Stakeholder and Public Engagement

Respondents who are concerned about better access for cars and other vehicles questioned why only a two-lane tunnel is proposed and would like to see four lanes for general traffic (two in each direction) because they believe this would future-proof the investment and support population growth and intensification.

Those who support the aim of getting cars off the road worry a new tunnel would be counter-productive to that goal, as it would encourage car use. In addition, people are concerned about the level of disruption that construction of a new tunnel and its carbon impacts.

9.3.6 Cost and Economics

As outlined above, incremental analysis of Options 1 and 4 indicates an incremental BCR of between 1.1 and 1.4 under the intensified land use scenario. Therefore, as with other elements of the transformational programme, investment in the Mt Victoria Tunnel (and Basin Reserve) is justified if the intensified land-use scenario can be achieved.

9.3.7 Mt Victoria Tunnel Summary

Similar to the Basin Reserve analysis, the investigations have shown that providing a new Mt Victoria Tunnel that allows for two new PT lanes provides a wide range of benefits in relation to the project objectives. It significantly improves public transport, walking and cycling access to and from the east, whilst also significantly improving resilience and safety.

Without such investment, public transport services to the east are expected to have poorer performance before 2046, even under normal growth conditions. This will make public transport less attractive, limiting further growth potential and constraining progress towards mode shift and carbon emission reduction goals.

As with the Arras Tunnel extension, it is noted that the costs of the option are large, there are significant environmental effects and urban amenity considerations, and it does result in an increase in embodied carbon compared to a minor upgrade. The DBC should therefore focus on opportunities to reduce these impacts.

9.4 How can urban intensification be achieved?

The Spatial Plan identifies MRT stations as locations for higher density urban development. The “precincts” or areas around these stations have the opportunity for high quality comprehensive mixed-use development, including quality buildings for living and a mix of uses (high density housing, employment opportunities etc), housing choice and affordability, pedestrian connections, public spaces and streets with purposeful allocation to specific ‘place’ and ‘movement’ objectives. The greater the intensification around the stations, the greater the benefits for mode shift and lower carbon emissions.

The main methods for this urban development are district plan land use controls that enable high density, infrastructure upgrades, and facilitating or delivering the development. WCC and other agencies are already using these methods anticipating a future MRT within planning documents such as the Spatial Plan and the upcoming Proposed District Plan. The amount of development enabled by the Proposed District Plan will be much greater than the core scenario (or number reflected in the Spatial Plan) as the Proposed Plan anticipates Transit-Orientated Development around MRT stations once they are confirmed and is very enabling of development especially along within the Central City and to Newtown. The intensified land use scenario discussed above considers around 26,000 new households in these catchments. If LGWM partners support an intensified land use approach, a stronger and more proactive approach to high density urban redevelopment would be needed as discussed below.



9.4.1 District plan

The draft district plan already enables high density development in the MRT corridor from Wellington Station to Newtown. This corridor is in all four options. Decisions on these district plan provisions are scheduled for around November 2023. High density is not yet enabled south of Newtown and/or east of the Basin, except for the town centres of Berhampore, Kilbirnie, Miramar and Island Bay, until the MRT station locations are confirmed. RMA national direction requires district plans to enable (which does not mean require) at least 6 storey buildings in the “walkable catchments” from these rapid transit stops. However, natural hazards, historic heritage, Airport noise restrictions and other matters can limit these district plan high density areas. These will limit high density development in large areas to the east.

Once the preferred option is selected, urban areas within 10 minutes' walk of the future MRT stations (that are not already zoned for high density) will be zoned to enable 6 storey developments, except where the limiting matters apply. To increase urban development towards the intensified scenario, land use rules need to enable building heights above 6 stories near future MRT stations south of John St/Adelaide Rd, and/or east of the Basin Reserve. This is because constructing 5-8 storey buildings is typically not commercially feasible in these areas, and because some tall apartment towers would be needed to maximise housing around MRT stations.

9.4.2 Infrastructure upgrades

The Spatial Plan already prioritises the Central City to Newtown for infrastructure upgrades (along with Johnsonville and Tawa growth nodes). Berhampore and Island Bay are next in line, aligning with transport upgrades from 2031. Timing for Kilbirnie and Miramar is uncertain, depending on MRT decisions and having the growth constraints noted above. Three waters infrastructure and multi-modal transport infrastructure have critical constraints that need significant upgrades in these areas. Other upgrades to electricity, parks, schools etc. are also important.

To increase urban development towards the intensified scenario, the infrastructure capacity will need to be increased with larger pipes, better quality cycleways and pedestrian connections, thicker cables, more community services and assisted housing projects. It is noted that under the intensified scenario, the overall population in the region will not change, but the location and density will. This means that more infrastructure could be required in some locations, but not in others.

9.4.3 Development within the walkable catchment of the MRT corridor

Some level of intervention in urban development is likely to be appropriate to secure the urban environment outcomes discussed earlier. LGWM can have a role in facilitating or delivering urban development where urban development is not at sufficient scale, pace or quality around MRT stations. This might be in situations where:

- Land parcels are too fragmented or have complicated ownership arrangements and would benefit from acquisition and amalgamation to create larger and more feasible development sites
- Where there are opportunities to better utilise LGWM partner/Crown land
- To achieve high-quality and high-density development closely integrated with MRT stations (Transit-Orientated Development (TOD))
- Land is acquired for transport construction purposes with residual land used for urban renewal and development.

As LGWM's approach to urban development has been progressing, the programme has been focussed on providing confidence that there is shared commitment to enabling quality urban development and enhancing urban amenity alongside MRT, as appropriate for this stage in the process including:



- Development of working objectives for urban development to guide effort across LGWM funding and Mana Whenua partners and with Kāinga Ora and the Ministry of Housing and Urban Development
- Agreeing what the parties are collectively and individually committing to progress in relation to urban development
- Developing a Specified Development Project (SDP) proposal in partnership with Kāinga Ora (see below).

To increase urban development towards the intensified scenario, the facilitation and delivery of urban development would need to be significantly increased. In particular: acquisition and amalgamation of land by MRT stations, development of LGWM partner and Crown land, partnerships with developers, iwi authorities and Kāinga Ora, and facilitating good urban design and community outcomes.

The programme is considering pathways under both the RMA and Urban Development Act (UDA) for the selected option and associated urban development. The UDA is new legislation that facilitates urban development by combining the planning, funding and approvals for the development, transport, and infrastructure within an SDP. An SDP would be a useful process to coordinate redevelopment towards an intensified land use scenario. A decision on whether to submit an SDP application for Ministerial approval is scheduled to go to LGWM partners in the first half of 2023.

Regardless of the pathway chosen, an Urban Design Framework will be developed during the DBC phase to set out the overall urban design vision for the Project and how it will integrate with wider aspirations and plans in surrounding areas.

9.4.4 Considerations regarding growth elsewhere in the region

As articulated earlier in the report, the scenarios have assumed the same total quantum of growth across the Wellington region, and under an intensified land use scenario, this is assumed to result in a reduction of growth elsewhere in the region. This reinforces the importance of LGWM being well-integrated with wider work occurring through the Wellington Regional Leadership Committee (WRLC) on the Wellington Regional Growth Framework.

LGWM modelling for the intensified scenario has shown that the greater the number of people living and working within the MRT corridor catchment, the more the region can deliver on the regional 2050 climate change targets. A more intensified scenario has the ability to significantly reduce regional transport emissions generated through private travel elsewhere in the region (reduced VKT) and support more people within Wellington City taking MRT or walking and cycling.

During 2022, the WRLC is advancing work on a regional emissions reduction plan and also undertaking further work on the sequencing of growth across the region. LGWM analysis will support this activity and greater ambition needs to be sought via the WRLC and WRGF to more actively prioritise transit-orientated development growth along the MRT corridor and discourage growth in greenfield areas or more dispersed growth through the greater land use controls and prioritisation of supporting infrastructure.

9.5 How will the options integrate with the wider transport system?

Consideration has been given to how the public transport system would need to change upon implementation of MRT systems with each of the four programme options.

All four programme options include a suite of improvements across the wider public transport network. These include the provision of peak hour bus lanes on the Thorndon Quay/Hutt Road corridor, along with bus priority measures on other key corridors across the city street network. As such, the remaining



elements of the bus network will be configured to maximise the benefits of these investments to provide city and region wide benefits.

The differences between the options mainly relate to how they deliver improvements to the south and east. Options 1, 3 and 4 all feature LRT to Island Bay and varying degrees of bus enhancement to the east. Option 2 features BRT on both corridors. In all cases it is assumed that other bus services can benefit from the dedicated MRT facilities when they share a corridor.

Options with LRT will integrate well into the wider transport system as LRT to Island Bay replaces route 1 south via Kent/Cambridge. Route 1 north is routed to Lyall Bay via Taranaki/Wallace (current route 3) avoiding route duplication. Route 2 is maintained in full (Karori to East) with 'enhanced' bus infrastructure from the Station to Miramar. The new route 2 will travel via a new Mt Victoria tunnel and bypasses Hataitai and Mt Victoria. But this option assumes the retention of a core bus route via the bus tunnel to pick up Hataitai and Mt Victoria inner east catchments.

There is significant potential to upgrade 'enhanced' bus to BRT type infrastructure on east-west corridor as some point in the future. Scalability to the west can achieve at least 'enhanced' bus upgrades but is likely to be a bit more constrained than the East. Tighter curves/ horizontal geometry, narrower road corridors (Chaytor/ Glenmore) and Karori tunnel are likely to preclude the implementation of fully dedicated right of way to Karori from Wellington Station without significant property impacts.

In addition, refined modelling shows that there is an imbalance of frequencies between Golden Mile and Second Spine which result in bus-on-bus congestion on Golden Mile, this could be mitigated by moving some services to second spine, truncating or hubbing services. This must be investigated in more detail over the coming phases of the project.

9.6 Are parking levies or congestion charging proposed?

The Programme has investigated both priced and non-priced Travel Demand Management approaches, including two priced approaches: a commuter parking levy and congestion pricing.

These elements have been the subject of a number of sensitivity tests, including transport modelling. These sensitivity tests show that interventions that serve to reduce the traffic demand entering the central city by way of pricing have a significant positive impact on the performance of the options in relation to the investment objectives. The benefit of congestion pricing or parking levies is significant regardless of the programme option.

Previous modelling²² has indicated that a congestion charge could reduce traffic entering the central city by 8%. It has also indicated that it could increase PT patronage by over 2000 per hour²³ (with a particularly notable increase in rail patronage from the north).

The conclusion in the PBC was that a combination of infrastructure investment, service improvement and travel demand management was required to maximise delivery on the overall investment objectives. That conclusion remains the same.

A congestion pricing system appears to have advantages over a commuter parking levy: the price directly affects all drivers, it can be used to influence behaviour at particular locations and times, and it impacts all traffic, rather than just parked cars. However, further work is required on congestion pricing to understand its effectiveness and impacts, including on equity.

The use of pricing schemes needs further investigation and will involve further engagement with Wellingtonians. Both congestion pricing and a commuter parking levy would need legislation to enable

²² [2021-10-22-LGWM-PASLO-Report.-Final_Redacted.pdf \(amazonaws.com\)](#)

²³ [2021-11-01-LGWM-PASLO-Modelling-Report_Redacted-v2.pdf \(amazonaws.com\)](#)

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their implementation, but it is understood that work is progressing in this space. Before pricing schemes are introduced, consideration will be given to the timing of the scheme in relation to the other elements of the LGWM programme to ensure that the capacity and performance of public transport services and active mode infrastructure provide viable alternatives to private vehicles.



10 Uncertainties and Risks

The previous sections of this report have presented the performance of the options in a future that can be reasonably expected. However, the future cannot be predicted and therefore the preferred programme option should be resilient and flexible enough to continue to provide the best value for money outcomes in range of other circumstances.

The biggest uncertainties that affect the options, and therefore also affect the choice of preferred option, are outlined below along with a discussion about the level of the risk and a determination of which option is likely to respond best to the risk.

- **Cost Escalation:** As presented previously in this report, this programme is at an early stage the overall project lifecycle and therefore costs have a degree of uncertainty.
 - **Mitigation:** This has been mitigated to some extent by undertaking parallel estimates, reporting on the 95%ile estimated costs and the development of an affordability threshold, but there remains an ongoing risk. It can be further mitigated by selecting an option well below the affordability threshold, or reducing the scope of the preferred programme option at a later date. It is considered that BRT has a greater ability to reduce scope compared to LRT, particularly in terms of the level of infrastructure provided to the east. It should be noted that the high cost of land coupled with increasing costs of construction currently present challenges outside the direct control of LGWM partners but will require a coordinated approach with central government to address challenges facing New Zealand more broadly.
- **Level of land use intensification** – This report shows the importance and impact of high levels of intensification to deliver the programme objectives, however the level of intensification that can be realised is still very uncertain. Work to date has shown that continuation of a BAU approach to land use, or even adopting the ‘core’ land use scenario, has significantly fewer benefits compared to a high land use scenario. Not facilitating high land use could result in consenting risks (as the transport solution will have to show ‘need’) not achieving the expected outcomes and/or over-investing in a transport solution.
 - **Mitigation** - To ensure intensification is not limited, Option 1 provides the necessary capacity south and east. Section 9.4.3 outlines the measures LGWM are undertaking to help facilitate growth, but more will be needed by Wellington City Council, Kainga Ora and others. If intensification levels greater than those represented in the “core land use scenario” are not able to be achieved, roll out of any form of MRT system is unlikely to be value for money and a ‘Continuous Bus Priority’ network may provide appropriate outcomes and a lower cost although issues such as the impact on urban amenity would need to be assessed. This needs to be reviewed during the DBC phase.
- **Pricing:** The addition of congestion pricing and/or a parking levy will reduce the amount of travel by private car and increase the demand on the public transport system.
 - **Mitigation:** Pricing could have a similar impact to greater land use intensification and therefore this is best managed by implementation of Option 1 which provides the greatest capacity.
- **Future MRT technologies:** A number of different companies around the world are developing rubber tyre-based MRT vehicles that will have similar characteristics as light rail such as multiple car units, low floor walk through units, driverless services etc. This means that BRT could provide the same capacity and customer experience as LRT, whilst having the other benefits of BRT such as flexibility, extendibility and resilience.



- **Mitigation:** Not restricting the mode would enable these future technologies to be investigated further during the DBC phase.
- **COVID 19 and future ways of working:** The pandemic has resulted in significant periods of lower travel demand, a reluctance to use public transport due to proximity to others and an increase in employees working from home. This could result in a lower demand for travel.
 - **Mitigation:** The DBC phase should monitor these effects over the next two years to enable this trend to be understood further before a funding decision is made
- **Climate change policies:** There is an understanding that further climate change policies will be enacted in the near future. As the modelling has shown, the best way to enable reduced emissions is to facilitate intensification and implement pricing.
 - **Mitigation:** As above, intensification and pricing will result in additional demand for MRT to both the south and east, which is best enabled by Option 1.
- **Other changes:** The preferred option decision is not a decision to build now. That decision comes at the end of the DBC phase. The decision now should allow flexibility to determine what is the best way of achieving the best outcome for Wellington, but still enabling flexibility for the key determination at the end of the DBC.
 - **Mitigation:** The best way to enable flexibility but not impact on programme if circumstances do change, is to investigate all components through the DBC. That would mean investigating both LRT and BRT as well as Basin Reserve and Mt Victoria tunnel.

From the above discussion, there are risks and uncertainties which are best managed and mitigated by retaining some flexibility in the preferred option through the detailed business case phase.



11 Selecting the Preferred Programme Option

This chapter discusses the key decisions towards selecting a preferred programme option. It presents:

- The preferred programme options from the MCA analyses, which were Option 1 and 2
- The impact of high intensity land use scenario and how that intensification and high capacity MRT are interdependent
- Why Options 3 and 4 do not provide an appropriate solution for the eastern suburbs to make a step change in mode shift
- A discussion on the relative benefits of Option 1 and Option 2

11.1 Multi Criteria Analyses

The original MCA analysis undertaken as part of the PASLO report identified that Options 1 and 2 were the better performing options, with Option 2 performing slightly better due to its ability to provide better transport accessibility, flexibility and resilience. However, the majority of the aspects that Option 2 performed slightly better in than Option 1 are not considered key outcomes as sought in the Programme Objectives. For example, Option 2 does not encourage as much urban development as other options.

The MCA on the intensified scenario indicates that a high capacity MRT service is required to the south and high quality public transport is required to the east. This translated clearly to a preference for Option 1, which provides this to the east through the provision of the Basin Reserve and Mt Victoria Tunnel, and to the south through LRT which can move more people than BRT.

11.2 High Intensity Land Use and BCR

From the economic analysis, it is clear that MRT needs to be implemented under the intensified land-use scenario to provide an economic return on investment. If options are delivered with the core land use scenario, the BCR is approximately 0.5 but if delivered with the high intensity scenario, the BCR reaches 1.0 (with the highest BCR being achieved for Option 1).

In a complementary way, modelling has shown that high quality public transport is needed to service the level of intensification that is required to make MRT economic. For the south this means high capacity services and for the east it means provision of new PT lanes.

Accordingly, MRT and intensified land use need to be delivered concurrently and this will not happen with a business-as-usual approach. Targeted and specific action needs to be taken to deliver this intensification along the MRT corridors.

The analysis has also shown that intensification has the largest impact of any other intervention investigated as part of LGWM in relation to reducing carbon emissions. It therefore is likely to be a focus of upcoming carbon and housing policy changes.

For the purposes choosing a preferred programme option, it has been assumed that this level of intensification can be delivered. If it is not, and development happens elsewhere in the city and region, then none of the four programme options are appropriate. Other programme options will need to be developed that are based around an enhanced bus system.

11.3 Options 3 and 4

The image below shows how the options perform against the decision criteria presented in Section 1.2. The reasoning behind the colours is summarised in the text below the table.



	Updated objectives performance	Updated BCR, economics	Risk and cost certainty	Sensitivity testing	Engagement response	Key Questions
Option 1	Green	Light Green	Red	Green	Green	Green
Option 2	Light Green	Light Green	Light Green	Light Green	Light Green	Red
Option 3	Light Green	Light Green	Light Green	Light Green	Light Green	Red
Option 4	Light Green	Light Green	Light Green	Light Green	Light Green	Red

11.3.1 Updated Objectives Performance

The Basin Reserve grade separation has a wide range of benefits compared to retaining the existing layout with minor improvements. It improves amenity, reduces congestion for all modes, provides much better and safer facilities for walking and cycling and was supported by the community. However, the ongoing benefits for carbon and mode shift are limited unless it is paired with the Mt Victoria tunnel²⁴ to deliver PT capacity improvements to the east.

Options 3 and 4 performed less well in both the core land use and high intensity land use MCA. They deliver poorer outcomes against the investment objectives, particularly in relation to access and resilience.

Overall, providing Option 1 in comparison to Option 4 (for the core land use scenario) provides:

- More people living in close proximity to key destinations (230,000 people living within 1 hour of the Airport compared to 190,000).
- Improved PT travel time and travel time reliability (11.5 minute journey time from Mirimar to CBD compared to 8.5 minutes).
- Better comparative travel times between public transport and private car (journeys from Airport to Bowen Street take the same amount of time for Option 1, but PT journeys take 20% longer than private car journeys in Option 4).
- Reduced car mode share (42% increase in non-car mode share compared to 38%).
- Better mode share in the central city (52% compared to 46%).

These outcomes become even more pronounced when considering the high intensity land use scenario.

In addition, capacity calculations for future years have shown that the one-lane Hataitai bus tunnel, coupled with the side friction and congestion in the residential areas on either side of the tunnel results in poor levels of service, delays and unreliable journeys for PT services to the east. In order to achieve mode shift targets, this needs to be rectified as, with the longer journeys from Mirimar and the Airport,

²⁴ The Mt Victoria tunnel cannot be delivered without the Basin Reserve as the investigations undertaken through the Mass Rapid Transit workstream have shown that there is not an efficient route that can service the south and east via Mt Victoria without traversing the Basin Reserve.



active travel is not always a feasible alternative. Not providing this additional capacity would limit development to the east, inhibit mode shift and reduce accessibility to the Airport and Airport businesses.

However, Options 3 and 4 can be delivered with less infrastructure in shorter timeframes, therefore having less impact in terms of short-term embodied carbon.

11.3.2 Updated BCR, Economics

- Option 1 intensified land use – 0.9 to 1.2
- Option 4 intensified land use – 0.9 to 1.1

Both Options 1 and 4 facilitate intensification to the south. However, Option 1 also allows for improved public transport services and mode shift to the eastern suburbs with the extension of the Arras Tunnel and a new Mt Victoria Tunnel.

An incremental BCR has been calculated to determine whether the additional benefits gained outweigh the additional costs. The better public transport services and walking and cycling interventions around the Basin Reserve and Mt Vic Tunnel result in significant increases in Public Transport and Health Benefits. The better connectivity to the east also results in a large uplift in agglomeration benefits, contributing to an incremental BCR of Option 1 over Option 4 of around 1.4. This indicates that the additional infrastructure in Option 1 is a good investment.

11.3.3 Risk and Cost Certainty

Options 3 and 4 cost significantly less (whole of life costs of \$5.8 and \$6.6B compared to \$7.4B for Option 1) and therefore have greater flexibility for cost increases within the affordability threshold.

11.3.4 Sensitivity Testing

The uncertainty and risk analysis discussion earlier shows the benefits of further investigation into the Basin Reserve and Mt Victoria tunnel projects as they provide the most flexibility to respond to different future conditions such as greater land use intensification, road pricing, future technologies and climate change policies.

11.3.5 Engagement Response

Proceeding with these two projects was the preference of the public engagement and online panel research.

11.3.6 Key Questions

The conclusion from the Key Questions section was to proceed with Basin Reserve and Mt Victoria Tunnel as both significantly contributed to the outcomes sought.

11.3.7 Overall

Overall it is therefore recommended Options 3 and 4 be removed from further investigation. They would not unlock public transport capacity and travel time improvements to the east to support mode shift and carbon outcomes.

However, removing the options at this stage would not preclude them to be fall back positions if, at the end of the DBC, circumstances (such as forecast land use) have changed, as only moderate additional work would be required to the MRT investigations to change from the other options.



11.4 Options 1 and 2

Programme Options 1 and 2 both include the Basin Reserve and Mt Victoria Tunnel but provide different forms of MRT to both the south and east.

The image below shows how the options perform against the decision criteria presented in Section 1.2. The reasoning behind the colours is summarised in the text below the table.



11.4.1 Updated Objectives Performance

Under the core land use MCA, Options 1 and 2 perform similarly. Option 2 performed slightly better in terms of resilience but otherwise the scores were similar. However, when considering the intensified land use scenario, Option 1 outperforms Option 2 in relation to Liveability as well as Carbon and Mode Shift.

Exact performance metrics are not available for Option 2 as that option has not been modelled to the same extent as Options 1 and 4.

However, the land use assessment work and comparative city analysis has shown that BRT is likely to catalyse less development than LRT due to the perceived permanence of the infrastructure and the potentially lower levels of service.

With more intensification comes better carbon outcomes. This is due to both shorter trips being required and a greater proportion of those trips using active or public transport modes.

11.4.2 Updated BCR, Economics

- Option 1 intensified land use – 0.9 to 1.2
- Option 2 intensified land use – 0.8 to 1.0

An incremental BCR has been calculated to determine whether the additional benefits gained outweigh the additional costs. This calculation has shown that the incremental BCR of Option 1 over Option 2 is greater than 3, meaning that the additional infrastructure in Option 1 is a good investment.

11.4.3 Risk and Cost Certainty

Option 2 (\$7.0B) costs slightly less than Option 1 (\$7.4B). BRT also has more flexibility resulting in a greater ability to descope the project (and reduce cost), but this may impact benefits delivered.

BRT also has more flexibility to stage construction. However, whilst a delay to construction will show a reduction in the programme costs over the 30 year period, construction inflation will increase costs and interest and principal repayments will be pushed into the period beyond the 30 years.



11.4.4 Sensitivity Testing

The uncertainty and risk analysis discussion earlier shows the Option 2, as modelled does not provide the same ability to respond to intensified land-use scenarios when compared to Option 1, particularly when thinking very long term. However, other BRT systems which have not been modelled, do have greater capacity and these systems would perform better.

BRT systems also have more flexibility to respond to changing MRT vehicle technology.

11.4.5 Engagement Response

The public generally preferred LRT over BRT for reasons previously mentioned in this report, although the gap narrowed for the online panel research, particularly when considering those who live in Wellington City.

11.4.6 Key Questions

The key question section noted that Wellington needs the capacity and permanence of a system with the characteristics of LRT but noted the benefits associated with BRT based systems. The section recommended that LGWM define the expectations for an MRT system that has enough capacity and permanence, but reserve a decision on the type of wheel until the DBC stage or later, when more detailed information can be sourced on the latest and emerging MRT systems.

11.4.7 Overall

Overall it is recommended that both options proceed through to the Detailed Business Case. There is very little difference in infrastructure that would be required between the two options at a DBC level of detail. LRT has benefits over BRT in terms of facilitating urban intensification but internationally, BRT systems are improving in this space.

Nevertheless, it is important to define the ideal characteristics that MRT should have for the Wellington situation as a basis for further investigation. These are described further below.

11.4.8 Desired MRT Characteristics

11.4.8.1 Network

The evaluation undertaken by specialist teams to date has identified a range of advantages and disadvantages of 'open' and 'closed' MRT systems. In reality, any system in Wellington is unlikely to be fully closed and the design of an MRT service or services for Wellington and how this interfaces or affects legacy bus routes needs to weigh up these trade-offs including the potential benefits of a more closed system such as journey time reliability, against any disbenefits for passengers on other corridors such as the need to transfer.

Network integration work has demonstrated the following attribute requirements for the Wellington system:

- Core, frequent services that run throughout the day
- Flexibility to accommodate additional peak services as required to accommodate surges in demand
- A dual spine through the CBD to maximise capacity for MRT and bus services



- Capacity to accommodate up to 5,000 people per hour at the peak load points on the southern and eastern approaches to the Basin Reserve²⁵
- Extendability, particularly to the north and west where population is expected to grow.

11.4.8.2 Infrastructure

A high level of segregation is recommended to maximise journey time reliability and travel time competitiveness. It was also identified that regardless of level of segregation the MRT should operate on a high-quality running surface (rails or road pavement). Broken or rutted pavements, or uneven tracks present significant barriers to speed and reliability as well as passenger comfort.

The location and spacing of MRT stations is a key element to a successful MRT system but represents a trade-off between catchment and in vehicle speed. Stations should assist in the MRT performing a rapid / limited stops function within the urban public transport network and therefore it is typically expected that stations would be greater than 400m apart. The ultimate location of stations will be influenced by factors such as land use, urban form, the street network and redevelopment potential. Regardless of location, MRT stations should be high quality with the following common features:

- Easy access to the station – excellent, inclusive, pedestrian and cycle connections with shade/ weather protection and minimal pedestrian delays (e.g. signals).
- Comfortable and safe platforms – sufficient space for standing, sitting and manoeuvring (including for wheelchairs, prams etc) as well as weather protection (wind, sun, rain), security/ CCTV, excellent lighting and activation from surrounding land uses.
- Information and reassurance – real time passenger information, help facilities, printed maps and timetables along with network information suitable for all users (e.g. visually impaired).
- Secure cycle and e-scooter parking – to improve first mile-last mile access and expand the effective catchment area.

11.4.8.3 Operational systems and policies

High quality and efficient MRT systems would exhibit the following operational system and policy features:

- Off board ticketing and ticket validation
- All door boarding
- Dynamic real time passenger information systems that can convey vehicle location and on-time status to multiple locations including to web apps.
- A high degree of priority for MRT vehicles at signals to minimise journey time and reduce travel time variability.

11.4.8.4 Vehicles

The recommended MRT vehicle suitable to the study area would have the following characteristics:

- High capacity and low floor with multiple wide doors and aisles
- Electric propulsion
- A bespoke vehicle design with a tram-like appearance and similar interior layout and level of quality
- Modular/flexible to operate different vehicle lengths to meet demand while retaining consistent maintenance and stabling requirements. It is noted that stabling needs and location can be significantly different depending on vehicle choice.

²⁵ This is higher than the 2046 demand, but provides a factor for additional growth after this time period.

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As these will be longer/wider vehicles than can legally be operated on New Zealand roads, legal assessment including road controlling authority approval will be required to enable these vehicles to operate MRT services beyond the end of the dedicated MRT infrastructure.



12 The Preferred Programme Option

The preferred option that should be progressed to detailed business case is a high quality, high capacity MRT solution along the southern corridor from Wellington Station to Island Bay with a new tunnel through Mt Victoria to improve facilities for active modes and public transport and a grade separated solution at the Basin Reserve. This is the same as Option 1 but it is recognised that BRT could provide similar outcomes to LRT if appropriately specified and designed. This is the preferred programme option as:

- **It best enables, and responds to, intensified land use.** BRT as modelled as part of Option 2 may not meet Level of Service expectations to the south in the long term and new public transport lanes are required to the east. Only the capacity provided in Option 1 can provide this certainty.
- **It enables the most mode shift away from private cars.** Providing LRT and the Mt Victoria tunnel creates the most comprehensive mass transit network, thereby enabling the most intensification which then leads to the best mode shift for the region.
- **It has the best reduction in enabled carbon.** With mode shift comes a significant reduction in enabled carbon emissions.
- **It enables improved movement to and from the Airport and the east.** The Basin Reserve improvements and the Mt Victoria tunnel ensures that many more people can live within 60 minutes of the Airport by public transport services.
- **It best enhances urban amenity and active travel around Te Aro.** The Basin Reserve improvements and the Mt Victoria tunnel provide a step change in safe and efficient facilities for pedestrians and cyclists wanting to travel through this part of Te Aro to connect north south east or west. The surrounds to the Basin Reserve will also be beautified to make this a place people will want to be, connecting Pukeahu, the Basin Reserve facilities and the surrounding schools and catalysing adjacent development.
- **It has the best return on investment.** The BCR for Option 1 is above 1 and the largest of all the options considered. It also returns a positive incremental BCR when compared to other options.
- **It contains elements that received the most positive response from engagement.** Respondents replied most positively to LRT, the Basin Reserve and Mt Victoria Tunnel improvements compared to the alternative options.

However, the preferred option does not come without issues or risks:

- **It has the highest cost.** It is therefore closest to the funding threshold and has the highest risk of exceeding this value.
- **It has the highest embodied carbon.** Constructing more infrastructure results in higher levels of embodied emissions. This is problematic for Wellington's short-term targets but is countered in the long term by better enabled emissions.
- **It has the highest level of effects.** Newtown, Mt Victoria and The Basin Reserve are all sensitive areas and construction through them will require comprehensive consideration and detailed management plans to minimise impacts on people and the environment.



- **LRT has less flexibility and extendibility.** Due to the in-ground infrastructure, LRT services cannot deviate from the route or extend past where the tracks finish. This makes it harder for services to extend, for example, to Johnsonville. Likewise, it is not as easy to stage construction. Accordingly BRT alternatives will continue to be considered.
- **It has lower resilience to unexpected events.** In earthquakes, floods or even when crashes occur, light rail vehicles cannot take a different route to avoid affected sections of the network. Again, BRT alternatives will continue to be considered.
- **It relies on acceptability and market delivery of high-density urban development in the MRT corridor.** The National Policy Statement on Urban Development and the new Medium Density Residential Standards require various levels of medium to high density to be enabled in most of Wellington's existing urban areas. The public acceptability and commercial attractiveness of intensification, and the number of existing opportunities for more dispersed development may limit the intensified land use modelled in this report, and the outcomes that can be achieved.

In addition, there are other factors to consider:

- **There are still a lot of uncertainties.** These include different land use scenarios, future investment in rail network capacity, future ways of working, the ongoing impact of COVID-19, future MRT technologies and additional policy changes in relation to climate change.
- **This is not a decision to build yet.** The decision now should determine what is the best way of achieving the best outcome for Wellington, but still enabling flexibility for the key determination at the end of the DBC.

The preferred programme is therefore as presented in the figure overleaf. This is fundamentally the same as Option 1 with the exception that the 'light rail' element of the MRT system is not specified and instead the requirement is for a high-quality high-capacity system to the south.

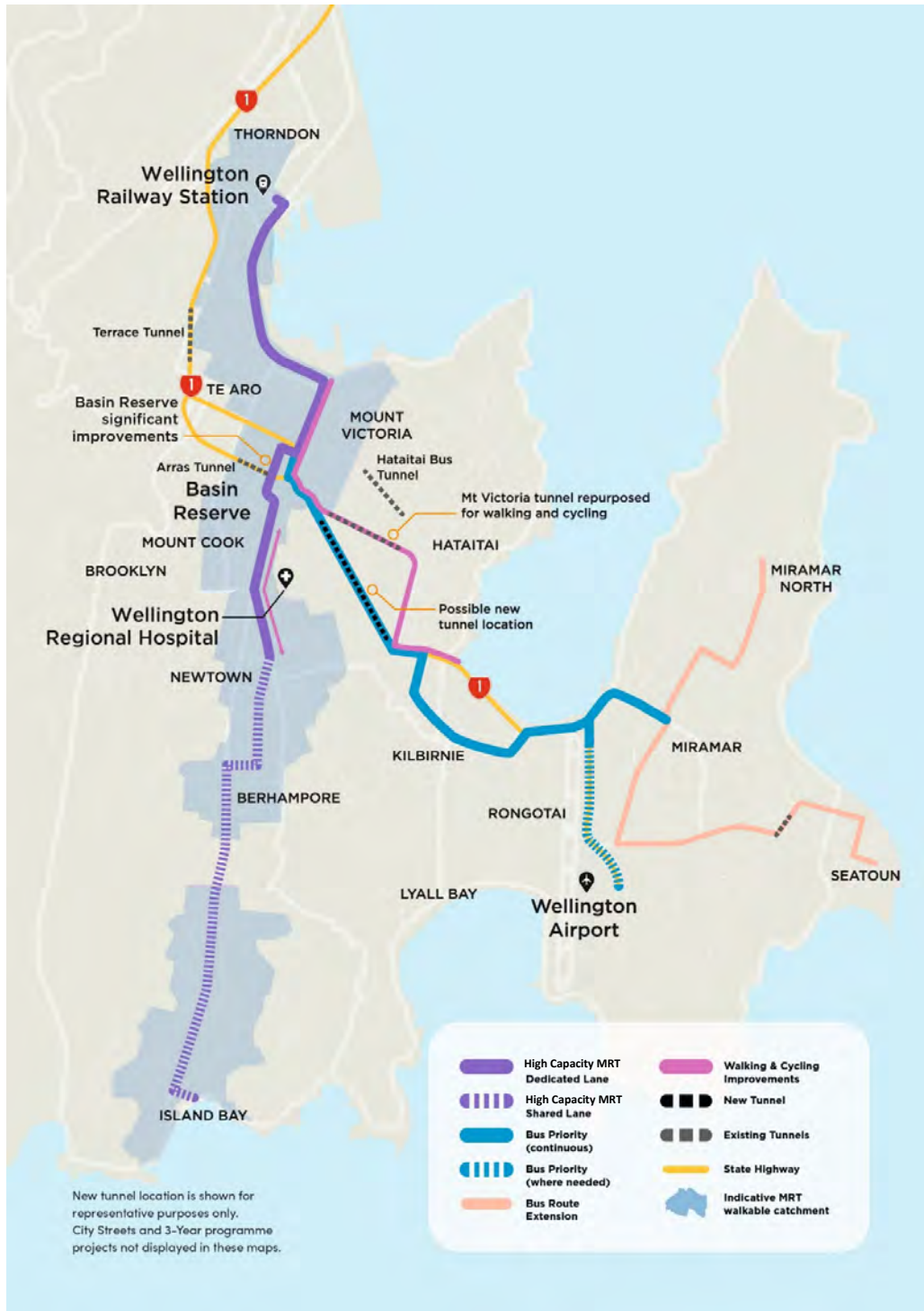


Figure 19: Preferred Programme Option



13 How the programme will be delivered

13.1 Sequencing and Timeframes

Careful planning of the implementation of the Programme is required to ensure appropriate prioritisation of elements within the Programme, consideration of how the Programme interfaces with other works being undertaken in the city and that any impacts of implementation can be appropriately managed.

Work is currently underway²⁶ to identify the best way to sequence all the programme elements. This is subject to further investigation and development but presents an initial indication as to the likely implementation sequence and timing.

Specific elements of the 'base' scenario from the System Plan are:

- Potential for City Streets Featherston Street project to be delayed if required to help manage disruption in the CBD whilst the Golden Mile works underway
- Deliver eastern Continuous Bus Priority as early as possible to realise the benefit of this part of the MRT scheme and make use of the City Streets project (CBD to Kilbirnie and Miramar Town Centre)
- Break MRT substantive works into two to four stages, first stage from the CBD end to the Basin, which would provide an opportunity (subject to stabling yard location) to be able to operate this stage earlier.

Overall this would result in the programme implementation being complete in 2032. A summary of the key dates are:

- 3 year programme (including Golden Mile) finished by 2025
- City Streets Trance 1 finished by 2026, except Featherston Street which would be finished by 2026
- MRT, Basin and Mt Victoria tunnel investigations, design and consenting start as soon as possible which would enable construction start in 2027. Mt Victoria tunnel would follow Basin Reserve and both would happen in parallel with MRT construction.

13.2 Funding

The programme cost estimates are presented in Section 7.3.

LGWM is a significant investment and is expected to deliver benefits locally, regionally and nationally. The cost shares are expected to recognise this. At this time, cost shares have not been finalised, so a working assumption has been used. The principles applied are:

- **Investment split:** The split between central and local government in the funding work to date is based on the indicative split in the May 2019 Cabinet paper of 60% central government 40% local government. There is no formal agreement on the cost sharing between the local government partners. For the purpose of financial analysis this has been assumed to be 75% WCC and 25% GWRC, based on the relative size of the rates for each Council. Overall this simplifies the cost share assumption for this analysis to 60% Waka Kotahi; 30% WCC; and 10% GWRC.

²⁶ System Plan Stage 1 Report, April 2022



- **Ongoing cost split cost:** Allocated to the asset / service owner with current Funding Assistance Rates (FAR) applied.

At this time the funding sources have not been agreed and a range of options are still being considered. The most likely sources are:

- the National Land Transport Fund for central government share, although other crown funding sources may also be used
- City Council and Regional Rates for the local government share
- A range of other sources to reflect the specific benefits some groups will receive, such as a value capture targeted rate, travel demand management pricing, public transport fares and development contributions.

13.3 Key Questions for the DBC

This preferred programme work has identified a number of key questions that will need to be answered in the DBC for Strategic Highways and Mass Rapid Transit. These are in addition to the questions that a DBC normally seeks to answer and those identified in the IBC. These will need to be scoped in detail, but are summarised below:

- Are there ways of delivering MRT earlier, or staging the delivery, to realise economic benefits and carbon reduction as quickly as possible?
- What is the likely impact of upcoming climate change policies and how can that be reflected in the preferred programme option?
- What opportunities are there for reducing embodied carbon in the construction of the programme including electric plant, lower carbon materials and more efficient ways of working?
- What opportunities are there for future proofing the MRT system so that it can be extended north at some point in the future?
- What is the regionally agreed intensified land use scenario(s) that should be used as a basis for estimating public transport demand and undertaking the economic analysis?
- What BRT systems are likely to be available that can deliver the quality, capacity and outcomes required for agreed levels of intensification and what is their likely impact on urban uplift and/or urban development compared to LRT systems?
- What is the likely future commuter travel demand based on changes to ways of working and COVID-19?
- What are the likely future weekend travel demands (the current modelling only applies to weekdays)?
- What urban amenity improvements are needed as part of the programme to ensure the liveability objective is achieved?

It is acknowledged that the answers to some of these questions could impact on the choice of a programme option. Accordingly, early in the DBC, once the land use scenario(s) are agreed, it is recommended that the programme options be re-tested with the new information to ensure the best programme option is progressed.



13.4 Next Steps

Whilst this report recommends a preferred programme option, the full case for investment in the MRT and SHI elements of the programme will be provided in the final IBC, which is due to be completed by the end of 2022. The MRT and SHI IBC will fully document the case for investment, detail the assessment process and provide details on how future work could be delivered.

Prior to the completion of the IBC approval a recommended way forward will be presented to partners. This will enable a quicker transition from IBC to DBC and the option of starting some DBC work early, both of which will reduce the overall duration of the investigation phases.



14 Conclusion

Investigations into the packages, and how these best combine to form an overall programme, have identified that:

- there is a good investment case for MRT in Wellington City, subject to realising the intensified land-use scenario,
- focusing the highest quality MRT along the southern corridor has the greatest potential to both drive and support intensification,
- the priority to the east is fast and reliable public transport journeys to drive mode shift, urban development and access, including for trips to the Airport by public transport. This does not require MRT, but does require new infrastructure through Mount Victoria and grade separating the Basin Reserve to provide additional public transport lanes,
- a solution at the Basin Reserve has been identified that can deliver transport benefits by separating and prioritising MRT and enhanced public transport to both the south and the east, whilst also delivering urban development and urban amenity benefits,
- new public transport lanes are required through Mt Victoria to provide more direct and reliable access for public transport to the east, but there are different tunnel options to provide those lanes,
- there is support for and benefits associated with a dedicated active mode facility through Mt Victoria, and
- there is strong public support for change and for investment in MRT, a new Mt Victoria Tunnel and for grade separated improvements at the Basin Reserve. There is also a strong appetite to make it happen sooner, deliver the best value and get public transport right.

But there is a lot that needs to be considered during the next phase of planning, including:

- agreeing intensified land use distributions that should be used in the assessment of the programme and how best to assist in delivering urban intensification;
- ensuring that urban amenity enhancements are recognised and provided for in the public realm and the way in which urban development is delivered;
- assessing different MRT vehicle types and enabling infrastructure to deliver high quality, high capacity MRT to the south in a resilient way that is scalable to address different growth scenarios and strong the growth to the north;
- more detail in regard to the infrastructure required to enable MRT to the south and east including road space allocation, stabling and power supply;
- developing more detail in regard to the layout and form of the Basin Reserve solution;
- determining the alignment and configuration of existing and new tunnels through Mt Victoria to provide better facilities for walking and cycling and two new public transport lanes;



- integration with the wider transport network, and how best to maximise the benefits of the MRT infrastructure across the wider public transport network;
- identifying opportunities to reduce costs, limit environmental effects, and constrain embodied carbon;
- Determining how best to assist in delivering the urban development outcomes along the southern corridor;
- addressing public concern around social impacts and construction disruption; and
- determining how to further support giving life to Mana Whenua values and aspirations.

While this next phase of planning work continues, the programme will continue to deliver the 3-year programme elements of Golden Mile, Thorndon Quay and Aotea Quay and will be looking for opportunities to accelerate elements of the MRT/SHI Transformational Programme, such as a second public transport 'spine' down the waterfront in preparation for MRT.

In addition, the wider programme will be delivering important bus priority walking, cycling and amenity improvements to lock in early benefits and minimize disruption once construction begins on the larger elements of the programme.



Appendix A: Modelling Report



Appendix B: Economics Report



Appendix C: Carbon Report



28th May 2022

Preferred Programme Option Report: Modelling Appendix

Stantec / Future Group
Wellington Transport Analytics
Unit

Final



DRAFT



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1. Executive Summary

This report summarises modelling of the two of the four short listed programme options – Options 1 and 4 - to inform the development of the preferred option report. The four programme options are clearly documented elsewhere, however in summary they constitute the following key elements:

- Option 1 – Light Rail Rapid Transit (LRT) between the station and Island Bay, grade separation at the Basin Reserve, and a duplicated Mt Victoria Tunnel providing increased bus capacity to the east.
- Option 2 – Bus Rapid Transit (BRT) between the station and Island Bay and between the station and Miramar/the airport, grade separation at the Basin Reserve and a duplicated Mt Victoria Tunnel catering for the eastern BRT branch.
- Option 3 – LRT between the station and Island Bay, grade separation at the Basin Reserve and small scale improvements to buses to the east (no Mt Victoria Tunnel).
- Option 4 – LRT between the station and Island Bay, at grade improvements at the Basin Reserve and small scale improvements to buses to the east (no Mt Victoria Tunnel).

Modelling to inform the preferred option report has focused on the refinement of existing models and assumptions, building on learnings from previous phases of the project. These refinements have included changes to the representation of travel demand within the CBD (particularly in relation to active travel), changes to capacity assumptions on key links (informed by additional analysis), and improved representation of parking capacity for reflect the transformational nature of the programme.

In addition to this, a new intensified land use scenario reflecting 16,000 additional dwellings in the CBD and along the southern and eastern corridors (on top of the 10,000 in the core scenario) has been identified by the LGWM team and tested using the modelling suite. This “what if” scenario, when interpreted alongside the core land use scenario, provide two “bookends” to understand the benefits of achieving higher levels of development along the mass rapid transit (MRT) corridors¹.

Three different future scenarios have been modelled, to reflect potential future uncertainty regarding travel demand and travel behaviours. Model outputs and forecasts should be considered indicative, based upon a series of input assumptions, and be interpreted as a range to inform and support decision making.

Output has focused on elements that provide differentiation between the options – principally mode shift, accessibility (catchment analysis), environmental metrics, public transport demand and capacity analysis. The refinements to the modelling provide more differentiation between all of the options and the do minimum, strengthening the case for investment. They also provide more differentiation between the options, particularly under the higher land use scenario. Although all options demonstrate similar levels of public transport patronage from the south, options that provide a duplicated Mt Victoria Tunnel are forecast to experience higher levels of PT uptake than those that don't, due to improved travel times, increased reliability and increased capacity.

¹ This is a “what if” scenario based loosely on work undertaken by The Property Group in January 2021. It is not intended to be a forecast land use response of the MRT investment.

2. Introduction

This document summarises the modelling work undertaken to support the Let's Get Wellington Moving preferred option report.

The preferred programme options report (PPOR) seeks to consolidate work done to date on the four short listed programme options and make a recommendation on a technically preferred option. It will draw on the Programme Affordability Short List Options (PASLO) report, the various business cases, the outcomes of the consultation process and 'Other Factors' from PASLO to help decide on a preferred option. It will also draw on a number of other technical reports (including a Carbon Analysis Technical Report and an Economics Technical Report). It will eventually form part of the business case deliverables.

The four programme options are clearly documented elsewhere, however in summary they constitute the following key elements:

- Option 1 – Light Rail Rapid Transit (LRT) between the station and Island Bay, grade separation at the Basin Reserve, and a duplicated Mt Victoria Tunnel with Enhanced bus to the east.
- Option 2 – Bus Rapid Transit (BRT) between the station and Island Bay and between the station and Miramar/the airport, grade separation at the Basin Reserve and a duplicated Mt Victoria Tunnel catering for the eastern BRT branch.
- Option 3 – LRT between the station and Island Bay, grade separation at the Basin Reserve and small scale improvements for Enhanced Bus to the east (no Mt Victoria Tunnel).
- Option 4 – LRT between the station and Island Bay, at grade improvements at the Basin Reserve and small scale improvements for Enhanced Bus to the east (no Mt Victoria Tunnel).

As well as making a recommendation on a technically preferred programme, the report also seeks to answer a number of key questions:

- LRT v BRT
- Mt Victoria Tunnel duplication v No Mt Victoria Tunnel duplication
- Basin grade separation v Basin at grade

It also covers a range of considerations that are not directly impacting on option choice. These include:

- Congestion Charging (would require legislative change)
- Speed of delivery
- Sequencing (including disruption (and therefore compensation))
- Staging (if part of a bigger programme)
- Funding
- Delivery mechanism

The preferred programme option report brings in information from a range of disciplines. Of most significance are the inputs from the urban development and carbon specialists. Modelling cuts

across a number of areas and has focused on providing a range and “bookends” as follows to guide decision making:

- two “bookend” options (options 1 and 4)
- two “bookend” land use scenarios (core and intensified).
- three model scenarios with different assumptions around active mode uptake and working from home to reflect a range for both PT and active mode demand

The intensified land use scenario has been developed externally to the modelling workstream and should be considered as a “what if” scenario rather than an attempt to predict the level of intensification stimulated by the infrastructure improvements.

The purpose of the modelling is to inform the decision making process.

3. Modelling Methodology – WTSM refinements

The overall approach to the modelling was to draw on existing modelling and implement small adjustments and improvements based on refined assumptions and improved knowledge of the constituent components of the transformational programme.

This section focusses on refinements to inputs to the Wellington Transport Strategy Model (WTSM). Unless documented below, all other assumptions and inputs remain unchanged and have been documented previously.

At a high level, the refinements have a relatively small impact both in isolation and combination when viewed in the context of a transformational programme of the scale of LGWM, and provide a more robust evidence base for the development of the preferred option.

Capacity and travel time refinements

Mt Victoria Tunnel

The duplicated Mt Victoria Tunnel as previously modelled in WTSM assumed a mid-block capacity of around 1600 vehicles per hour.

Subsequent AIMSUN modelling undertaken to inform the PASLO report showed that in order to accommodate movements at the eastern intersections of the tunnel, the effective mid-block capacity of the new tunnel will be nearer to 1,450, equivalent to that of the existing Mt Victoria Tunnel. This capacity constraint has been adjusted in WTSM.

This effectively means that a duplicated tunnel would not deliver a material increase in capacity from the east for private motor vehicles.

Hataitai Bus Tunnel

It was previously assumed that targeted bus priority to the east of the existing bus tunnel will deliver travel times of 8 minutes between Wellington Rd and Elizabeth St, with an In Vehicle Time (IVT) perception factor of 0.9 to represent the impact of the priority measures and reliable journeys.

Further investigation, including benchmarking against current observed travel times and spreadsheet modelling of future travel times for Options 3 and 4 has shown that the targeted bus priority might not deliver the level of travel time and reliability improvements that was previously assumed.

A pragmatic approach to modelling this has been adopted for the Preferred Option Report Modelling, whereby the in-vehicle perception factor between Wellington Rd and Elizabeth St via Hataitai was adjusted from 0.9 to 1.0 to reflect the impact of bus-on-bus congestion along the corridor and the resulting travel time has been adjusted from 8 minutes to 9 minutes to reflect slower future travel times than previously assumed (informed by benchmarking against current travel times and spreadsheet modelling of future travel times)

Second Spine travel times

Analysis of the second spine travel speeds showed that in the PASLO modelling, a faster speed was assumed along the Waterfront than is likely to be achieved in reality due to the representation of bus stops and side friction.

As a result, travel times along the second spine has been increased by 2 minutes in all options, ensuring consistency with the spreadsheet based modelling of travel times that has been used as a basis for the development of transport model assumptions.

Active mode and working from home scenarios approach

The travel demand management assumptions that reflect potential working from home and increases in the attractiveness of walking / cycling (due to the transformational programme) have been adjusted to test a range of outcomes to reflect future uncertainty.

Working from Home

These adjustments apply to both the Do Minimum and Option for two of the three modelled scenarios and effectively remove a small proportion of home-based work (commuter) trips according to job category (and propensity to work from home) to reflect a potential future with more people working from home

Active modes – walking and cycling

The approach for adjusting the attractiveness of walking and cycling (relative to other modes) to reflect significant walking and cycling investment and the extent to which this could achieve modal shift from car and PT is purposefully high level and indicative, with the following context and caveats:

- WTSM represents slow trips (walking / cycling) using a simple distance based approach to extract a proportion of demand based on trip length to apportion to walking / cycling.
- More detailed modelling using other tools is required at the DBC stage to further understand changes in behaviour from walking and cycling investment to feed into the broader assessment

The modelling approach uses a range of sector-based factors to adjust the attractiveness of both walking and cycling (in generalised minutes) relative to the Do Minimum. These factors are informed by existing work undertaken for the City Streets IBC and are broadly applied as follows:

- Within CBD – reflecting road space reallocation from car to walking / cycling and increasing attractiveness of walking / cycling
- From north / west to Wellington CBD to reflect City Streets investment in walking / cycling
- From the south and east to reflect the transformational programme and intensification resulting in increased attractiveness of and propensity to walk and cycle

- All scenarios assume an improved active mode facility through Mt Victoria Tunnel, with this reflected in the modelling
- Higher factors (leading to higher modal shift to walking / cycling) for the intensified land use scenario than the core scenario

Given the indicative “what if” nature of these adjustments and need for more refined work during the DBC stage, a scenarios based approach has been developed to provide a range within which future outcomes are likely to sit:

- Scenario 1 – some working from home (5% to 10%) and a significant modelled shift from car / PT to active modes as a result of the infrastructure improvements
- Scenario 2 – some working from home (5% to 10%) and small levels of modelled shift from car / PT to active modes as a result of the infrastructure improvements
- Scenario 3 – a no working from home and no modelled shift from PT to active modes under the Options as a result of improved infrastructure

This approach to modelling walking / cycling demand is considered appropriate for the IBC stage of the project and standard for strategic transport models. For the DBC stage it is recommended that a more detailed assessment of walking and cycling demand be undertaken, with this fed back into the analysis of other modes.

Under an intensified land use scenario, the representation of walking / cycling does result in an increase in underlying walking/ cycling demand regardless of infrastructure investment due to more people living within close proximity of work and leisure locations and thus favouring active modes. This is considered intuitive and reflective of both current behaviours and the desired outcomes that intensification would achieve.

Car ownership

The table below shows the assumed car ownership for the base model (2013) and 2046 future models.

In terms of adjustments made to the model:

- Small adjustments (that have been included in previous phases of LGWM modelling) have been made to both the base year and 2046 core land use to reflect more recent Stats NZ census data regarding car ownership and update the model assumptions (that were derived initially from the 2001 census) to a more current and appropriate baseline to reflect trends within Wellington CBD over the last 5 to 10 years where car ownership levels have reduced
- Further adjustments to car ownership along the MRT corridor have been made to reflect the nature of development along the corridor under an intensified scenario being similar in characteristics to current intensified developments in the CBD

This changes under the intensified land use scenario reflects the characteristics of the compact urban form that is envisaged under the intensified land use scenarios, and is based on an assumption that the MRT corridor would have similar levels of car ownership to current dwellings in the CBD. Whilst needing to be verified during the DBC stage, this assumption is considered pragmatic for testing the ‘what if’ intensified land use scenario.



The adjustment to car ownership assumptions are based upon the intensified land use scenario delivering multi-storey and multi-unit dwellings that have fewer car parks than dwellings that would result in lower rates of car ownership.

Analysis of the Household Travel surveys data shows that some areas of Wellington CBD already have household car ownership levels of around 0.3 – the intensified land use scenario assumes that this becomes the norm, in part driven by investment in PT and active modes, with development with these characteristics spreading from the CBD to the inner suburbs (Newtown) and to some extent further south towards Berhampore and Island Bay.

Table 1 - Car ownership rate adjustments

Zone	2013 Stats	2013 WTSM		2046 Core		2046 Intensified Land Use	
		Base	Adj	Base	Adj	Base	High
36	1.1	1.3	1.3	1.6	0.8	1.6	0.8
37	0.9	1.3	1.3	1.6	0.8	1.6	0.8
38	1	1.4	1.3	1.6	1	1.6	1
39	1.4	1.6	1.6	1.6	1.2	1.6	1.2
46	0.5	1.4	0.7	1.6	1	1.6	0.3
47	0.8	1.1	0.5	1.5	0.8	1.5	0.3
48	0.8	1	0.4	1.3	0.5	1.3	0.3
49	1.1	1.4	0.8	1.6	1	1.6	0.3
50	0.4	0.9	0.3	1.2	0.4	1.2	0.3
51	0.5	1	0.4	1.3	0.5	1.3	0.3
52	0.4	0.9	0.3	1.2	0.4	1.2	0.3
53	0.5	0.9	0.3	1.2	0.4	1.2	0.3
54	0.6	0.8	0.2	1.3	0.4	1.3	0.3
56	0.9	1	0.4	1.4	0.5	1.4	0.3
57	0.5	1	0.4	1.5	0.6	1.5	0.6
58	0	1	1	1.1	0.5	1.1	0.5
59	-	1.8	1	1.4	0.7	1.4	0.7
60	0.5	0.9	0.2	1.4	0.4	1.4	0.4
61	-	1.3	1.3	1.5	0.7	1.5	0.7
62	-	-	-	-	-	-	-
63	-	-	-	-	-	-	-
64	1	1.3	0.6	1.4	0.7	1.4	0.7
65	-	0.5	0.5	0.7	0.4	0.7	0.4
66	-	1	0.9	1.5	0.7	1.5	0.7
CBD	0.7	1.1	0.6	1.4	0.6	1.4	
13	0.9	1.2	0.4	1.4	0.6	1.4	0.4
14	1	1.2	0.5	1.5	0.7	1.5	0.4
19	1	1.2	0.5	1.5	0.7	1.5	0.4
21	1	1.3	0.6	1.5	0.7	1.5	0.4
44	0.6	1	0.4	1.4	0.7	1.4	0.4
45	0.7	1.2	0.4	1.5	0.7	1.5	0.4
Newtown	0.9	1.2	0.5	1.5	0.7	1.5	
16	1.5	1.6	1.6	1.6	1.1	1.6	0.7
17	1.4	1.6	1.6	1.6	1.2	1.6	0.7
20	1	1.2	0.6	1.5	0.8	1.5	0.7
IB / BP							
1	1.4	1.5	1.5	1.6	1.1	1.6	1
2	1.4	1.5	1.5	1.6	1.1	1.6	1
3	1.5	1.6	1.6	1.6	1.2	1.6	1.1
4	1.4	1.5	1.5	1.6	1.1	1.6	1
5	1.6	1.7	1.7	1.7	1.3	1.7	1.2
6	1.7	1.8	1.8	1.7	1.4	1.7	1.3



7	1	1	1	1.2	0.9	1.2	0.8
8	1.3	1.4	1.4	1.6	1	1.6	0.9
9	1	1.1	1.1	1.5	0.8	1.5	0.7
East	1.3	1.4	1.4	1.6	1	1.6	

Parking

CBD Parking in WTSM is represented by charges across zones in the CBD, with the charge varying by time period, purpose and area. Note that there is no parking capacity constraint within WTSM.

The Golden Mile, second spine and transformational programme will result in a reduction in on-street parking, and also potentially a significant reduction in off-street private parking due to the potential redevelopment of parking building sites for apartments / residential dwellings and the development of vacant lots that might currently be used for off-street parking.

Through time, it is also envisaged that the mix of parking would evolve from a 90/10 split between commuter vs short stay parking to a greater percentage of parking (off-street) being short stay parking.

The principles of supply and demand suggest that if parking supply were to decrease, the cost would likely increase to keep a balance between supply and demand, and therefore the modelling assumptions for all three scenarios assumes a 30% increase in parking charges in 2046 to reflect the reduced parking capacity in the CBD.

This is considered a pragmatic approach in order to replicate a transformational programme of the nature of LGWM, that is likely to reduce the supply of demand and restrict traffic circulation within and to the CBD.

It should be noted that further more detailed work is required during the DBC in order to test assumptions and outcomes in relation to the reduction in traffic capacity within the CBD and the reduction in parking spaces.

Revised land use assumptions

The land use inputs used in previous modelling work have been refined by the urban development team and revised inputs for the model have been produced. The previous assumptions – for an additional 16,000 dwellings over and above the 10,000 enabled by the spatial plan - are reported in the PASLO modelling report² and were based on projections of growth developed by The Property Group in January 2021 that themselves were based on previous option V1A that assumed MRT to the south and east.

The more recent changes undertaken for the PPOR maintain the same overall level of growth – 16,000 additional dwellings compared to the Do Minimum – but change the distribution of growth accordingly:

- Lower levels of growth in the eastern suburbs (relative to previous intensified land use scenario)
- Higher growth in Island Bay and Berhampore (relative to previous intensified land use scenario)

² https://lgwm-prod-public.s3.ap-southeast-2.amazonaws.com/public/Documents/Nov-1-MRT/2021-11-01-LGWM-PASLO-Modelling-Report_Redacted-v2.pdf



New land use inputs have been developed for the intensified land use scenarios and implemented in WTSM as shown below:

Table 2 - Land use adjustments

Area	Zone	MRT Enabled Population growth - Previous Intensified Land Use	MRT Enabled Population growth - Revised Intensified Land Use	MRT Enabled Employment growth - Previous Intensified Land Use	MRT Enabled Employment growth - Revised Intensified Land Use
Miramar	1	400	250	100	
Miramar	2	800	700	200	500
Miramar	3	800	250	200	
Miramar	4	1050	300	250	
Miramar	5	1050		250	
Lyll Bay	8	350	200	100	
Kilbirnie	9	1300	800	400	300
Eastern suburbs		5800	2500	1500	800
Newtown	13	3900	4600	1200	1200
Newtown	14	3900	4600	1200	1200
Berhampore / Newtown	19	2600	2000	800	300
Mt Cook	21	975	1300	300	150
Mt Cook	44	975	350	300	75
Mt Cook	45	650	350	200	75
Newtown / Adelaide Rd		13000	13300	4000	3000
Island Bay	16	650	1150	125	280
Island Bay	17	650	1150	125	280
Berhampore / Island Bay	20	1300	1550	250	140
Island Bay / Berhampore		2600	3900	500	700
Te Aro	46	2600	2850	1625	1800
Te Aro	47	2600	2850	1625	1800
Te Aro	48	2600	2850	1625	1800
Te Aro	49	2600	2850	1625	1800
Te Aro	50	2600	2850	1625	1800
Te Aro	51	2600	2850	1625	1800
Te Aro	52	2600	2850	1625	1800
Te Aro	53	2600	2850	1625	1800
CBD / Te Aro		20800	22600	13000	14500

As has been the case in previous modelling undertaken for the transformational programme, the intensified land use scenario retains the same population growth across the region overall as the

core land use scenario, with development focused on the MRT corridors rather than the wider region.

This approach allows us to assess the impact of the change (a faster rate of growth on a particular corridor enabled by transport investment) in isolation to other changes. It is also best practice in terms of the Waka Kotahi Monetised Costs and Benefits Manual.

It also enables us to understand potential trigger points – in terms of the level of additional development and / or timing of such growth – whereby demand might warrant a particular modal solution.

In this sense the 'core' and 'intensified' land use scenarios can be considered “bookends”, and the modelling can be used to understand the trade-offs between capacity, frequency and mode on the continuum between the core and intensified scenario

The scenario has been developed based on the assumption that PT network improvements catalyse development to the south and (to a lesser extent) the east and is loosely based on a land use response to option 1. It is intended to represent a “what if” scenario and provides an indication as to the implications on programme performance.

Further analysis is required to determine a forecast level of response, however it is anticipated that the other programme options will respond differently to option 1:

- Based on international literature, BRT based systems are shown to catalyse lower levels of intensification than LRT based systems. Therefore, lower levels of intensification may be achievable for the southern corridor under option 2. Higher levels of intensification, however, may be achievable for the eastern corridor under option 2 reflecting an improved level of PT provision
- Option 3 will support identical levels of intensification to the south to option 1. It will, however, support limited levels of intensification to the east.
- Option 4 will support similar levels of intensification to the south to options 1 and 3. The MRT corridor follows a slightly less desirable route to the north of the Basin Reserve – further work would be required to determine whether this would have any effect on development. Similarly to option 3, it will support limited levels of intensification to the east.

A realistic outcome could also be one where the PT investment stimulates faster population and economic growth across the whole region, with this additional growth being focussed on the MRT corridor, however this would need to be taken together with other factors that could influence the speed of intensification, including national and regional economic factors and policies.

It should also be noted that the intensified scenario assumes:

- a similar demographic breakdown to the existing demographic breakdown for a particular zone
- a similar distribution of employment by type for each zone based on the existing breakdown for a particular zone

This is noted as an improvement area for the DBC, where improvements the dynamic nature of the transport-land use response will be refined and incorporated into modelling work.

Do Minimum

Further details around the Do Minimum are provided in the IBC document, however in summary the Do Minimum includes no significant interventions on the highway and rail network and only

incremental improvements to PT frequencies to accommodate future demand (which it is assumed would have consequences in the central city for PT reliability).

Importantly, it does not assume any rail improvements that would result in increased service frequencies and improved levels of service compared to the current status quo.

4. Modelling Methodology – Aimsun

Strategic models by their very nature are not designed to accurately represent highway impacts at a more local level within compact urban areas, due to their simplified representation of mid-block queuing and congestion and coarse zone systems

As a result, a more refined approach is required to improve our understanding of the traffic impacts of Options 1 and 4.

The AIMSUN meso-scope model has been used to provide a more faithful representation of the traffic impacts of the Options 1 and 4 and provide a more robust differentiation between options, in particular relating to:

- the impact of reduced capacity in Wellington CBD
- the performance of the Basin Reserve and Mt Victoria tunnel

The approach taken for the AIMSUN modelling that has informed the preferred option assessment is as follows:

- Run AIMSUN Options 1 and 4 with growth / change in demand derived from revised WTSM demand (Scenario 1)
- Derive benefits from these options, quantitative assessment of network performance, input to economics

The AIMSUN model uses a nominal 2026 model year, focussing on the impact that a given change in traffic volumes could have on the operation of the CBD and state highway network.

The outputs of the AIMSUN modelling are shown in Appendix B

5. Output Metrics

The programme wide KPIs are well documented elsewhere and draw input from a range of technical disciplines including modelling. The previous work indicated that there is limited differentiation between the options for some of the modelling related KPIs, therefore the focus of the modelling output for the preferred options report has been on the elements that do show some differences in performance.

The following table highlights where updated modelling output has been extracted (modelling outputs are highlighted in bold). In summary, WTSM modelling has been used to inform the option comparison work. It has also been used to inform the economic analysis. Aimsun modelling has been used to answer some of the key questions highlighted in the introduction to this document as well as inform the option comparison work.

It is important to acknowledge that the results from WTSM and Aimsun are not directly comparable – WTSM modelling has been undertaken for 2046 (as this shows the greatest amount of differentiation), whereas Aimsun modelling has been undertaken for a notional scheme opening year (it is based on a modified 2026 forecast, but the date is less critical due to the operational nature of the model).



Table 3 - Key output metrics

Objective	KPI	Measure	Application in Preferred Programme Report
A transport system that enhances the urban amenity and enables urban development outcomes	Urban Amenity	The quality of the urban environment associated with Comfort, Composition, Connectivity and Activation	Not a large differentiator in PASLO so no further work has been carried out
	Urban Development	Qualitative assessment and quantified net value uplift (Yield, Viability and Value Uplift and Opportunity)	Not a differentiator due to modelling approach but a key consideration by Partners. Modelling does not forecast urban development potential. Modelling has been used to show the difference in performance between core and intensified options for the key metrics outlined below in this table.
	Attracting traffic off city streets	Number of vehicles using highway rather than waterfront or city streets at key screen lines	Revised Aimsun modelling output has been used to understand the implications of the Basin Reserve grade separation and the second Mt Victoria Tunnel on key city streets (and route choice around the city).
A transport system that provides efficient and reliable access for users	People living within close proximity of key destinations	Resident population within a 30-minute journey time of Wellington City Centre and key social and economic opportunities	This is a differentiator when considering the impact of congestion charging and/or urban development Updated WTSM modelling has been used to derive 15 and 30 minute catchment areas to understand differentiation
	Travel time reliability	Travel time reliability for general traffic and public transport across the Wellington region	Not a differentiator in PASLO. Aimsun outputs have been reviewed to determine the extent to which Basin and Mt Vic Tunnel influence travel time reliability
	Comparative travel time between modes	Travel time ratio for key modes and routes	Slight differentiator only – this report draws on PASLO analysis
	Equitable Travel	Changes to accessibility (measured using effective density) for higher deprivation areas in Wellington.	Slight differentiator only (some options have 2-3% increase vs 4-5% increase). This report draws on PASLO analysis
	Pedestrian Level of Service	Qualitative assessment of quality of infrastructure and likely delays at intersections	Not a differentiator



	Public Transport Delay	Comparison of public transport peak travel times vs free flow travel time	This is a differentiator when considering congestion charging. Updated PT travel time metrics have been extracted from Aimsun model.
	The quality of cycling facilities	Qualitative assessment of quality of infrastructure.	Not a differentiator
A transport system that reduces carbon emissions and increases mode shift by reducing reliance on private vehicle travel	Mode share in the central city	Number of people travelling across the central city screenline by mode	Not a differentiator for the region but high interest, therefore a new metric has been developed using WTSM outputs to show mode share of trips with a start or end point in the Wellington CBD. This is reported on for core and intensified land use scenarios, as well as for the congestion charge sensitivity test. In addition to this, analysis of PT line loadings on the two MRT branches has been undertaken.
	Mode share across the region	Person kilometres travelled by mode around the region	
	Carbon Emissions	Composite assessment using Carbon Assessment Tool for investment (CATi), Fleet emissions (VKT and fuel consumption) and amount of active transport enabled	Slight differentiator from previous work and high interest for the stakeholders. New methodology for assessing enabled carbon has been developed, drawing on model outputs – particularly fuel consumption and VKT. These are reported for core and intensified land use scenarios and for the congestion charge sensitivity test
	Embodied Carbon	Estimation of the carbon embodied in the construction of new infrastructure.	Slight differentiator and high interest. No modelling required for this KPI
A transport system that improves safety for all users	Deaths and serious injuries for people walking or cycling	Deaths and serious injury equivalents for people walking and cycling in and around the central city	Not a differentiator
	Deaths and serious injuries of all transport users	Deaths and serious injury equivalents for all transport users	Not a differentiator but safety is an investment objective, so reporting is provided. No modelling implications
A transport system that is adaptable to disruptions and	Enhances the resilience of land transport access to critical facilities	Qualitative assessment of journeys impacted and resilience gaps	Differentiator but combined across all three KPIs – no modelling implications

future uncertainty	and within the city		
	Resilient to HILP events and contributes to access for communities	Qualitative assessment of access for emergency response and recovery after a high impact event	Combined into above
	Enhances the resilience of access to provide socio-economic functionality in LIHP and unplanned events	Qualitative assessment of how the socio-economic functionality is changed after a low to moderate impact event	Combined into above

Outputs from the WTSM modelling are presented in Appendix A and outputs from the Aimsun modelling are presented in Appendix B.

6. Discussion

The analysis presented in Appendices A and B can be summarised as a range based on the three scenarios that have been modelled as follows:

VKT – Regional

- Options 1 and 4 reduce daily VKT by around 1 to 2%
- This increases to between 7% and 10% under the intensified land use scenario, a direct result of shifting growth from outside of Wellington City (with relatively high car dependency) to the MRT corridor with relatively low levels of car dependency and high PT / active mode trip rates
- Option 1 is forecast to result in a slightly greater reduction in VKT than option 4 due to the greater level of PT improvements to the east

VKT – Wellington City

- Options 1 and 4 reduce daily VKT by between 2% to 4% in Wellington City (relative to Do Minimum), rising to 3% to 7% under intensified scenarios
- In per capita terms, the intensified scenario reduces VKT in Wellington City by up to 15% compared to the core scenario and up to 20% compared with the current

PT Passenger Kilometres – Regional and Wellington City

- Options 1 and 4 increase daily PT passenger kilometres in Wellington City by 15% compared to the Do Minimum, with the intensified land use scenarios generating a 25% to 30% increase

- At a regional level, daily PT passenger kilometres travelled increase by up to 10% between the Do Minimum and Options 1 and 4
- The increases noted above are greater in the peak periods than in the inter-peak
- In per capita terms, daily PT passenger kilometres increase by around 10% between the Do Minimum and Options

PT Passenger Kilometres – Southern and eastern suburbs

- Public transport passenger KMs travelled (PKT) indicate a greater level of difference between options 1 and 4 when assessed at a more granular level
- Option 1 indicates a 25% to 35% uplift in PKT from the south and east under the core land use scenario
- Option 1 indicates a 20% to 25% uplift (relative to the do minimum in 2046)
- These figures increase to 80% to 85% and 65% to 70% respectively for the respective intensified land use scenarios.

Accessibility

- The differences between the options are reflected to a greater extent in the catchment analysis than they are in some of the other metrics
- Over 500,000 people live within one hour (by car) of the airport under option 1, whereas around 420,000 people live within one hour of the airport under option 4 (around 380,000 people live within one hour of the airport in the do minimum)
- The assessment of public transport accessibility shows a very similar outcome, with significant improvements to accessibility seen for Option 1 relative to Option 4 to the east
- This differentiation between Options 1 and 4 to the east is driven by the Mt Victoria tunnel duplication and the Basin Reserve grade separation.

Mode Share – Trips to CBD

- All options increase the non-car mode share of trips to the CBD in the AM peak
- Relative to the Do Minimum, Options 1 and 4 increase non-car mode share of trips to the CBD in the AM peak from around 58% to 66%
- The intensified land use scenarios result in a further increase in non-car mode share, to around 71%
- The difference in increased non-car mode share between the options is small up to 2046, however it is expected to increase beyond this date as there is limited capacity to accommodate additional PT demand in option 4 due to the capacity constraint at the Hataitai tunnel.

Mode Share – Trips to CBD from south and east

- All options increase the non-car mode share of trips to the CBD in the AM peak from the southern and eastern suburbs
- Relative to the Do Minimum, Options 1 and 4 increase non-car mode share of trips to the CBD from the south and east in the AM peak from 40% to around 55% (Option 1) and 54% (Option 4)

- The intensified land use scenarios result in further increases in the non-car mode share, to 64% for both Options 1 and 4
- The main difference between Options 1 and 4 relates to around 400 to 500 fewer PT trips in Option 4 compared to Option 1 under both the core and intensified land use scenarios - This is due to slower PT travel times from the east under option 4, leading to a lower level of modal shift

Emissions

- All options have a positive impact in terms of reducing vehicle emissions
- Option 1 and 4 generate a 2% to 4% reduction in daily emissions within Wellington City (1% to 2% across region) relative to the Do Minimum
- Option 1 results in a marginally greater reduction in daily emissions compared to Option 4, primarily due to higher modal shift from the east
- Intensified land use scenarios reduce daily emissions by around 7% to 10% at a regional level

Active Modes

- An estimated 50% increase in AM peak cycle trips to the CBD in Options 1 and 4 (relative to the Do minimum), increasing to 100% in intensified land use scenarios
- An estimated 50% increase in AM peak walk trips to the CBD in Options 1 and 4, increasing to 100% for intensified land use scenarios
- Inner suburbs – Adelaide Road, Mt Cook, Newtown – account for the majority of the growth in walking trips
- Minimal forecast differentiation between the options reflecting the assumed high quality of provision for the active modes in all options.

AIMSUN Modelling – travel times

- Option 1 – 3 minutes faster travel times from Miramar to Taranaki St (AM Peak) than Option 4
- Similar travel times between options 1 and 4 for other travel time routes

AIMSUN Modelling – congestion

- Taranaki St is a more constrained corridor for general traffic (with MRT) compared to Kent / Cambridge
- This is predicted to result in greater congestion at intersections along Taranaki St and in the environs in option 4, compared to option 1

7. Summary of scenario modelling metrics

As noted above, three scenarios have been modelled looking at different assumptions around active modes, working from home and parking charges, to provide a range of outcomes:

- **Scenario 1** –high shift to active modes and PT as a result of the transformational programme, some working from home (~5% to 10%) and other TDM measures, 30% increase in parking charge as proxy for reduced capacity

- **Scenario 2** – lower level of shift to active modes as a result of the options, some working from home (~5%)/ broader TDM, 30% increase in parking charge as proxy for reduced capacity
- **Scenario 3** – no modelled shift to active modes, no TDM or working from home, 30% increase in parking charge as proxy for reduced capacity

These future scenarios reflect the inherent uncertainty of forecasting future outcomes that are dependent on the eventuation (or otherwise) of multiple assumptions.

Key metrics

The table below summarises the changes in key metrics as a result of these tests in relation to Scenario 1 under the core land use.

Note **green signifies an increase**, **orange a decrease** and **blue no material change**

Table 4 Scenario testing summary - Core Land Use

	DM	Option 1			Option 4		
		Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
PT cordon crossing, South (2hr, AM)	3,000	2,500	3,500	3,900	2,900	3,700	4,200
PT cordon crossing, East (2hr, AM)	3,300	4,800	4,800	5,500	4,000	4,100	4,700
PT cordon crossing from S&E (2hr, AM)	6,300	7,400	8,200	9,400	6,900	7,800	8,900
Car cordon crossing from S&E (2hr,AM)	11,200	10,200	10,600	10,700	10,100	10,500	10,600
PT Mode Share to CBD from S&E	35%	44%	46%	48%	42%	44%	47%
Increase in PKT in S&E suburbs (cf DM)		25%	30%	35%	13%	20%	25%
Walk / cycle cordon crossings	2500	4800	3800	3800	4800	3800	3800
Non-car mode share from S&E	40%	54%	53%	55%	54%	53%	55%
PT cordon crossings - Total	36,000	39,700	41,000	45,800	39,200	40,300	44,800
MRT Load - Basin	1,250	1,500	2,000	2,400	1,800	2,000	2,500
PT Load – Diagonal / Bus Tunnel	1,700	2,400	2,300	2,600	2,300	2,400	2,600
Reduction in VKT – Wellington CBD		7%	5%	3%	7%	5%	3%
Reduction in VKT – Wellington City		4%	3%	3%	3%	2%	2%
Reduction in VKT – Wellington Region		2%	1%	1%	2%	1%	1%
General traffic travel time Miramar to CBD (AIMSUN)	12.0 min	8.5 min	8.5 min	8.5 min	11.5 min	11.5 min	11.5 min



Persons within 60 min to Airport by PT	160,000	230,000	230,000	230,000	160,000	160,000	160,000
Persons within 60 min to Airport by Car	380,000	500,000	440,000	440,000	420,000	420,000	430,000

The table below summarises the changes in key metrics as a result of these tests in relation to the intensified land use scenarios. As set out above, the land use scenario has been developed to be reflective of Option 1.

The Option 4 metrics are in italics as it is unclear whether the same level of intensification could be achieved under option 4.

Table 5 Scenario testing summary - Intensified Land Use

	DM	Option 1			Option 4		
		Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
PT cordon crossing, South (2hr, AM)	3,000	4,500	5,900	6,600	5,200	6,400	7,200
PT cordon crossing, East (2hr, AM)	3,300	6,300	6,100	6,800	5,100	5,000	5,700
PT cordon crossing from S&E (2hr, AM)	6,300	10,800	11,900	13,400	10,300	11,500	12,800
Car cordon crossing from S&E (2hr,AM)	11,200	10,000	10,500	10,600	10,000	10,500	10,600
PT Mode Share to CBD from S&E	35%	55%	56%	58%	54%	55%	57%
Increase in PKT in S&E suburbs (cf DM)		75%	80%	85%	60%	65%	70%
Walk / cycle cordon crossings (estimate)	2500	7200	5800	5800	7200	5800	5800
Non-car mode share from S&E	40%	64%	63%	64%	64%	63%	63%
PT cordon crossings - Total	36,000	43,600	43,800	48,300	43,000	43,200	47,600
MRT Load – Basin	1,250	2,500	3,400	3,900	2,500	3,400	4,000
PT Load – Diagonal / Bus Tunnel	1,700	3,400	3,200	3,500	3,000	3,200	3,300
Reduction in VKT – Wellington CBD		6%	2%	1%	6%	2%	1%
Reduction in VKT – Wellington City		6%	5%	5%	6%	5%	4%
Reduction in VKT – Wellington Region		10%	9%	8%	10%	8%	8%
General traffic travel time Miramar to CBD (AIMSUN)	12.0 min	8.5 min	8.5 min	8.5 min	11.5 min	11.5 min	11.5 min
Persons within 60 min to Airport by PT	160,000	280,000	280,000	280,000	230,000	230,000	230,000
Persons within 60 min to Airport by Car	380,000	500,000	440,000	440,000	420,000	420,000	430,000

Economic Summary

The tables below show highway and PT benefits for Scenarios 2 and 3 relative to Scenario 1 based on indicative model outputs. Note this should not replace to more detailed programme economics, but provide a guide as to the relativity between options.

Table 6 Comparison of benefits – Sensitivity Tests, Core land use

	Option 1 - Core			Option 4 - Core		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
PT	100%	95%	105%	100%	95%	105%
Highway (exc intra CBD)	100%	50%	20%	100%	40%	-10%
Highway (exc intra CBD and to / from CBD)	100%	65%	70%	100%	50%	60%
Walking (estimate)	100%	50% to 75%		100%	50% to 75%	
Cycling (estimate)	100%			100%		
Agglomeration ³	100%	80%	75%	100%	90%	80%

Table 7 Comparison of benefits – Sensitivity Tests, Intensified land use

	Option 1 – High			Option 4 - High		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
PT	100%	95%	105%	100%	95%	105%
Highway (exc intra CBD)	100%	30%	25%	100%	30%	15%
Highway (exc intra CBD and to / from CBD)	100%	75%	90%	100%	75%	90%
Walking (estimate)	100%	50% to 75%		100%	50% to 75%	
Cycling (estimate)	100%			100%		
Agglomeration ⁴	100%	75%	70%	100%	75%	75%

³ Based on EJD outputs

⁴ Based on EJD outputs

Whilst the figures show a decline in highway benefits (relative to Scenario 1), this is largely a function of less trip suppression due to different working from home assumptions, less modelled shift to active modes (from car and PT) and less resulting de-congestion benefits.

Analysis of model outputs also shows that:

- the majority of the dis-benefits relate to trips to / from the CBD in the inter-peak and, to a lesser extent, PM peak
- the nature of these dis-benefits are largely a result of changes to accessibility to particular zones (re-routing resulting in longer trips) as opposed to increases in congestion

In reality, people would be likely to either change their destination (car park, parking location) rather than incur significant dis-benefits of the nature indicated by the strategic model – neither the strategic model nor the AIMSUN model will represent this response and therefore it is considered pragmatic from an economics perspective to potentially discount these dis-benefits.

It should also be noted that the modelling reported in this note does not specifically reflect the potential transformational nature of plans such as the Multi-modal Network Plan that envisages up to a 30% reduction in road capacity within the central city network, generating a significant increase in walking and cycling trips nor does the strategic model fully capture the transformational nature of the programme and fundamental changes in land use and behaviour (and increase in walking / cycling and less general traffic) in the Wellington CBD.

Furthermore, the active travel benefits and figures (cyclists / pedestrians) are estimated from the strategic model at a high level and should in future stages be benchmarked against those derived from other workstreams such as the City Streets IBC and various SSBC documents for the Golden Mile and Thorndon Quay / Hutt Rd.

Therefore overall, the view of the modelling team is that the highway travel time benefits and cycle benefits are likely to be conservative, particularly for scenarios 2 and 3, as the full transformational nature of the programme has not been fully captured.

During the subsequent DBC stage of the project, it is recommended that a more detailed assessment of active mode uptake and benefits be undertaken and fed back into the wider assessment, together with a more detailed assessment of the transformational nature of the programme be undertaken to feed into subsequent analysis.

It is therefore in this context that the figures in this report should be taken as indicative of a range, and are likely to be on the conservative side in terms of reductions in traffic volumes / VKT that could be achieved from a transformational programme of the nature of LGWM.

High level summary

In summary, the scenario tests show the following:

- Increases in PT patronage, a shift from walking / cycling and working from home
 - Option 1 Core - a 25% to 35% increase in PKT to the south and east
 - Option 4 Core - a 20% to 25% increase in PKT to the south and east
 - Option 1 High - a 75% to 85% increase in PKT to the south and east
 - Option 4 High - a 60% to 70% increase in PKT to the south and east



- Reductions in VKT
 - A 1% to 2% reduction at a regional level for the core scenario, rising to 7% to 10% under the intensified scenario
 - Changes in VKT within Wellington CBD of between 2% and 7% reduction (note that this is largely driven by changes in active mode assumptions – the modelling does not reflect the potentially more transformational impact of the City Centre Traffic Circulation Plan)
- Increases in non-car mode share to the CBD from the south and east
 - Increase from 40% to 55% under core scenario
 - Increases from 40% to 64% under intensified scenarios

Line loadings

One of the key metrics is MRT / BRT / bus line loadings during the peak hour. The table below summarises the MRT line loadings at the following locations:

- MRT approaching the Basin (Option 1 and 4)
- Bus approaching the basin (Option 1⁵) and bus tunnel (Option 4)

Table 8 MRT Line loadings - Sensitivity Tests, Core and Intensified Land Use, AM peak 1hr

			Option 1		Option4	
		DM	Core	High	Core	High
Approaching Basin (Options 1 and 4)	Scenario 1	1,250	1,500	2,500	1,600	2,600
	Scenario 2		2,000	3,400	2,000	3,300
	Scenario 3		2,400	3,900	2,500	4,000
East – approach to Basin (Option 1), Bus Tunnel (Option 4)	Scenario 1	1,650	2,400	3,400	2,300	3,000
	Scenario 2		2,300	3,200	2,300	3,000
	Scenario 3		2,600	3,500	2,600	3,300

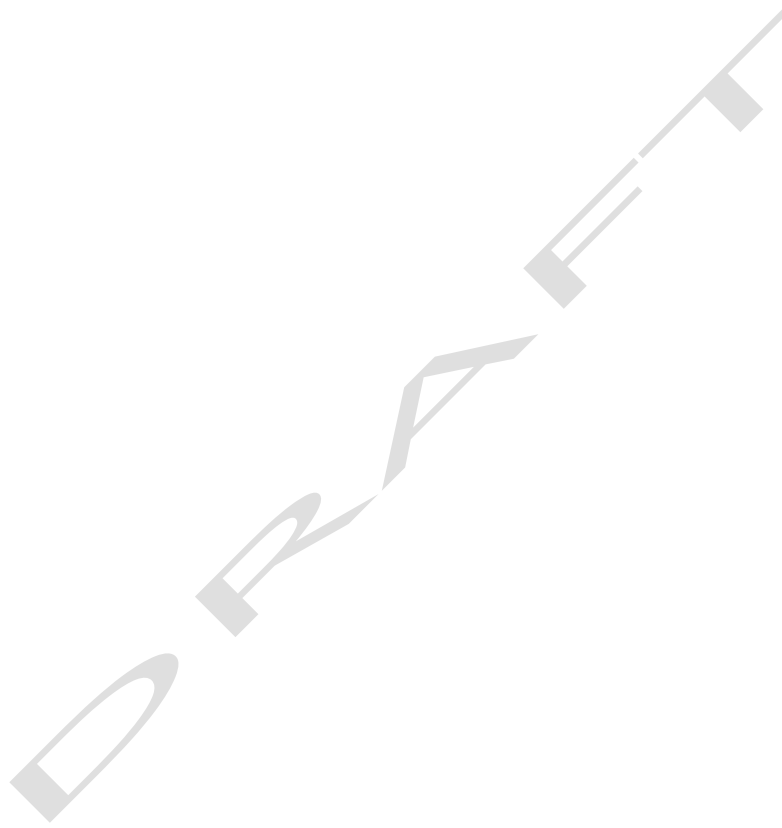
The modelling shows the following:

- hourly demand at the peak load point approaching the Basin Reserve could be up to 4,000 passengers in the peak hour, suggesting that high capacity MRT / LRT would be required to accommodate this kind of growth
- hourly demand at the peak load point from the east under a high land use scenario (3,300 to 3,500) is unlikely to be able to be accommodated reliably under option 4 without-resulting in a deterioration in travel times through Hataitai and the bus tunnel

⁵ Note that Option 1 only includes demand approaching the basin and does not include local bus passengers who would still use the bus tunnel under Option 4



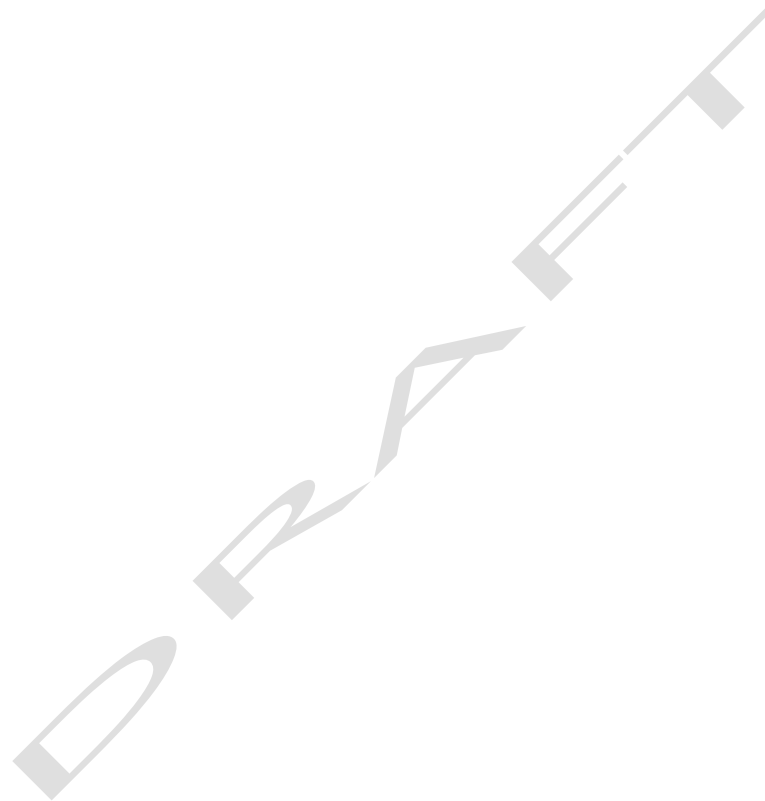
Analysis and interpretation around what these loads mean in terms of service frequencies, mode and reliability is provided in the Preferred Programme Options Report





Appendices

Appendix A – WTSM Model Output



PREFERRED OPTION MODELLING RESULTS

Appendix A – WTSM modelling

29th April 2022



General

Attachment 1a to Report 22.227

- Modelling based on assumptions that were developed at a particular point of time in relation to:
 - Population projections
 - Urban development outcomes
- **Three scenarios have been developed, reflecting different assumptions around active modes and working from home**
- **Result presented in this note relate to a mid-point scenario; results and outcomes should be considered as indicative of a range**, given the inherent uncertainty forecasting 20 to 30 yr into the future
- Further more detailed work to be undertaken during the DBC will be used as a basis to refine assumptions and further develop the analysis

Modelling approach

- Modelling undertaken to inform aspects of the preferred option reporting
- Two areas of focus for preferred option reporting:
 - Areas of differentiation between options – mode choice, accessibility, carbon and economics
 - Key outstanding question to be answered (LRT vs BRT, Mt Vic vs no Mt Vic, Basin Grade separation vs at grade)
- Where possible, draw on previous work – PASLO modelling, business cases, engagement feedback
- Model refinements based on assumption changes and network clarifications prioritising options 1 and 4 (two bookend options with interpolation used to understand the relative impact of options 2 and 3)

Changes to assumptions – Core

- Mt Victoria Tunnel – lower capacity for general traffic in Option 1 (based on a more detailed understanding of capacities derived from the Aimsun model)
- Hataitai bus travel times optimized for Option 4 based upon updated input travel times
- Walking and cycling more attractive within CBD and within southern suburbs (MRT corridor)
- Small increase in cost of parking as proxy for likely reduction in parking supply (on and off-street) due to transformational change
- Minor changes to improve representation of cycling to east, resulting in Option 1 and 4 having similar attractiveness
- Modal adjustments to correct for short trip bias

Changes to assumptions – Intensified

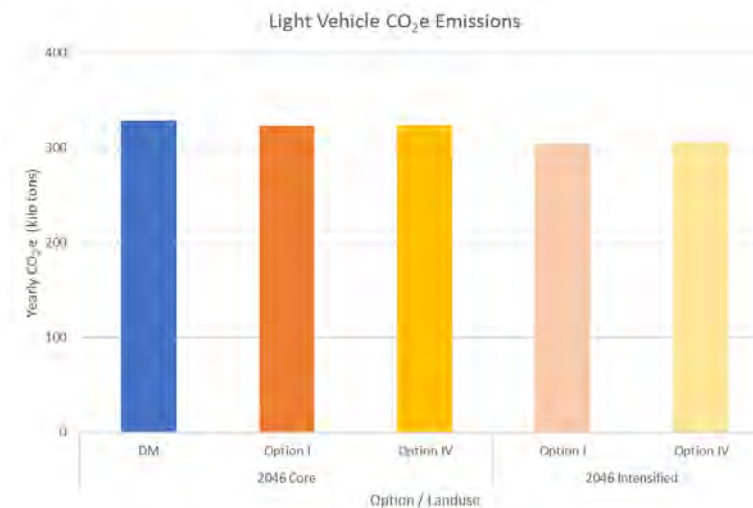
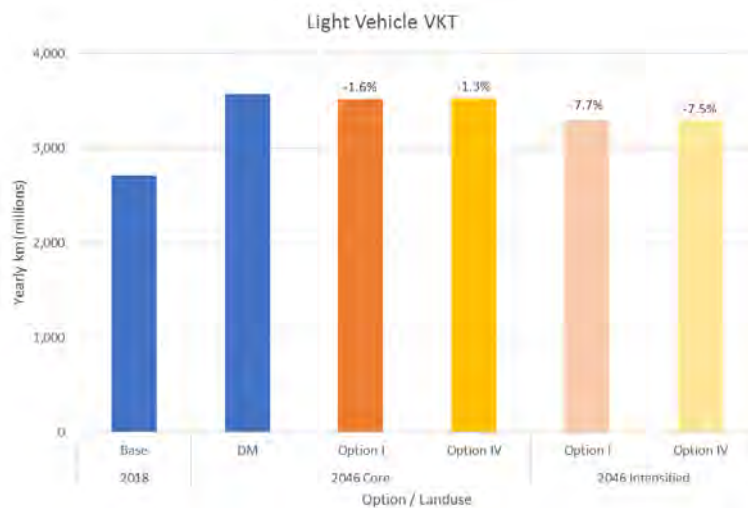
- Intensified scenario used to understand the implications on the network should higher levels of development intensity occur along the MRT corridor (it is **not** a forecast of level of intensification)
- As for core plus:
 - Walking and cycling **significantly** more attractive within CBD and within southern suburbs (MRT corridor)
 - **More significant** increase in cost of parking as proxy for likely reduction in parking supply (on and off-street) due to transformational change
 - Revised land use inputs – MRT enabled UD focused more on southern corridor and less to east (compared to previous)
 - **Lower car ownership** rates along MRT corridors

Carbon Assessment

Modelling forms an input to the carbon assessment – this section provides an overview of the changes in fuel consumption and VKT/PKT

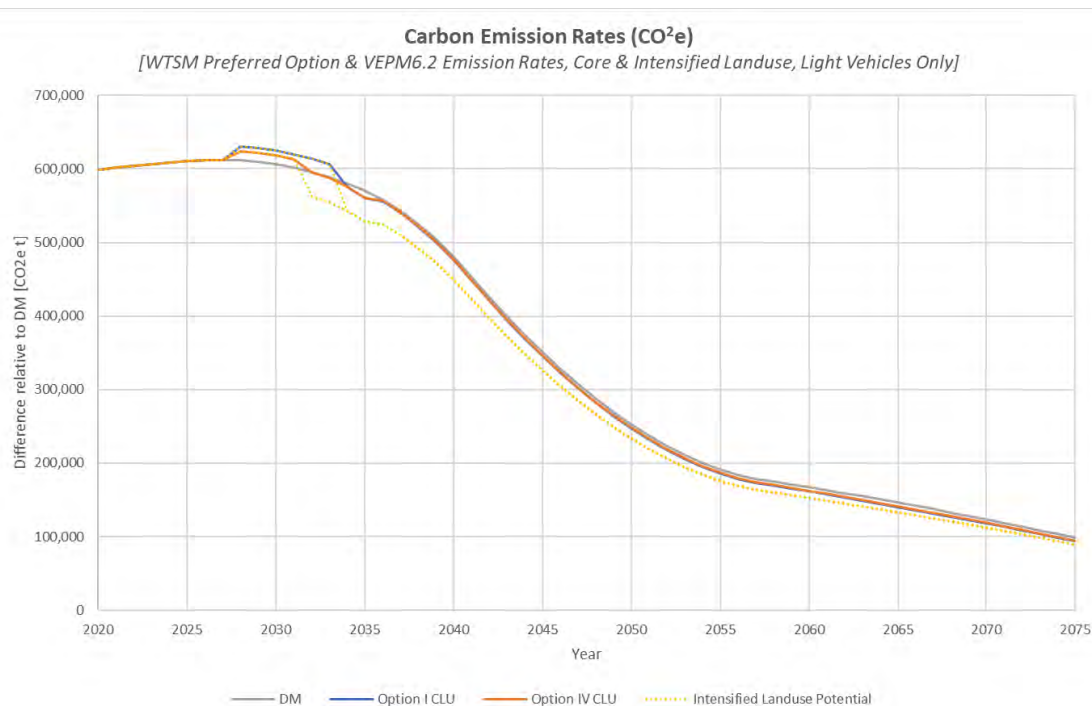
VKT/ CO2 Emissions for Light Vehicles in 2046

- ~1.5% reduction of region-wide VKT and emissions under Option I and IV
- ~7% reduction of region-wide VKT and emissions under Option I and IV with the High Land Use (HLU) assumptions
- Opt I and Opt I HLU show higher reductions than Opt IV and Opt IV HLU



Yearly emissions extrapolated to 2034 to 2074 evaluation period

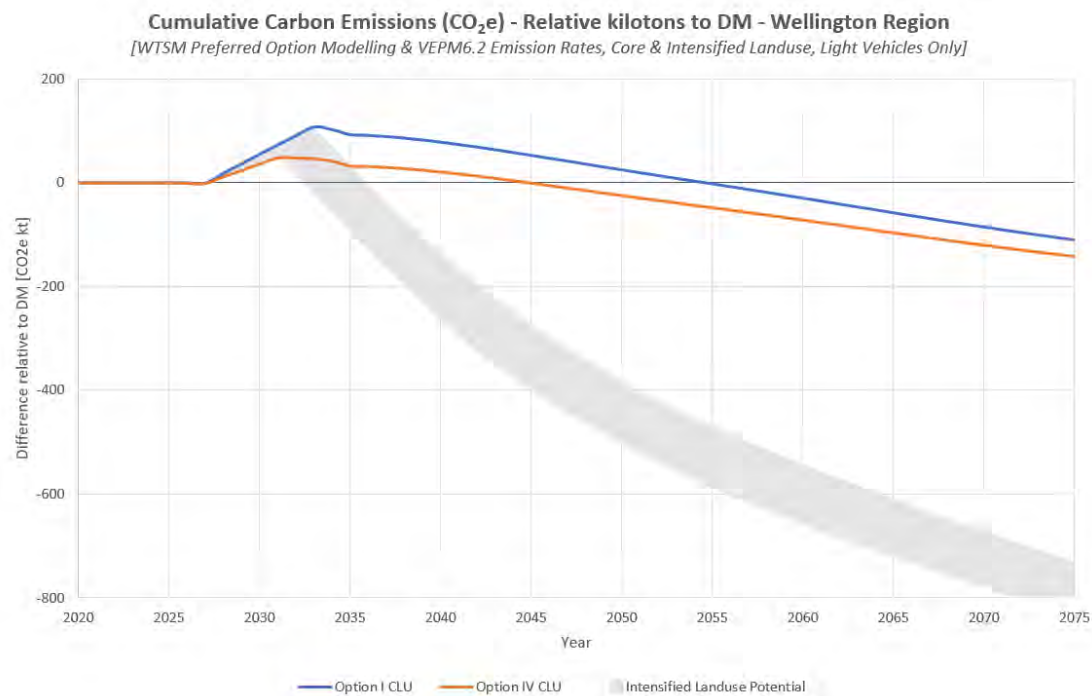
- Modelling suggests that VKT keeps increasing over time, but better fuel efficiency means total emissions decrease year on year
- Biggest difference between scenarios in early years



Construction Emissions balanced by Accumulated Savings

Attachment 1a to Report 22.227

- Enabled emissions are very similar for Options 1 and 4 – the main differentiator between these options is the embodied emissions
- The difference between core and intensified scenarios is significant, the result of more people living in close proximity to their place of work, resulting in an increase in PT patronage, walking and cycling
- HLU outcomes expressed as range to account for uncertainty regarding urban development outcomes



Changing the delivery timeframes

Attachment 1a to Report 22.227

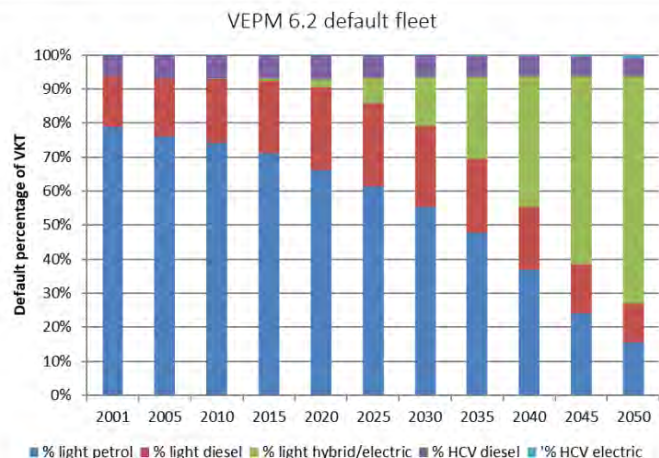
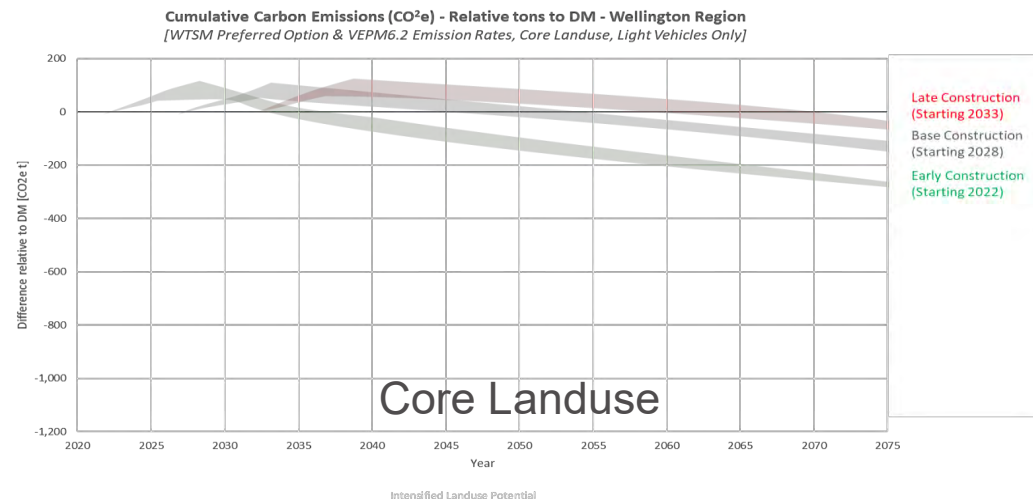


Figure 2: Default fleet (%VKT by vehicle class) in VEPM 6.2. Note that HCV includes buses



- The EV / Hybrid fleet mix is forecast to increase to 15% in 2030, 40% in 2040, 65% in 2050
- These are median figures and there is significant uncertainty regarding EV uptake
- Early delivery of interventions that might lead to increased mode shift and lower VKT between now and 2030 will (proportionately) have a greater impact in terms of emissions reductions as average emissions are forecast to be much greater between 2020 and 2030 (compared to later years) due to the lower EV fleet proportion in earlier years
- Conversely, later delivery of interventions that contribute towards modal shift and VKT reduction will result in a lesser impact in terms of emissions reductions

Carbon analysis summary

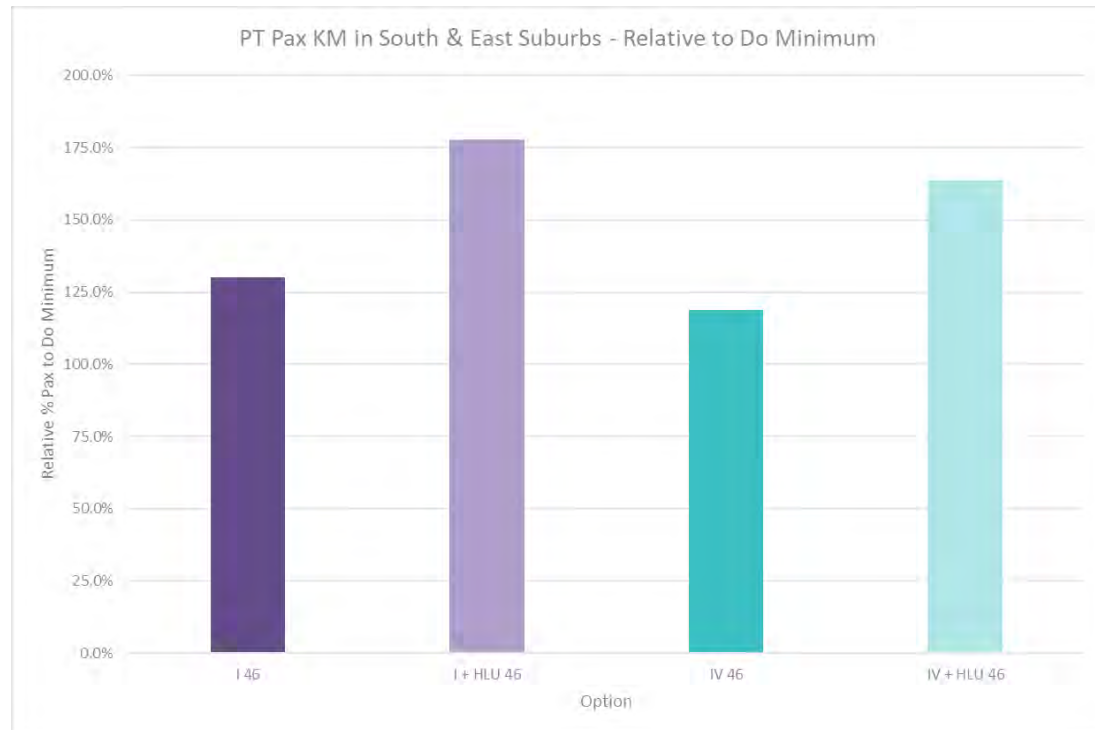
- The main difference in carbon emission performance (as assessed through the modelling) between Option I and Option IV is embodied emissions during the construction phase; there no significant difference in terms of enabled emissions
- The difference in whole of life emissions between the Core Scenario and Intensified Scenario is significantly higher than the difference between Option I and Option IV, highlighting the importance of intensification in terms of reducing emissions regardless of the option
- The difference between delivering an option earlier or later can be more significant than the difference between Option I and Option IV, highlighting the need to invest and reduce emission as quickly as possible from the present day in order to have meaningful impacts in terms of emissions reductions

Mode Share

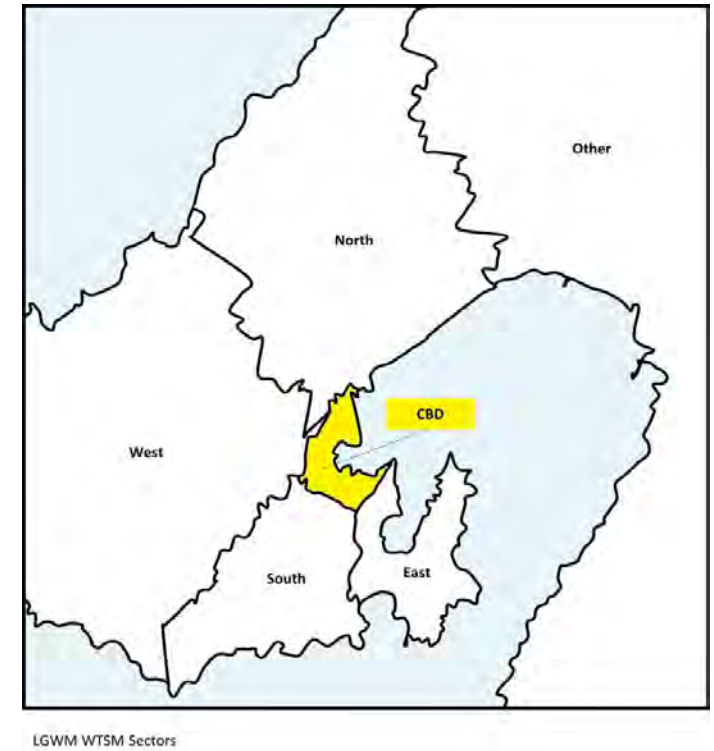
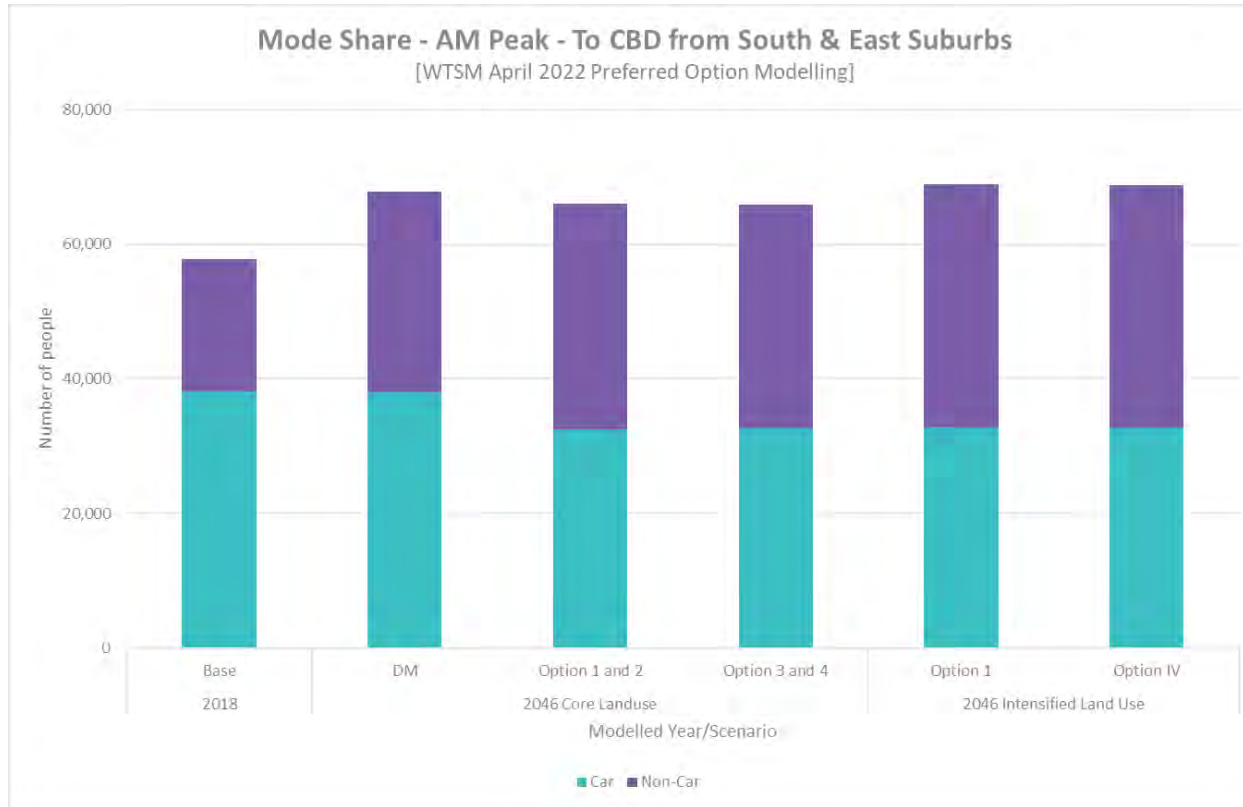
Mode share has been calculated at a number of levels to understand differences between options. Focus has been on mode share to the CBD rather than at a regional level as this demonstrates the greatest impact

PT Pax Km – South and East suburbs

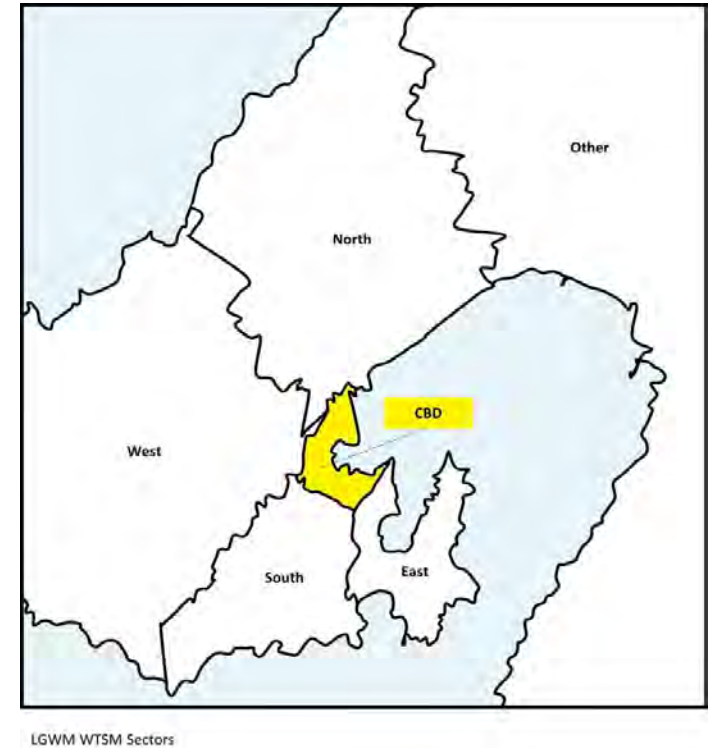
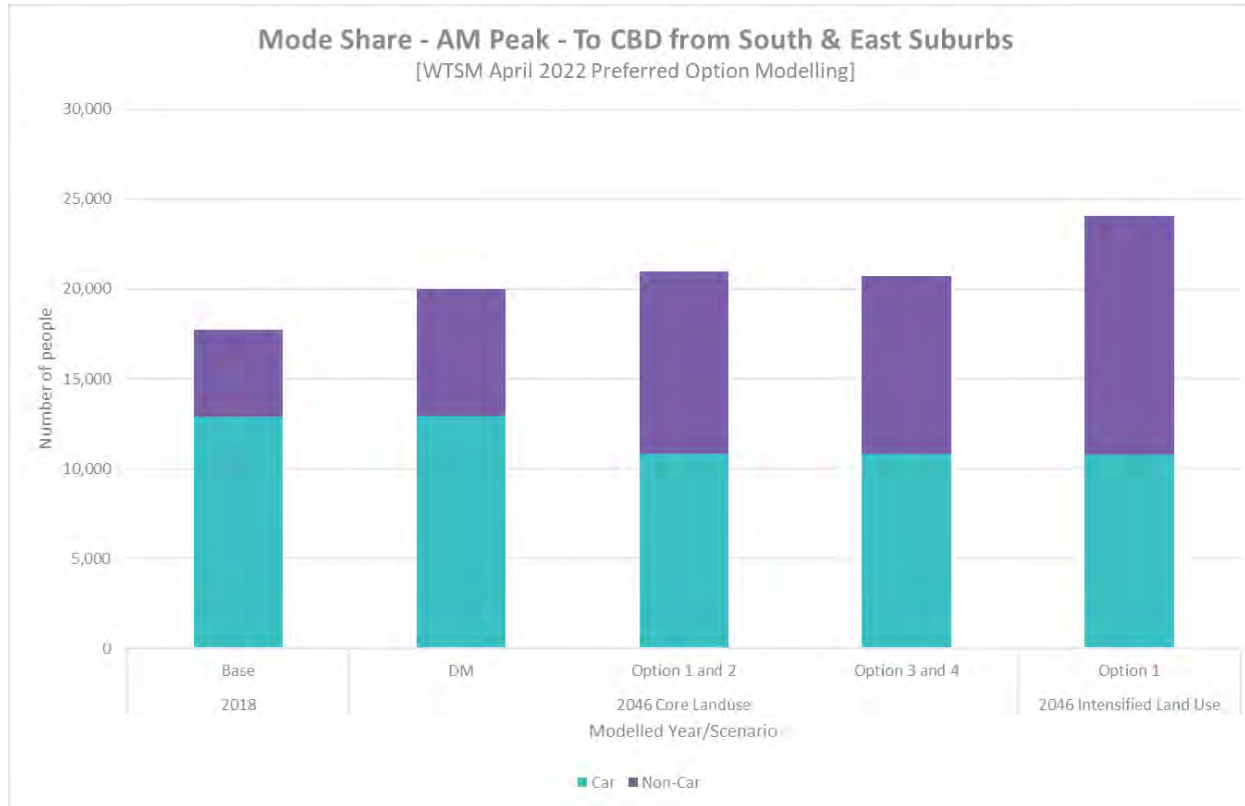
- PT km travelled increase overtime between base and do min
- Options 1 and 4 increase PT km travelled relative to the do min
- Option 1 delivers roughly twice the increase of option 4
- Intensified land use results in the highest increase in PT uptake



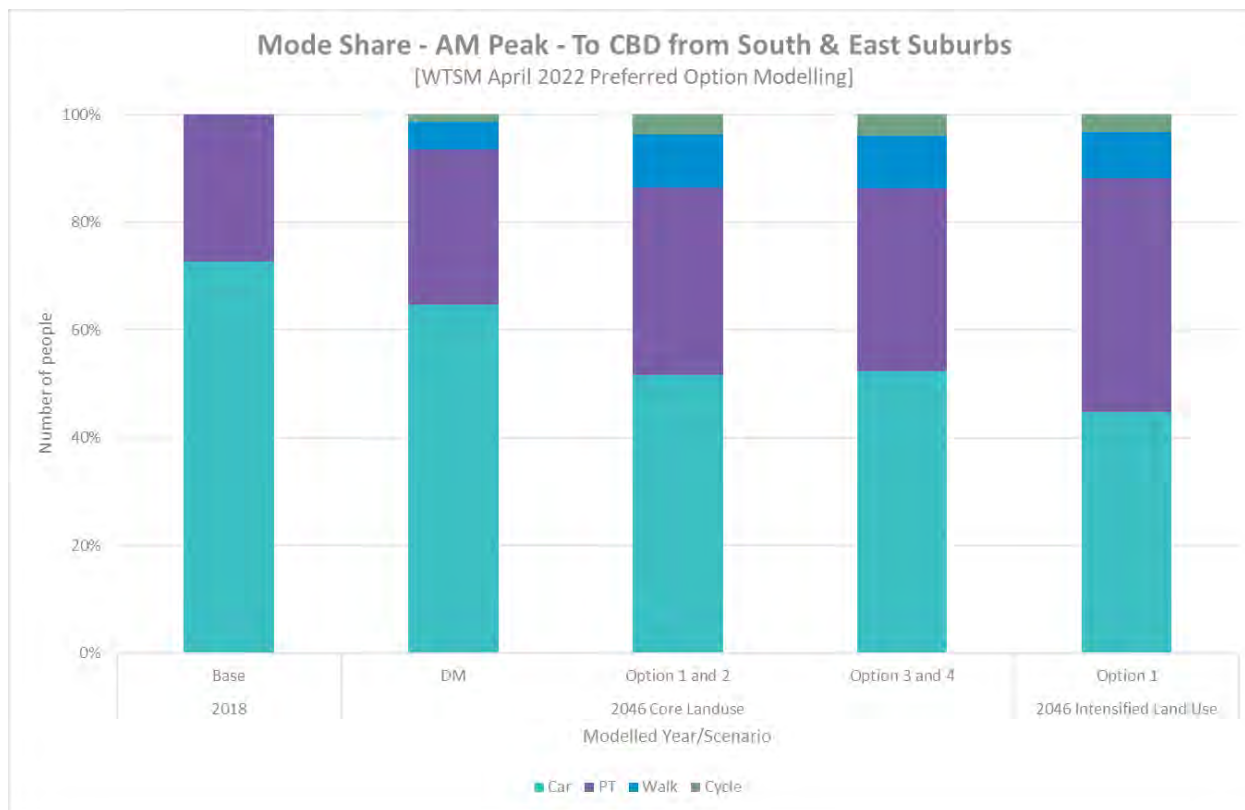
Person trips by mode – To CBD



Person trips – To CBD from South and East



Mode Share - Cordon crossings from south and east



Overall mode share commentary

Background growth is forecast to be more significant on PT and active modes than for general traffic

LGWM investment sees drop in traffic and increased uptake on PT, particularly to the south and east and an increase in active travel across the city

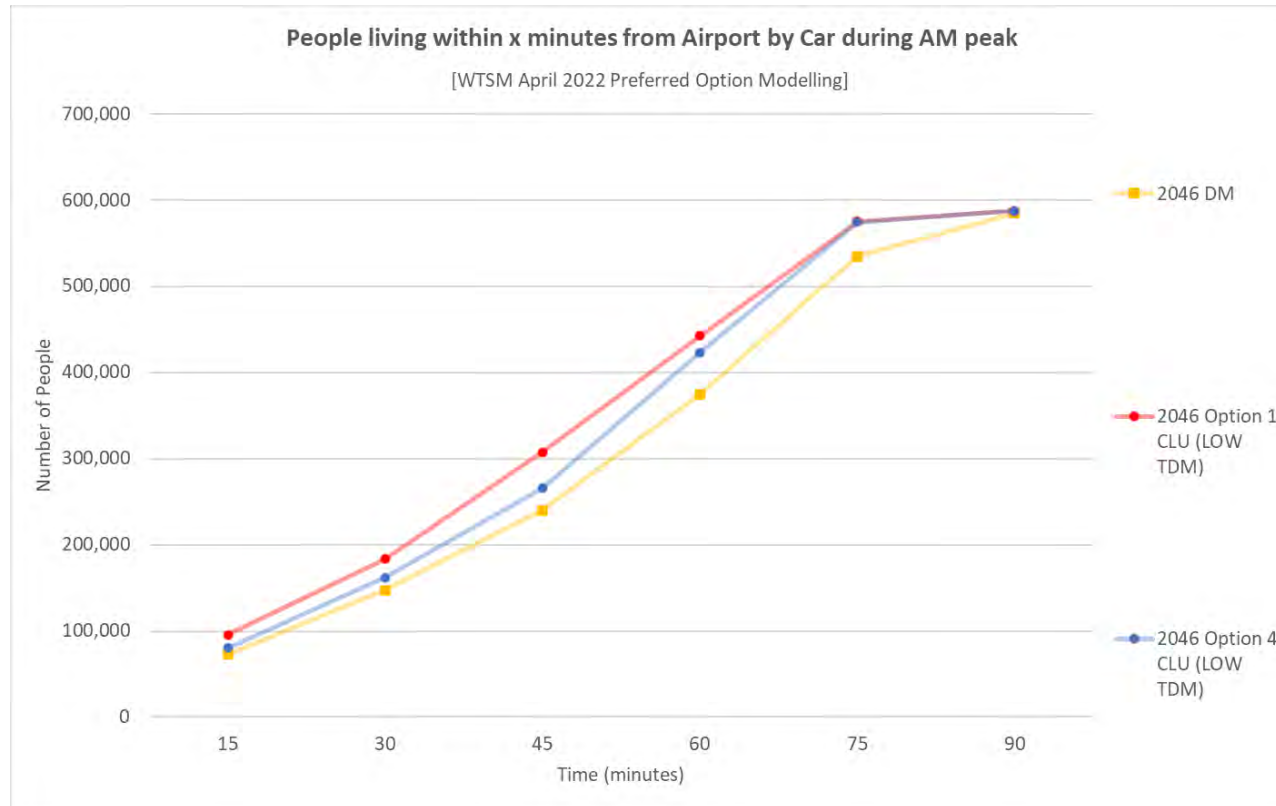
Intensification results in further shift from car to PT and active travel

Very limited differentiation between the options

Accessibility

Graphs show an assessment of the number of people and jobs within key time increments of the airport and railway station

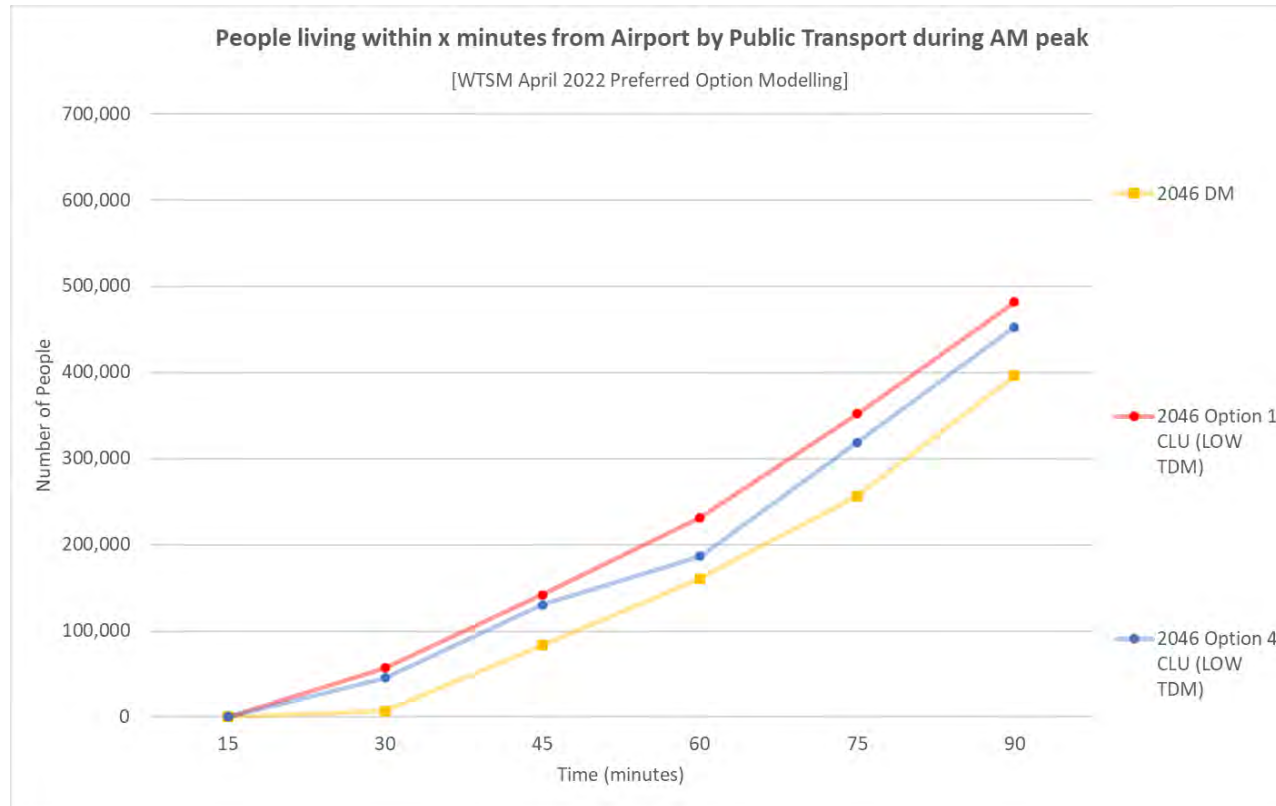
Accessibility - Airport



Graph shows number of people who live within x minutes of the airport by car.

Over 500,000 people are within an hour of the airport under option 1, compared to around 420,000 under option 4 and 380,000 under the do minimum, indicating the contribution of the Basin and Mt Vic Tunnel

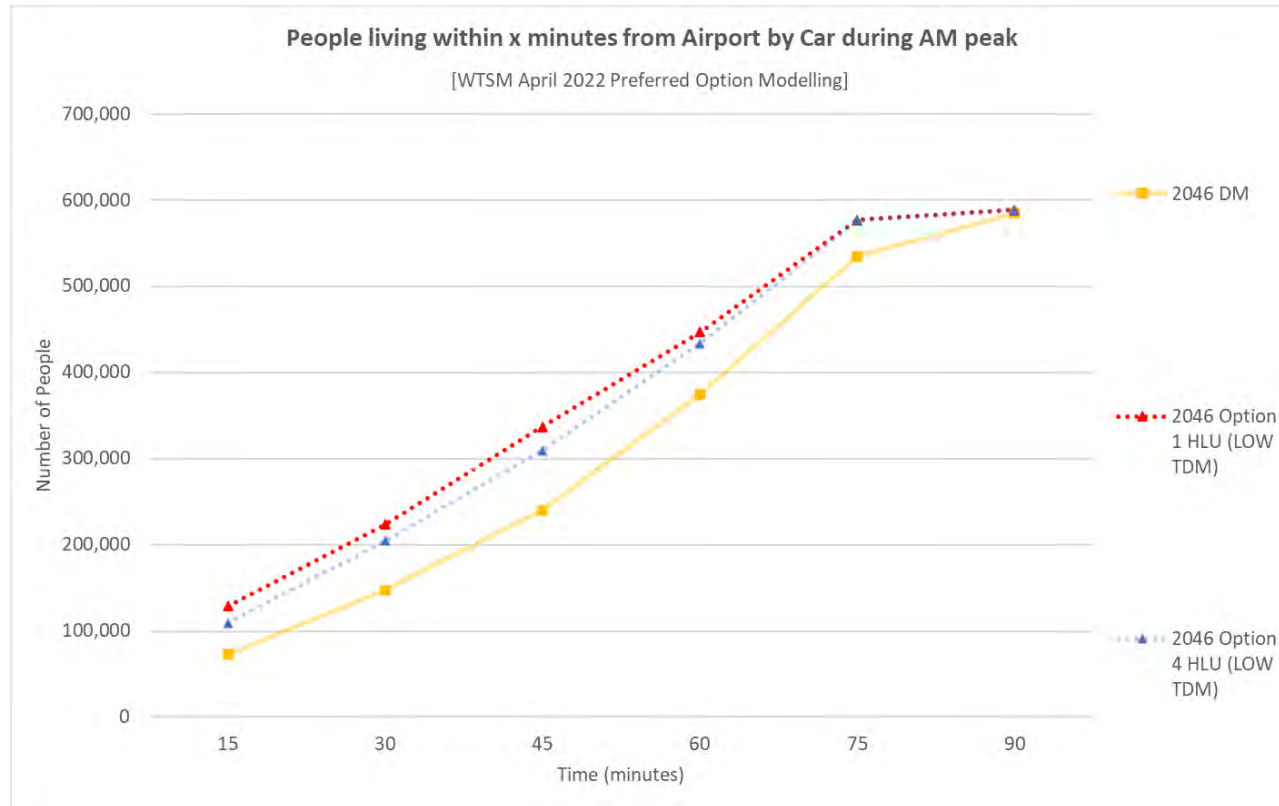
Accessibility - Airport



PT accessibility shows a similar pattern to traffic accessibility reflecting the benefit to PT of the interventions to the east

Under option 1, around 270,000 people can access the airport in under an hour by PT compared to 210,000 people for option 4 and 160,000 for the do minimum

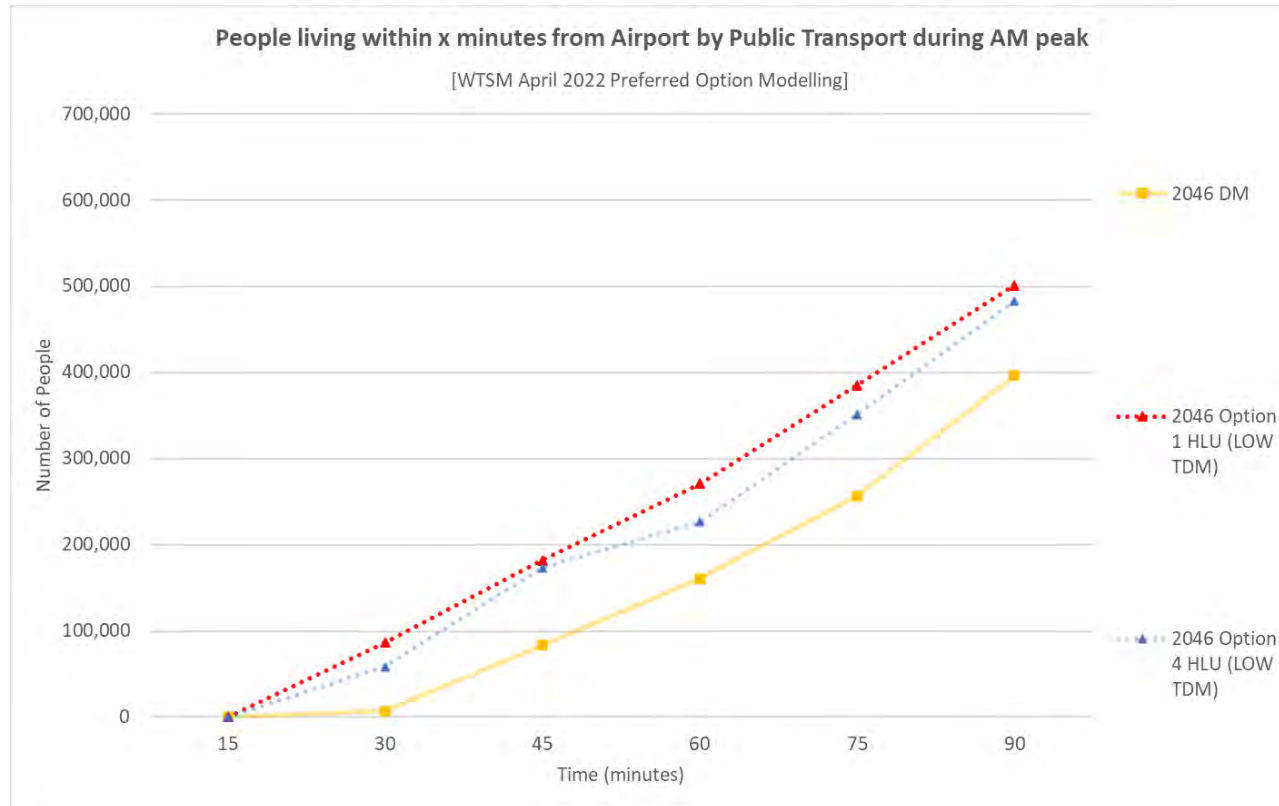
Accessibility - Airport



Land use intensification results in improved accessibility.

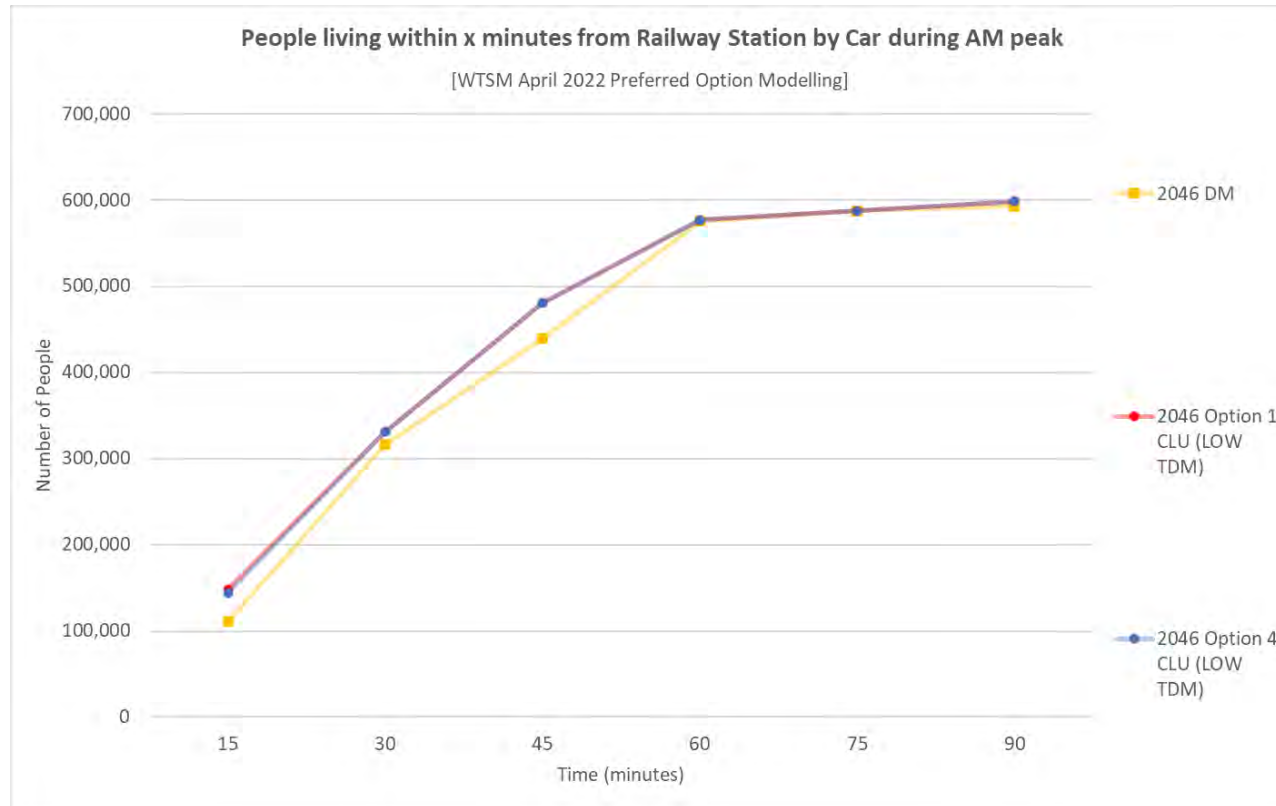
260,000 people can access the airport by car in 30 minutes in the intensified option 1 scenario compared to just over 200,000 in the core land use scenario

Accessibility - Airport



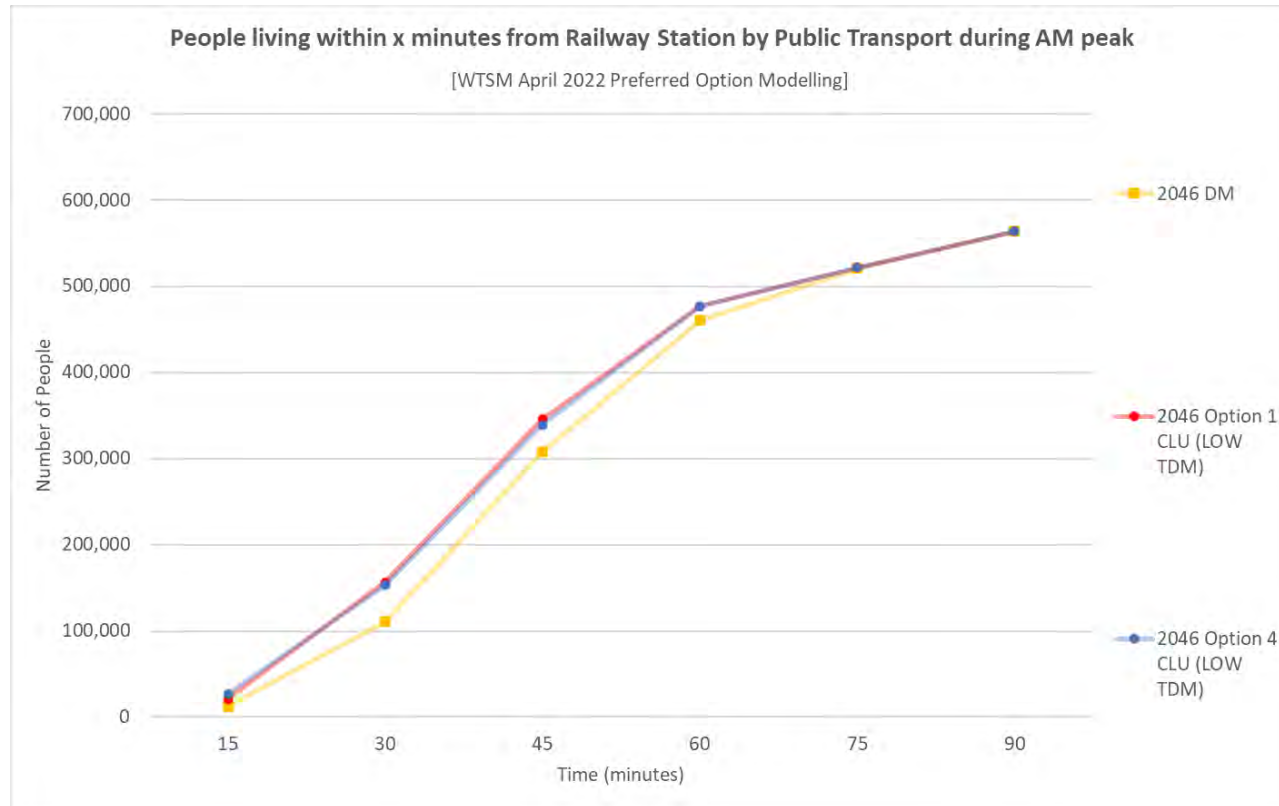
Land use intensification also results in increased public transport accessibility for the airport

Accessibility - Station



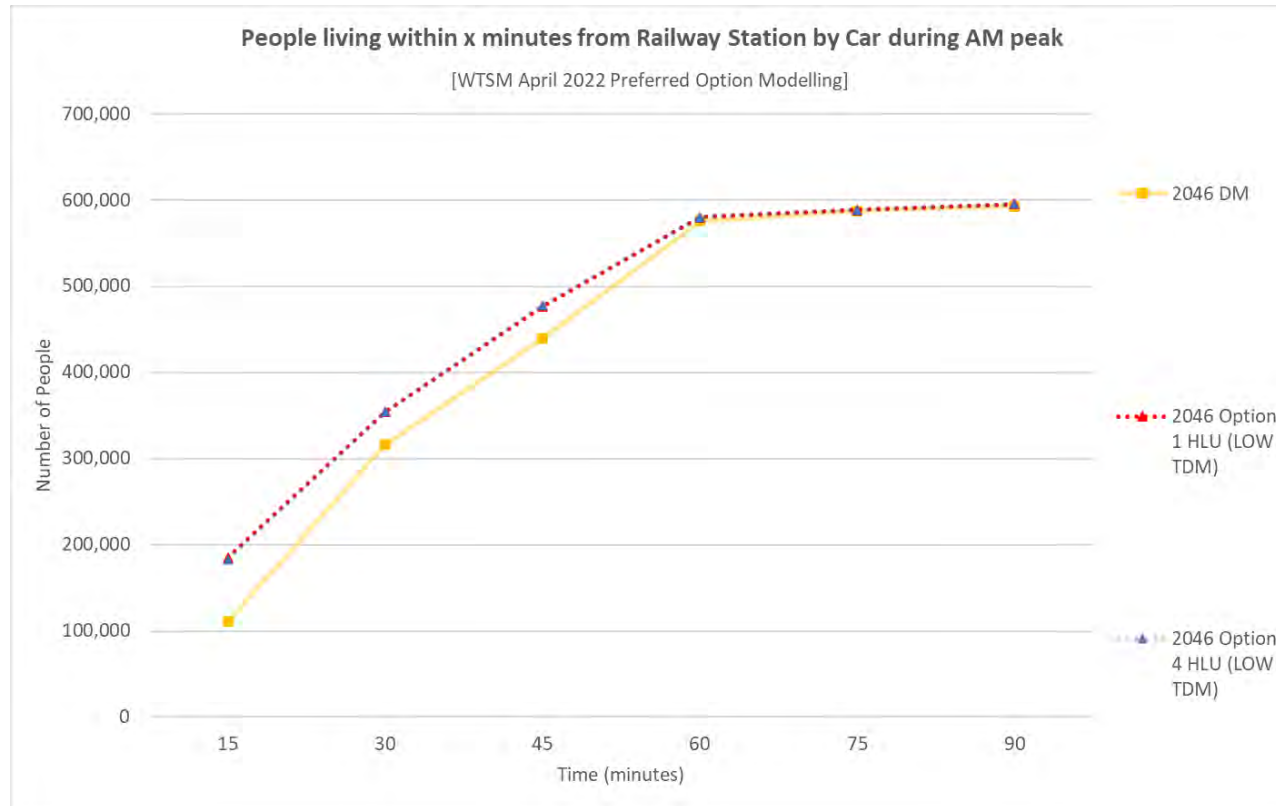
Both tested options demonstrate an increase in accessibility from the northern part of the CBD (taken from the railway station), however there is little differentiation between the options

Accessibility - Station



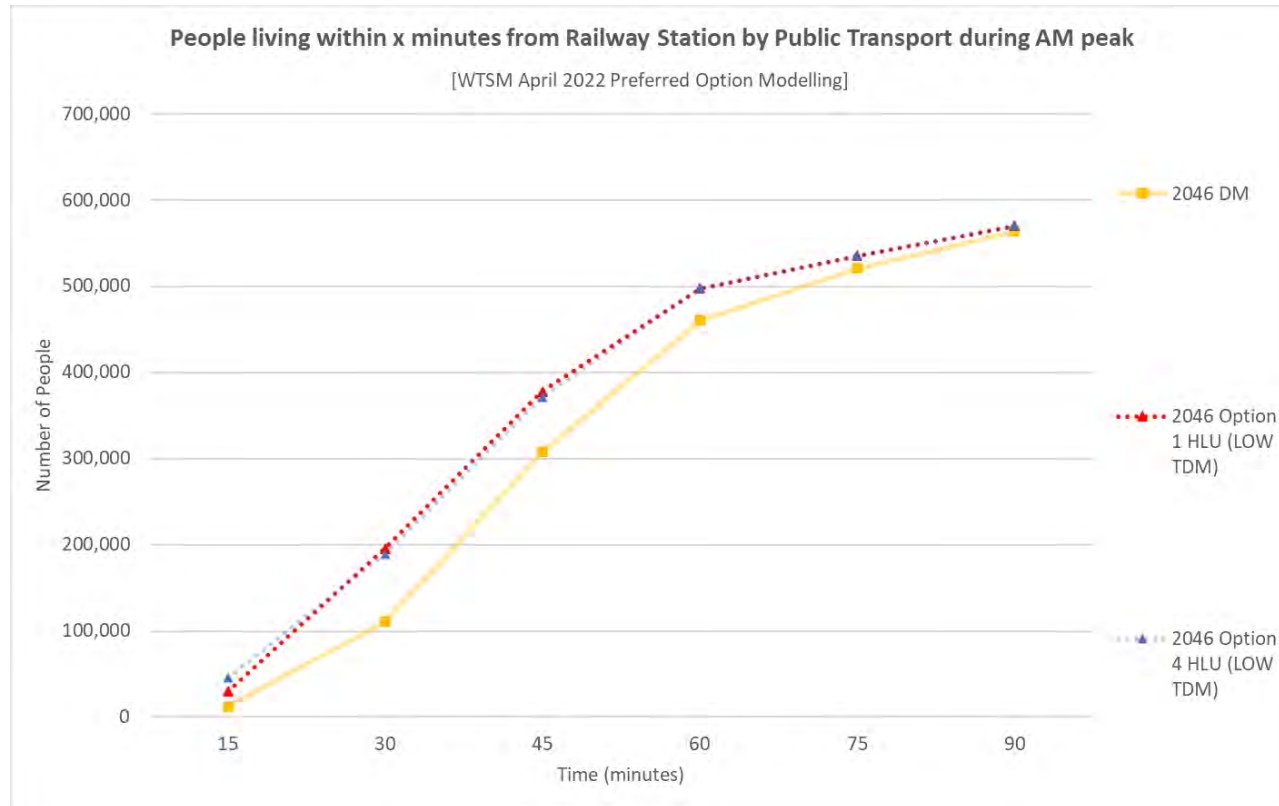
Public transport accessibility to the northern CBD is improved by both options relative to the do minimum. Again, there is little differentiation between the two tested options

Accessibility - Station



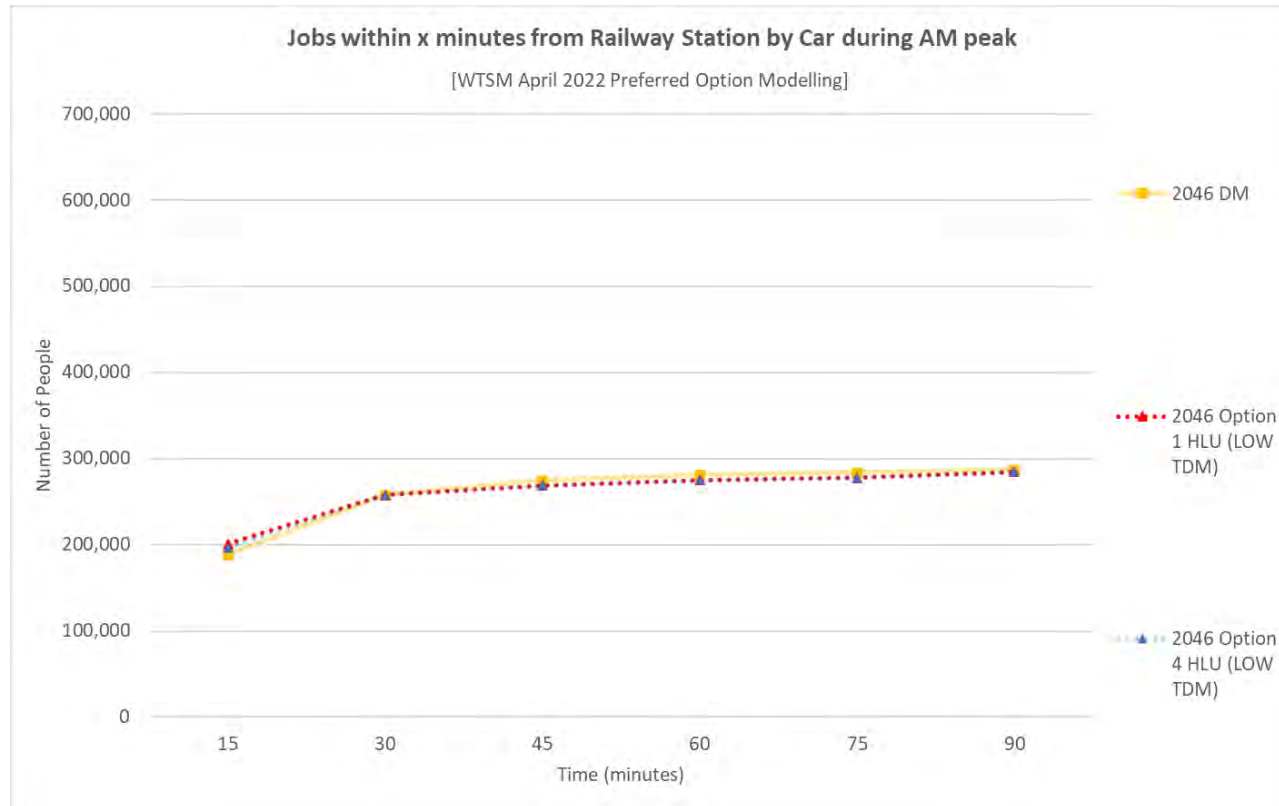
Increased residential density means that more people live within closer proximity of the northern CBD (again, little difference between the options)

Accessibility - Station



Increased residential density means that more people live within closer proximity of the northern CBD (again, little difference between the options)

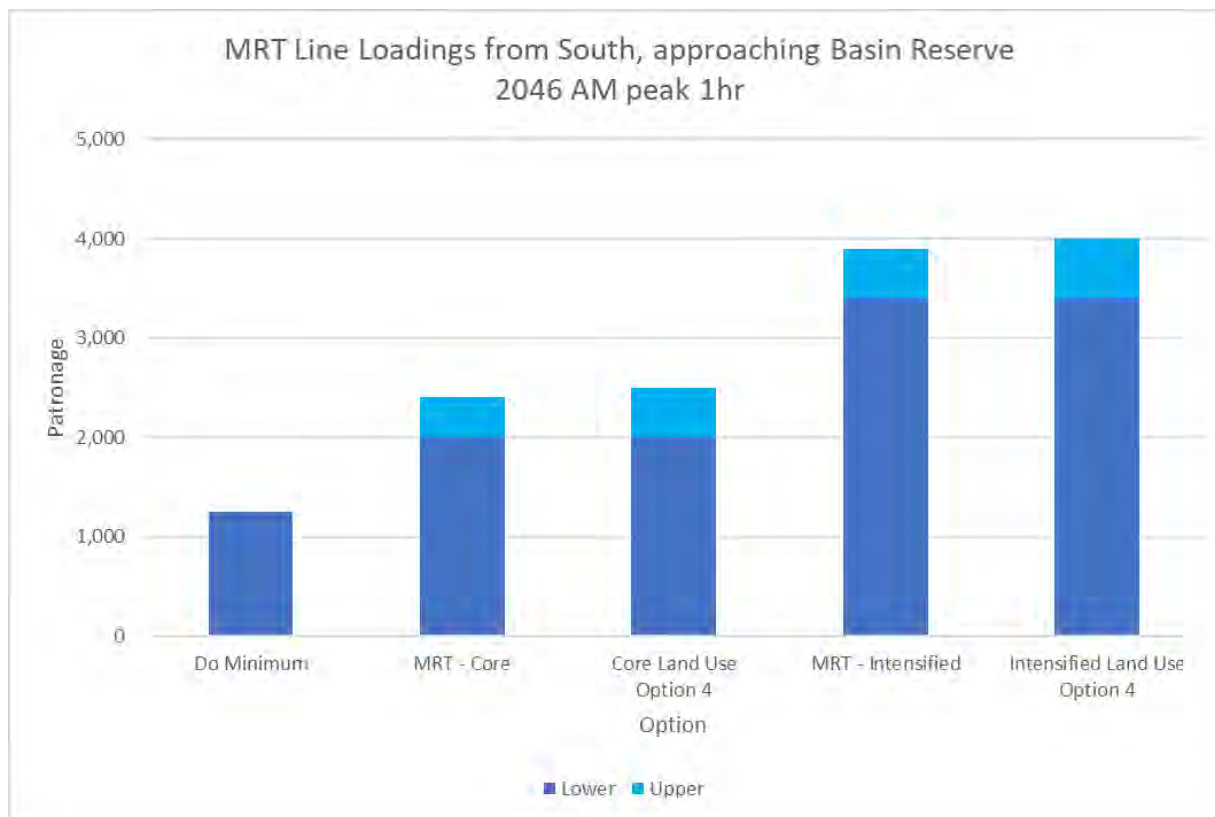
Accessibility - Station



Line loadings

This section presents line loadings for the southern and eastern corridors. This can be used to determine required capacity and therefore inform decisions on mode and vehicle size.

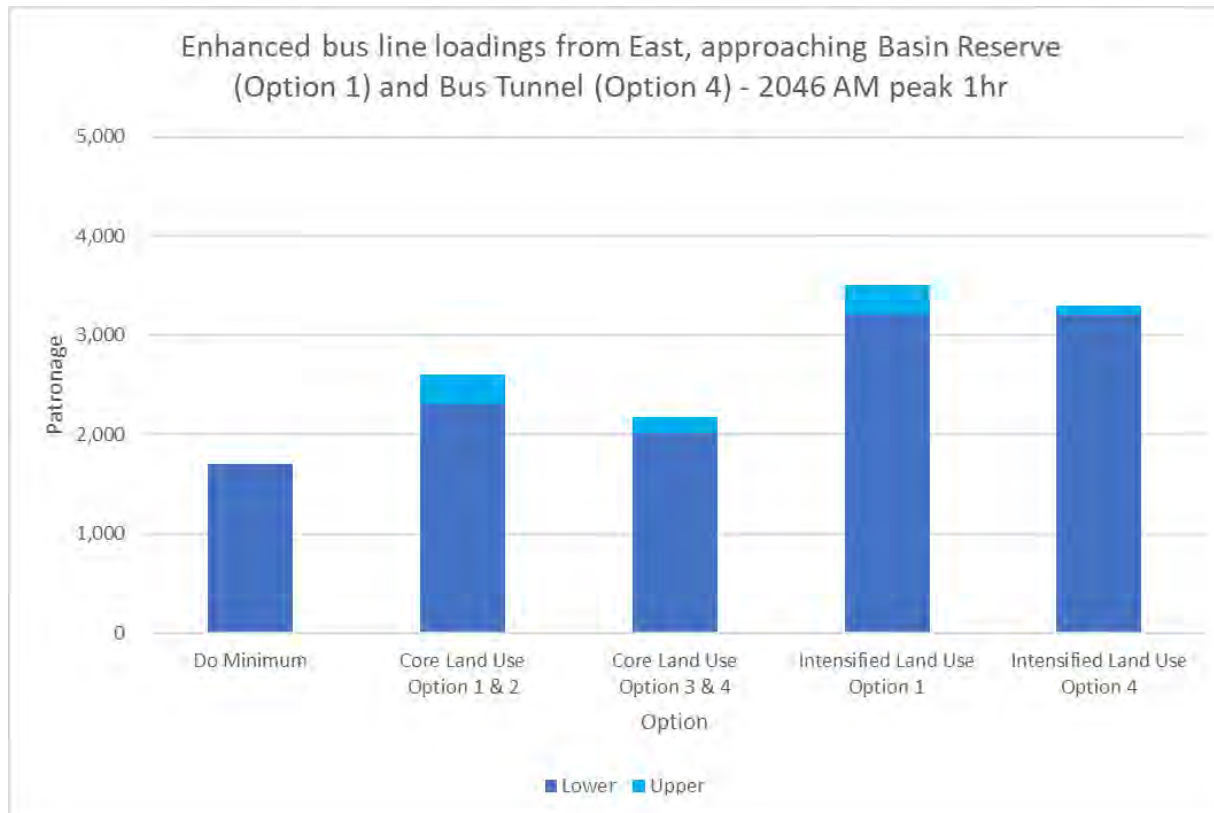
Line loadings from the south



Line loadings show the following:

- 2,000 to 2,500 on MRT at the peak load point in 2046 under the core scenario
- 3,400 to 4,000 on MRT at the peak load point in 2046 under the intensified scenario

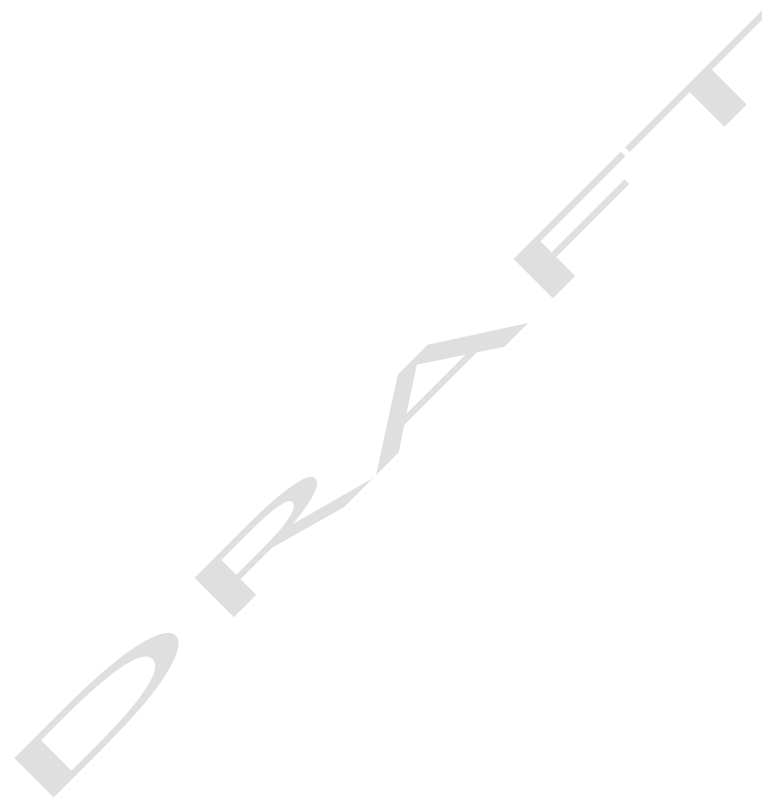
Line loadings from the east



Line loadings show the following:

- 2,300 to 2,600 on MRT at the peak load point in 2046 under the core scenario
- 3,400 to 4,000 on MRT at the peak load point in 2046 under the intensified scenario
- Note Option 1 excludes 600 to 800 people from the Hataitai catchment who continue to use the bus tunnel

Appendix B – Aimsun Model Output



PREFERRED OPTION MODELLING RESULTS

Appendix B – Aimsun modelling

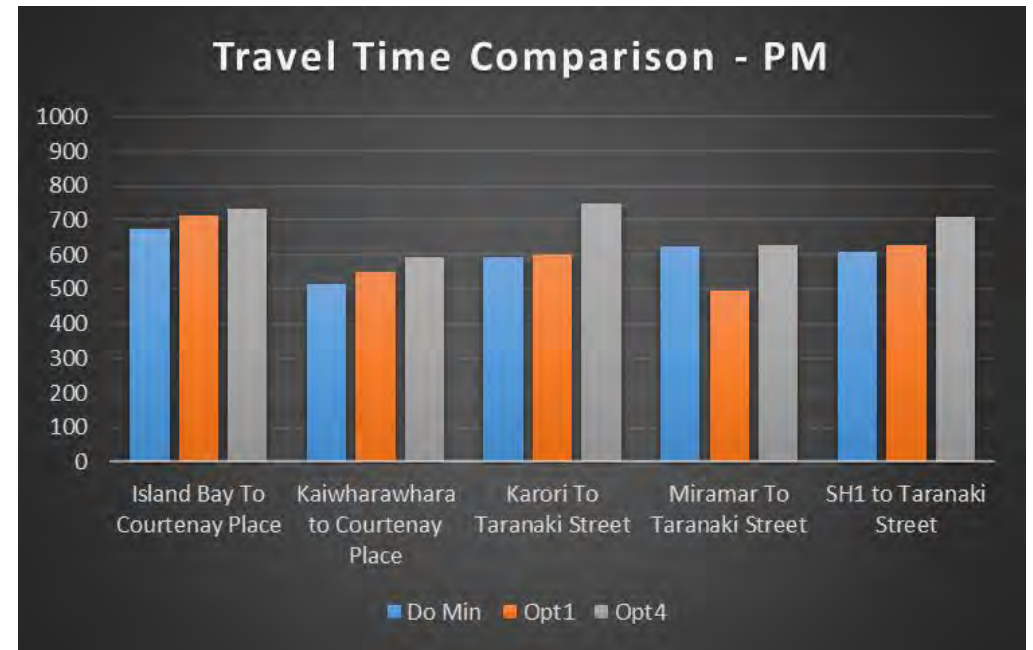
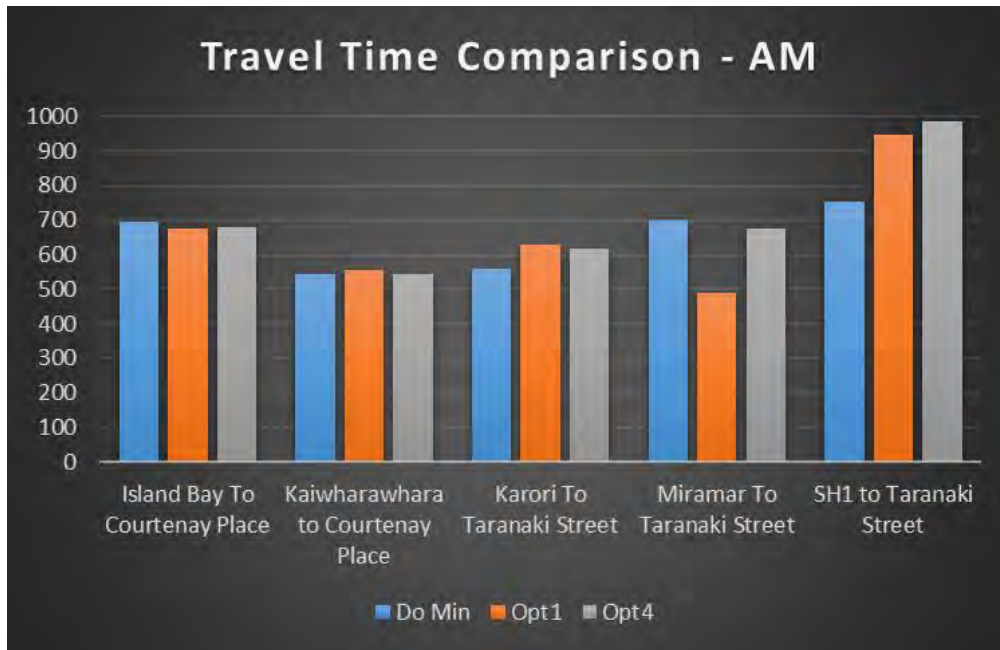
13th April 2022



Modelling approach

- Modelling undertaken to inform aspects of preferred option reporting
- Two areas of focus for preferred option reporting:
 - Areas of differentiation between options – mode choice, accessibility, carbon and economics
 - Key outstanding question to be answered (LRT vs BRT, Mt Vic vs no Mt Vic, Basin Grade separation vs at grade)
- Where possible, draw on previous work – PASLO modelling, business cases, engagement feedback
- Model refinements based on assumption changes and network clarifications prioritising options 1 and 4 (two bookend options with interpolation used to understand the relative impact of options 2 and 3)

Travel Time Summary AM and PM Peaks

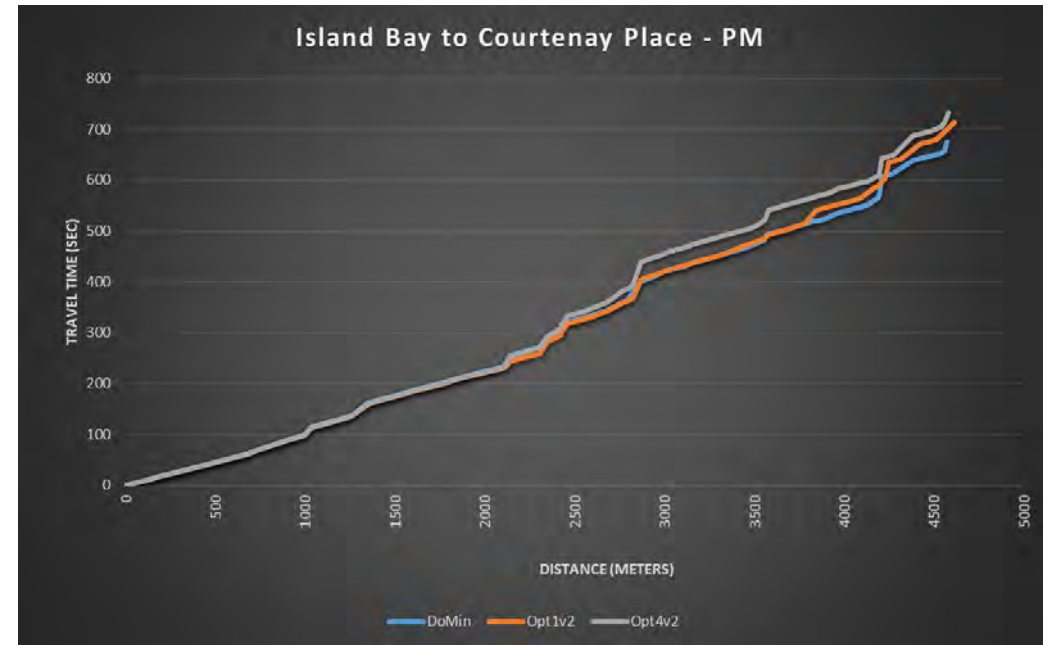
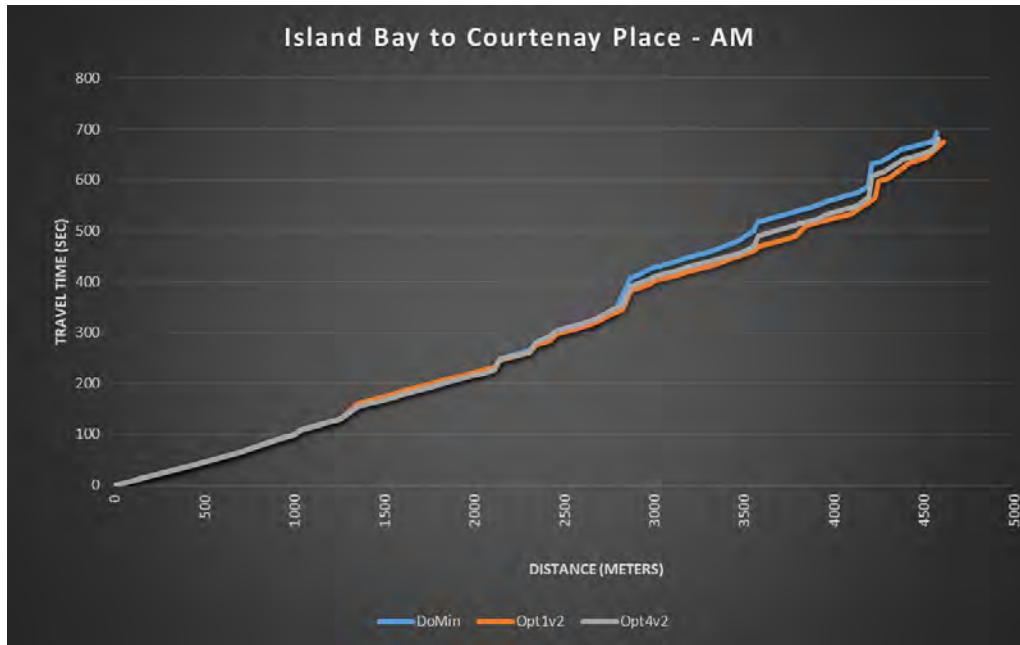


Travel Time Summary AM and PM Peaks

	Do Min	Opt1	Opt4
Island Bay To Courtenay Place	11:30	11:15	11:15
Kaiwharawhara to Courtenay Place	09:00	09:15	09:00
Karori To Taranaki Street	09:15	10:30	10:15
Miramar To Taranaki Street	11:30	08:15	11:15
SH1 to Taranaki Street	12:30	15:45	16:30

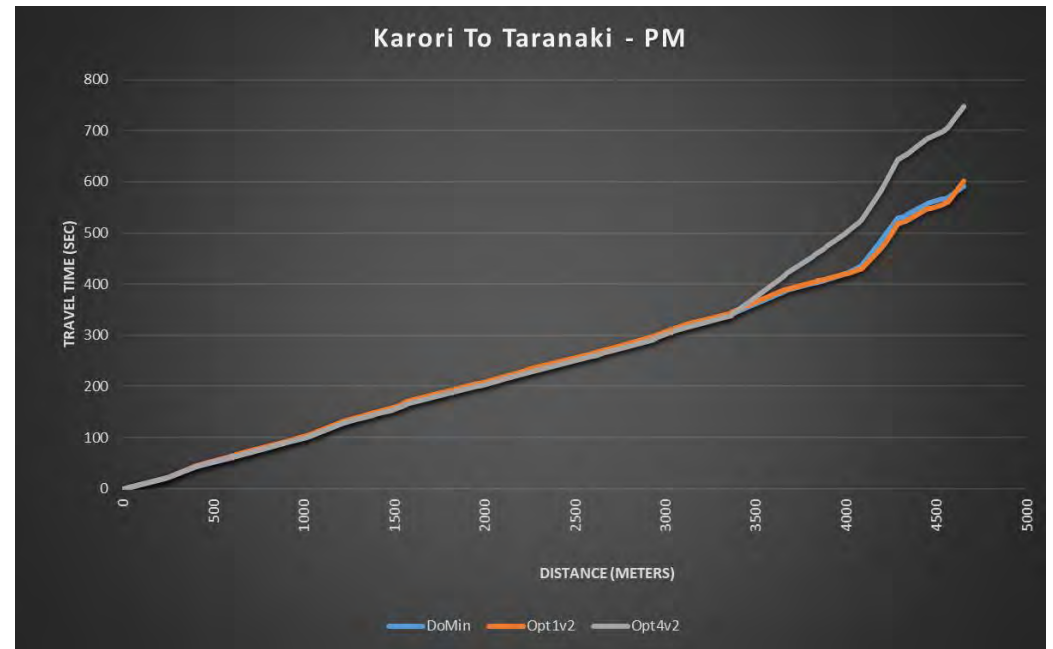
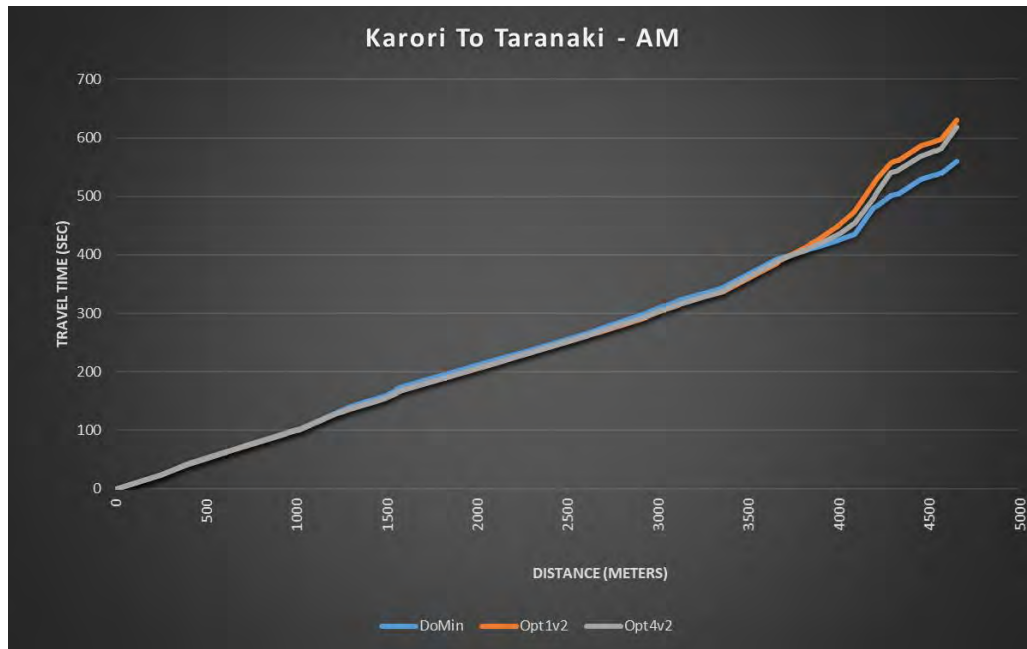
	Do Min	Opt1	Opt4
Island Bay To Courtenay Place	11:15	11:54	12:11
Kaiwharawhara to Courtenay Place	08:36	09:12	09:52
Karori To Taranaki Street	09:51	10:01	12:27
Miramar To Taranaki Street	10:24	08:17	10:26
SH1 to Taranaki Street	10:10	10:28	11:48

Travel Time – Island Bay to Courtenay Place

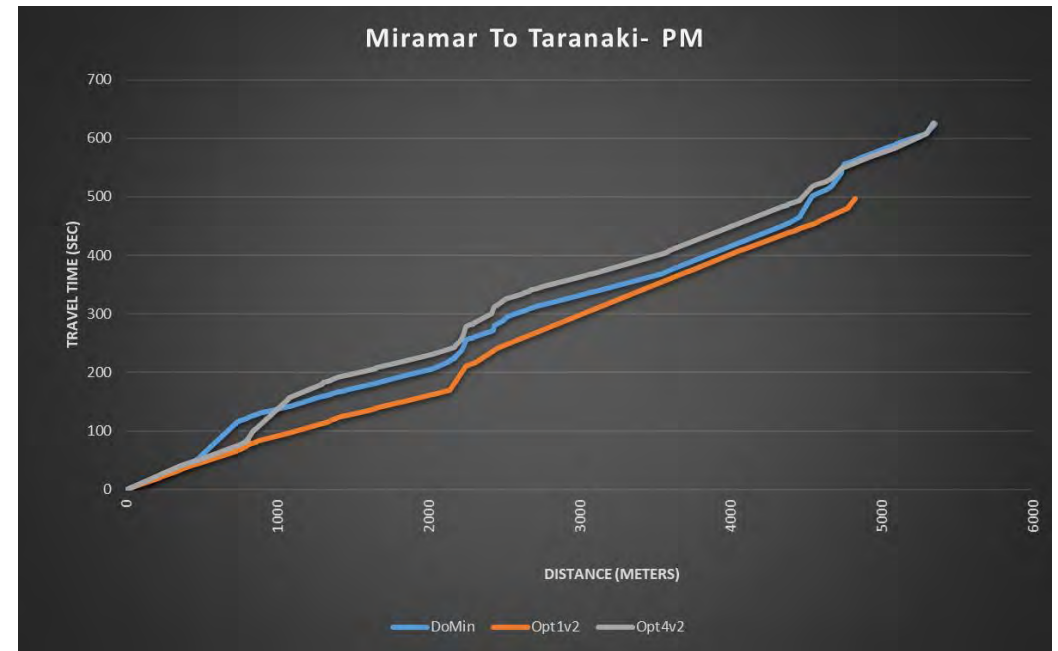
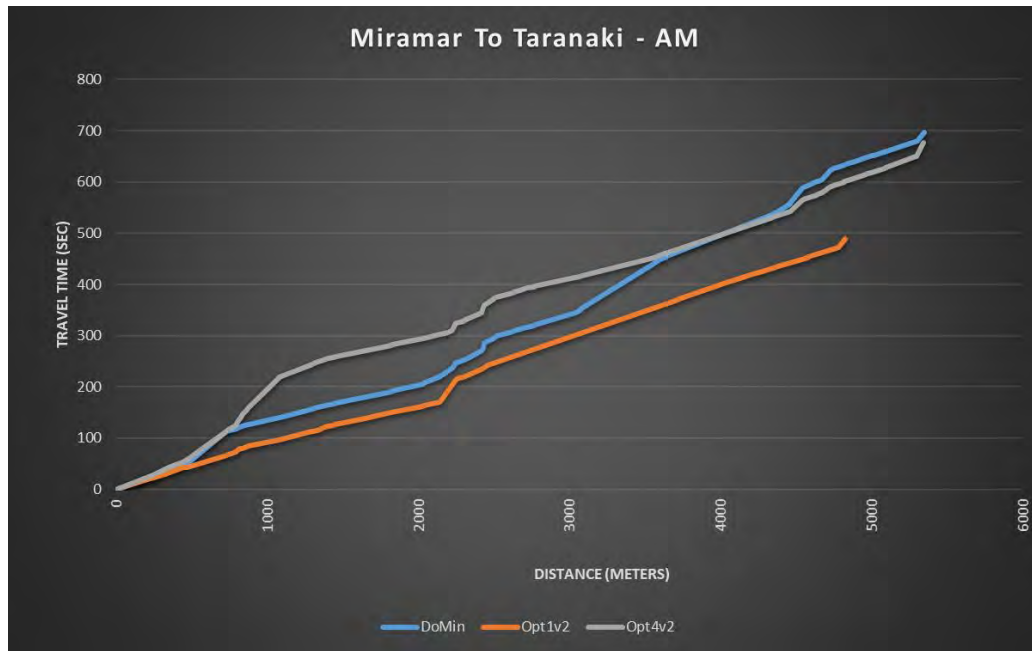


Travel Time – Karori to Taranaki Street

Attachment 1a to Report 22.227

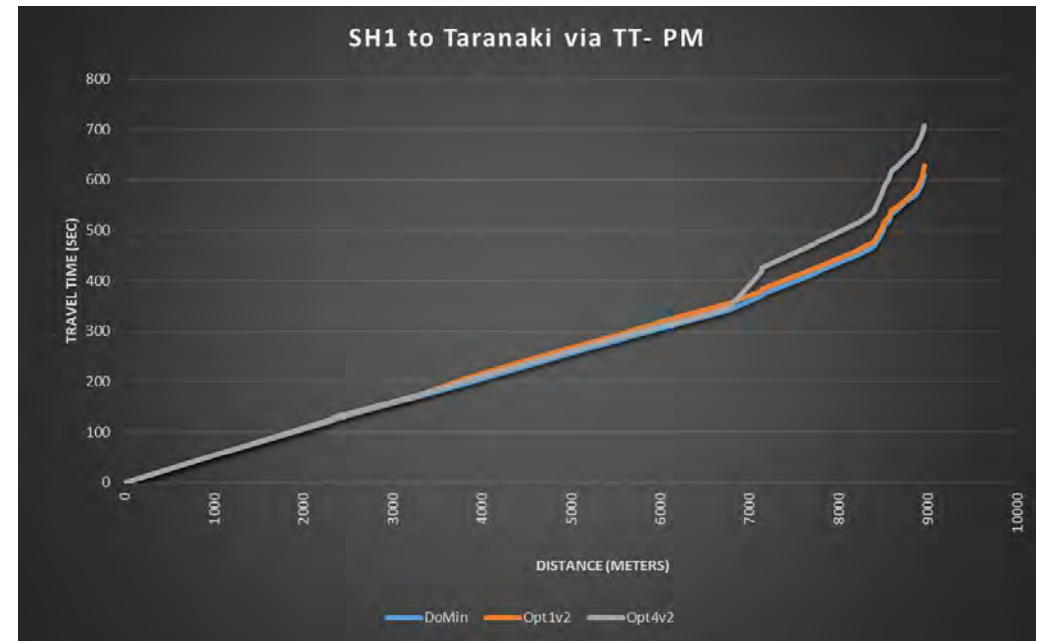
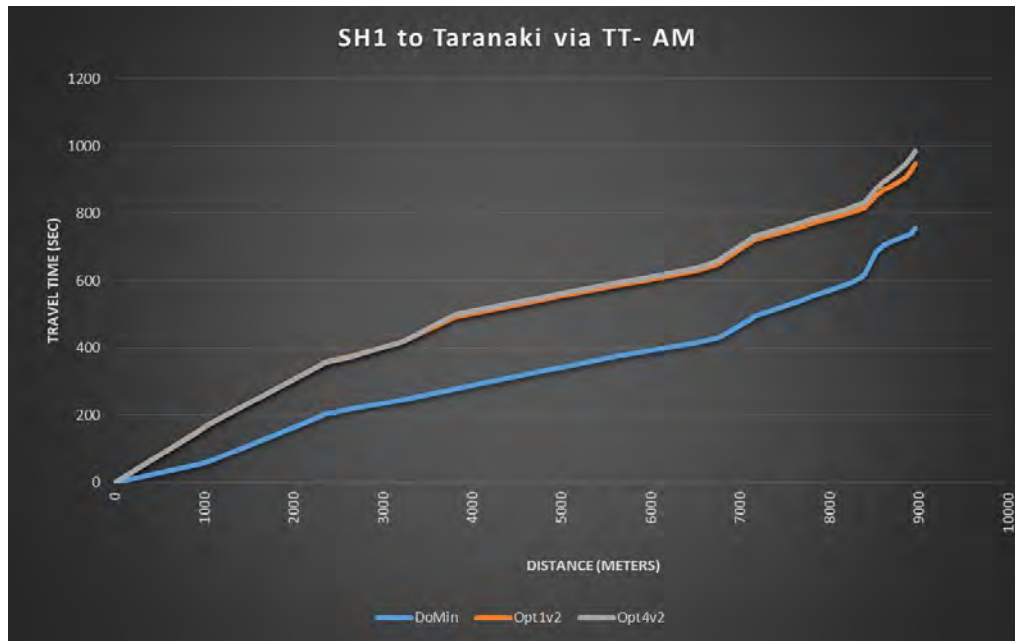


Travel Time – Miramar to Taranaki Street



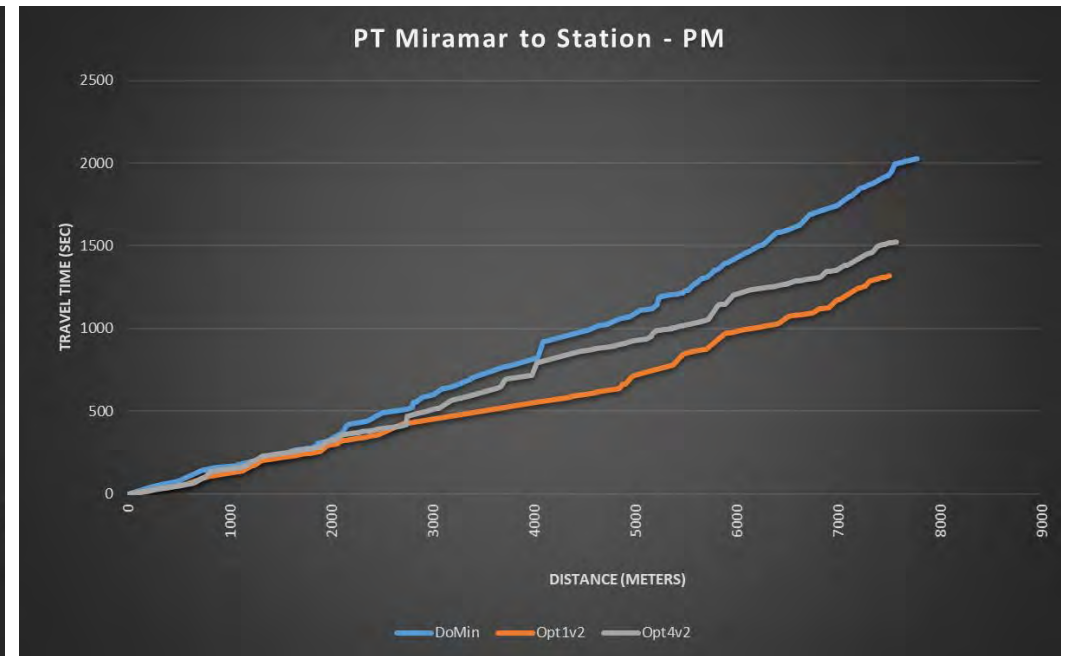
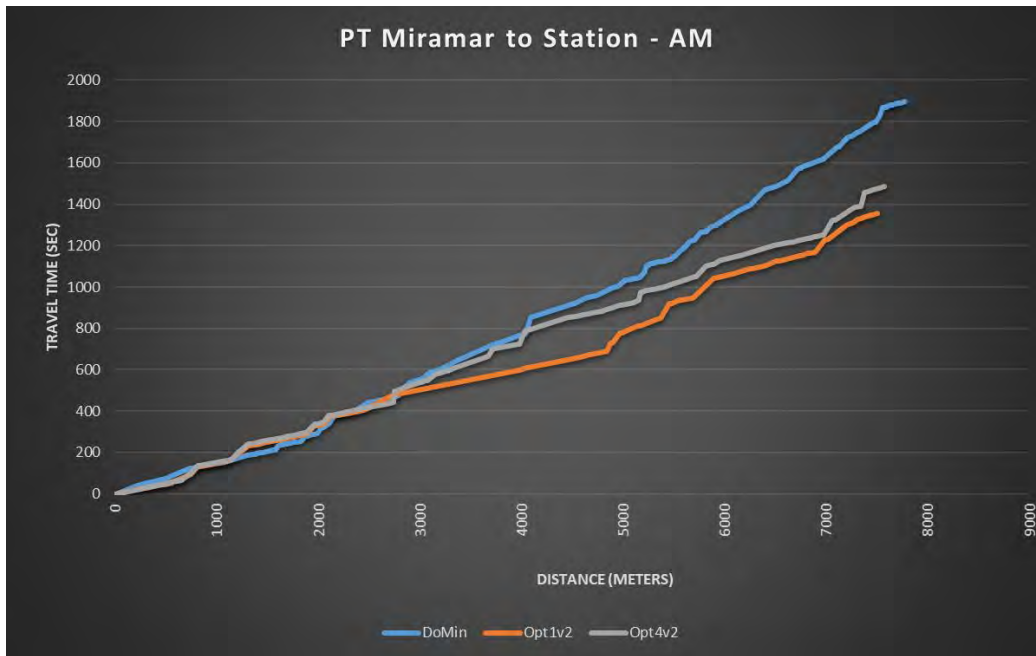
Travel Time – SH1 to Taranaki Street

Attachment 1a to Report 22.227



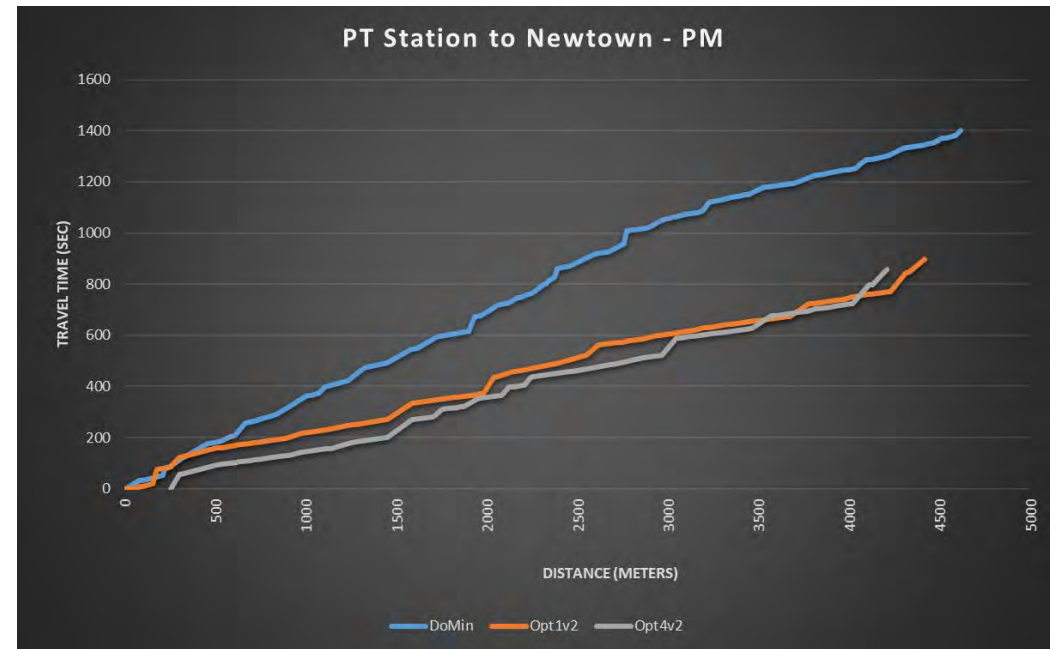
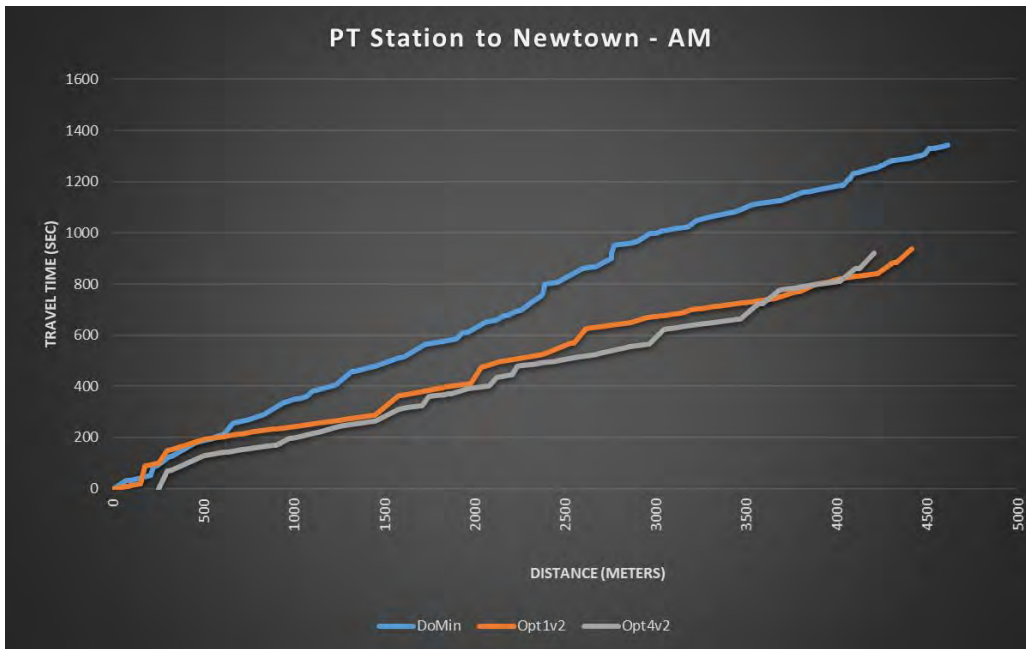
PT Travel Time – Miramar to Station

Attachment 1a to Report 22.227

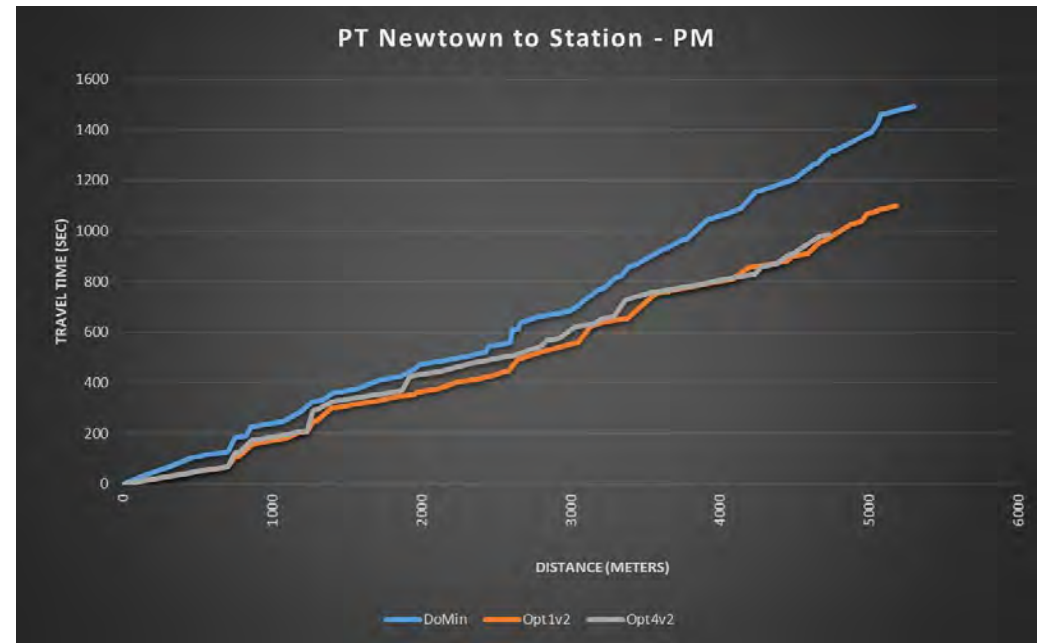
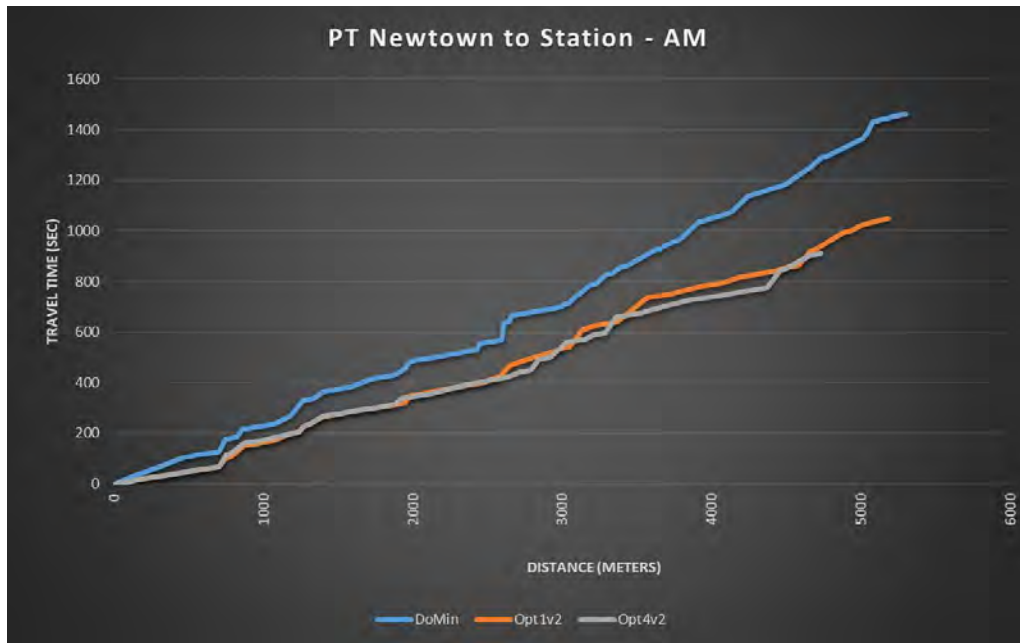


PT Travel Time – Station to Newtown

Attachment 1a to Report 22.227

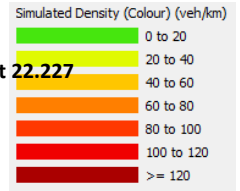


PT Travel Time – Newtown to Station



LGWM – Kaiwharawhara/Aotea Quay Area

AM (8:00AM to 9:00AM) (Attachment 1a to Report 22.227)



Do-Minimum

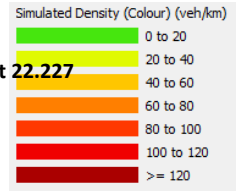
Consultation Option 1

Consultation Option 4



LGWM – Thorndon Area

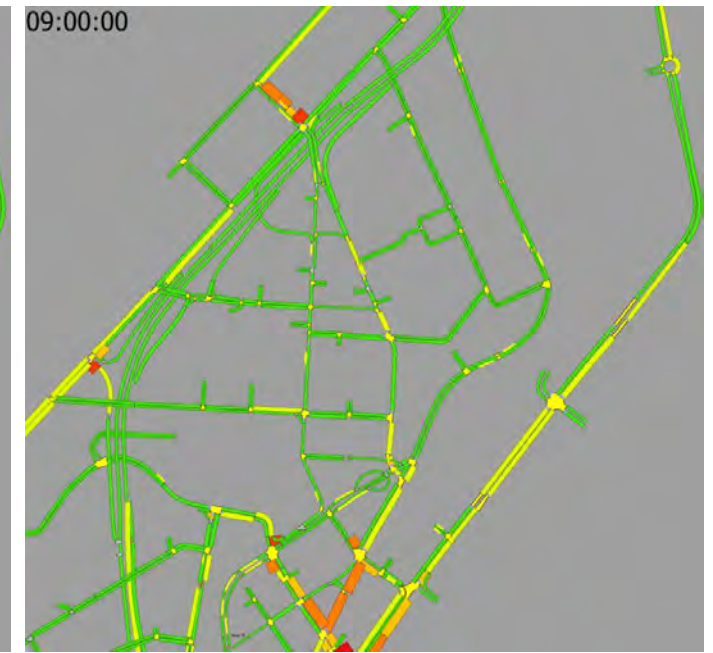
AM (8:00AM to 9:00AM) (Attachment 1a to Report 22.227)



Do-Minimum

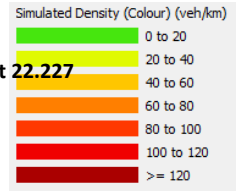
Consultation Option 1

Consultation Option 4



LGWM – Wellington Central Area

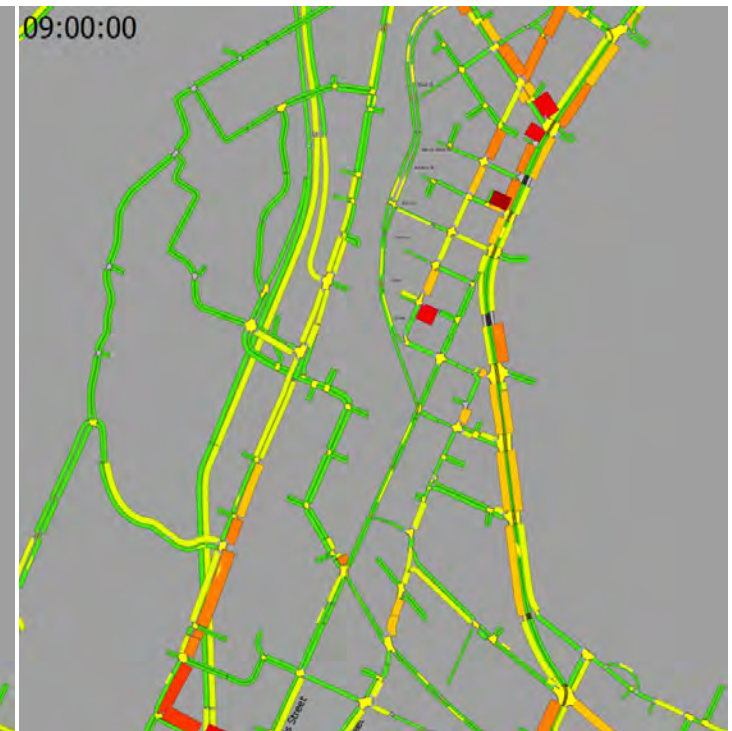
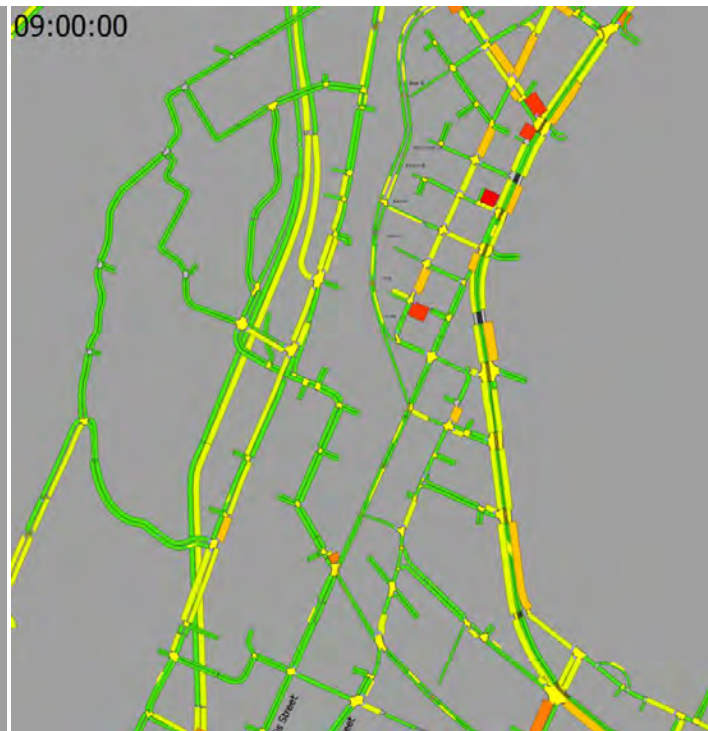
AM (8:00AM to 9:00AM) Attachment 1a to Report 22.227



Do-Minimum

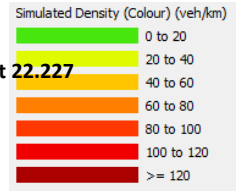
Consultation Option 1

Consultation Option 4



LGWM – Te Aro Area

AM (8:00AM to 9:00AM) Attachment 1a to Report 22.227



Do-Minimum

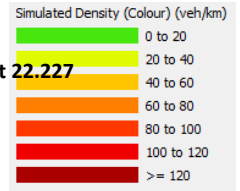
Consultation Option 1

Consultation Option 4



LGWM – South of Basin

AM (8:00AM to 9:00AM) (Attachment 1a to Report 22.227)



Do-Minimum

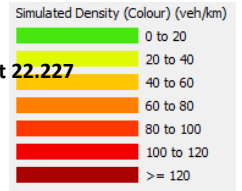
Consultation Option 1

Consultation Option 4



LGWM – East of Basin

AM (8:00AM to 9:00AM) (Attachment 1a to Report 22.227)



Do-Minimum

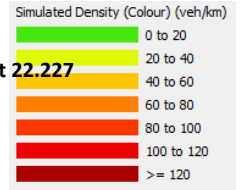
Consultation Option 1

Consultation Option 4



LGWM – Kilbirnie/Hataitai

AM (8:00AM to 9:00AM) (Attachment 1a to Report 22.227)



Do-Minimum

Consultation Option 1

Consultation Option 4

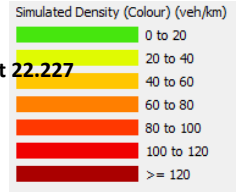


Aimsun Density Plot Comparison

- **Evening Peak (4:00PM to 6:00PM)**
 - **Kaiwharawhara/Aotea Quay**
 - **Thorndon**
 - **Wellington Central**
 - **Te Aro**
 - **South of Basin**
 - **East of Basin**
 - **Kilbirnie/Hataitai**
 - **Airport**

LGWM – Kaiwharawhara/Aotea Quay Area

PM (5:00PM to 6:00PM)



Do-Minimum

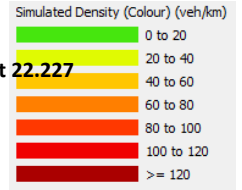
Consultation Option 1

Consultation Option 4



LGWM – Thorndon Area

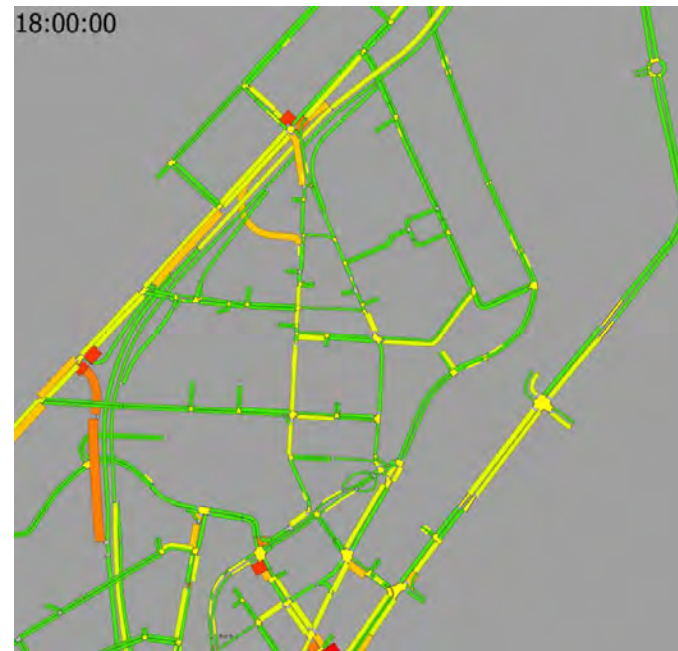
PM (5:00PM to 6:00PM)



Do-Minimum

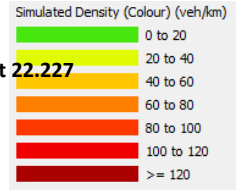
Consultation Option 1

Consultation Option 4



LGWM – Wellington Central Area

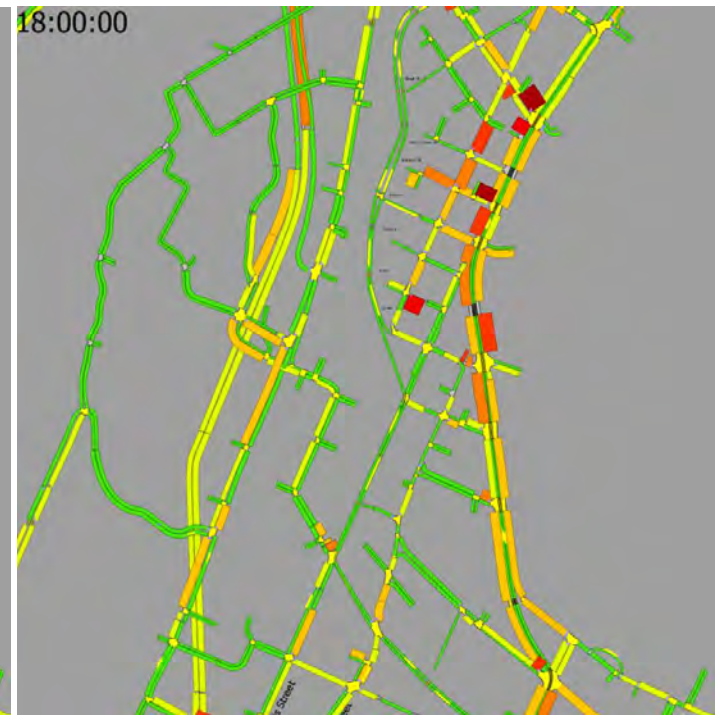
PM (5:00PM to 6:00PM)



Do-Minimum

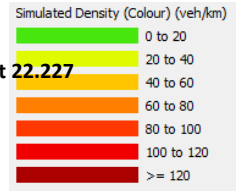
Consultation Option 1

Consultation Option 4



LGWM – Te Aro Area

PM (5:00PM to 6:00PM)



Do-Minimum

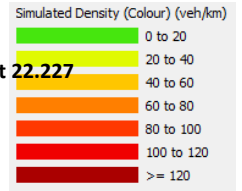
Consultation Option 1

Consultation Option 4



LGWM – East of Basin

PM (5:00PM to 6:00PM)



Do-Minimum

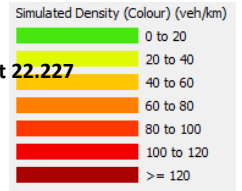
Consultation Option 1

Consultation Option 4



LGWM – Kilbirnie/Hataitai

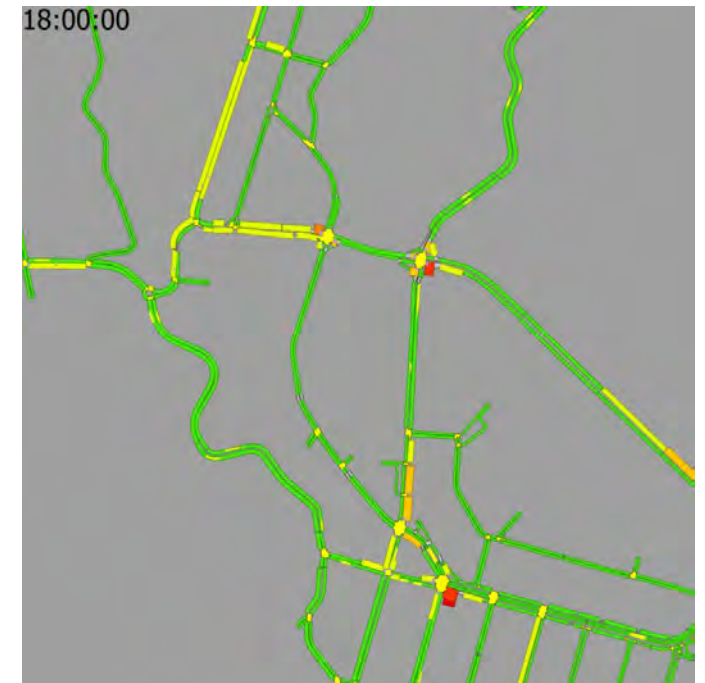
PM (5:00PM to 6:00PM)



Do-Minimum

Consultation Option 1

Consultation Option 4



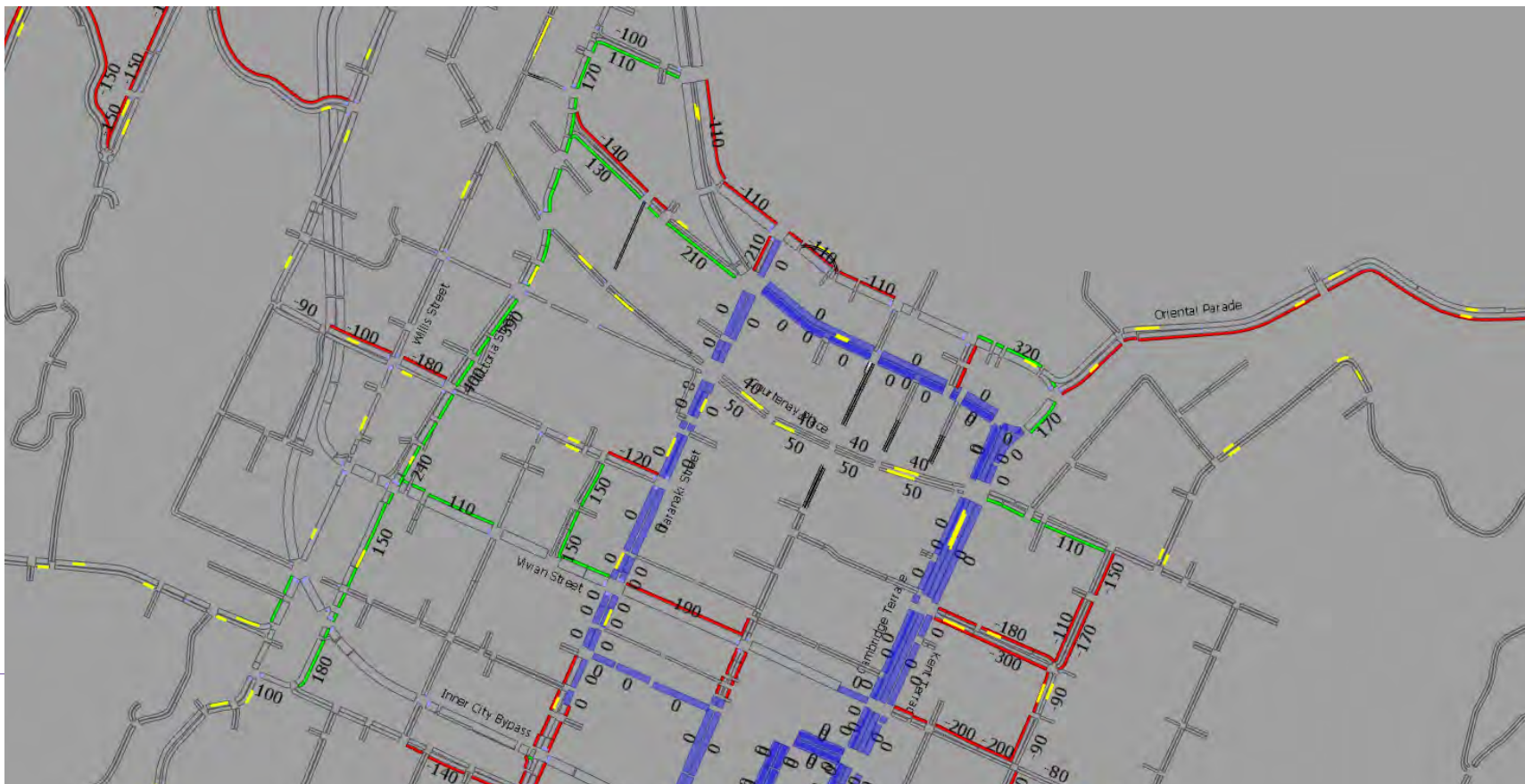
Traffic Demand Comparison

Attachment 1a to Report 22.227

- **Option 1 vs Option 4**

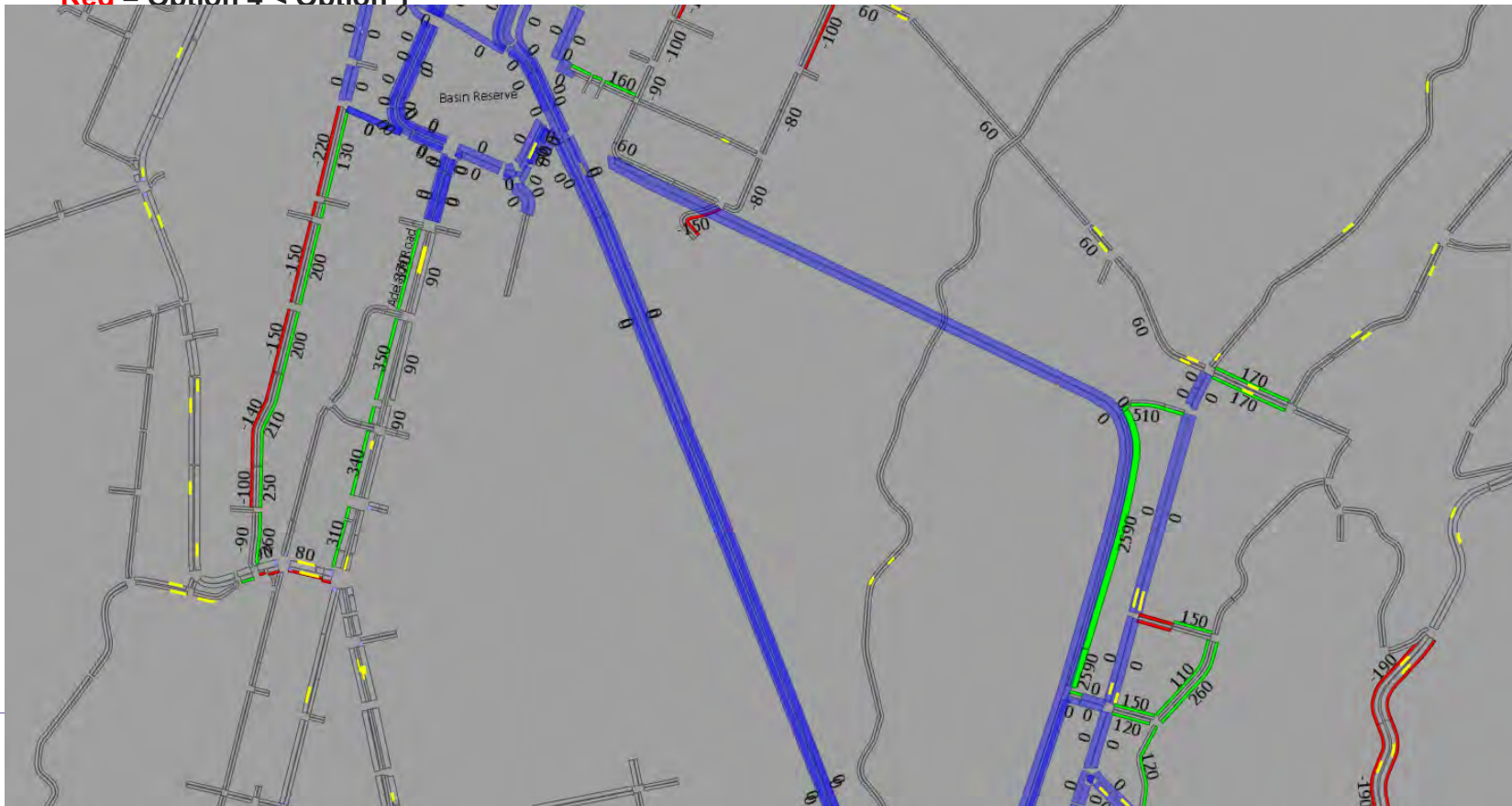
LGWM – Te Aro – AM Peak (Aggregated 7:00-9:00)

- **Green** = Option 4 > Option 1
- **Red** = Option 4 < Option 1



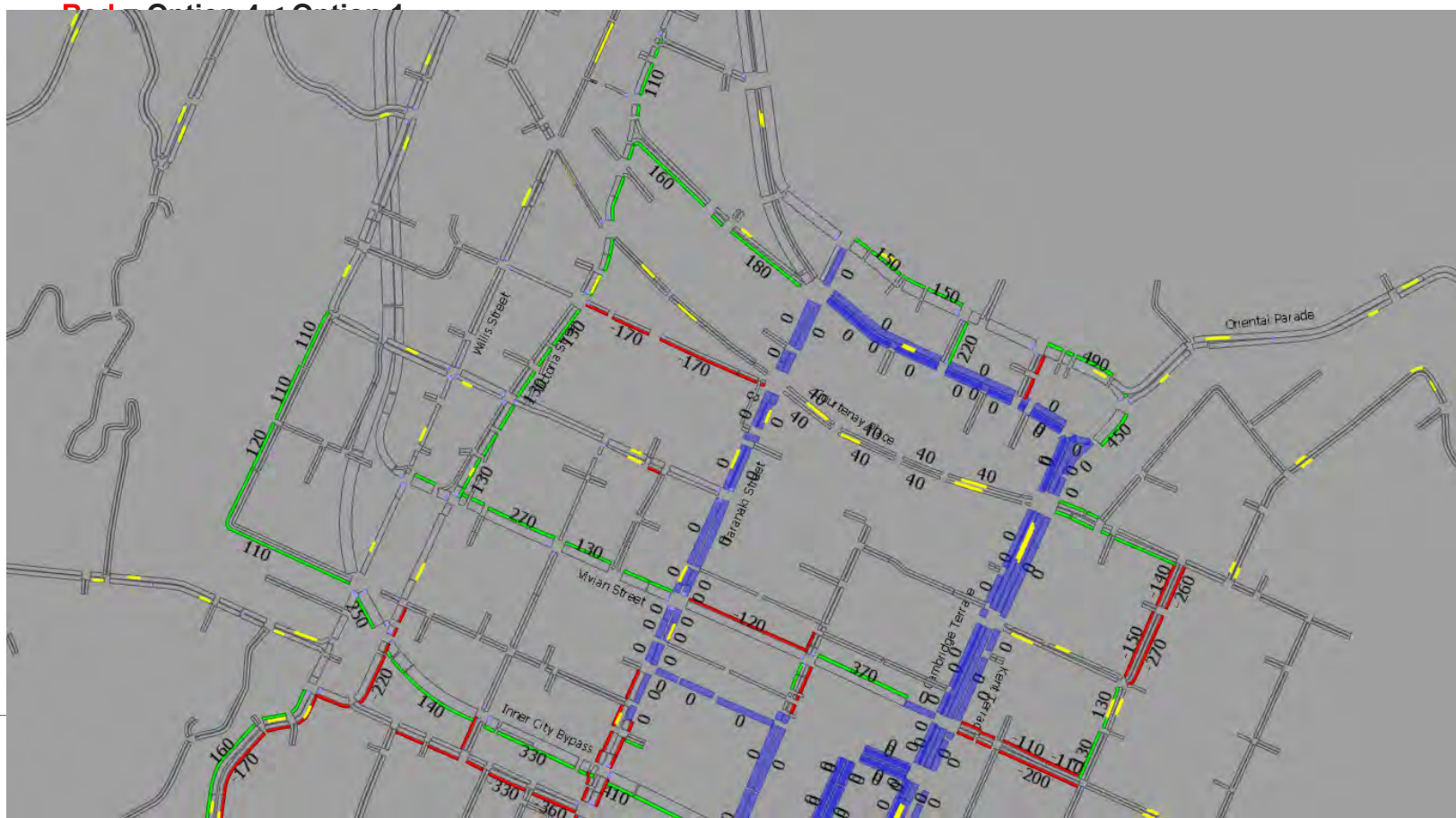
LGWM – Newtown/Hataitai– AM Peak (Aggregated 7:00-9:00)

- **Green** = Option 4 > Option 1
- **Red** = Option 4 < Option 1



LGWM – North CBD & Waterfront – PM Peak (Aggregated 16:00-18:00)

- **Green** = Option 4 > Option 1



LGWM – North CBD & Waterfront – PM Peak (Aggregated 16:00-18:00)

- **Green** = Option 4 > Option 1





9 June 2022

Economics Technical Report: Strategic CBA Review

Sensitivities and Critical Considerations for Programme Benefit Cost
Analysis



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Revision History

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Document Acceptance

Action	Name	Signed	Date
Prepared by	Transformational Programme Team		
Reviewed by	Andrew Bowman		
Approved by	Adam Nicholls		
On behalf of			

1 Executive Summary

EY has been asked to provide a strategic review of Cost Benefit Analysis methodology within the Let's Get Wellington Moving Programme, exploring the breadth and relevance of economic assessment completed to date, as well as identifying opportunities to refine option analysis within the next stage of investment decision making. This Technical Report also includes sensitivity analysis intended to complement the uncertainties and risks considered within the *Preferred Programme Options Report*.

Our conversations with the wider LGWM team and review of CBA documentation indicates that **an appropriate and proportionate range of costs and benefits** have been modelled for the purposes of IBC development. The Programme team have clearly recognised the challenge of modelling and forecasting regional transformation and scoped their analytical workstreams accordingly.

A small number of analytical gaps have been identified by the joint MRT/SHI consultant team, for example a focus on traditional transport benefits and the application of an exogenous land use scenario (see section 4.2). We do not consider any of these issues serious enough to constitute an error or material deficiency in analysis at IBC stage. All four issues have been well-communicated to Programme decision makers through the *Programme Short List Options Report, October 2021* and *Preferred Option Report – Modelling Appendix* reports.

We have identified a number of opportunities to refine Programme analysis at the Detailed Business Case (DBC) stage, ensuring that final options appraisal results are an accurate representation of viability and relative efficiency. We recommend that DBC planning include the following activities:

1. Dedicated population and Do Minimum modelling well ahead of DBC drafting
2. Alternative air pollutants and GHG scenarios, in line with contemporary Waka Kotahi guidance
3. Calculate returns to Government (BCR-Gs) in addition to standard national benefit calculations (BCR-Ns)
4. Review and agree an appropriate scope for the analysis of Wider Economic Benefits
5. Agree an approach to estimating, collating and communicating the uncertainty associated with option assessment results

Whilst the *LGWM Programme Preferred Option Report* recommends a preferred Programme option, the full case for investment in the MRT and SHI elements of the programme will be provided in a final IBC, which is due to be completed by the end of 2022. The key next for LGWM options analysis will therefore involve fully document the case for investment across MRT and SHI projects, detailing a final assessment process and proposing how future work could be delivered.

2 Introduction and Scope

This review has been commissioned to identify and explore key analytical issues within the Let's Get Wellington Moving (LGWM) Programme (the Programme). Specifically, EY has been tasked with reviewing the scope and methodology of Cost Benefit Analysis (CBA), as applied to the Indicative Business Case (IBC) stage of the Programme. It has been completed in the span of 6 weeks over the course of March – April 2022.

We note that the review is explicitly targeted at a conceptual and strategic level. EY has not examined the technical implementation of any modelling tools, for example the accuracy of spreadsheet formulae or source code. Findings and recommendations are based on methodological guidance information provided by the joint MRT/SHI consultant team, presentations developed by the Programme Technical Advisory Group, draft IBC documentation, the Programme Affordability Short List Option (PASLO) work and conversation with experts within Stantec and the LGWM joint initiative.

The review also includes a small volume of sensitivity analysis performed by EY, where direct testing was the most efficient way to address questions of uncertainty, sensitivity and materiality (see Section 0). This analysis is based on outputs provided by joint MRT/SHI consultant team. We understand that these organisations have robust quality assurance processes in place to avoid technical errors, so EY has not attempted to replicate this exercise.

Core to this review was a pragmatic and proportionate approach to critique. We recognise, for example, that the 'perfect' CBA model does not exist, and expanding the depth or complexity of assessment is not always desirable. Particularly in the case of dynamic or intangible benefits, the most appropriate model scope will often be a matter of professional judgement. Analysis beyond a certain point will sometimes represent a poor use of limited Programme resources, for example if results will be irrelevant or immaterial in differentiating options.

Equally important to our evaluation was the purpose of LGWM analysis as of April 2022, and the expectations for Indicative Business Case (IBC) options assessment set out in published government guidance. A different set of evaluation criteria would have been applied if LGWM had recently completed a Strategic Assessment or Detailed Business Case (DBC).

In addition to findings provided by a standard review, a significant part of this document proposes and explains tools that could be used to refine LGWM analysis at the DBC stage. Such key considerations and sensitivities include a dynamic Do Minimum option (recognising that the 'counterfactual' scenario can directly influence the economic viability of 'do something options'), quantifying wider economic benefits and carefully considering underlying population growth forecasts. Both low-effort and longer-term recommendations are provided, split into Sections 7 and 0.

In performing this review we have sought to answer six questions:

1. **Standard procedures:** Have good-practice costs and benefits been considered and assessed by the Programme team? (I.e. those that would be expected of any transport-sector Programme?)
2. **Strategic alignment:** Are the unique strategic objectives of the LGWM Programme adequately reflected in the scope of CBA modelling?
3. **Recognising uncertainty:** Have significant sources of variation and risk been identified and communicated to decision-makers?
4. **Modelling approach:** Are CBA design choices and assumptions aligned with published Government guidance? (For example, the Waka Kotahi Monetised Costs and Benefits Manual)

Attachment 1b to Report 22.227

5. **Fit-for-purpose:** Is the analysis sufficient to provide decision-makers with the evidence necessary to make an informed decision?
6. **Next steps:** Has IBC analysis laid the groundwork for a successful and appropriate DBC?

As noted above, our answer to Question 6 includes a number of suggestions as to how LGWM modelling could be refined or expanded in future. We note that such recommendations are specific to DBC options appraisal, and are entirely distinct from our commentary on IBC analysis.

3 Context and Role of CBA

As described above, this Technical Report focuses on analytical issues that are both **appropriate to an Indicative Business Case** (IBC) process, and could have a **meaningful impact** on option assessment results. Considerations that meet these criteria represent important sources of evidence for LGWM decision making in 2022. This Section is intended to clarify what this scope looks like in practice and the justification for its application at this point in PGWM Programme development.

3.1 Indicative Business Case Expectations

IBC documents provide decision-makers with an early indication of the preferred way forward, ahead of formal recommendations being developed.¹ A successful IBC document should answer two fundamental questions:

- i Is there an issue or opportunity that is clearly worth investigating?
- ii Is there an approach or number of approaches to this issue that would lead to demonstrably different outcome to our current way of doing things?

Optioneering within an IBC does not consider an optimised Programme that is ready for implementation, and the Economic Case does not provide a definitive view on the best way forward. Rather, an IBC should articulate the rationale for an undertaking and support an in-depth options assessment exercise for the Detailed Business Case phase.

This approach was recently endorsed by Te Waihanga / NZ Infrastructure Commission and the Treasury in a review of New Zealand's Better Business Case Guidance, which is consistent Waka Kotahi's approach to business cases in the transport sector. The review highlighted an inadequate separation of analytical scope between IBCs and DBCs to date – with the fault lying in IBCs failing to answer the core questions at the right level. This has led to poor value for money and negative implications for delivery timeframes.

3.2 Material impacts and uncertainties

Complementing the purpose of analysis within an IBC, this Technical Report explores economic factors that could have a material impact on Programme decision making, and should be considered for LGWM analysis at DBC stage. There are a significantly greater number of areas that might have a small influence on costs and benefits and may be of academic interest. These have been excluded from this analysis for reasons of proportionality and focus.

Material impacts and uncertainties can primarily influence Programme recommendations in two ways: Altering whether a proposal represents **value for money** (sometimes characterised as economic viability, requiring a Benefit Cost Ratio of at least 1), as well as the **relative value** of Programme options (providing more nuanced differentiation for the purpose of selecting a preferred option).

We note that the majority of impacts explored within this Technical Report are monetisable, in the sense of being recognised by published guidance (e.g. Waka Kotahi's Monetised Costs and Benefits manual or similar). They have not been calculated at the IBC stage because their calculation requires bespoke analysis that is of a scope and magnitude that it is best quantified once detailed design at the DBC stage has decreased programme uncertainty and risk. The identification of these benefits at IBC stage is intended to provide confidence that a range of benefits commensurate with the scale of the programme have been identified conceptually, those able to be calculated at IBC stage have been considered, and those most appropriately considered at DBC stage will be assessed if the programme advances.

¹<https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/better-business-cases/guidance>

3.3 Why Benefit Cost Ratios Matter

Traditionally, BCRs are a quantitative measure of Programme / project viability, from the perspective of net economic value.² A standard BCR is calculated by dividing total benefits by total costs, with all inputs in real, discounted dollars, net of the Do Minimum.

A BCR of 1 means that the monetisable benefits of an option are equal to its monetisable costs. A BCR greater than 1 is commonly perceived as a necessary condition for an option to represent value for money. In contrast, a BCR of less than 1 means that an option is expected to incur costs in excess of its benefits. It is difficult to justify government expenditure in this case, absent other forms of evidence.

BCRs have a second, and equally critical purpose; namely they provide a standardised, rules-based approach to evaluating the differences between options. BCRs are often used as measures of relative economic efficiency, identifying where the government can expect to receive the greatest return on investment. BCRs, in this respect, arguably offer the fairest, most balanced single equation for comparing options for government intervention.

There are, however, a number of issues with relying on BCRs as the sole determinant of Programme viability and efficiency (discussed in more detail within Section 0). To ensure decision makers understand the pros and cons of alternative options, it is good practice to combine this type of CBA output with:

- Qualitative (or non-monetised) analysis, particularly focusing on costs and benefits that cannot be accurately measured in dollar terms. Such analysis can take the form of a Multi Criteria Analysis (MCA) exercise, or take the form of narrative assessment, summarised within an Appraisal Summary Table (AST).
- Assessments of strategic alignment, for example consistency with the Government Policy Statement on Land Transport. A Programme that offers very large journey time improvements alongside increased deaths and serious injuries, disincentivises the use of public transport and significant growth in greenhouse gas emissions may enjoy monetised benefits in excess of monetised costs. Presenting decision-makers with a BCR, isolated from strategic context and contextual information, would be highly misleading in this instance.
- Financial and commercial analysis, noting this can often give very different results from CBA modelling. A Programme with very large upfront capital costs may be unaffordable, based on available funding streams, such that it's BCR is irrelevant. Similarly, an assessment of potential contractor capability may identify that an option introduces high levels of legal and commercial risk to the government. This option is unlikely to represent an optimal choice, even if it has the highest BCR.

The next section of this Technical Report provides an overview of LGWM CBA analysis completed to date, including modelling assumptions and preliminary results. This is followed by commentary on the quality of IBC modelling overall, answering the six strategic-level review questions described in Section 2 above.

² Note that economic viability and financial viability are different concepts. The former questions whether an investment represents a prudent and worthwhile use of public funds, whereas the later tests affordability through an examination of available funding streams

4 CBA Approach and Preliminary Results

The Programme has undertaken economic evaluation of the shortlist options through a Cost Benefit Analysis (CBA). The CBA follows the recommended approach prescribed in Waka Kotahi's Monetised Benefits and Costs Manual (MBCM). It is a tool to support decision-makers and is widely used in the appraisal of public infrastructure projects to assess the total benefits generated for society by government investment, relative to the costs incurred to society in generating those benefits.

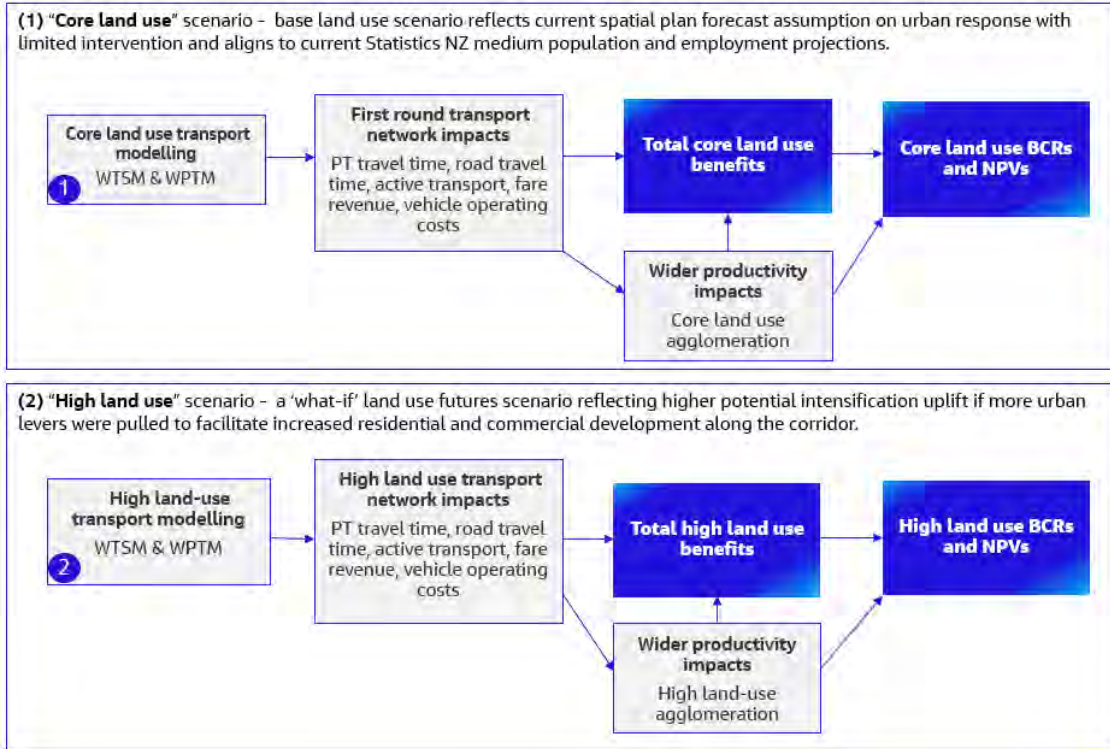
Economic benefits were estimated based on each option's modelled impact on Wellington's transport system, including the extent of mode-switching from the road network to public and active transport, reduced environmental impacts, and health benefits. These benefits were compared to the economic costs of delivering each option. The economic evaluation to-date focuses only on transport benefits and does not consider broader benefits that LGWM could deliver, such as benefits from improved urban form, climate change and social benefits. The Programme expects the benefit-cost ratios could rise further once these additional benefits and the nuance between options have been considered (i.e. applying a 'value engineering' process). Given these limitations, the Programme considers the results presented herein as **preliminary** only and subject to further refinement after a preferred option has been selected.

A preliminary CBA has been undertaken on Options 1, 2 and 4 to support this preferred option report. This relies on the multiple rounds of transport modelling and economic evaluation undertaken since the Programme Business Case in 2019 and the through the development of the IBC. With this body of existing evidence, full transport model runs were not performed on all options, with the focus for additional modelling work focusing on the 'bookend' options 1 and 4. Option 3 was not progressed to formal economic evaluation through CBA. As Programme transport modelling results have, in general, been aligned with the findings of MCA assessment, we have no reason to believe that an economic evaluation of Option 3 would identify material benefits over Options 1, 2 and 4. Similarly, as the cost of Option 3 is not significantly lower, it is unlikely to exceed the BCR range for Option 1. Each option has a wide range of possible urban outcomes, depending on the level of ambition and the supporting measures used to drive greater urban intensification.

An assessment of the potential urban uplift for each option was undertaken. Two scenarios were used to undertake the analysis – a 'core land use' and 'higher land use' scenario. The 'core land use' scenario reflects the current spatial plan forecast assumption on urban response with limited intervention³, whereas the 'higher land use' scenario relate to a 'what-if' scenario of potential intensification uplift if more urban levers were pulled to facilitate increased development along the corridor. An overview of the approach is illustrated in Figure 4-1 below.

³ Core land use assumptions developed in 2019 based upon updates to projections undertaken by .ID, in collaboration with the local Territorial Authorities. Core land use assumptions aligned to current Statistics NZ medium projections.

Figure 4-1: Economic appraisal approach



The Wellington Transport Strategic Model (WTSM) and Wellington Public Transport Model (WPTM) prepared by the Wellington Analytics Unit (WAU), were used to estimate transport impacts, with the models being able to output economic appraisal related measures which allowed for the monetisation of benefits. The tools have different strengths and weaknesses and have been used appropriately for the analysis associated with the IBC – depending on the issue being assessed and the level of detail required. Transport modelling outputs were processed in an interactive mapping tool to sense-check the spatial distribution of the outputs and identify any unintuitive results which could skew or bias the CBA.

The economic benefits appraised to date can be broken down into the following components:

- Public transport user benefits: including travel time savings (reduced in-vehicle time (IVT), access/egress time and wait times), and transfer penalties (the perceived travel costs incurred by public transport users who are required to change within modes (e.g., bus to bus) or between modes).
- Road user benefits: including travel time savings, savings in vehicle operating costs (VOCs), and improved road safety.
- Active mode user benefits: incremental benefits from making walking and cycling more attractive.
- Non-user benefits: including environmental benefits (emissions reductions) and incremental net fare revenue.
- Wider economic benefits (WEBs): including agglomeration.

4.1 Key appraisal assumptions and inputs

Table 4-1 below outlines the key parameters and assumptions that are adopted throughout the preliminary CBA modelling. Further parameters and assumptions for benefit calculations can be found in 'Let's Get Wellington Moving - Draft Programme Report for Public Engagement'.

Table 4-1: General parameters and assumptions

Parameter	Assumption	Source
Real discount rate	4% per annum	Waka Kotahi (August 2021) MBCM
Base year for discounting	FY21	Assumption
Project opening year	FY31	Assumption based on potential phased completion of early LGWM programme components
Appraisal period	40 years of operation; final year of benefits is FY71	Waka Kotahi (August 2021) MBCM
Transport model years	2036 and 2046	WTSM and WPTM outputs
Linear interpolation	Benefits are estimated based on strategic transport modelling outputs for modelled years 2036 and 2046. Between these years, linear interpolation is used to estimate benefits on an annual basis.	Assumption
Extrapolation growth rate	The final modelled year for strategic transport modelling outputs is 2046 (mapped to financial year FY47 for benefit cashflows). Between this point and the final year of the appraisal period (FY70) benefits are extrapolated at a rate of 1% per annum.	Assumption
Benefits prior to first modelled year	The first modelled year for strategic transport modelling outputs is 2036 (mapped to financial year FY37 for benefit cashflows). For years between the first year of benefits (FY31) and the first modelled year (FY37), benefit cashflows are estimated by decaying the linear interpolation rate between FY37 and FY47.	Assumption. Consistent with interpolation of benefits between the modelled years
Inflation / escalation	Unit resource values for benefit and cost calculations are sourced from a range of publications and guidelines published at different points in time, quoting unit values in different prices. All unit values are escalated to March 2021 dollars using quarterly price indexes sourced from Statistics New Zealand. All future cash flows in the detailed CBA are expressed in real 2021 dollars, with no inflation or escalation applied.	Statistics New Zealand: Labour Cost Index (LCI) All Sectors Combined, All Salary and Wage Rates – for all values of time other than freight Producers

Attachment 1b to Report 22.227

Parameter	Assumption	Source																
		Price Index (PPI) Outputs: Road Transport – for freight value of time Consumers Price Index (CPI) All Groups for New Zealand – all other parameters																
Rule of half	The 'rule of half' is applied when quantifying changes to consumer surplus for new or induced users of the transport network. The rule of half states that, on average, the change in consumer surplus to new and induced users is one half the change in consumer surplus to existing users of the network. The basis for this approximation is that the first new or induced user will realise the full extent of the improvement in the transport network, while the last new or induced user will realise only a negligible benefit, based on each user's perceived cost of travel. This approximation reflects an assumption that the demand curve for the transport network is linear. The rule of half does not apply to the estimation of resource corrections and externalities which are not included in users' perceived cost of travel.	Transport and Infrastructure Council, Australian Transport Assessment and Planning (ATAP) Guidelines: T2 Cost Benefit Analysis, May 2018, p. 32																
Expansion factors	The strategic transport modelling outputs are provided for three partial periods of the day: AM peak (AM) Inter-peak (IP) PM peak (PM). To estimate annual outcomes, transport demand must be expanded from (1) partial periods of the day to a full 24-hour period on an average weekday; and then (2) from an average weekday to a full year. The following expansion factors were applied: <table border="1" data-bbox="379 1413 1129 1547"> <thead> <tr> <th>Model Period</th> <th>PT</th> <th>Car</th> <th>HCV</th> </tr> </thead> <tbody> <tr> <td>AM</td> <td>406</td> <td>368</td> <td>368</td> </tr> <tr> <td>IP</td> <td>1,853</td> <td>2,169</td> <td>1,658</td> </tr> <tr> <td>PM</td> <td>406</td> <td>245</td> <td>245</td> </tr> </tbody> </table>	Model Period	PT	Car	HCV	AM	406	368	368	IP	1,853	2,169	1,658	PM	406	245	245	Wellington Analytics Unit (within GWRC)
Model Period	PT	Car	HCV															
AM	406	368	368															
IP	1,853	2,169	1,658															
PM	406	245	245															
Construction period	FY21 to FY34	Based on capital cost estimates and programme phasing assumptions																
Programme investment costs	Programme costs include phased capital investment, on-going operating and renewal costs, alongside lost parking income and the cost of financing. The costs are built up from work package and project information, which are a work in progress, subject to change, and will continue to be refined and updated. P50 cost estimates are considered appropriate to adopt for the purposes of the economic evaluation. P50 cost estimates	The forecast costs of each option were estimated by the Programme and incorporated into the CBA model																

Parameter	Assumption	Source
	refer to a confidence level of 50% regarding the probability of the cost not being exceeded and adopt a set of assumptions around cost contingency.	

4.2 Land use scenarios

As detailed in the Preferred Programme Options Report, a key consideration of a transformational programme of this nature is how it responds to, and catalyses, changes in land use. A successful programme will enable changes in land use patterns, urban form, and urban amenity relative to a situation where no programme is implemented (described below as a “do minimum” scenario).

A range of land use scenarios have been developed by LGWM that consider the nature and location of future growth. For the purposes of the analysis, all future year scenarios have assumed the same total quantum of growth across the Wellington region but have adjusted the distribution of future growth using a sliding scale between dispersed growth across the region and intensified growth along the MRT corridor.

Sensitivity tests show that Option 1 delivers significantly more benefits than options 2 and 4 under the intensified land use scenario. We understand, however, that the options 2 and 4 assessments are not directly comparable to the option 1 assessment. The option 2 analysis reported here has been developed based on an assumption that the assumed BRT option has less capacity to stimulate growth than the LRT based options – 20% less intensification has been assumed. The assessment undertaken for option 4 has assumed that the level of intensification assumed for option 1 to the south is achievable in this option. More detail on these assumptions is contained within the *Preferred Programme Options Report*.

We recognise that the assumption regarding total growth across the region is a simplification and ignores the very realistic potential for the transformational programme to deliver additional growth in the Wellington region because of the investment, which will be investigated further at the DBC stage.

4.3 Transport model runs and inputs to economics

The LGWM Programme Team have undertaken multiple rounds of transport modelling and economic evaluation using outputs from WTSM and WPTM since the Programme Business Case in 2019 and since through the development of the IBC in 2020 and 2021. This large body of evidence provides us with sufficiently detailed information about the how notable transport interventions affects transport network and generates economic benefits for the programme. For this reason, full transport model runs were not performed on all options and instead model runs were undertaken on selected ‘bookend’ options to reflect the recent strategic transport improvements.

Improved representation of Option 1 and 4 were prioritised for full transport model runs for both modelled years as these were identified as suitable ‘bookends’ of the shortlist options for analysis to demonstrate the corresponding programme benefits. Consequently, transport network impacts and total benefits for Option 2 are inferred using results from Option 1 and previous model runs undertaken to support the public engagement and consultation material. This is considered reasonable as the transport network impacts of the Option 2 are similar in direction and magnitude to those of Option 1, with the exception of the selected mass rapid transit mode.

Table 4-2: Economic analysis inputs

Options	Core Land Use Scenario	High Land Use Scenario	Additional notes on transport modelling and economic benefits
Option 1	Outputs of improved representation of Option 1 strategic transport model used.	HLU scenario output used.	<ul style="list-style-type: none"> ▪ PT travel, private vehicles, safety, and environmental benefits calculated using transport model inputs. ▪ Active transport model and agglomeration derived with transport model inputs and benchmarked against previous model runs. ▪ 'What-if' high land use scenario based on LGWM Urban Development assumptions.
Option 2	No new strategic model runs performed. Based on previous model outputs supporting Consultation material, with adjustment to the transport modelling outputs to reflect recent model improvements.	No strategic model runs performed. Inferred based on HLU scenario analysis performed on Option 1 with adjustment to reflect reduced potential on stimulating urban intensification compared to Option 1.	<ul style="list-style-type: none"> ▪ Based on previous model outputs supporting Consultation material, with adjustment to the transport modelling outputs to reflect recent model improvements. ▪ Inferred transport model adjustment from Option 1 as similar transport network impacts, with key difference in mode vehicle. ▪ Benefits benchmarked and factored using previous relativity of benefits between Option 1 and 2. ▪ Although this option also provides improvements to all modes of transport, it is less focussed than Option 1 on stimulating intensified urban development. As a result, outputs for the HLU scenario have been revised downwards by 20% to reflect this. This adjustment is consistent with preliminary views about differences in urban intensification between Options 1 and 2.
Option 4	Outputs of improved representation of Option 4 strategic transport model used.	Option 4 (with HLU scenario assumption from Option 1) used.	<ul style="list-style-type: none"> ▪ PT travel, private vehicles, safety, and environmental

Options	Core Land Use Scenario	High Land Use Scenario	Additional notes on transport modelling and economic benefits
			<p>benefits calculated using transport model inputs.</p> <ul style="list-style-type: none"> ▪ Active transport model and agglomeration derived with transport model inputs and benchmarked against previous model runs. ▪ Results for the high land use scenario is most likely to over-estimate programme benefits as this assumes that Option 4 contains sufficient capacity to generate AND accommodate the increased network demands.

4.4 Summary results

Summary CBA results are presented in Table 4-3 and Table 4-4 below, for the base core and high land use scenarios respectively. They demonstrate that the high land use scenarios produce significantly higher transport network benefits and slightly lower agglomeration benefits than the core land use scenarios.

Option 1’s high land use scenario generates the highest possible Net Present Value (NPV) of \$697 million and a benefit cost ratio (BCR) of 1.20. Option 2 is also likely to generate a NPV of \$223 million and a BCR of above 1. Whilst Option 4 high land use scenario indicates a high BCR, this is likely to be over-stated as this simply assumes land use assumption from Option 1.

Preliminary transport modelling outputs from core land use model run of Option 4 indicates that it is unlikely to be able to accommodate this scale of demand on the network. Furthermore Option 4 high land use scenario generates lower agglomeration benefits than the Option 4 core scenario due to the fact that the high land use scenario will relatively higher effective job density in the CBD.

We note that discussion is ongoing, within the LGWM analytical team, about the volume of additional cycling trips that can be expected as a result of Programme investment. WCC analysis performed for other, similar projects suggests that these benefits could be significantly higher for the LGWM parts of the strategic bike network. The ‘Health Benefits for additional cycling trips’ row in the tables below should, therefore, be interpreted as subject to change.

Table 4-3: Core land use preliminary CBA Results (Discounted, \$2021 millions)

	Option 1	Option 2	Option 4
Viability metrics			
NPV (excluding agglomeration)	-\$1,896	-\$1,634	-\$1,317
BCR (excluding agglomeration)	0.46	0.51	0.53
NPV (including agglomeration)	-\$1,137	-\$924	-\$780
BCR (including agglomeration)	0.68	0.72	0.72
Costs			
Total costs	\$3,500	\$3,312	\$2,781
Benefits			
Public transport – travel time benefits	\$640	\$679	\$603
Public transport – incremental fare revenue benefits	\$101	\$107	\$87
Private vehicle – travel time benefits	\$143	\$147	\$135
Private vehicle – travel time reliability benefits	\$11	\$12	\$9
Private vehicle – reduction in vehicle operating costs	\$91	\$91	\$82
Safety benefits	\$109	\$112	\$85
Environmental Benefits - Harmful pollutant and CO2 reduction	\$31	\$31	\$27
Health Benefits for additional walking trips	\$405	\$423	\$369
Health Benefits for additional cycling trips	\$73	\$76	\$66
Agglomeration	\$759	\$710	\$537
Total benefits	\$2,363	\$2,388	\$2,001

Table 4-1: High land use preliminary CBA results (Discounted, \$2021 millions)

	Option 1	Option 2	Option 4
Viability metrics			
NPV (excluding agglomeration)	-\$334	-\$686	-\$168
BCR (excluding agglomeration)	0.90	0.79	0.94
NPV (including agglomeration)	\$697	\$223	\$278
BCR (including agglomeration)	1.20	1.07	1.10
Costs			
Total costs	\$3,500	\$3,312	\$2,781
Benefits			
Public transport – travel time benefits	\$740	\$714	\$624
Public transport – incremental fare revenue benefits	\$319	\$273	\$226
Private vehicle – travel time benefits	\$353	\$245	\$293
Private vehicle – travel time reliability benefits	\$21	\$15	\$19
Private vehicle – reduction in vehicle operating costs	\$302	\$203	\$263
Safety benefits	\$391	\$261	\$327
Environmental Benefits - Harmful pollutant and CO2 reduction	\$97	\$66	\$84
Health Benefits for additional walking trips	\$799	\$720	\$659
Health Benefits for additional cycling trips	\$144	\$130	\$118
Agglomeration	\$1,031	\$908	\$447
Total benefits	\$4,197	\$3,535	\$3,059

Examining the detail of the CBA reveals a substantial increase in health benefits for users of active modes of transport. Walking and cycling benefits are distributed across the city but concentrate in and around the CBD where pedestrians and cyclists gain significantly improved infrastructure, leading to greater demand. The high land use scenario also introduces a noticeable additional increase in health benefits for pedestrians and cyclists from the core land use scenario.

5 CBA Review Conclusions

Our conversations with the wider LGWM team and review of CBA documentation indicates that **an appropriate and proportionate range of costs and benefits** have been considered as part of IBC development. The Programme team have clearly recognised the challenge of modelling and forecasting regional transformation and scoped their analytical workstreams accordingly.

We understand that, over the last year, a LGWM Technical Advisory Group has been convened in order to provide space for discussion, challenge, and critique. Several analytical approaches have been reconsidered and refined in response to feedback. In our view this is a valuable and important innovation, particularly where responsibility for Programme modelling is spread across several organisations.

LGWM team members have noted a small number of analytical gaps where modelling completed to date is uncertain, incomplete, or inconsistent. These consist of:

- A benefit profile based on exogenous intensification assumptions, as opposed to a quantitative model output. This 'higher land use' scenario is intended to explore what would happen if growth policy settings and levers were adjusted in parallel to LGWM investment, in alignment with local, regional, and national policy.
- The economic evaluation to-date focuses primarily on transport benefits and has not fully considered the broader benefits that LGWM could deliver, such as urban form and social benefits.
- Forecasts of public transport uptake remain uncertain across Programme options and highly sensitive to assumptions. LGWM team members have responded by reporting on the more conservative benefit estimates while explicitly noting the potential for change.
- Assessment of one of the four Programme short-list options was discontinued part-way through the CBA process. This could be described as a pragmatic response to emerging evidence more than an analytical deficiency, as the joint MRT/SHI consultant team proposed that sufficient modelling had already been completed to understand relative performance. A decision was made to leave this option 'as is'.

We agree that three out of the four of these gaps are suboptimal and represent areas that require additional analysis prior to final Programme investment decisions being taken. In our view, however, none of the issues are severe enough to undermine confidence in the IBC process as a whole. All three deficiencies relate to complex, difficult-to-measure benefits, where uncertainties and a reliance on exogenous assumptions are common across New Zealand transport Programmes. More importantly, the LGWM Programme team was successful in proactively identifying these limitations and including them in IBC advice.

Our answers to our six strategic review questions are set out in the table below:

Table 5-1: Review conclusions by Strategic Question

Question	Answer
1. Standard procedures: Have good-practice costs and benefits been considered and assessed by the Programme team?	Yes. The scoping, discussion and review of CBA methodology is clearly evidenced by Programme documentation. Good practice has been further supported by iterative consultation with Waka Kotahi experts
2. Strategic alignment: Are the unique strategic objectives of the LGWM Programme adequately reflected in the scope of CBA modelling?	Yes. Objectives such as regional transformation have been reflected in planning documents and discussions. The unique objectives of the Programme will be further explored as part of DBC analysis
3. Recognising uncertainty: Have significant sources of variation and risk been identified and communicated to decision-makers?	Yes. A number of uncertainties and risks are discussed in detail within key documents such as the <i>LGWM Programme Preferred Option Report</i> . This Technical Report identifies additional sensitivities that could be explored as part of DBC development
4. Modelling approach: Are CBA design choices and assumptions aligned with published Government guidance?	Yes, where appropriate. Alignment is evidenced by methodological referencing as well as direct Waka Kotahi consultation. Where alternative approaches have been applied, they are clearly documented and explained
5. Fit-for-purpose: Is the analysis sufficient to provide decision-makers with the evidence necessary to make an informed decision?	Yes. See section 3 of this paper for an in-depth discussion of IBC expectations
6. Next steps: Has IBC analysis laid the groundwork for a successful and appropriate DBC?	Yes. Risks and opportunities for DBC analysis are considered and communicated throughout Programme documentation. This Technical Report provides an additional source of intelligence for DBC planning

6 Next Steps: Considerations and Sensitivities

The remainder of this Technical Report explores and proposes options to strengthen Programme analysis at the DBC stage. This Section explores material analytical considerations, identifying where Programme CBA could be refined and sharpened as part of DBC assessment. It begins by highlighting key dependencies and potential biases within economic case assessment tools such as CBA before discussing the accuracies that can arise if model specification is inconsistent or simplistic.

As discussed in Section 2 above, we note that simplifying assumptions are entirely appropriate for IBC documents. Applying the more sophisticated tools and approaches described below would have been disproportionate for IBC-stage analysis.

Although the majority of these simplifying assumptions are conservative, in the sense that they are most likely to understate Programme benefits, it is not certain that overall BCRs will increase at DBC stage. This is because 'unknown unknowns' exist and cannot be predicted with any degree of confidence, so any speculation about DBC conclusions would be notional and speculative.

Several dimensions of CBA are critical for decisionmakers to understand in the context of large, complex Programmes. This is because technical modelling choices are likely to have large and unexpected implications for CBA results when:

- Programme options represent long-term scenarios, rather than simple, one-off government decisions.
- A degree of judgement is required to determine what would happen in the absence of government intervention.
- A Programme is expected to provide a wide range of benefits.
- Benefits are difficult to measure and / or attribute to a specific government intervention.
- Benefit realisation depends on behavioural choices by citizens and businesses over time.

In these circumstances, summary outputs such as BCRs and net benefit values have the potential to mislead decisionmakers. Economic assessment results are unlikely to indicate the sensitivity of viability or efficiency conclusions. Arguably all of these criteria apply to the LGWM Programme.

Two common and significant examples are the definition of the Do Minimum and the scope of benefits estimated within the CBA. The potential implications of these considerations, as well as methods to ensure key sensitivities are adequately considered in DBC analysis, are set out below.

6.1 The importance of the Do Minimum

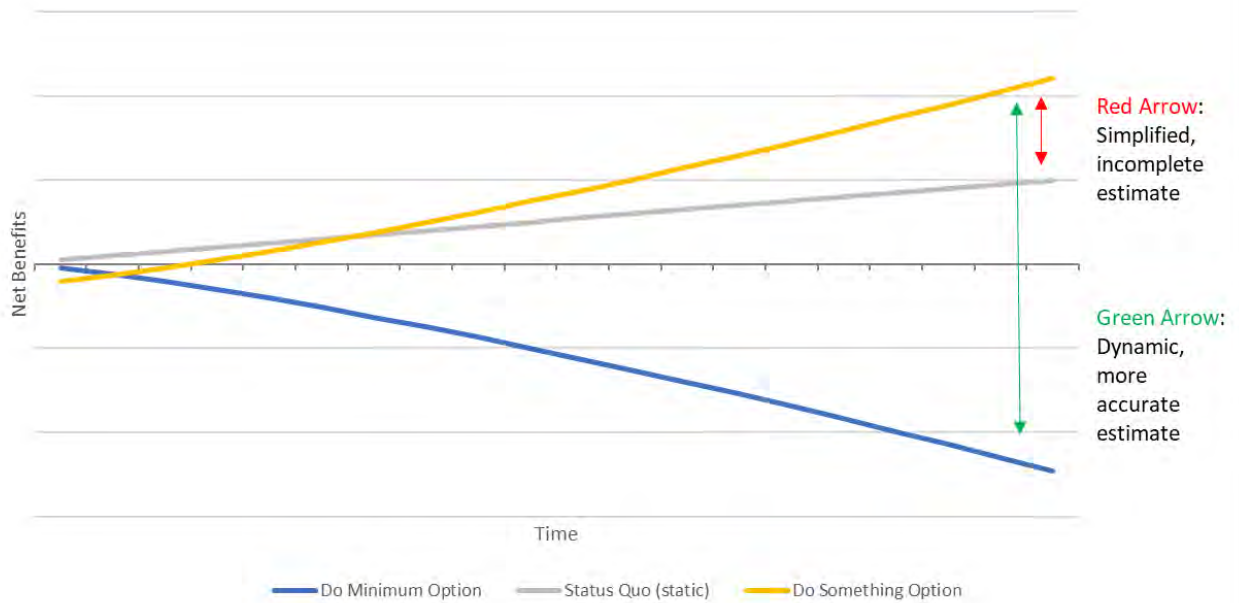
In a CBA, options are compared to a baseline scenario where Government intervention does not occur. This is the way we expect the Programme area, and the Wellington Region as a whole, to behave in the absence of the Programme investment. A "Do Minimum" is not a "do nothing." Government would still expect to maintain, and invest to cope with growth, in line with statutory obligations and land transport requirements set out in legislation. Such requirements are not cost-free, hence a Do Minimum option will often involve both costs and benefits.

The Do Minimum can also be understood as the "coping" option where government tries to not make things demonstrably worse than the status quo. But it is important to recognise that most Do Minima incur the costs associated with baseline forecasts (e.g. growing GHG emissions in the transport sector) in addition to financial cost (e.g. road maintenance).

Decisionmakers should, therefore, consider the long-term costs and network effects of the status quo when comparing options. CBA to support small-scale, low-risk projects often make a simplifying

assumption that the Do Minimum involves zero costs or benefits. Such an assumption is inappropriate and inaccurate for a region-shaping Programme such as LGWM, where Do Minimum impacts on funders, businesses and households are substantial. This is discussed in more detail in Section 7.

Figure 6-1: Indicative Option impacts net of the Do Minimum



One of the single largest influences on Do Minimum costs and benefits (as well as the performance Programme options) is population growth forecasts. Population growth is often a core determinant in the economic viability of major urban transformation projects in the transport sector, regularly dictating whether a Programme BCR is greater than 1. This is because almost all monetizable factors are correlated with the number of users, for example time (saved or lost), emissions and safety. Effects on mode shift and public transportation can be non-linear, for example where the viability of a mass transit system depends on a critical mass of local commuters.

Typically, major urban transformation projects incur the majority of costs in the first 10 years, but often only receive meaningful benefit streams in the last 10 years of the project (as the number of additional users reach a critical mass). An issue is created when future benefits are heavily discounted and / or a static land use approach is applied to analysis (where there is no population response to the investment). Regional transformations Programmes that intend to shape long-term travel patterns are heavily penalised by such methodologies. Sensitivity analysis, with respect to discount rates and analysis periods, are discussed in Section 9.

6.2 Population growth

As discussed above, BCRs compare the difference between costs and benefits under the Do Minimum with the costs and benefits under 'do something' options. Results are driven partly by the quality of the Options, which is where most of the focus of decision-makers lies, but are equally, if not more reliant on the reduction in quality, level of service and level of well-being from the Do Minimum – which is driven by population growth. Inaccuracies arise, however, if population projections are simplified or otherwise incomplete, for example if dynamic response from households and businesses are not considered.

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Publicly available forecasts in New Zealand have, in the last 20 years, underestimated population growth.⁴ This arguably creates a systemic bias against long-term transformational Programmes, manifest in 'under-costing' Do Minimum Impacts over time.

In 2020 New Zealand's population reached 5 million people. That is almost 10 years faster than Statistics New Zealand forecast in 2006, and almost 3 years faster than Stats NZ forecast in 2013. The impact is tens of thousands more households travelling, using schools, hospitals and utilities than was anticipated, all of which should have been reflected in economic assessment exercises.

While three years may not sound like a long time, the nature of exponential growth means that such an inaccuracy will have significantly altered the evidence presented to decision-makers at the time. The business cases on these projects cover 40-60 years, so divergences will accumulate over time. Using the 2006 estimates meant decisionmakers were potentially underestimating the value to users of these projects by up to 25%.

To ground this in reality it is useful to consider a snapshot of New Zealand infrastructure projects where investment decisions have been based on underestimates of population, such that transformational options will have been undervalued. The table below highlights that underestimation has been a regular occurrence, even where considerable economic modelling and sensitivity analysis was performed.

Table 6-1: Population Assumptions across NZ Infrastructure Projects

Projects using 2006 population projections (5 million people by 2030)	Projects using 2013 population projections (5 million people by 2023)
Auckland double tracking, electrification and EMU purchase	Wellington trolley bus decision/bus contracting
Wellington rail network improvements (extension of electrification, new EMUs etc)	Transmission Gully
Tauranga Eastern Motorway	Puhi to Warkworth
Victoria Park Tunnel	City Rail Link
Waterview Tunnel	Peka Peka to Otaki
Kapiti Expressway	ATAP projects
Christchurch Transport Interchange	Huntly By-Pass
Christchurch Accessible City Programme	Auckland Light Rail Stage 1
Lower Hutt Dowse to Petone	Wellington integrated fares
Most of Waikato Expressway	SH58 Improvements

There remains a risk that the published Statistics NZ forecasts continue to underestimate population growth. The current projection, which underpins LGWM Programme CBA, is that we will reach 6 million people by 2050. But, in addition to questions of population redistribution, these figures are highly dependent on net migration in a post-COVID world. If New Zealand returned to its pre-COVID net

⁴ Referred to in this Technical Report as "static" growth because dynamic redistribution is not considered

migration average of around 50,000 per year, we would reach 6 million people by 2040 on net migration alone (i.e. excluding domestic growth).

A net increase of 75,000 people per year (pre-COVID net migration plus natural increase) would see a population of 6 million by 2033 – 17 years sooner than the Statistics NZ forecasts. For context, New Zealand took 17 years to grow from 4 million people (2003) to 5 million (2020). This suggests an uncertainty band of up to 100% of historic growth levels.

Underestimating population growth, and therefore potential demand, can result in under-calculating the benefits of the Programme options. Section 7 of this Technical Report explores the effect of 'rebasin' population forecasts on the LGWM Programme and demonstrates the significance of this on the BCR. Modelling completed to date does not include a fundamentally higher base population in the Do Minimum, but this would have a similar, and potentially greater impact. Any improvement to the performance of 'do something' options are additional to decreases in the performance of the Do Minimum.

6.3 Dynamic Do Minima

Another barrier to the accurate estimation of Do Minimum impacts, over and above forecasting challenges, is the nature of population flows in a region over time. Even under a Do Nothing scenario, firms and households will make decisions about where they choose to operate, live, and work. Local residents will respond to a lack of investment in the same way they can be expected to respond to successful regional transformation, for example making relocation decisions in response to congestion, accessibility, and public transport capacity trends.

In the original LGWM Programme Business Case published in 2018, economic viability conclusions were significantly influenced by base case assumptions. The Programme area (Wellington CBD, Te Aro, the South and the East) was assumed to never reach capacity under the Do Minimum. This runs contrary to historic trends, where many households in the Wellington region have responded to location choices by 'drifting' northwards over the last fifteen years (in some cases suburb by suburb).

Such situations introduce an error of omission, rather than under-forecasting. Within a static population model, growth at a sub-regional level will remain constant, outside of exogenous factors such as demographics and migration. Growth will halt, in a binary manner, when a limit on capacity is reached. By extension, 'at capacity' population levels can be treated as an indicator of inadequate infrastructure, and evidence of missed opportunities.

While logical within a static economic model, population capacity is not an accurate or reliable indicator of deficiencies in a transport network in the real world. As discussed above, individual households will respond to trends in infrastructure quality as they emerge, based on their own experiences and preferences, as opposed to acting as a single uniform group. Behavioural responses will, in reality, accumulate gradually until an equilibrium is reached. Transport network deficiencies may actually **prevent** the 'capacity limit' figure ever being reached, rather than the later providing evidence of the former.

Programme BCRs will therefore be artificially low where static capacity limits are treated as a necessary and sufficient condition for inadequate transport services. This conflation of demand forecasts and behavioural responses means that relevant, material costs will be excluded from Do Minimum estimates. As demonstrated in Figure 6-1 above, this decreases the net benefits and (by extension) BCR of 'do something' Programme options.

Omitting substantial costs from the Do Minimum is one of the principal reasons why the LGWM Programme has received modest BCRs to date: Modelling does not recognise pressing problems in the region because artificial criteria for inadequacy are not met. To put it another way, **households and**

businesses exiting geographic areas in response to declining transport service quality is interpreted as evidence of adequate transport capacity. It is also entirely possible that these entities shifting further north are different to those that would be attracted into the region under a Programme option. In other words, there may be a significant omitted benefit in retaining these households whose first choice is to remain in the Programme area.

6.4 What is quantified and what is not – The Importance of Dynamic WEBs

CBA models vary significantly in breadth and depth, so it is important to understand what makes up a BCR. We note that there is no 'right answer', and judgement is required to determine whether these items should be presented more often. In many cases it is not appropriate for a project to analyse in any detail basic Wider Economic Benefits (WEBs). For example, a passing lane in regional New Zealand will not offer any tangible WEBs. The table below sets good practice for major urban programmes such as LGWM.

Table 6-2: The treatment of Wider Economic Benefits in programme economic assessment

Always Presented	Often Presented	Rarely Presented	Not part of approach
Travel time saved and lost	Agglomeration – people being more productive due to location	Dynamic land use response to investment	Dynamic Do Minimum (as discussed in the Section above)
Carbon dioxide emissions (noting the Waka Kotahi shadow price now includes a range of scenarios)	Impacts on mode shift and associated carbon dioxide emissions	Total greenhouse gas emissions, beyond carbon (CO ₂ -e)	Emissions Trading Scheme impacts in terms of abatement credits (e.g. savings through decarbonisation)
Safety impact of reduced (or increased) deaths and injuries	Particulates from diesel – namely PM ₁₀	Other dangerous emissions from diesel fuel – namely Sulphur and Nitrous Oxides	Path dependency implications, where government investment shapes long-term network planning and mode choice
Construction cost of the Programme	Employment impacts	Resilience values other than improvements in average trip times reflected in time calculations	Economic impact of the region from delay in Programme execution (the cost of delay)
Maintenance and renewal cost of the Programme	Vehicle operating costs (or savings)	Construction costs of projects forgone or delayed outside of the Programme – related to the dynamic land use response	Wider housing and development benefits (e.g. better affordability through increased housing supply)
	Imperfect competition impacts	Related to dynamic responses – signal value of investment	

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Always Presented	Often Presented	Rarely Presented	Not part of approach
		Cost to funders apportioned, and in particular where there is alternative funding	

As previously discussed, much of the BCR analysis relies on population – how many people and businesses are in the Programme area, and how many will there be. This dictates the number of people who will impacted through time saved, carbon emitted, accidents, operating costs etc.

Many transport programmes are evaluated based on an assumption of fixed land use – this is where the population and business forecast for the Programme and its investment remains largely unchanged from the Do Minimum. The Programme is evaluated on its ability to resolve issues and create benefits for people who are forecast to be in the study area, regardless of the investment made. In many cases, fixed land use is appropriate, especially where it is difficult to attribute changes in land use to the transport investment made.

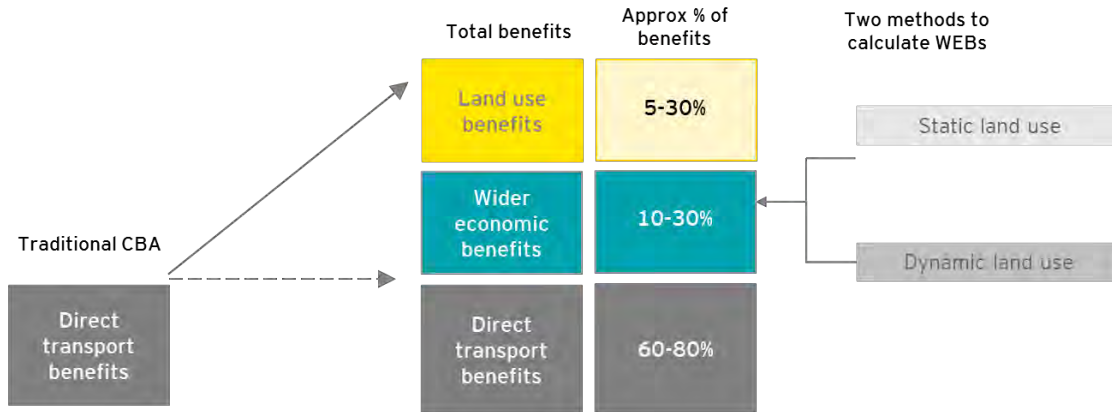
For a complex urban Programme like LGWM, a fixed land use assumption is implicitly arguing that no household relocates, no business relocates and the only people who benefit from the Programme are those who are forecast to remain. This is clearly inaccurate for a Programme explicitly focussed on regional growth and transformation.

Fixed land use analysis also impacts the design process materially. Because there is no behaviour change in terms of location (business and household) choice in the analysis, the only monetisable benefit from design that increases amenity, placemaking and encourages better land use (e.g. housing intensification) is that gained through mode shift (i.e. making public transport or cycling more accessible or attractive).

With no land use change (and no incentive to design for it), this also makes third party contributions to the cost of the project largely impractical to evaluate. In order to capture value, the Programme must first create the value and analyse it.

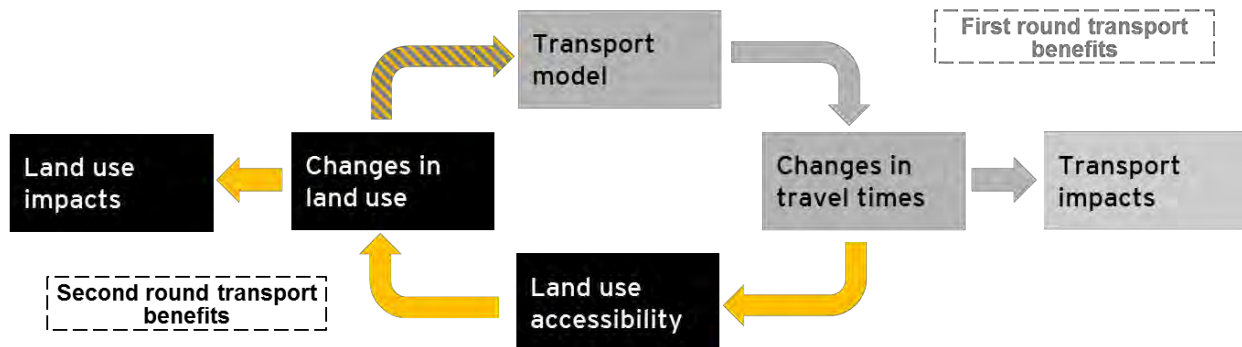
Waka Kotahi now have allowable processes to evaluate what is called dynamic wider economic benefits the main component of which is dynamic land use responses to the investment. The potential value of this analysis is shown in Figure 6-2 below.

Figure 6-2: The potential value of Wider Economic Benefits



Waka Kotahi have a simplified procedure and complex procedure allowed for the calculation of dynamic land use. Both effectively follow the prescription below:

Figure 6-3: Calculating dynamic land use benefits



In the figure above, an important feature is the feedback loop from land use change back into the transport model. Land use change means more people and businesses in the Programme area compared to the static approach which means:

- More public transport patronage
- Greater farebox recoveries (linked to the above)
- More saved carbon from mode shift
- Reductions in average time saved (as roads are more congested compared to static analysis) but increases in total time saved (as there are more users benefitting from the investment).

To date, the LGWM Programme have followed a variation of the simple procedure. This is appropriate for two reasons:

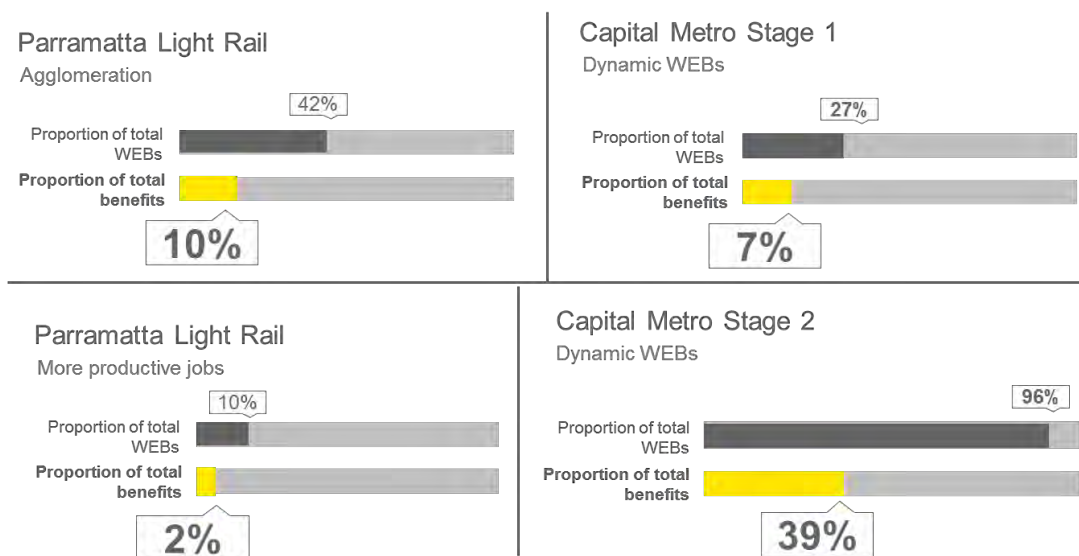
- i The analysis is only at the Indicative Business Case Stage and therefore is not yet at the level of design where investment of time in the complex process would deliver robust results.
- ii There have been questions of attribution between projects within the programme with their individual IBCs, where project teams took a justifiably conservative approach to land use

change in their projects so as to avoid double counting benefits with another project. This was a particular concern with the MRT and State Highway projects, but also applied to Golden Mile and MRT.

The Programme Report has made considerable improvements to the dynamic calculation, but these retain a “top-down”/principles-based approach, thus keeping it within the scope of the simple procedure. To reiterate, this is appropriate for the Indicative Business Case stage of the Programme.

The complex approach is one adopted and adapted from the approach used and accepted in Australia. This has delivered results that have a material impact on the benefits of major urban mass rapid transit projects, as shown below.

Figure 6-4: Dynamic land use benefits in Australia



The important conclusion is that at this stage of the analysis, we consider that there are material uncounted benefits that can be monetised appropriately under the Waka Kotahi’s complex method at the Programme Level once the Detailed Business Cases commence.

7 Opportunities for Low-Effort, High-Impact Analysis

This Section considers four areas that are not presently monetised within LGWM analysis, and could have additional analysis articulated in the DBC. These four areas are at the more straightforward end of the analysis and three of the four are allowable under Waka Kotahi's Monetised Benefit and Costs Manual (MBCM). The BCR of Option 1, for example, could increase from 1.2 to 1.7 if a 10-year delay were assumed as part of the Do Minimum (potentially reducing the net cost of the option by \$1,000 million in NPV terms).

7.1 The value of signalling

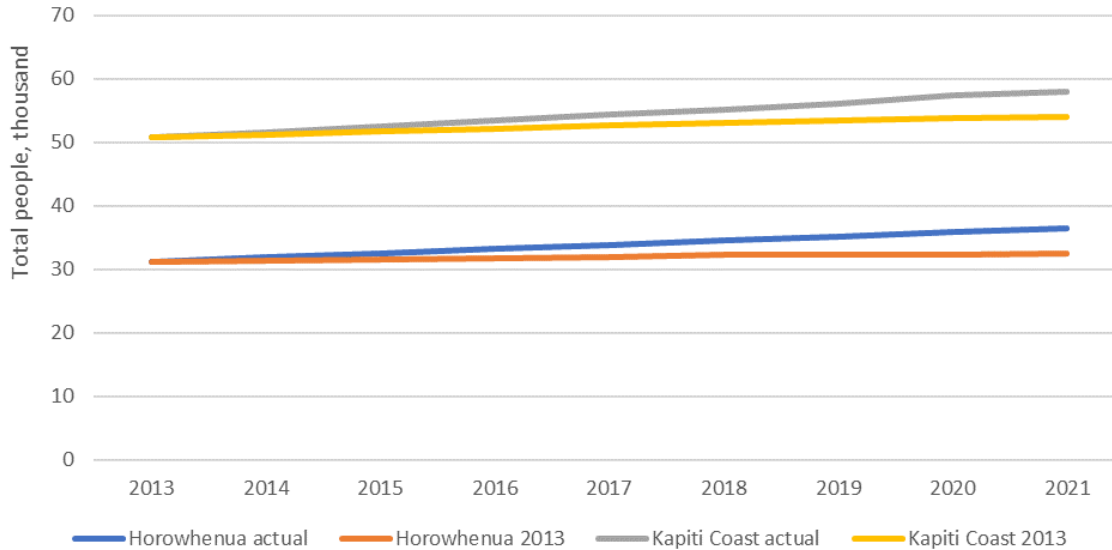
When assessing CBA's, the usual approach is to measure the costs of the Programme from the day of construction start, but not measure the benefit stream until the day the project goes live. This is appropriate under a static land use analysis as there is no response to the announcement of the investment. But there is strong evidence that under a dynamic land use, the response to investment occurs well before the delivery date of the programme. New Zealand has had three very recent tangible examples:

Work undertaken for Waka Kotahi in 2018 around the Manawatu Gorge Replacement included a market sounding of private investment intentions in the region. The sounding estimated around \$45 million of investment waiting for certainty around the preferred option (this did not include KiwiRail's Bunnythorpe plans). While the majority of this investment would occur anyway, timing was critical, and would occur between project funding decision and project delivery.

Between the Notice of Requirement decision and the Crown's funding decision for City Rail Link approximately \$200 million of investment went into Albert Street in the Auckland CBD. This included commitment to a major development on the site over the proposed Aotea Station between Sky City and the Crowne Plaza. There has been subsequent material investment along the CRL Route after the Crown's funding decision, including the Commercial Bay development. Again, while this investment would have happened anyway, it is uncounted in both static land use, and because it occurs prior to project delivery, yet as materially re-based the population in the project area.

In the Wellington Region, the population in the Horowhenua and Kapiti Coast changed materially compared to the Statistics New Zealand population forecasts. This divergence began in a material way in 2014, coinciding with the announcement of Transmission Gully and the ongoing development of the Kapiti Expressway.

Figure 7-1: Population projections for the Transmission Gully Project



This growth is uncaptured in the business cases for Transmission Gully, the Kapiti Expressway and also Peka Peka to Otaki. Even if a static land use was used once the projects were delivered, each project would start on a materially higher user base on Year 0 compared to their respective business cases.

It is allowable under the MBCM to count population responses to investment decisions prior to project delivery (Project Year 0) where there is sufficient evidence to do so.

A simple approach to this for Let's Get Wellington Moving would be to apply the current simplified dynamic growth approach used (i.e. the growth percentage over and above static land use) to the construction years to re-base the population in the Programme catchment. This is not an insubstantial impact on the CBA because the growth percentage even under a medium growth profile is material, and a construction period of over five years gives a significant rebasing of population by the time the Programme is implemented.

7.2 Population modelling and air pollutants

We understand that forecasts are presently being developed that will estimate and apply a new average growth rate after Programme construction begins. In the interim, however, the LGWM High Land Use scenario (which is a useful proxy as both approaches result in more population in the Programme area, faster) is indicating a doubling of conventional transport benefits, with a similar impact on Wider Economic Benefits.

To date the focus of the Programme analysis has been on decarbonisation and the monetised carbon impacts of the options. There are potentially additional significant benefits of further analysis on diesel-related emissions that have not been fully assessed. Carbon is presently valued in the MBCM at less than \$70 per tonne. Sulphur dioxide – a major pollutant from diesels does not have a value assigned in the MBCM, but recent work for the Ministry of Transport for the Crown's Rail Strategy agreed to use the Ministry for the Environment figure of around \$18,000 per tonne.

The LGWM Do Minimum already assumes an aggressive move away from diesel use to electrics in public transport. As such, the first order benefits of the options from counting non-carbon emissions will be muted. Where significant benefits can be gained is through mode shift from private vehicles to public transport or walking/cycling.

Using a simple approach of mode shift from private motor vehicle users being in proportion to vehicle type would see significant increase in sulphur dioxide benefits. Nitrous oxides and PM10 have lower values, but can be modelled in the same way, with the emphasis being on mode shift from private vehicles to public transport fleet that already has high degrees of electrification.

7.3 Updated GHG Analysis

A sensitivity of carbon price would also be a useful addition to the analysis. Waka Kotahi have had previous research undertaken that suggests the carbon price in the MBCM should be in the vicinity of \$90 per tonne. This is reflected in the latest version of the MBCM, where a range of shadow prices are included. Moreover both 'high' and 'low' carbon prices grow in real terms over time.

Additional analysis of GHG emissions impacts should be relatively straightforward due to publicly available modelling tools such as the Vehicle Emissions Prediction Model (VEPM). As such, there would also be value in the Programme considering two other GHG-related scenarios for the purposes of sensitivity testing. Including the carbon price range identified above, these consist of:

- High and low shadow prices for carbon (\$61 - \$122 in 2021)
- Limiting anticipated efficiency gains in the performance of petrol and diesel engines (e.g. applying 2022 emissions factors)
- Applying CO₂-e emissions, or carbon dioxide equivalent values, which represent a more accurate and internationally recognised approach to measuring GHGs.

While out of scope for an economic analysis focussed review, we note that greenhouse gas (GHG) emissions are likely to become increasingly important from a strategic perspective. The Climate Change Commission in New Zealand has published ambitious mitigation targets for the transport sector, the achievement of which relies on significant change to investment planning in large regions such as Wellington. It is likely that, by the time a final Programme DBC is being considered, decreases in transport emissions will be seen as a baseline requirement for NLTP funding, as opposed to a monetisable part of CBA subject to trade-offs.

7.4 Calculating returns to government

As noted above, LGWM has already undertaken a simplified dynamic land use calculation which has resulted in more development and more intensity in the study area. It is possible, and there is work ongoing within the LGWM programme around this, to determine the commercial value of that land use change to developers and builders.

Currently, the LGWM analysis presents the BCR as national (public and private) benefits and costs. This is known as BCR(n). BCR(g) is an allowable process by which you can subtract 3rd party contributions to the project costs from the cost component of the benefit cost ratio. It was originally developed for tolling projects and allowed Waka Kotahi to subtract toll revenue from the cost of the project when calculating the BCR.

A BCR(g) is calculated as the present value of national economic benefits minus the present value of private sector contributions, with the result then divided by the present value of net government costs. Benefits to government (the numerator) will usually be lower than total benefits, however a BCR(g) may still return a higher value if BCR(n) if costs net of 3rd party contributions (the denominator) are significantly lower than total costs.

The intent of BCR(g) is to give a more realistic view of the cost benefit analysis to **government** funders of the project. The principle being that 3rd party funders have already decided the project is a good idea, hence their willingness to pay, so their private benefit and private cost can be removed. The critical reason why benefits aren't also subtracted is that there is an underlying, uncounted consumer surplus to

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the project from these funders in the normal BCR. Put simply, 3rd party funders would not pay more for the project if private benefits were wholly captured by the current BCR.

While this was created for tolling projects (where the road user pays), there is nothing stopping the process being used for major urban transformation projects where developers and other potential 3rd party beneficiaries have a willingness to contribute to the cost of the project. This could be through any number of mechanisms such as development contributions, targeted rates, value capture, sale of air rights, tax increment financing, or commercial partnerships between Waka Kotahi/WCC and 3rd party funders.

A very good example is Crossrail in London, where 1/3rd of the cost of the project was met by 3rd party funding, principally through the provision of air rights (which have been very commercially successful in this project).

One approach to measuring BCR(g) for LGWM at this very early stage would be to treat the value of a small reduction in house price escalation delivered through the ability to increase housing supply attributable to Let's Get Wellington Moving as a proxy for value to private developers. Across the entire Wellington Region, a small \$25,000 reduction in house price *inflation* (noting that March 20 to March 21 house price inflation in Wellington was over \$200,000 and average price has over doubled since 2015) delivers a \$300m annual benefit (reduction in prices) that is a real commercial impact for people trying to build and develop housing. If the Programme were to capture 20% of that value through any number of mechanisms (special purpose vehicle, targeted rate etc), it would deliver a total hypothetical private contribution of \$900 million over 40 years (discounted).

If 3rd party funding could reach \$150 million per annum, the BCR(g) could increase to over 1.5 for Option 1 and over 5.00 for Option 4. It is important to note that this approach is illustrative only and does not recommend any particular funding approach or apportionment of costs. What it does show though, is that with a focus on how land use will respond, and then creating detailed business cases that understand the commercial and economic value of the programmes to households, businesses and developers, there are a significant number of opportunities to create projects where co-funding offers meaningful financial benefit for all parties that can impact on the Programme BCR.

7.5 The cost of delay

BCRs as a measure of a project essentially answer two questions:

- Is this a good project?
- Is this a good project to do now?

This is discussed in more detail in Section 3. The LGWM transport modelling team have assessed that even with a current BCR of 0.46, if decisions were to be deferred, a decision made in the 2030's would see a project BCR of 1. If nothing else changed. In other words, taking a simple CBA approach, the Programme is still a good programme, it's just not being advanced at the correct time using the lens of Cost Benefit Analysis.

Financial Analysis is important in this respect. It is useful to revisit the points earlier, that the largest share of the costs of major transformational programmes occur up front in the first 10 years, so are least impacted by the discounting of future costs and benefits. The benefits, however, occur as population grows, which tends to reach critical mass in the last 10-15 years of the 40-year analysis period and are therefore impacted more by discounting in the BCR calculation.

It is useful to consider the impact of inflation for capital projects, particularly if these projects were to be debt-financed. It is probable the total capital cost of LGWM will be debt financed with financing costs being met by the project partners through rates and NLTF. The Treasury's current forecast for inflation

averages 2.5% for the next 5 years. Table 7-2 below estimates inflation adjusted nominal project costs for Options 1 and 4, based on these assumptions.

Table 7-1: The cost of delay

	5 year delay	10 year delay	15 year delay
Option 1	\$400m	\$1,000m	\$1,510m
Option 4	\$350m	\$750m	\$1,200m

Given projects are financed at the nominal cost at the year at which financing is advanced, it is always useful to consider the impact inflation has on the cost of the project if commencement is delayed. While this is picked up in the CBA in many respects, the CBA itself only considers that decisionmakers say yes or no to a project at a given point in time. The CBA never considers that a “yes” decision would be made at a later date. This is why the “cost of delay” analysis is important.

On top of financing and inflation of project costs, there is also the consideration of the financial and economic costs of the Do Minimum that would be incurred with any deferral of the commencement of the Programme. As discussed in the introductory Section, these costs are effectively “zeroed” in the CBA analysis because the purpose of the CBA is to compare the options to the Do Minimum. Deferral of a Programme will necessarily mean costs incurred with “coping” in the interim (e.g. maintenance and additional services). It also means the economic losses associated with lost time, carbon and dynamic population movement are also incurred in the intervening years. Again, this is picked up in the CBA for a Year 0 decision, but not for a deferred decision.

A similar, detailed exercise was undertaken for Waka Kotahi for the Manawatu Gorge replacement. The cost to the Central North Island economy of a 1-year delay in that particular project was 1/3rd of the total cost of the project.

8 Opportunities for High-Impact, Longer-Term Analysis

The focus of this report has been on potential adjustments to the Programme BCRs to the current Indicative Business Case stage. It is also worth the Board understanding the potential longer term material changes that can be made either as part of any Detailed Business Case for individual Projects in the Programme, or across the Programme as a whole. With the exception of the Resilience Section below, these key considerations have already been discussed extensively in this report.

In general, these longer-term considerations are focused on three key goals:

1. Better understanding and articulating what is actually happening in terms of population dynamics and being able to better forecast these in a robust and defensible way.
2. Creating the environment where value can be created and the DBC teams rewarded for the creation of that value through improved economic impact results.
3. Better articulating the financial/cost components and understanding the cost implications of the way decisions are made.

8.1 Dynamic Do Minimum calculation – along with a view on core population scenarios

The reasons for the dynamic Do Minimum and the risks with the population forecasts are extensively discussed in Section 6. We therefore recommend that core tasks for the Programme DBC include the following:

- Getting a better handle on what's actually happening in the Do Minimum, ensuring the baseline scenario is fully specified and understood.
- Understanding those "pushed" out of the analysis area and whether they are different to those being attracted in.
- Assess the "retained" population, improving the accuracy of CBA (which may make the Do Minimum "worse", i.e. more of a pressing problem, and therefore the options generate higher benefits earlier).

This work should commence well in advance of the Detailed Business Cases as it will materially underpin much of the analysis undertaken in the DBCs

8.2 Cost of Delay/Inaction – Modelled approach

The previous Section has shown a basic financial impact through inflated Programme costs through a deferral of the Programme into a future year. A more comprehensive modelled approach undertaken alongside the DBCs for each project can include:

- GDP/ full Computable General Equilibrium modelling of economic impact to the region of delaying the projects. This can potentially include housing affordability impacts as well as agglomeration, productivity, employment, and higher value land use.
- Financial (capital cost and impact of rates) assessment of region-wide project implications (e.g. more capital investment to support different growth profiles as opposed to avoided or retimed investment from early investment).

8.3 Complex Dynamic WEBs approach

As discussed above, building on the simplified, top-down approach used in the IBC stage will deliver significant additional benefits for the Programme. It includes:

- Utilising the prescribed Dynamic WEBs approach (complex) in the Waka Kotahi Monetised Benefits and Costs Manual

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- Commercial and economics workstreams (i.e. understanding population and housing investment responses, including commercial property)
- Identifying tangible opportunities for third party funding
- Delivering a fully integrated BCR(g) calculation which will significantly lift the BCR for government investors.

8.4 The value of resilience

One area not discussed in the report to date is the value of resilience. The current LGWM modelling does include modelling of reliability benefits, but Waka Kotahi's research shows there are significant additional resilience benefits that are often uncounted, but allowable under the MBCM.

Resilience can include not only natural events, but also the ability of networks to recover from, and cope with, other disruptions such as major works or incidents on the network. We would expect both the MRT and State Highway projects would significantly add to the resilience of the Wellington networks, and applying Waka Kotahi's resilience framework will identify a range of benefits presently not accounted for.

9 Sensitivity Analysis Completed

The final part of this review consists of sensitivity analysis performed by EY, spread across five outcome areas. These areas were identified as potentially having a material impact on the BCR, and have been analysed to review the potential effects and outcomes that any alternative assumptions would have. In some cases, we recommend that additional modelling is unlikely to add value. We note that this analysis is intended to inform prioritisation and planning decisions leading up to the Programme DBC and should not be read as definitive results.

9.1 Mode-specific preferences

Many transport models look at general behavioural preferences of travellers when they are considering public transport choices. There is a well-established hierarchy for public transit preferences:

1. Ferry
2. Heavy Rail
3. Light Rail
4. Bus Rapid Transit
5. Bus.

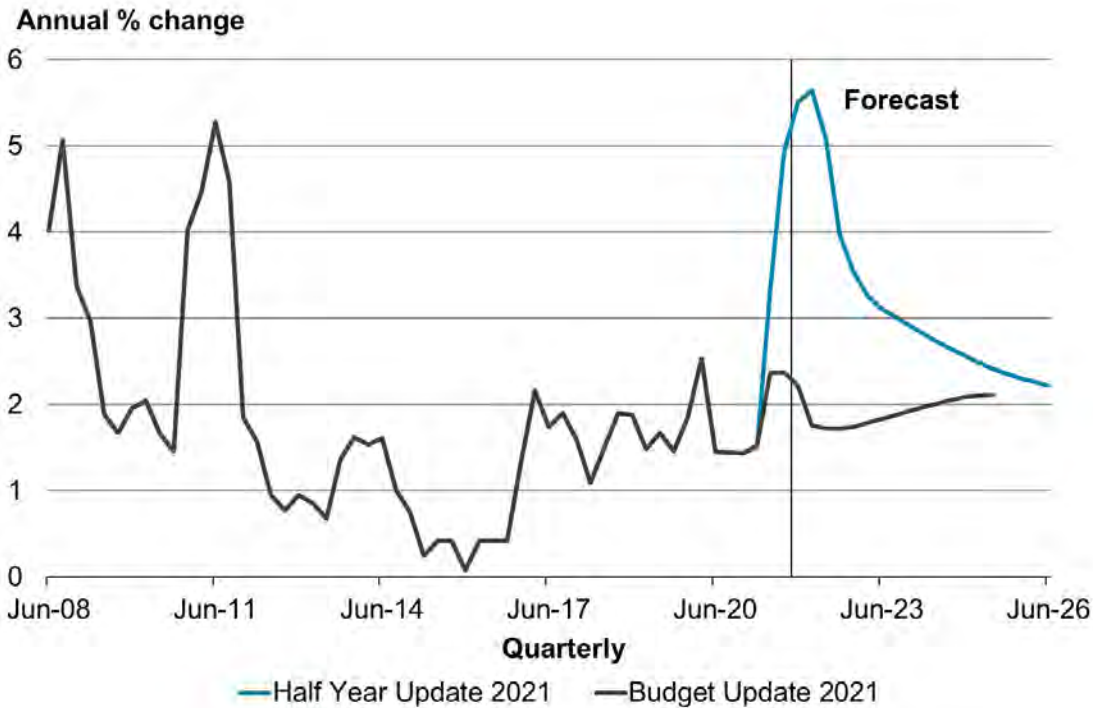
The modelling performed for LGWM has appropriately considered these choices alongside predicted traveller behaviour, with respect to the fact that the only feasible public transit options in the Programme area are light rail, bus rapid transit, and bus. From our testing, it is considered that further analysis at the DBC phase would not lead to materially different results.

9.2 Inflation forecasts

In the year to December 2021, the Consumer Price Index increased 5.9 percent. This is the largest annual increase since 1990. As such, it is worth reviewing whether New Zealand will move to a materially higher inflation environment than that which underpins the current LGWM forecasts.

The Treasury's Half Yearly Economic and Fiscal Update for December 2021 contains a consensus-based medium-term inflation forecast. This shows the present spikes will abate within the forecast period moving back to a reasonably stable 2.5% average:

Figure 9-1: Budget 2021 Inflation Forecasts



On this basis there is little justification to fundamentally revisit the inflation forecasts used by LGWM.

9.3 Population projections

These are discussed in detail in Section 6. At the IBC stage, and if a dynamic land use is developed further, the population projections should remain unchanged. However, for the reasons discussed above, the current projections should be viewed as conservative and have the impact of materially reducing benefits.

Further work and testing, along with development of the complex dynamic land use approach is a high priority. We recommend investigation and discussion of Programme-appropriate population forecasts be advanced as part of the DBC stage.

9.4 Modelling Safety Valve

Transport models aren't designed to "fail": They are designed to solve problems and identify the merits of solutions. The issue is, for major urban transport projects, the model "failing" on the Do Minimum is an important finding. What that means is that the network cannot cope with the growth that it is being asked to accommodate.

Most models have a safety valve where the model equilibrates when under pressure. This can occur in a number of ways. For Wellington, it appears that the system never comes under irresolvable pressure because households and businesses dynamically exit the LGWM programme area as part of the Do Minimum. In effect household and business behaviour is providing the safety valve, meaning there is a "real-time" failure as opposed to a modelled one.

9.5 Discount Rates and Analysis Periods

Consistent with the most recent Waka Kotahi guidance, a 4% discount rate has been applied alongside a 40-year appraisal period. A 60 period could also be considered in light of long-term Programme

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ambitions. Reinforcing the recommendations within Section 8 above, Waka Kotahi emphasises the importance of accurate demand forecasting in such circumstances:

An increase of the analysis period to 60 years is permitted to ensure that the whole-of-life costs and benefits of long-lived infrastructure activities are captured. An extension of the analysis period increases the importance of demand forecasting. Emphasis should be placed on developing a range of options and scenarios, and on reporting uncertainty in the business cases and economic evaluation, when the analysis period is extended.

We recommend that, to inform discussion of long-term impacts and (if necessary) intergenerational equity, DBC analysis include the results of sensitivity testing. This could consist of a 2% and 6% discount rate, as well as a 60-year appraisal period.

10 Conclusions and Next Steps

Our conversations with the wider LGWM team and review of CBA documentation indicates that **an appropriate and proportionate range of costs and benefits** have been modelled for the purposes of IBC development. The Programme team have clearly recognised the challenge of modelling and forecasting regional transformation and scoped their analytical workstreams accordingly.

Sensitivity analysis performed by EY and the LGWM team has identified a range of uncertainties, including (but limited to) land use intensification, pricing, mode-specific preferences, inflation, discount rates and future ways of working. In our view the potential for Programme assessment results to change has been clearly and effectively communicated within documents such as the *LGWM Programme Preferred Option Report*. It may be appropriate, at DBC stage, to collate and formalise this analysis into quantified uncertainty bands, for example through the use of Monte Carlo analysis.

A small number of analytical gaps have been identified by the joint MRT/SHI consultant team, for example a focus on traditional transport benefits and the application of an exogenous land use scenario (see section 4.2). We do not consider any of these issues serious enough to constitute an error or material deficiency in analysis at IBC stage. All four issues have been well-communicated to Programme decision makers through the *Programme Short List Options Report, October 2021* and *Preferred Option Report – Modelling Appendix* reports.

We have identified a number of opportunities to refine Programme analysis at the DBC stage, ensuring that final options appraisal results are an accurate representation of viability and relative efficiency. We recommend that DBC planning include the following activities:

1. Dedicated population and Do Minimum modelling well ahead of DBC drafting
2. Alternative air pollutants and GHG scenarios, in line with contemporary Waka Kotahi guidance
3. Calculate returns to Government (BCR-Gs) in addition to standard national benefit calculations (BCR-Ns)
4. Review and agree an appropriate scope for the analysis of Wider Economic Benefits
5. Agree an approach to estimating, collating, and communicating the uncertainty associated with option assessment results

Whilst the *LGWM Programme Preferred Option Report* recommends a preferred Programme option, the full case for investment in the MRT and SHI elements of the programme will be provided in a final IBC, which is due to be completed by the end of 2022. The key next for LGWM options analysis will therefore involve fully document the case for investment across MRT and SHI projects, detailing a final assessment process and proposing how future work could be delivered.

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7 June 2022

Programme Level Carbon Considerations for Let's Get Wellington Moving

Programme and Options Breakdown

Let's Get Wellington Moving



Attachment 1.c to Report 22.227

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On behalf of			

Introduction

This technical note applies a carbon reduction lens to the overall programme and to the four transformational programme options. It draws together an overview of the work undertaken to understand the carbon reduction implications of investment in Let's Get Wellington Moving (LGWM).

Prior to the public engagement at the end of 2021, a range of tools and approaches were used to consider the impact on carbon reduction that might be expected from the LGWM investment proposals. The multi criteria assessment of the four options was informed by initial transport modelling outputs, together with qualitative tools to provide a fuller picture. They included the Climate Assessment of Transport Investment, a qualitative tool used to assess the level of climate positive and climate negative elements within a programme, and a Comparative Cities analysis which compares Wellington to 15 other cities with comparable populations, densities and in some cases topography, that have invested in mass rapid transit (MRT).

Further work has now been completed, incorporating refinements to the approach to transport modelling to further reflect the transformational nature of the programme.¹ This report details the revised carbon emissions impacts of the LGWM programme in order to support decision makers identify their preferred option for the completion of the MRT and State Highway Improvements combined Indicative Business Case – the Transformational Programme.

Background

LGWM is an initiative between Wellington City Council, Greater Wellington Regional Council and Waka Kotahi New Zealand Transport Agency, together with mana whenua partners Taranaki Whānui ki Te Upoko o Te Ika and Ngāti Toa. LGWM seeks to deliver an investment that supports Wellington's aspirations for how the city and region looks, feels and functions.

The LGWM programme's geographical scope extends from Ngauranga Gorge to Miramar in the east, including connections to the central city, port, regional hospital and international airport, and a number of core multi-modal corridors connecting the central city with suburbs to the north, south, east and west. However, the programme is set within a wider city and regional context when it comes to trips, networks, land use and outcomes.

Our vision is: "A great harbour city, accessible to all, with attractive places, shared streets, and efficient local and regional journeys."

The following objectives and weightings have been agreed for the LGWM programme:

- Carbon emissions and mode shift: 40% - Reduces carbon emissions and increases mode shift by reducing reliance on private vehicles
- Liveability: 20% - Enhances urban amenity and enables urban development outcomes
- Safety: 15% - Improves safety for all users
- Access: 15% - Provides more efficient and reliable access for users
- Resilience: 10% - Is adaptable to disruptions and future uncertainty

¹ Information about the approach to transport modelling is contained in the Preferred Option Report – Modelling Appendix.

While all the above objectives are critical for the programme, the significant relative weighting given to carbon emissions and mode shift signals the importance of this objective to LGWM partners in the context of a climate emergency and national, regional, and local carbon reduction targets.

The LGWM programme comprises:

- a 3-year programme of early bus priority and active mode improvements (including Golden Mile, Thorndon Quay & Hutt Road);
- City Streets – rolling out bus reliability and active mode improvements in the central city and on key routes to suburbs; and
- a Transformational Programme of larger elements that will help shape future growth, transform our city and significantly change how we get around, including MRT.

The key differences between the four programme options within the Transformational Programme are identified in Table 1 below

Table 1: Summary of the differences between the four options for the LGWM Transformational Programme

	Option 1	Option 2	Option 3	Option 4
Basin Reserve	Grade separated	Grade separated	Grade separated	At-grade
Mt Victoria Tunnel	New tunnel	New tunnel	Existing tunnel	Existing tunnel
MRT City to South	Light rail, via Cambridge Tce	Bus rapid transit, via Cambridge Tce	Light rail, via Cambridge Tce	Light rail, via Taranaki St
MRT East	Enhanced bus, via new tunnel	Bus rapid transit, via new tunnel	Enhanced bus, via Hataitai bus tunnel	Enhanced bus, via Hataitai bus tunnel

For greater detail about the Transformational Programme options as well as the wider LGWM programme, please refer to the LGWM Programme Affordable Short List Options Report.²

Why is reducing carbon emissions and increasing mode shift away from private vehicles such an important objective for LGWM?

At the national level, the government has declared a climate change emergency, and has committed to urgent action on reducing emissions. Enactment of the Climate Change Response (Zero Carbon) Amendment Act in 2019 has set a target for NZ to achieve net zero emissions by 2050 (for carbon dioxide emissions) and the government is currently developing an emissions reduction plan (ERP) that will set out the policies and actions needed to meet this target.

Transport is responsible for around 43 percent of total domestic carbon dioxide (CO2) emissions, and 20 percent of total greenhouse gas (GHG) emissions³. Therefore, transport emissions need to fall significantly, and quickly, to achieve our emissions reductions commitments and targets.

² Available at: <https://lgwm.nz/all-projects/mass-rapid-transit/related-documents/>

³ Emissions Reduction Plan discussion document 2021 - MfE

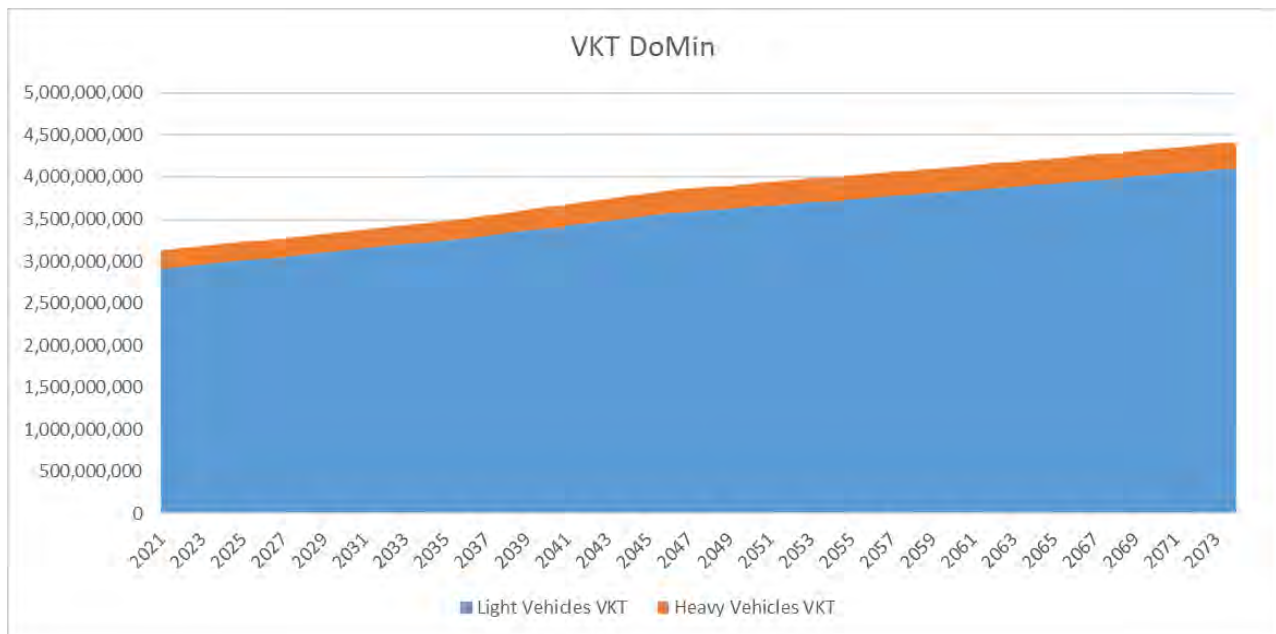
The government’s draft ERP includes three focus areas for reducing transport emissions by 2035, the first of those being ‘Reducing reliance on cars and supporting people to walk, cycle and use public transport’ with an associated target: *Reduce vehicle kilometres travelled (VKT) by cars and light vehicles by 20 per cent by 2035 through providing better travel options, particularly in our largest cities.* A key action identified in the draft ERP within this focus area is to ‘progress Let’s Get Wellington Moving, including the delivery of bus priority measures and the planning of mass rapid transit’. The final ERP is due to be released in May.

At the regional level, the Wellington Regional Land Transport Plan 2021 targets seek a *35% reduction in transport-generated emissions*, alongside a 40% increase in the mode share of public transport and active modes, by 2031.

Wellington City Council has adopted Te Atakura – First to Zero, a blueprint to make Wellington City a zero-carbon capital by 2050. As part of this, WCC has committed to a *57% reduction in emissions by 2030*. Both councils have declared a climate emergency to reflect the urgency of this problem.

Action is needed now to meet these carbon commitments. Transport is the biggest source of emissions in the Wellington region, accounting for 40% of all emissions in the region, and 48% of emissions in Wellington city⁴. Between 2001 and 2019, total transport emissions rose by 14%, with road emissions from petrol and diesel use increasing by 8 percent.⁵ The current pathway does not put the city or region on track to meet any of these emissions targets.⁶

Figure 1: Doing nothing – the problem does not just go away: Wellington region VKT⁷



⁴ LGWM Programme Report

⁵ Wellington Region Greenhouse Gas Inventory 2020

⁶ Emissions Reduction Plan discussion document 2021 - MfE

⁷ Data from Wellington Transport Strategic Model, Wellington Analytics Unit.

Figure 1 above shows that, under the do-minimum scenario, regional VKT for light vehicles is projected to increase by more than 55% from 2.8 to 4.4 billion kms from 2021 to 2074. For heavy vehicles, regional VKT is projected to more than double from 180 million to 375 million kms over the same period.⁸

Figure 1 shows why the LGWM objective seeks both to reduce carbon emissions directly and to increase mode shift away from a reliance on private vehicles. As identified in the draft ERP, a focus only on reducing carbon emissions does not account for the ongoing impact of fossil fuel powered vehicles in the New Zealand vehicle fleet, or the impact that congestion has on producing emissions. New Zealand's vehicle fleet is comparatively old and turns over comparatively slowly.

We cannot rely on the transition to electric vehicles and decarbonising the vehicle fleet - this will not be fast enough, even with current incentives.⁹

Figure 2: Doing nothing – light vehicle emissions drop, but not fast enough¹⁰

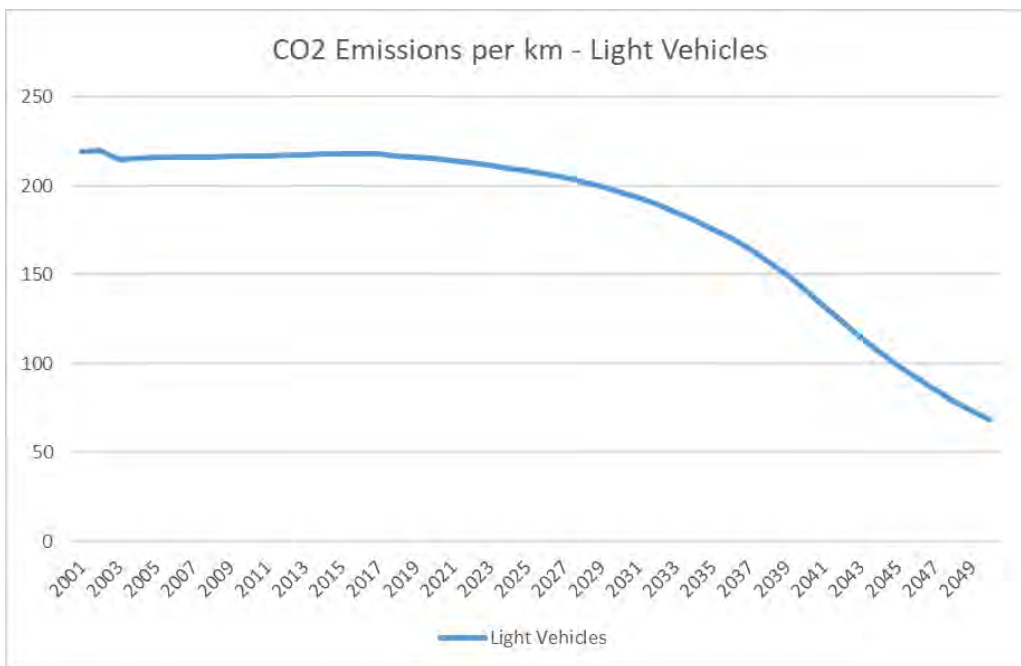


Figure 2 above shows that across time, CO2 emissions per km from light vehicles are projected to decrease due to a mix of efficiency improvements and electrification. However, this doesn't start to accelerate until after around 2030. This is not fast enough to meet Wellington City's commitments, Wellington's regional commitments, or New Zealand's national commitments.

⁸ Results are based on interpolation of 2013, 2036, and 2046 results from the Wellington Transport Strategic Model and assumes 0.5% annual VKT growth post 2046.

⁹ Ibid

¹⁰ Data from Wellington Transport Strategic Model, Wellington Analytics Unit.

Figure 3: Doing nothing – heavy vehicle emissions are on a slow decline¹¹

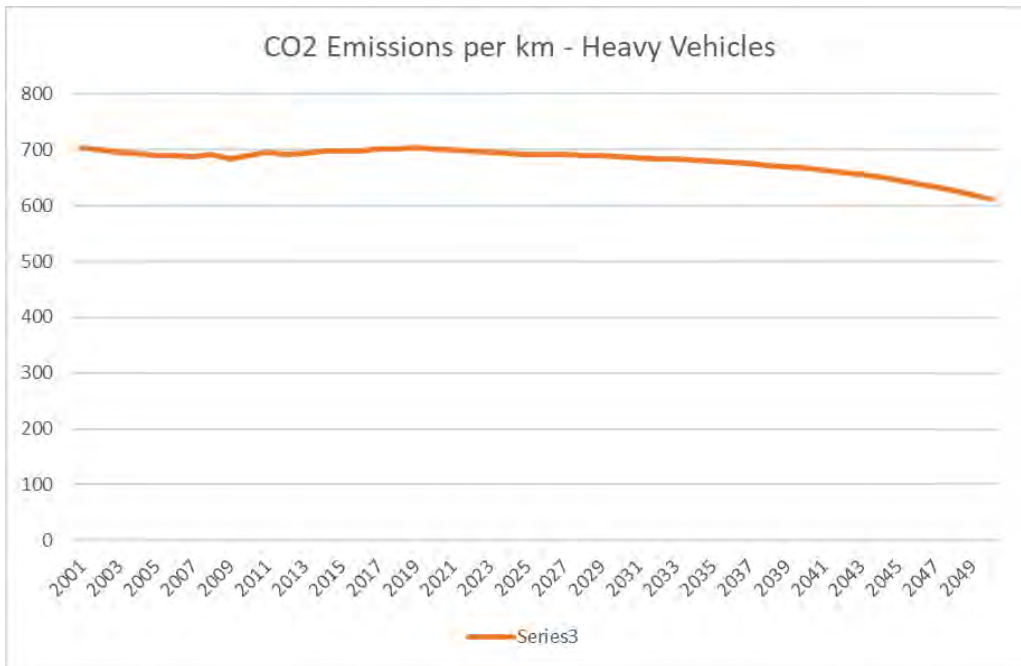


Figure 3 above highlights the slow expected decline in carbon emissions per km from heavy vehicles.

Transport investment, and the denser urban form that it enables, have an important role to play in reducing carbon emissions. Not only does investment in infrastructure for active modes and for zero-emissions public transport reduce emissions, MRT can stimulate a change in urban form to greater density living, which further reduces demand for private motor vehicle use – electric or fossil-fuel powered.

Reducing the amount of travel that people do in fossil-fuelled vehicles is key. The greatest opportunity for transport emission reductions comes from our large cities where population densities provide economies of scale for public transport and people are likely to have more choice. By improving public transport, walking and cycling options and managing demand we also realise much wider benefits such as travel choice and accessibility, better health and safety, and less congestion, which all improve the liveability of Wellington.

What’s the role of LGWM in contributing to carbon reduction and mode shift goals?

The LGWM programme sits alongside a much broader regional investment programme to significantly improve public transport and active modes, and shape urban form. Examples include: Te Ara Tupua, enabling many more active mode trips between our two largest cities; the regional rail programme, with associated opportunities for more intensive transit-oriented development around stations; and other major land use transport integration projects like RiverLink, Access Kenepuru and the Eastern Porirua regeneration programme. Together these projects and other programmes are expected to cumulatively influence mode shift and emissions for the region.

Wellingtonians are already high users of public transport compared to other New Zealand cities, particularly for commuter trips to central Wellington city. Our regional rail network, relatively contained urban form and strong central employment hub in the Wellington CBD contribute significantly to this. The

¹¹ Data from Wellington Transport Strategic Model, Wellington Analytics Unit.

Wellington region has the highest mode share for public transport, walking and cycling for all trips compared with other cities in New Zealand,¹² and these modes account for over half of trips to the CBD during the morning peak.¹³

This context needs to be acknowledged when we look at the role of LGWM in reducing emissions, and the expected level of mode shift and VKT reductions from the programme. Achieving a significant increase in public transport and active mode share will be challenging starting from a high base, so investment needs to be transformative in a way that shapes future land use. As our population grows, we need even more people in the region to live in locations close to the things they need, so they can travel shorter distances and can choose active modes or public transport for more trips, seven days a week.

The MRT component of the LGWM transformational programme will provide the catalyst for significant urban development and intensification along key corridors to the south and east of the city centre. The programme options have been developed with scenarios exploring the addition of between 16,000 and 21,000 new homes in locations along the MRT corridor where people can live and access a wide range of jobs, services and facilities without needing a car.

The mode of MRT is important: light rail-based MRT is more likely to deliver greater density than bus-based MRT. This is explored in more detail in other LGWM reports.¹⁴

Achieving this level of intensification will rely heavily on other aspects like land use policies and urban development mechanisms, and supporting infrastructure being provided – like three waters and other social infrastructure.

Travel demand management and congestion pricing

To unlock the full carbon reduction benefits of the LGWM infrastructure investment, we will also need to consider travel demand management tools. The LGWM programme is investigating the potential for road pricing measures, like a congestion charge, and scaling up our travel behaviour change programmes.

Analysis suggests that a congestion charge could be expected to provide further reductions in VKT and associated carbon emissions.

More planning and detailed design is required to inform further transport modelling to quantify the impact that road pricing measures and further travel behaviour change would have on the reduction of carbon emissions. Priced travel demand management, like congestion charging, would be implemented in a similar way no matter what Transformational Programme option may be advanced, therefore, this factor is not a point of differentiation between the programme options. It is already clear, however, that a high-quality, high-capacity, extensive public transport network and active modes networks are necessary precursors to the implementation of road pricing measures.

Our approach to assessing the carbon reduction and mode shift contribution of the LGWM programme

The carbon analysis work completed as part of the IBC has sought to understand the potential impact of LGWM investment on emissions at both a programme level and comparatively across the four options in the transformational programme.

The carbon emissions that arise over the whole of life of land transport infrastructure projects can be categorised into the following:

¹² Keeping Cities Moving 2019, Waka Kotahi NZ Transport Agency

¹³ Wellington RLTP Annual Monitoring report 2021

¹⁴ LGWM Programme Affordable Short List Options Report, Ibid.; Urban Development Summary Report, October 2021, available at: <https://lgwm.nz/all-projects/mass-rapid-transit/related-documents/>

- Construction emissions – those associated with construction materials and construction activities that occur over the duration of the construction. Together these are often referred to as embodied emissions.
- Operational emissions – those associated with the materials and activities required to operate and maintain the infrastructure over its service life
- Enabled emissions – emitted by the vehicles using the infrastructure / transport network over its service life. For this project, where vehicle use reduces due to mode shift (for example, a shift from private vehicles to public transport or cycling/walking), the reduction in vehicle emissions has been calculated (i.e. the vehicle emissions that have been avoided by the mode shift).

Emissions will reduce over time as the fuel efficiency of the vehicle fleet changes.

Methodology for the estimation of carbon emissions

Transport modelling underpins our analysis

Transport modelling for the preferred option decision has focused on two programme options from the LGWM Programme Affordable Short List Options Report as 'bookends' – Option 1 as the highest cost with the largest infrastructure footprint, and Option 4 as the lowest cost with smallest infrastructure footprint. Two land use scenarios have also been identified – core and intensified.

- The core land use scenario provides the base results reported for the LGWM programme option. It assumes the same level of population and employment growth along the MRT corridor as the Do Minimum, which is informed by recent regional population projections; it does not include any additional growth generated / enabled by the transport investment.
- The intensified land use scenario was created to test the impact of high density residential and commercial development occurring along the MRT corridor, assuming up to 26,000 additional dwellings. It should be considered as a 'what if' scenario rather than an attempt to predict the level of intensification stimulated by the infrastructure improvements.

The carbon impacts from this updated modelling work are presented in this technical note. It should be noted that these are still just scenarios and present plausible outcomes that could be achieved given a particular set of assumptions.

For the intensified land use scenario, it was assumed that the population of the Wellington region would be the same in 2046 as assumed under the Do Minimum land use scenario. The main difference is that the population distribution (i.e. where new growth would be located within the region) would change in response to the scenarios, focussing growth along the MRT corridor.¹⁵

This approach is considered best practice in order to understand the contribution that the programme itself could generate, particularly in relation to carbon emissions, compared to a Do Minimum scenario.

It is accepted, however, that the intensification scenario assumes the future population redistribution occurs without further intervention. Another plausible future scenario could be one where the transformational programme increases the overall growth rate for the Wellington region, with this additional growth being focussed on the MRT corridor. It is proposed that the detailed business case (DBC) explore these scenarios further.

¹⁵ An additional 200,000 people living in the region by 2046 – Source: LGWM Programme report

Both the modelling approach and the qualitative tools provide useful insight but do all have limitations when it comes to understanding a large and complex transformative investment like LGWM. These are discussed in the Limitations section below.

Embodied emissions

The embodied carbon analysis prepared for the LGWM programme was a high-level comparison between programme options using quantity estimates of concrete and steel: the materials that have the most embodied carbon.

The design team estimators provided early bill of quantities estimates of materials volumes, from which the volumes of concrete and steel on each individual project within the programme options were calculated. The emissions associated with the raw materials, manufacture and transport of these materials were calculated by applying an emissions factor (tons of CO₂ emitted per tonne of concrete, for example). Emission factors were developed by the design team based on local suppliers' Environmental Product Declarations and assumptions about transport distances and mode (for example, concrete was assumed to be transported by road from local plants in Wellington). Using these emissions factors, an estimate of the total emissions embodied in each option was derived by assuming that the embodied concrete and steel emissions would make up approximately 50% of the total project emissions, and that 30% of the total emissions would be attributable to fuel use during construction.

In summary:

- MRT vehicles are heavy: large amounts of carbon-intensive materials are required for foundations, regardless of mode.
- The programme options with tunnels have the biggest overall embodied emissions because of the quantity of materials involved in the tunnels and the earthworks involved.
- The estimates are considered indicative at this stage but are broadly consistent with estimates derived for other major construction projects. Please see the Limitations and Assumptions section below for further information about the assumptions made to enable estimation.

Operational emissions

The main operational emissions for bus rapid transit and light rail transit – the two forms of MRT considered within LGWM – are those emissions associated with the electricity required to run the system. Based on experience with other projects, and given New Zealand's high proportion of renewable energy, these are likely to be only a small part of whole-of-life emissions. Further, as the level of operational emissions is unlikely to materially distinguish between the programme options for MRT they have not been calculated at this point. Operational emissions will be formally calculated and optimised during the DBC.

Enabled emissions

The potential change in enabled emissions attributable to each programme option is calculated by comparing the modelled predicted future traffic flows (with the MRT in place, referred to as the "programme option" or "do-something" scenario) against the traffic flows expected without the programme in place (referred to as the "do-minimum" scenario).

To estimate the reduction in enabled emissions attributable to LGWM interventions, the VKT outputs from the Wellington Transport Strategic Model traffic modelling have been used as inputs to the Vehicle

Emissions Prediction Model (VEPM) which provides a prediction of the emissions profile of New Zealand's vehicle fleet over time.¹⁶

VEPM was developed by Waka Kotahi and Auckland Council to predict emissions from vehicles in the New Zealand fleet under typical road, traffic and operating conditions. VEPM relies on assumptions about the make-up of the vehicle fleet from the Vehicle Fleet Emission Model provided by the Ministry of Transport. This includes assumptions about how quickly electric vehicles will enter the New Zealand vehicle fleet, as well as the level of carbon emissions from vehicles powered by internal combustion engines.

Further information about the limitations of the analysis using VEPM is contained in the Limitations and Assumptions section below.

Application of the quantified analysis

The following steps have been followed to produce the quantified results below:

1. The Wellington Transport Strategic Model produces VKT estimates (light vehicles only) by:
 - a. Preferred option Modelling Scenario
 - b. Daily AM / interpeak / PM 2 hour peak
 - c. Transport model sector
2. VKT for each sector/scenario extrapolated to yearly using annualisation factors
3. Average network speeds for each sector also extracted from Wellington Transport Strategic Model for later use in VEPM to obtain emission rates— speeds kept consistent across options
4. VKT per year interpolated between modelled years
5. Emission rates [CO₂ e g/km] from VEPM 6.2 applied to VKT [km] to produce outputs in CO₂ e tons¹⁷
 - a. VEPM emission rates for light vehicles vary by year and speed
 - b. Light vehicle speeds for each Wellington Transport Strategic Model sector applied to get yearly average emission rates for each sector
6. Embodied emissions introduced at 2028, split evenly over construction period

The estimates for volumes of embodied carbon emissions are assumed to be emitted at the same average rate across the period of construction assumed for each programme option. We do not have sufficient detail to accurately estimate when construction emissions would in fact be produced.

Enabled carbon emissions savings for each programme option are assumed to ramp up across the construction period progressively, with 2.5% of the savings achieved each year across the construction period. Upon opening, enabled emissions savings increase progressively across the first three years of operation to 100%.

¹⁶ More information about VEPM can be accessed at: <https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/air-quality-climate/planning-and-assessment/vehicle-emissions-prediction-model/>

¹⁷ VEPM 6.3 was released after this analysis was completed. Analysis during the DBC will use the most up-to-date version available.

As noted early, operational emissions have not been quantified at this stage of the analysis because of insufficient information about the source of energy for MRT. Operational emissions are not expected to distinguish between programme options.

Bringing embodied and enabled emissions together, carbon emissions are produced during construction, while comparatively small amounts of carbon emissions savings are experienced as benefits from the City Streets active modes projects are delivered progressively across the transformational programme construction period. The 'peak' in carbon emissions will be experienced at the end of the construction period, after which the new transport options stimulate change in travel behaviour, resulting in enabled carbon emissions savings growing across time.

Programme-level carbon emissions estimate for LGWM

The performance of the LGWM programme options modelled is displayed in Figure 4 below, showing the projected cumulative carbon reduction in kilotons of carbon emissions compared to the do minimum scenario for the entire Wellington Region.

Figure 4: Carbon emissions 'payback' – programme options and land use scenarios compared

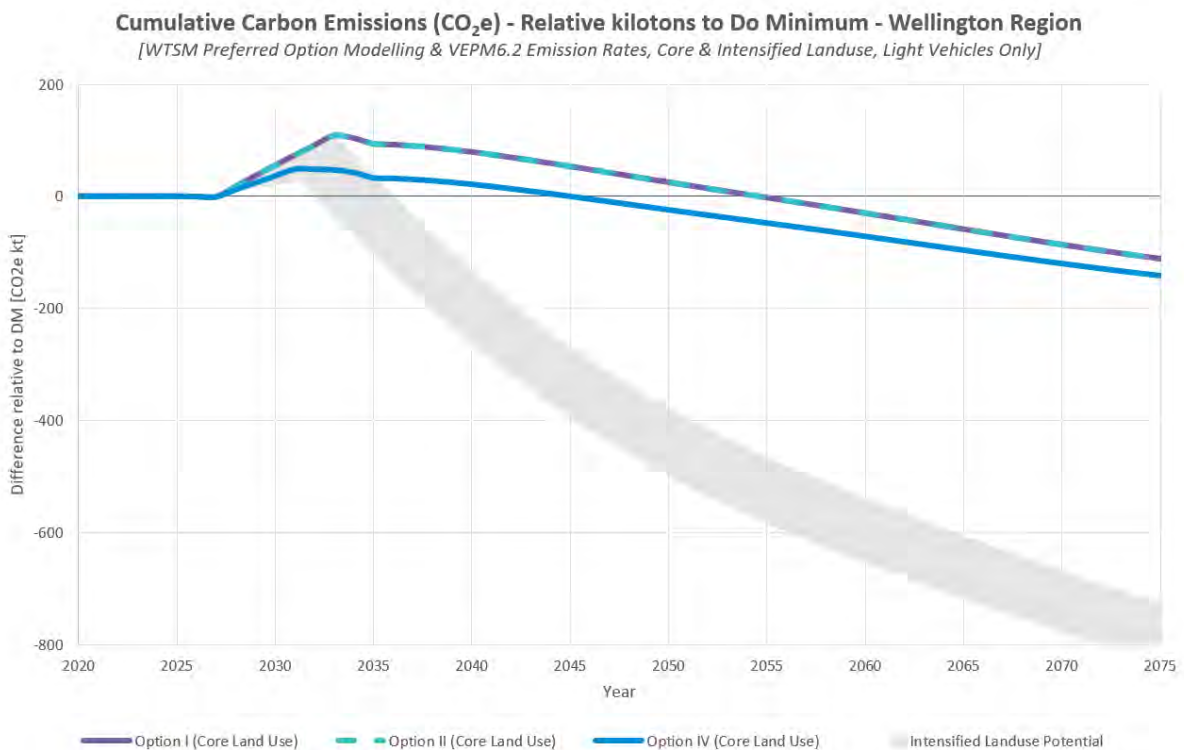
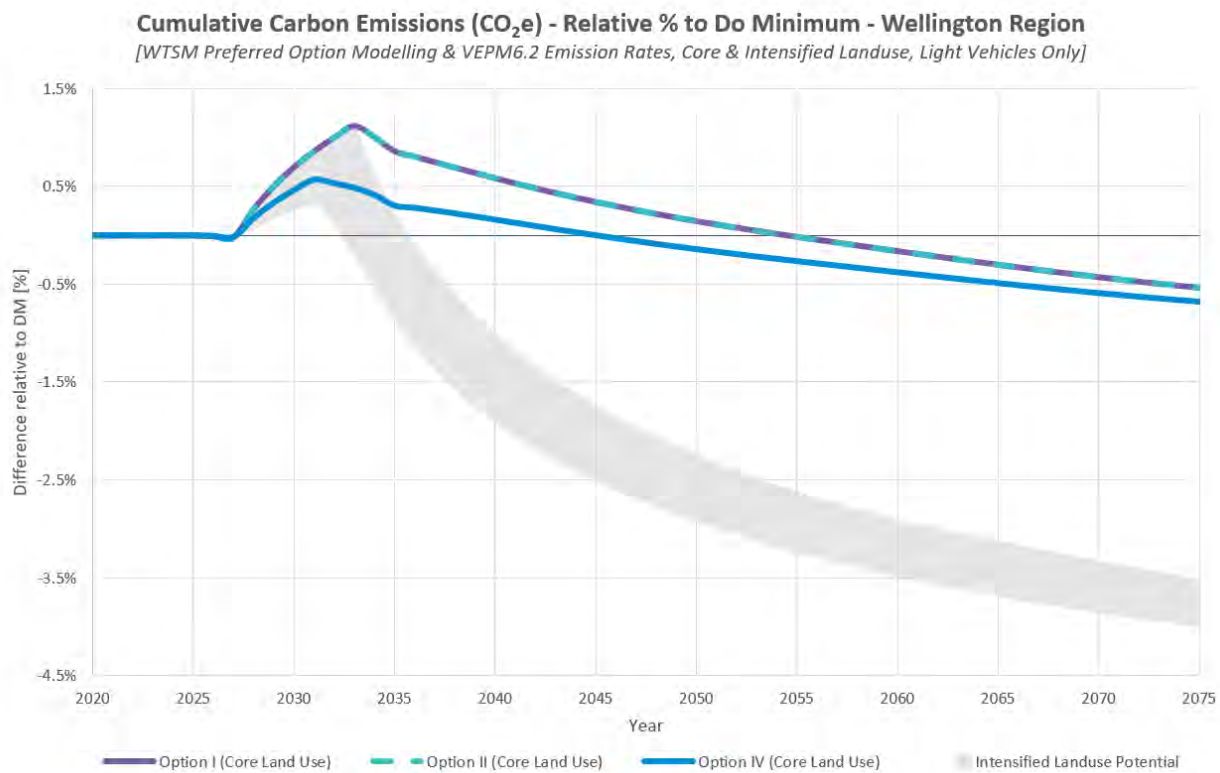


Figure 5 below displays the same information but displays the y-axis as the percentage of regional emissions reduced by the LGWM programme options.

Figure 5: Carbon emissions ‘payback’ in regional emissions percentages – programme options and land use scenarios compared with a different lens



Both figures show that, under the core land use scenario, Option 4 shifts sufficient journeys to active modes and zero carbon public transport to recover the enabled carbon consumed through construction by 2045. Options 1 and 2 pay back their enabled carbon by 2055, taking longer due to the higher level of carbon assumed to be required to construct the additional infrastructure in these two options.

Under the core land use scenario, all options perform in a broadly similar way. While Option 4 is projected to deliver net zero carbon ahead of Options 1 and 2, we can see that the gap between these options narrows across time as the performance of Options 1 and 2 gradually catch up to Option 4.

On the other hand, the intensified land use potential ‘range’ shows a substantially faster payback period, along with substantially greater total enabled carbon savings.¹⁸ In the best-case scenario, payback is predicted to be achieved in 2033 while in the lower-case scenario, payback is reached in 2036. The intensified land use projections show the potential to deliver a reduction of more than 700 kilotons CO₂e, or approximately 3 – 4% of cumulative regional emissions compared to the Do Minimum scenario.

The Intensified Land Use Scenario was built around Option 1 and is also considered to be broadly representative of the performance of Option 2 in a similar situation. Option 1 is considered to perform more towards the ‘top’ of the Intensified Land Use Scenario band (most carbon emissions savings) while Option 2 is considered more likely to perform more towards the ‘bottom’ of the Intensified Land Use scenario band. We have less confidence about the accuracy of the Intensified Land Use Scenario in analysing the performance of the other programme options.

¹⁸ Modelling assumptions for the Intensified Land Use Scenario are detailed in the Preferred Option Report – Modelling Appendix (page 9 onwards).

The above results, along with some additional data points are summarised in Table 2 below.

Table 2: LGWM Option performance across outyears

Land use Scenario	Core		Intensified	
Year	Option 1 / 2	Option 4	Lower bound	Upper bound
2033	1.1%	0.5%	1.1%	-0.2%
2036	0.8%	0.3%	0.0%	-1.2%
2045	0.3%	0.0%	-1.8%	-2.5%
2055	0.0%	-0.3%	-2.6%	-3.2%
2065	-0.3%	-0.5%	-3.1%	-3.7%

Key

	More carbon
	Break even year
	Less carbon

Timing tradeoffs

The analysis undertaken for LGWM has reinforced the importance of timing and sequencing for carbon reduction and supporting mode shift away from private vehicles.

The assumptions that underpin VEPM and the Vehicle Fleet Emissions Model drive the importance of timing – because the vehicle fleet contains a growing proportion of low / zero emissions vehicles, and because this proportion is expected to rise continuously, vehicle trips converted to non-car modes are only beneficial from a strict carbon perspective if they come from someone that would otherwise have driven a fossil-fuel powered vehicle. Electric vehicle trips diverted to public transport have no carbon benefit – this means the carbon benefit of vehicle trips diverted to public transport in the future declines as the models assume that the proportion of zero emission vehicles in the fleet rise year on year.

Carbon emissions need to be reduced quickly to support New Zealand to achieve its carbon reduction commitments. The various commitments of the three LGWM Partners vary from each other in timing and in scope. It is not appropriate for this programme-level analysis to make the tradeoff between these differing targets with their differing time commitments and different options for meeting their commitments.

LGWM does not deliver sufficient carbon reductions to entirely meet any of the Partners’ commitments to reduce carbon emissions – an indication of the significant task to meet these objectives. Investment in LGWM programme options is also not the only intervention by any of the Partners that seeks to reduce the production of carbon emissions.

It is not within the scope of the LGWM programme analysis to identify whether investment in any of the LGWM programme options is a more or less efficient means of reducing New Zealand’s carbon

emissions than any of the Partners' other carbon reduction projects (for example, faster electrification of the bus fleet, further infrastructure support for electric vehicles and / or car sharing; higher subsidies for the uptake of electric vehicles, etc).

Carbon emissions avoided in Wellington from, for example, investing in less embodied emissions (Options 3 or 4 over Options 1 or 2) are only beneficial to the extent that they are not emitted anywhere else in New Zealand – the cap on carbon emissions in the Emissions Trading Scheme is likely to be more influential than selecting a LGWM programme option on the basis of lower levels of embodied carbon. This is particularly so given that, if the density enabled by the intensification scenario is achieved, embodied emissions make up a small proportion of the total enabled emissions savings.

At the IBC stage, there remains significant uncertainty about design considerations that will substantially affect the level of carbon consumed (embodied emissions) and carbon saved (reduced enabled emissions) by LGWM programme options. Regardless of this uncertainty however, the programme analysis clearly shows increasing the density of Wellington City is more likely to deliver an urban form that is lower carbon than the alternative of enabling urban growth on greenfields sites.

Advancing a programme option that enables behavioural change sooner rather than later – for example by publicly committing to advancing MRT – will start to deliver enabled emissions reductions earlier. Our transport modelling is not able to capture this benefit (for further analysis of these under-counted benefits, the Economics Technical Report identifies these benefits from an economic perspective). These early benefits will be the subject of further investigation and quantification during the DBC phase.

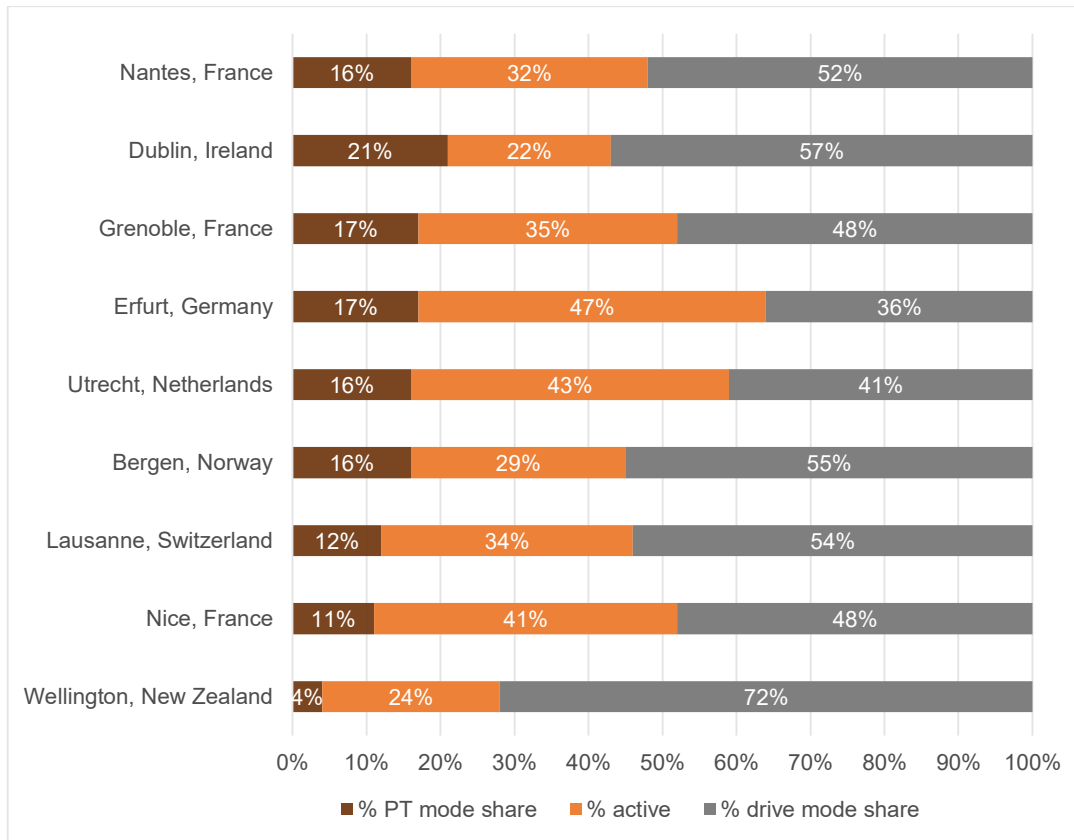
Comparative Cities: What can we learn from looking at similar sized cities who have implemented Mass Rapid Transit?

Internationally, cities have experienced mode shift success through the provision of supporting transport infrastructure. Among the work reviewed by the LGWM programme is analysis undertaken by Wellington City Council that compares Wellington to 15 other cities with comparable populations, densities and in some cases topography, that have invested in MRT.

This work found that in cities where significant investments in active and public transport networks, including MRT, had been made, 'car' mode share was relatively low (all below 60% where cities have invested in light rail MRT systems) and 'non-car' mode share relatively high, compared with Wellington which had a car mode share of 72% in 2018.

It is important to note that much of the non-car mode share comes from active transport across these cities. Active modes, particularly walking trips to Wellington City CBD at peak times also make a significant contribution to Wellington's non-car mode share currently. However, looking at the comparative cities with light rail (below), all their public transport mode shares exceed 11% for public transport as compared to Wellington's 4% of all trips.

Figure 6: Comparative Cities analysis – Wellington transport mode share compared internationally



One of the comparative city case studies was Grenoble, France - where 700km of cycle lanes and 4 light rail lines/extensions have been completed since 1987. Grenoble, a city with 47 km of MRT network achieved a 23% reduction in carbon emissions between 2005-2018. Wellington achieved only a 7% reduction over a similar, slightly longer, period.

Comparative analysis is a useful additional tool with which to consider what might be possible with similar sorts of change in another location – it does not provide a forecast of what will happen. While the cities identified in the comparative analysis have all been chosen due to the similarity of their characteristics to Wellington, this analysis is only provided as an example of what might be possible should similar investment be undertaken in Wellington.

Mass Rapid Transit investment impacts in Auckland

In the New Zealand context, successful rapid transit investments include the 6.2 km dedicated Auckland Northern Busway which opened in 2008 with subsequent very strong patronage growth and mode shift from North Shore to the CBD. The patronage on the busway has also significantly exceeded forecast demands.

Significant investment in upgrading Auckland’s rail system over the 10-year period from 2001-2011 demonstrated the willingness of Aucklanders to change their travel habits and use rail, with patronage

increasing from 2.2 million trips million per annum to 9.5 million, a growth of 332 per cent¹⁹. Prior to the Covid pandemic, Auckland's rail patronage was regularly approaching 2 million trips per month²⁰.

Looking at case studies both overseas and at home helps to give us confidence that investment in MRT can contribute to significant improvements in mode share and carbon emissions outcomes for Wellington.

Conclusion

LGWM Transformational Programme performance: carbon emissions reduction and mode shift

The LGWM programme sits alongside a range of initiatives across the region to reduce carbon emissions by improving transport choice, managing demand, and shaping land use and urban form. We will need all these programmes and projects to cumulatively deliver emissions reductions if we are to achieve national, regional and city carbon targets.

Shaping our cities and towns is key to improving the overall efficiency of the transport system. Meeting the housing needs of a growing regional population while reducing carbon emissions will require a response both within Wellington City and across the region.

The Wellington Regional Growth Framework expects approximately two-thirds of the housing growth over the next 30 years to occur in existing urban areas through infill, urban renewal and intensification, and approximately one-third of the growth in greenfield areas, extending the current urban footprint of the region. The greater the urban densification enabled and stimulated by the LGWM programme, together with intensification in and around sub-regional centres and around rail stations, the less greenfield development will be required, and the more transport emissions will be reduced.

The LGWM 3-year programme will make travel by public transport and active modes much more attractive and support mode shift to low-carbon modes. However, it is the LGWM Transformational Programme that will provide the foundations for a fundamental change to the way urban form develops in Wellington City, with associated significant and sustained reduction in carbon emissions and other important co-benefits over the medium to long term. A new MRT system and associated infrastructure provides an important city shaping catalyst for this change.

The more, new housing provided in Wellington City along the MRT corridor, the higher the number of trips expected to be easily made by walking and cycling and public transport given the proximity and access to the region's largest centre and employment hub, Wellington City CBD.

Analysis has shown that under the core land use scenario, the embodied carbon of all of the LGWM programme options takes a long time to be 'paid off' with enabled carbon savings. On the other hand, if the density forecast under the intensified land use scenario is achieved, the Transformational Programme has the potential to deliver a reduction of over 700 kt CO₂e or between 3-4% of regional emissions compared to the Do Minimum scenario. This is a significant contribution to regional emission reduction in the context of trip making across the wider region where private car is the dominant mode of travel and, on an annual basis, over 4 billion vehicle kilometres are travelled.

Opportunities to reduce the carbon emissions created during the construction phase will be a key objective for the DBC, as will be identifying specific actions that will support greater urban density to be delivered along the MRT route as quickly as is feasible.

¹⁹ Auckland City Rail Link, Updated Economic Evaluation, 2011

²⁰ AT Metro patronage report web-pax-dec-2021.xlsx (live.com)

Option differentiation

The LGWM carbon analysis shows that the degree of urban intensification achieved, followed by the level of mode shift enabled, is the key differentiator between programme options, rather than the performance of the programmes themselves. The degree to which the programme options are likely to facilitate the assumptions underpinning the intensified land use scenario is a key factor for consideration, though not the only one:

- a. Option 1 is likely to support very high levels of intensification along the southern corridor with light rail as the form of MRT and provides for direct public transport journeys and increased public transport capacity to the east to support mode shift to public transport and intensification.
- b. The bus-based form of MRT proposed in Option 2 is assumed to provide less capacity and less urban development than light rail-based MRT. However, this option includes bus-based MRT both south and east and is likely to support intensification across both these areas.
- c. The lower public transport level of service and capacity limits to the east under Options 3 and 4 are likely to constrain the degree of intensification in the east.

While the LGWM programme has found less scope for residential intensification in the east, the intensified land use scenario also supports greater employment density in the CBD, supporting more productive, higher-paying jobs.²¹ To the extent that this supports some intensification in the east, and reinforces the primacy of the Wellington CBD as the employment centre, it supports the need to provide additional, reliable public transport capacity for current and future eastern suburbs residents. Mode shift is also important, alongside direct reduction in carbon emissions.

Infrastructure investment under Mt Victoria and at the Basin Reserve (Options 1 and 2) support mode shift to public transport from the eastern suburbs, supporting the draft Emissions Reduction Plan objective to reduce VKT by light vehicles. Average commuter journeys from the eastern suburbs are longer than from the south, which reinforces the importance of viable and reliable public transport options for residents in the eastern suburbs to have low carbon travel choices and not to be reliant on private vehicles.²²

While Options 1 and 2 both are estimated to have higher embodied carbon than Options 3 and 4, in the long run, embodied carbon emissions are less important than the level of land use density each programme option is assessed to enable and achieve – greater urban density produces significantly greater carbon emissions savings than the carbon produced in construction.

The degree of mode shift predicted also cannot be ignored given LGWM's objectives, and the draft Emissions Reduction Plan. Options 1 and 2 both include substantial investment in public transport provision to the south but also to the east – the new Mt Victoria Tunnel in Options 1 and 2 delivers a threefold increase in dedicated public transport capacity to the eastern suburbs without increasing private vehicle capacity.²³

The early difference in carbon emission performance between Option 1 and Option 4 is embodied emissions from construction. Option 1 embodies more carbon upfront and takes longer to construct than Option 4. Nevertheless, the enabled carbon performance of the intensified land use scenario is significantly higher than the difference between Option 1 and Option 4 – between 2026-2046 model

²¹ Economics Technical Report.

²² Preferred Programme Option Report – Modelling Appendix

²³ Preferred Programme Option Report – Modelling Appendix. The form for the proposed Mt Victoria Tunnel will not be determined until the DBC stage – should it be preferred. Neither of the two high-level designs provide for additional private vehicle capacity though final designs may, subject to network conditions, provide for some more direct journeys for some private vehicle users. This will be explored in detail during the DBC.

years, enabled carbon reductions each year under the intensified land use scenario are around 50 kt CO₂e, or nearly half of the estimated embodied carbon for Options 1 and 2.²⁴

Limitations and assumptions

According to the Treasury:

“The indicative business case provides decision-makers with an early indication of the preferred way forward for high value and / or high-risk investment proposals... The information presented is indicative only [emphasis quoted]. It provides the decision-makers with just enough information to consider change and agree the short-listed options for further analysis, or to decide not to proceed with the project, before too much work is done.”²⁵

The level of analysis – and the accuracy with which we can project future outcomes – is necessarily limited at the IBC stage. The purpose of the IBC is to provide sufficient information to narrow the range of detailed analysis, not to provide certainty.

The quantification of embodied carbon has relied on high level estimates of quantities of traditionally carbon-intensive materials: construction fuel, concrete and steel. Without detailed design for all options, these estimates are subject to wide error ranges so these calculations should be regarded as high-level estimates only. Subject Matter Experts considered the impact of embodied carbon in the Multi-Criteria Analysis undertaken to identify the Programme Affordable Shortlist Options. Through this process, the Subject Matter Experts identified that Options 1 & 2 were broadly similar to option V1A, and that Options 3 & 4 were broadly similar to Option V3A. Consequently, for the embodied emissions quantification, Options 1 & 2 are assumed to be the same, while Options 3 & 4 are also assumed to be the same.

This is a simplifying assumption to enable quantification: the LGWM programme team acknowledges that the programme options will have different levels of embodied carbon. At this stage in an IBC, however, the embodied carbon estimates for the programme options are not sufficiently different to alter the overall carbon analysis between the options because the level of embodied carbon emissions is much lower than the emissions they enable or discourage from the use of infrastructure. Using VEPM and estimates of VKT from the Wellington Analytics Unit models, embodied carbon is estimated to be between 0.2% and 0.5% of enabled carbon emissions savings from the programme options over 40 years.

Design finalisation introduces opportunities for embodied carbon reduction through improvements in materials and design practice, which is required under the Waka Kotahi Sustainability Rating Scheme. Tradeoffs will be possible in the use of materials. Some emissions-reducing technologies are already market-ready, such as lower-emissions concrete mixes with Supplementary Cementitious Materials replacing Portland Cement, the use of recycled steel for reinforcing, and the increasing availability of electric construction machinery. The DBC phase will investigate the viability and likely cost of such tradeoffs.

The Wellington Transport Strategic Model, augmented with additional microsimulation modelling, provides the basis for assessing the quantitative impacts of the LGWM programme options on VKT and enabled carbon reductions. In general, strategic models will struggle to represent transformational change – such as that proposed with investment in MRT. The Wellington Transport Strategic Model outputs forecast the impact of the programme options on demand for different transport modes. There are inherent limitations forecasting future behaviour, particularly in the outyears of the model forecasts.

²⁴ Wellington Transport Analytics Unit analysis for LGWM Programme.

²⁵ Better Business Case Indication Business Case Guidance (Sept 2020); accessed at <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/better-business-cases-bbc/bbc-guidance/project-indicative-business-case-ibc>

This is because the model relies on underlying assumptions about transport consumers' demand / preferences for particular modes.

The LGWM programme options all introduce significant investments in city-shaping forms of transport – MRT does not currently exist as a transport choice for Wellington transport consumers south of the Wellington Railway Station, while the City Streets investments will join up previously incomplete cycling routes to create a network. These investments will fundamentally alter travel patterns and modal choices, particularly if they succeed in encouraging the faster development of denser housing options located along the MRT corridor, in close proximity to employment, education and services. It is difficult for a transport model to accurately project travel patterns in such a dynamic environment.

The impact of changes to urban form are only partially captured within the transport modelling outputs that form the inputs for the quantification of carbon emissions. This analysis is conservative in the scope of the carbon emissions savings calculated. We know, however, that denser residential development results in more public transport trips and more walking, cycling and micro-mobility. This dynamic effect is unlikely to be fully captured.

There are other carbon emissions savings that have also not been quantified in this analysis, but which we know will be supported, in part, by the expansion of high quality MRT and active mode networks:

- Denser development also makes more efficient use of other infrastructure, such as three-waters pipes, energy networks and social infrastructure such as schools, libraries, arts and cultural facilities. Less geographic spread results in less replication – less embodied and operational carbon emissions– better use – less carbon – and more PT and active transport use – less carbon per head of population.
- There is a range of evidence that identifies that the whole-of-life energy efficiency of denser housing is superior to that of standalone greenfields housing.^{26 27} To the extent that LGWM investments enable denser housing to be developed, LGWM is contributing towards a lower carbon future.

LGWM scope does not include directly supporting the achievement of greater urban density along the MRT corridor. LGWM transport modelling identifies the transport benefits that come from the improved accessibility provided by the LGWM programme infrastructure investment, however, due to the inability of the programme to directly influence urban form, these potential benefits have not been quantified or monetised in this analysis: as noted, the intensified land use scenario should be considered a 'what if' scenario, not a prediction of what will happen. Should the scope of the DBC be expanded to include this, it can be undertaken during the DBC, ahead of any final decisions on the LGWM programme options.

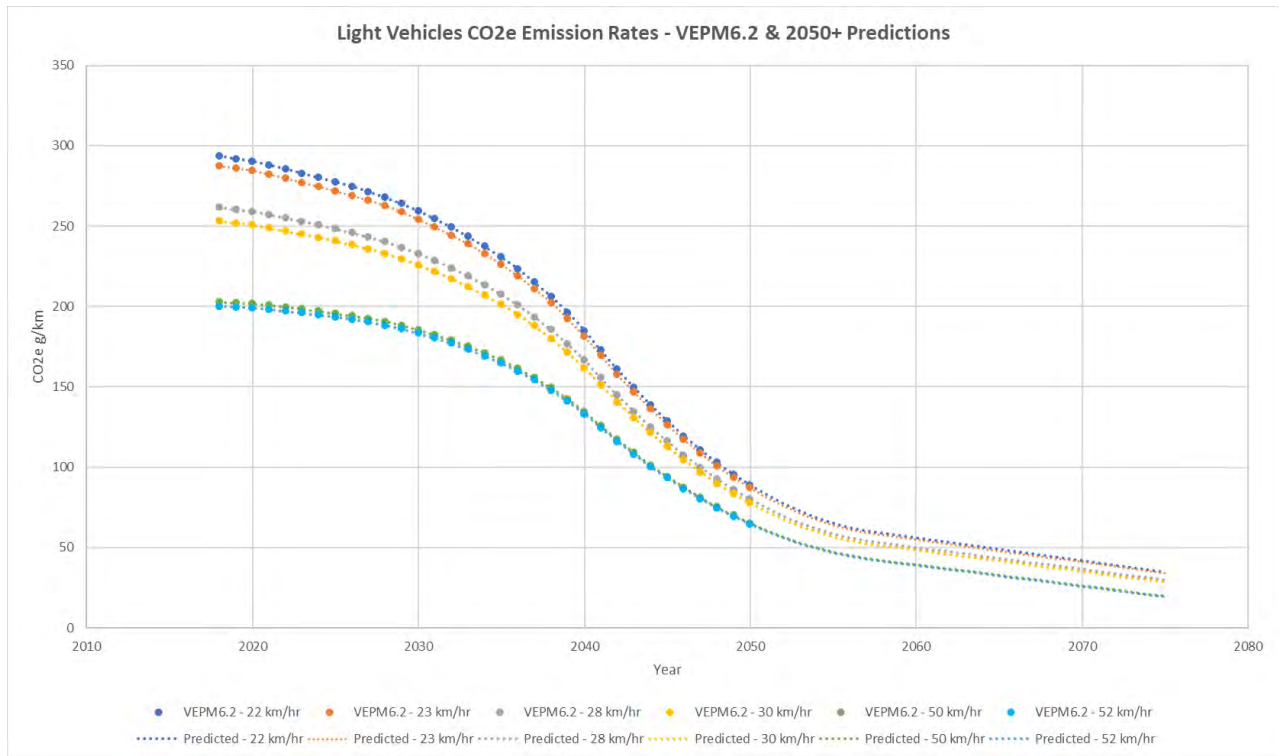
Vehicle Emissions Prediction Model

The Vehicle Emissions Prediction Model (VEPM) forecasts emissions based off network average speeds for each model sector. This is a significant simplification because vehicles starting and stopping – such as in congested conditions – has a large effect on emissions production compared to constant speed travel, as is assumed in the VEPM. This suggests that the estimates of enabled carbon reduction are likely to be conservative. The effect of assumptions about vehicle speeds is shown in Figure 7 below.

²⁶ Ganda (2019). A Life Cycle Assessment of Medium Density Houses in New Zealand; available from: <https://researcharchive.vuw.ac.nz/xmlui/handle/10063/8649>

²⁷ BRANZ (2021). LCAQuick: Life cycle assessment tool.; available from: <https://www.branz.co.nz/environment-zero-carbon-research/framework/lcaquick/>

Figure 7: Carbon emissions rates – VEPM and 2050+ predictions



VEPM does not currently forecast emissions rates beyond 2050, primarily because of the difficulty of making accurate assumptions about vehicle fleet composition and emissions factors this far in the future. Due to the longevity of LGWM transport modelling, however, some predictions have had to be made to support the quantification of enabled emissions savings. The effect of these predictions beyond 2050 is also shown in Figure 7 above. Emissions have been predicted to continue to taper down, however have not been assumed to fully reach zero. This reflects an assumption that the vehicle fleet will be dominated by zero-carbon vehicles by 2050, but that absent some form of regulation, there will remain a pool of fossil fuel-powered vehicles (traditional internal combustion engine or hybrid vehicles).

By necessity, VEPM also makes some simplifying assumptions to support its useability. This includes the following assumptions:

- Electrification of the fleet is 100% zero carbon – no account is made of the source of electricity.
- Emissions rates are nationwide, not regional, which may not accurately reflect Wellington’s regional vehicle makeup.

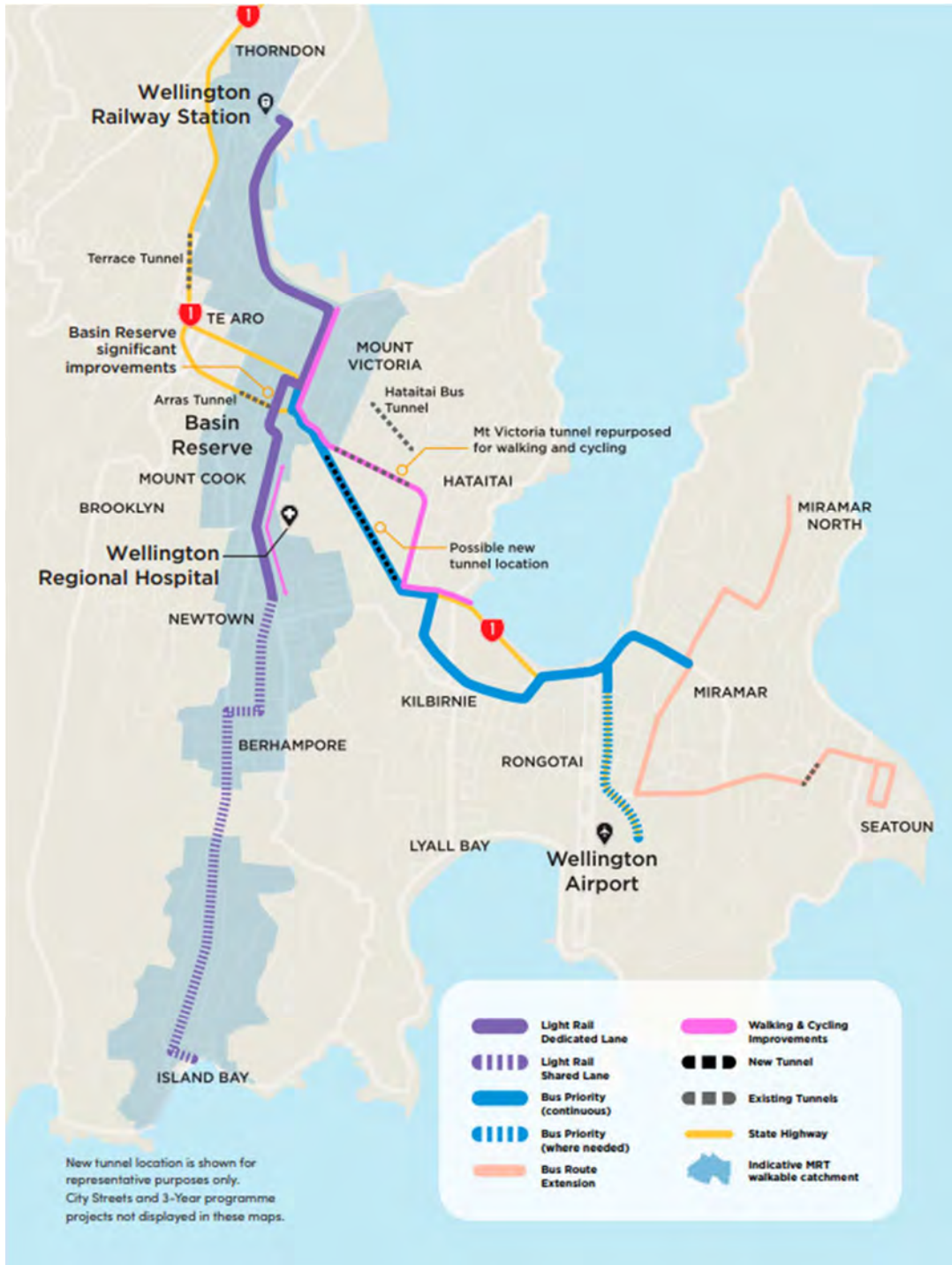
Attachment 1.c to Report 22.227



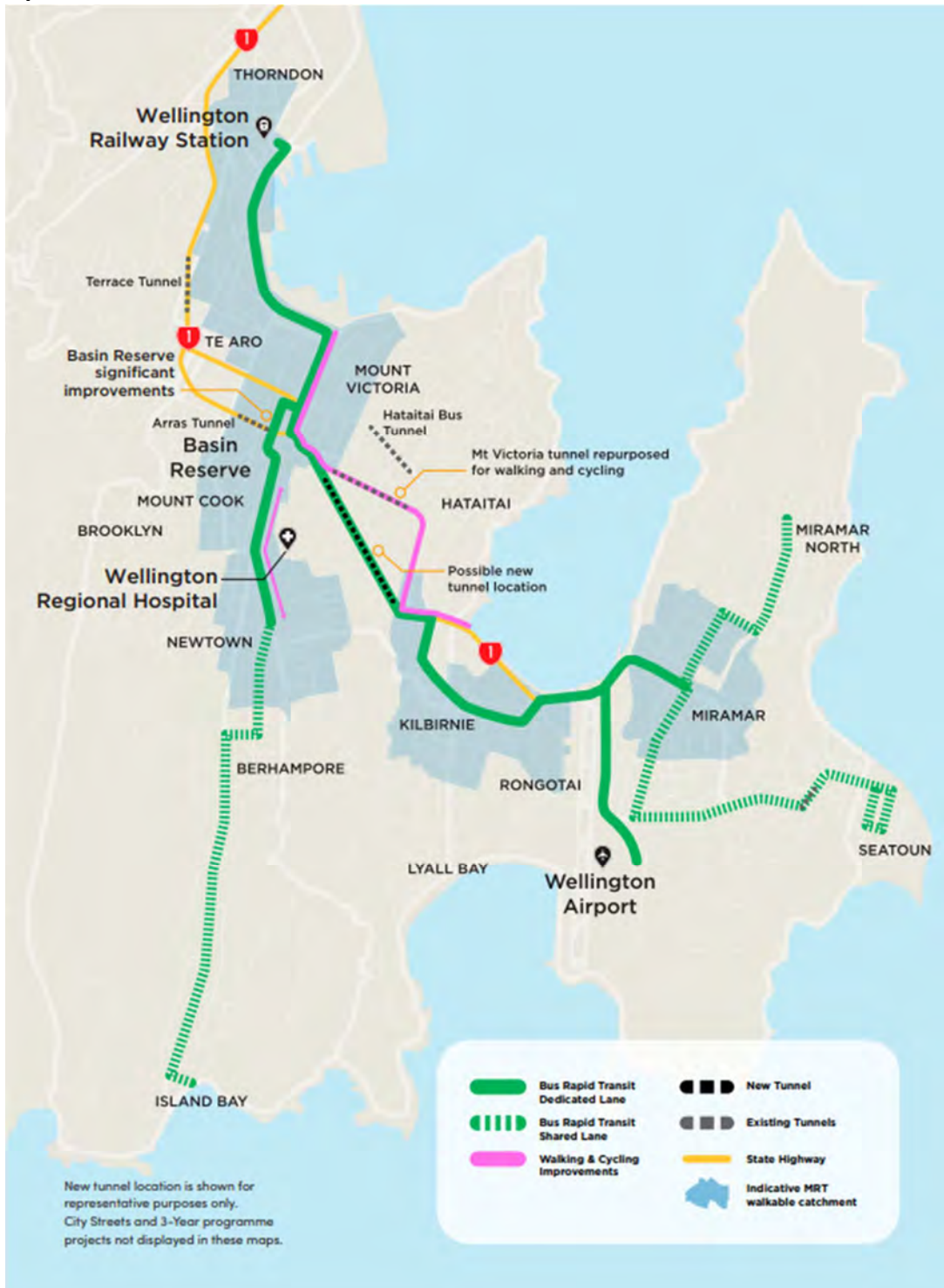


LGWM MRT/SHI SHORT LIST ENGAGEMENT OPTIONS 2021

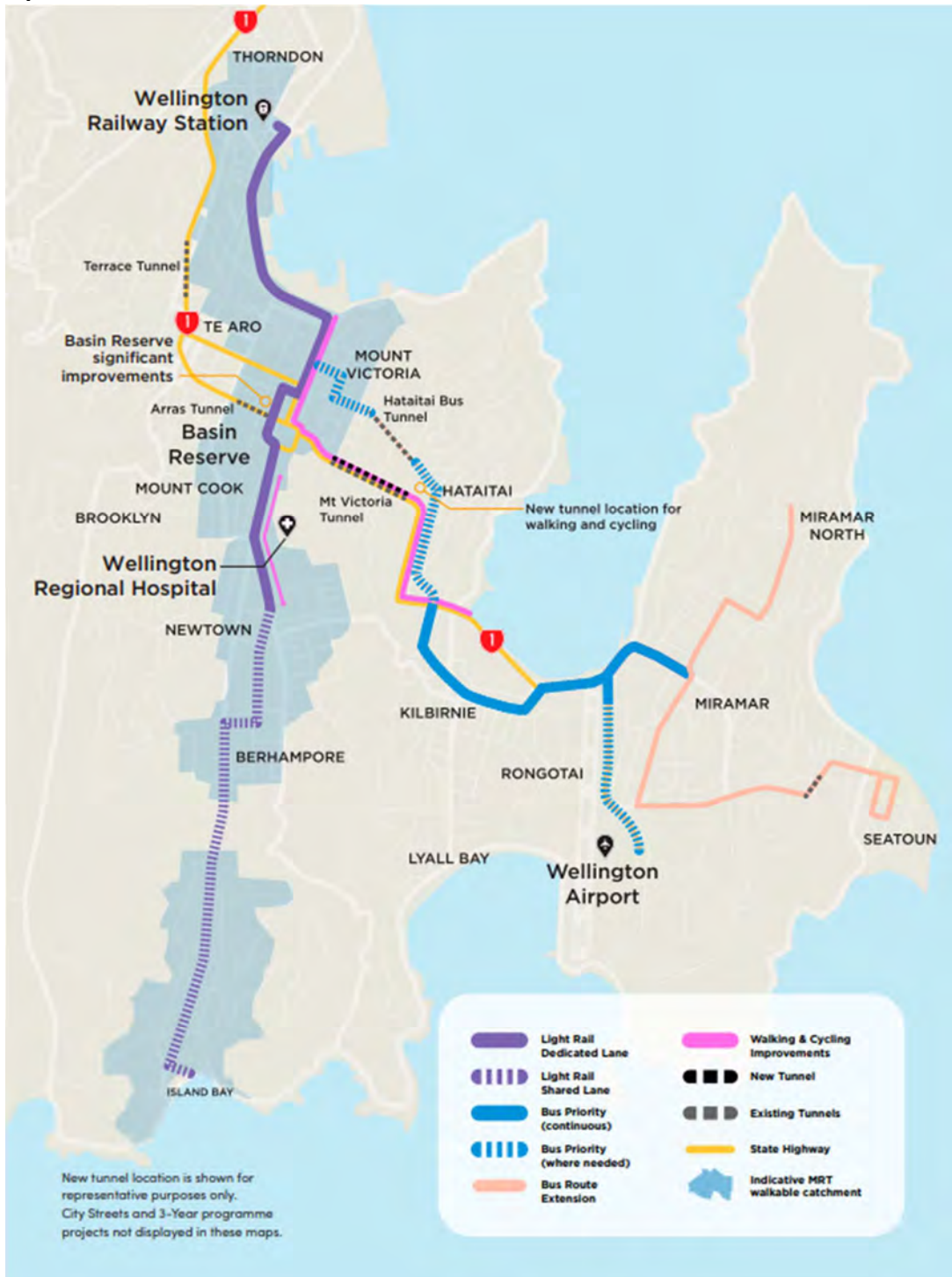
Option 1



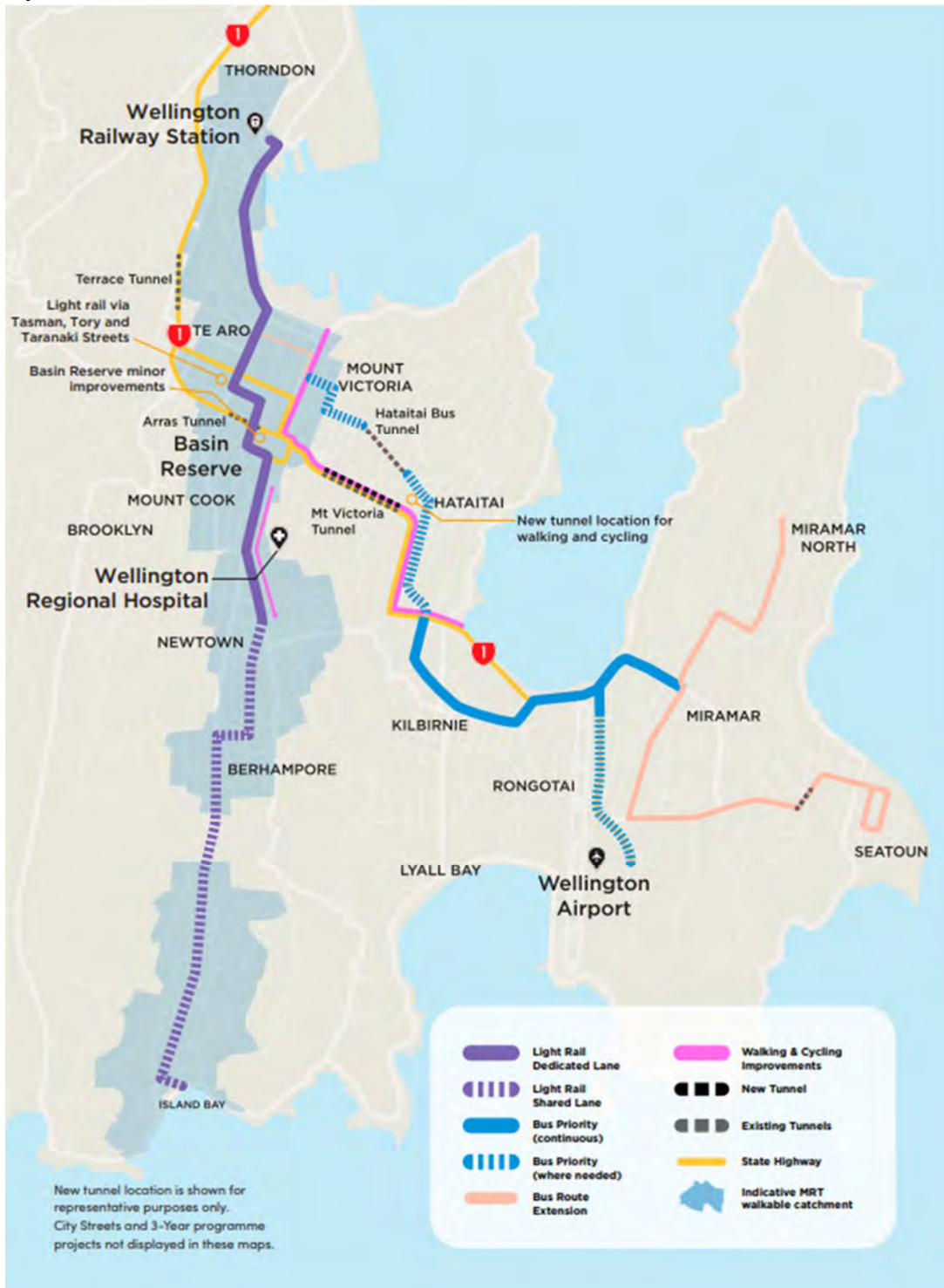
Option 2



Option 3



Option 4

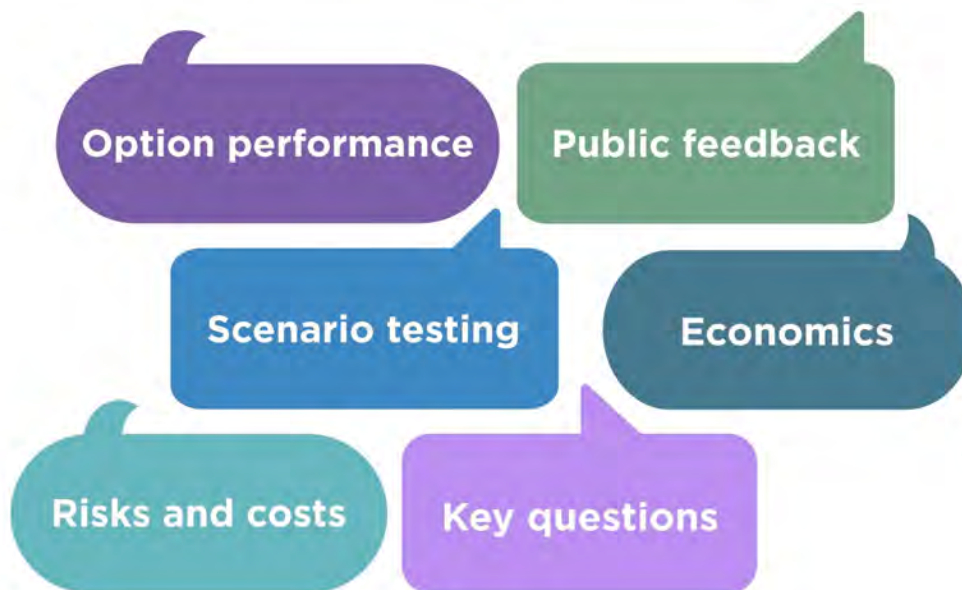




The engagement feedback is one of six key inputs our partners will balance when deciding on a preferred option. These include:

- **Option performance** – overall how the four options perform against the programme objectives
- **Public feedback** – the feedback the public gave us on the four options
- **Scenario testing** – what each of the four options might mean in different possible futures (different growth scenarios, the way we might build things etc)
- **Economics** – looking at the benefits and costs of the four options
- **Risk and costs** – considering the risks the four options might have and how much control we will have over their costs
- **Key questions** – what are the answers to the key differences between the options – MRT, the Basin Reserve, and an extra Mt Victoria Tunnel.

Inputs that will be used to select the preferred programme option



Attachment 3 to Report 22.227



March 2022

Let's Get Wellington Moving

Combined Mass Rapid Transit and Strategic Highway Improvements

Engagement and Consultation Report

SHI & MRT team





Executive Summary

Purpose of this report

This report presents the feedback and findings of the community engagement process conducted over six weeks from early November to mid-December 2021, on the largest components of the Let's Get Wellington Moving programme. These are the proposals to enable population growth and urban development through the introduction of Mass Rapid Transit (MRT) with opportunities for major changes to the Basin Reserve and a new tunnel through Mt Victoria.

A comprehensive and highly visible community engagement process sought feedback on four proposed options to help inform the Indicative Business Case (IBC) and, where relevant, the wider Let's Get Wellington Moving programme.

Aside from informing the IBC, understanding community sentiment also helps the Let's Get Wellington Moving partners gauge Wellingtonians' appetite for change and provides direction for further and future engagement.

Public feedback sought

The public was invited to give qualitative feedback on four options designed to help transform the way people travel around the Capital by moving more people with fewer vehicles, enabling more housing and helping to reduce carbon emissions. The options include MRT, improvements at the Basin Reserve and an extra Mt Victoria tunnel, as well as walking and cycling paths and improved bus journeys.

The questions were open-ended to gain rich feedback rather than a preferred option. This is standard practice when engaging at the very high-level IBC stage and there is insufficient detail available for people to make a definitive choice.

The feedback in this report is themed to give a flavour of community sentiment. This will be reflected in the final IBC and the scoping for the next stage.

Our City Tomorrow activity

Wellington City Council consulted on the [Paneke Pōneke - Bike Network Plan](#) and the [Wellington City Council Draft District Plan](#) at the same time as the MRT engagement period, under the umbrella of Our City Tomorrow.

The connections between the three projects made it easy for Wellingtonians attending the open days to find out about related proposals e.g. bike paths and urban development changes.

Engagement approach

We needed to deliver a comprehensive and accessible engagement process that encouraged and enabled the participation of everyone with a stake in the city's transport network. Our approach was to:

- Give people good information and make it easy for them to find out what they needed and wanted to know. A combination of owned, earned and paid media was used to raise awareness of the engagement process and why it was happening and to encourage people to take part.



- Make it easy for people to take part in the process where, when and how they preferred.

We held face-to-face meetings and presentations with key stakeholders, organisations and potentially affected property owners / occupiers around the Basin Reserve precinct.

We held a range of community events, webinars and Facebook events to encourage participation from all ages.

All communications encouraged people to go to the engagement website, with a strong call to action to review the options and submit feedback.

Number of submissions

We received 5,692 submissions from the public: 5,446 were completed using the online or hard copy feedback form; 211 comments were provided on Social Pinpoint and 35 detailed submissions were emailed to us or taken over the phone.

The Green Party of Aotearoa New Zealand filed a group submission from 441 people. Generation Zero had a submission portal from which we received 269 individual submissions. These were incorporated into the public submissions.

We also received written feedback from key stakeholder groups, including those the proposed options could directly and indirectly affect. All these submissions have been analysed alongside the public responses.

Feedback themes

Comments and feedback were diverse across a range of topics. Despite the diversity of feedback, six key themes emerged:

- Quality urban growth and development
- Better environmental, carbon, social and liveability outcomes
- Quality public transport
- Timeframe, cost and construction disruption
- Cyclist/scooter-friendly and walkable city
- Access for private vehicles and parking

In addition to the above, we received feedback in relation to the changes to the Basin Reserve and Mt Victoria tunnels.

People were also asked which type of MRT they preferred - light rail transit (LRT) or bus rapid transit (BRT) - at face value, based on the explanatory information we provided on both.

Quality urban growth and development

Respondents are very aware of the housing shortage in Wellington and want to see it addressed. Most support MRT as helping to enable more housing intensification and urban development and agree it will help future-proof our infrastructure to meet the needs of a growing population.



However, some concerns were raised about the nature and quality of housing intensification and what this would mean for the community.

Others questioned whether the options went far enough to meet the future needs of communities over the long term and some respondents doubted whether Wellington's population would grow as predicted.

Better environmental, carbon, social and liveability outcomes

Many respondents see MRT as contributing positively to future environmental performance, carbon reduction and social and liveability outcomes. People favoured a healthier and more liveable city with more green spaces where people could gather. Better walking and cycling facilities were important.

Respondents recognised the importance of reducing carbon emissions and the climate crisis was also mentioned in this survey under timeframe, cost and construction disruption. Some people questioned whether the proposed options would deliver a reduction in carbon emissions, especially during the construction period.

Respondents agree MRT needs to be able to cope with natural disasters or other disruption, but some people questioned whether the options provided for this resilience adequately enough.

Some wondered whether the options would suit Wellington's climate, hills and narrow winding streets.

Quality public transport

Respondents had most to say on how to improve the type of public transport on offer in future. This is understandable given Wellingtonians are high users of public transport and new types of MRT are at the core of each option.

They are positive about the prospect of high-quality public transport to make it easier to get around without a car. Respondents strongly support public transport that offers more people better connections to more places, more comfortably, frequently and reliably and with fewer transfers needed.

Concerns were raised about reaching key destinations and the need for transfers to places such as the hospital. There was a preference from respondents for LRT direct to the airport.

Respondents like the combination of dedicated lanes and shared space for MRT. There were, however, questions around how road sharing would work on Wellington's narrow and winding streets. Some saw shared lanes as continuing to encourage travel by car and thought the options needed to go further to encourage greener forms of transport.

Concerns were raised that MRT options seem to prioritise the southern and eastern suburbs over other parts of the city, and people queried the reasoning behind the proposed routes. Respondents would like to see improved public transport for other parts of the city, including areas they live and work in beyond the proposed routes.

Respondents want an MRT system that could extend to other areas and encourage more urban growth and development. At the next stage of engagement, they would like more detail about construction staging and property impact.



Timeframe, cost, and construction disruption

Timing and cost attracted the second highest number of comments from respondents. There were divergent views about the level of investment required, with some in support and others expressing concern. Some felt transformational change was important and that this would take a significant investment. Others thought the cost was too high and were looking for alternatives such as staged delivery, for example, starting with BRT and upgrading to LRT or delivering dedicated bus lanes first and upgrading to either BRT or LRT later.

Respondents want to know how any changes would be funded and the impact on ratepayers.

However, there was clear and unified feedback on the proposed timeframe, with respondents concerned it will take too long to deliver any change. This was also reflected in the social listening feedback, especially from younger Wellingtonians. They want real change, much sooner.

There was feedback around the cost of ongoing maintenance and repairs, especially if disrupted during an earthquake or other natural disaster.

Cyclist/scooter-friendly walkable city

Most respondents want a city that is well connected, enjoyable and safe for people to walk, cycle or scooter around. Whether there are dedicated lanes or shared spaces, personal safety is paramount.

It is not unexpected that this theme received the fewest responses, given the separate consultation underway over the same period for Wellington City Council's draft bike network plan, which had more detail for people to comment on. However, many comments were received regarding the new walking and cycling tunnel at Mt Victoria, with most in support of this (refer to section 3.6.2).

Respondents less supportive of walking and cycling facilities feel the money would be better spent elsewhere on the transport network. They feel Wellington's climate and terrain is not cyclist-friendly and that the bike paths and walkways won't be used enough to justify the investment.

Access for private vehicles and parking

This theme generated the most divergent views. Respondents acknowledge and support continued access for motor vehicles while reducing congestion and improving traffic flow. However, there was divided sentiment as to whether the goal should be to reduce or improve overall access to the network for vehicles.

Respondents see congestion as a problem that needs fixing and are concerned about options that won't address this or might make things worse. There was mention of electric vehicles and respondents questioned whether the options take this into account, especially around reducing carbon emissions.

Others feel that the options do not go far enough to remove or reduce car dependency and access.

Respondents had divergent views on parking. Some feel that MRT needs dedicated lanes to run smoothly so removing parking is inevitable. Respondents also said consideration should be given to park and ride facilities to ensure MRT can be used by more people. Others are



concerned about any loss of parking and the impact this could have on local residents and businesses.

In summary, respondents are wary of reduced private vehicle access and parking without credible user-friendly alternatives.

Changes to the Basin Reserve and Mt Victoria Tunnel

Basin Reserve

Respondents are supportive of efforts to reduce congestion and improve traffic flow around the Basin Reserve and many are also keen to have an enhanced, people-centred, open space.

Those in Porirua and Hutt Valley see the proposed changes as making it easier for them to get to the hospital and the airport.

Respondents who were less supportive of major changes questioned whether the plans would fix the congestion problem, especially since traffic would continue to merge and bottleneck further north towards the Terrace Tunnel. In particular, the extension of the Arras Tunnel was seen by some as too costly in terms of construction-related carbon emissions. Some respondents were concerned that it would incentivise driving rather than the use of public transport or walking and cycling.

Others worry that any major changes at the Basin Reserve would delay investment elsewhere on the network.

New Mt Victoria Tunnel

More respondents were in favour of a new tunnel than not. Some liked the focus given to MRT and that people who walk or cycle would be kept safely away from general traffic. Others saw the new tunnel as improving the connection between the city and the airport.

However, those who are concerned about better access for cars and other vehicles question why only a two-lane tunnel is proposed. They would like to see four lanes for general traffic (two in each direction) because they believe this would future-proof the investment and support population growth and intensification.

Those who support the aim of getting cars off the road worry a new tunnel would be counter-productive to that goal, as it would encourage car use. There were concerns about the level of disruption that construction of a new tunnel would cause and how long it would take to build, as well as the carbon impacts during construction.

At the next stage of engagement, respondents would like more detail about entry and exit points.

New or Refurbished Tunnel for Walking and Cycling

Respondents who say they support a new cycling/walking tunnel see it as a critical link in a future network that is safe and healthy and contributing to carbon reduction. People commented that the current walking and cycling experience through Mt Victoria is noisy, polluted, dark and unsafe.



The few who expressed concerns about the proposal for a new tunnel felt the money would be better spent elsewhere in the transport network, as any new tunnel would not be used enough to justify the investment.

A few people stated that the existing tunnel should be kept for car access (even if a new tunnel is provided).

Light Rail Transit (LRT) vs Bus Rapid Transit (BRT)

More than half of the respondents support LRT because of its capacity (over 300 people per trip), reliability and frequency, as well as improved carbon performance.

People also commented that LRT would be quiet to operate, despite consultation information on the website advising that LRT can be noisier due to steel wheels on tracks.

The respondents who supported BRT did so largely because of its flexibility to be extended to more suburbs in the future. Others preferred BRT because it requires less investment and is faster to implement.

Respondents also liked that BRT offers a quicker recovery time from a natural disaster because its rubber wheels allow it to be used on alternate routes and/or more quickly reinstated on existing routes.

What does this tell us?

This is not a straight-forward consultation, in that we are inviting the community's views on a future that is not yet within sight. We are sharing a long-term vision for a future Wellington where we all get around differently to how we do today. We are asking people to imagine a future state where people travel less by private vehicles, walk and cycle more, use types of public transport that many have yet to experience and live in an environment impacted by climate change.

Our perspective on mobility and access is determined by our lived experience. Imagining ourselves in a future Wellington we have not yet experienced is the ultimate hypothetical. To then consider what will be important to us in that hypothetical city, is a big ask.

This is reflected in the feedback we received. For example, many queried the logic of not increasing the tunnel capacity for private motor vehicles. Yet it makes sense when vastly different, high-capacity public transport exists and there are more, safer options for walking, cycling and other active modes.

Not surprisingly, respondents feel most strongly about what MRT must deliver for a top-quality user experience, the cost involved and the time it will take to implement.

Opinions were most divided around investment levels, particularly the split of investment between active modes and private vehicle access.

However, there was a strong appetite for change and consistent support to:

- make it happen sooner
- deliver the best value
- get public transport right (do it once and do it right).



Respondents have made clear the things they care about and while they understand the need to reduce carbon emissions and increase housing, they want balance between principle and reality. For example:

- I can understand the MRT vision BUT it needs to be best value in terms of investment.
- I can understand the need for more housing BUT what would intensification actually look like?
- I appreciate the benefits of Light Rail BUT it needs to be extended to other places.
- I understand the need for a new tunnel BUT consideration needs to be given to the number of private vehicle lanes, *whatever happened to four lanes to the planes?*
- I can understand the benefits of MRT BUT it needs to be resilient and suit Wellington's unique terrain.

Recommendations for Future Engagement

This consultation project uncovered valuable insights to inform the imperatives for future engagement.

The overarching vision for the future of Wellington's transport system and what that means for Wellingtonians needs to be consistently reiterated – particularly around our reliance on, and use of, private motor vehicles.

We need to make the vision for MRT relatable. Create multiple scenarios for different types of users and suggest what the proposed transport solutions would mean for them. Build a picture that makes sense to the family with multiple sport and school pick-ups and drop-offs, students looking for the cheapest way to get around, airport commuters, people living further afield rather than in the city, and so forth.

Provide more information and evidence as to why some things are in the plan (MRT route to Island Bay) and why some things are not (four lanes to the planes / LRT to the airport) so that people have enough context to feel confident to give feedback.

Whichever solution is decided on, we need to clearly communicate the rationale in terms of investment level and how the timeline could be expedited.



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1 Project Background

1.1 Background

Let's Get Wellington Moving is a joint programme by Wellington City Council, Greater Wellington Regional Council and Waka Kotahi NZ Transport Agency (Waka Kotahi), with the support of mana whenua partners Taranaki Whānui and Ngāti Toa.

In 2018, the Let's Get Wellington Moving vision was of a *great harbour city, accessible to all, with attractive places, shared streets and efficient local and regional journeys*. To realise our vision, we needed to *move more people with fewer vehicles*.

In November and December 2021, Let's Get Wellington Moving asked for feedback on four options designed to transform the way people get round the Capital by moving more people using fewer vehicles, enabling more housing and helping reduce carbon emissions. The options include Mass Rapid Transit (MRT), improvements at the Basin Reserve, walking and cycling paths, improved bus journeys and an extra Mt Victoria Tunnel.

The four options being considered are:

1. **South coast light rail + new public transport tunnel** – Moving the most people possible to and from Island Bay and surrounding suburbs, beautifying the Basin Reserve, supporting the most housing and urban development and making our streets better for everyone.
2. **Bus rapid transit to the sea and skies** – Moving more people to and from Island Bay and surrounding suburbs, eastern suburbs and the airport, but with less scope for housing and urban development than option one.
3. **South coast light rail** – Connecting the most people between Wellington Railway Station, Island Bay and surrounding suburbs, encouraging the most housing and urban development, making our streets better for everyone and providing some public transport improvements to Hataitai, Miramar and the airport.
4. **South coast light rail via Taranaki** – Light Rail Transit (LRT) to Island Bay and surrounding suburbs via Taranaki St, bypassing the Basin Reserve, beautifying streets and encouraging the most housing and urban development, for the lowest cost.

1.2 Partnership with Mana Whenua

Let's Get Wellington Moving is committed to working in partnership with Mana Whenua to deliver great environmental, social and transport outcomes on all projects. Input from our Treaty Partners is an important part of how we deliver high-quality projects.

Let's Get Wellington Moving is supported by mana whenua partners Taranaki Whānui ki Te Upoko o Te Ika (represented by the Port Nicholson Block Settlement Trust) and Ngāti Toa (represented by Te Rūnanga o Toa Rangatira).

To make sure mana whenua rights and interests shape the work, Mana Whenua are represented in the governance of the programme as members of the Governance Reference Group and in the more operational aspects of the programme as members of the Iwi Partnerships Working Group.

As partners in the programme, Mana Whenua were involved in the development and assessment of options. They developed values for the programme and assessed different investment options against those values to determine which options should be presented to the public for feedback.



1.3 Purpose of this Report

This report presents the feedback and findings of the community engagement process conducted between Monday 1 November and Friday 10 December 2021 on the largest components of the Let's Get Wellington Moving programme – MRT with potential major changes to the Basin Reserve and a new tunnel through Mt Victoria.

The project is at the Indicative Business Case stage (IBC). This stage provides decision-makers with an early opportunity to choose a preferred option to progress to further investment.

Four options were shared with the public as the result of technical and other assessments (including carbon emissions, mana whenua values, economic growth and housing development, etc). A comprehensive and highly visible engagement process sought community feedback on the four proposed options. The questions were open-ended to gain rich feedback rather than determine a preferred option. This is standard practice when engaging at the very high-level IBC stage, where there is not enough detail available for people to make a definitive choice. Information is indicative only at this stage and subject to change. Multiple options are still on the table and detailed impacts are unclear.

This report has assessed and analysed that feedback into key themes so that stakeholder and community perspectives can be reflected in the final IBC and, where relevant, the wider Let's Get Wellington Moving programme.

Aside from informing the IBC, understanding community sentiment also helps the Let's Get Wellington Moving partners gauge Wellingtonians' appetite for change and territories for further and future engagement.

The report also recommends the approach to future engagement.

1.4 Public Feedback Sought

We sought feedback on what people liked about the MRT options and what people thought could be improved.

We asked people to rank several statements in order of importance to Wellington's transport future. We also asked a series of demographic questions - but only those relating to where they lived (by suburb) and how they get around the city (range of modes) were mandatory fields.

We also asked:

- What do you like about these options?
- What don't you like about these options?
- Is there something missing?
- Which type of mass rapid transit do you prefer? Why?

Feedback could be submitted via our online survey, info@lgwm.nz email address or post.

1.5 Methodology

Public feedback was captured via the online survey, open days, the 0800 number and the project inbox. Feedback was centralised and then coded to themes against a wide range of topics (refer to Section 3).

Formal submissions from key stakeholders and organisations were reviewed and summarised individually (refer to Section 4).



The survey coding was quality-assured by an engagement professional and the number of comments were reported on per topic, recognising that:

- A single respondent would often make comments across a range of topics, both for and against
- When answering the question about what they liked, some people would also say what they disliked (and vice versa).
- Often a comment would appear in different themes, for example, carbon emissions may have been commented on under environmental performance (need to be reduced), timeline (need to act sooner for climate emergency) and Mt Vic tunnel (will encourage more car use).
- Responses were sometimes sarcastic (e.g. “Yes, I think we should build a tunnel for the 3 people who will use it”) and needed to be coded accordingly.

This is not unusual for open-ended questions and was allowed for.

Topics outside of the key themes and below a 10% response threshold were captured but not included in this report to ensure it remains representative and meaningful for decision-making purposes.

Topics were then amalgamated into key themes and analysis was done on each theme. ‘Like’ and ‘dislike’ comments and suggestions were analysed together so that perspective and context could be given. A high-level summary was then produced for each theme, as well as an overall summary and suggestions for future engagement.

Not all fields were mandatory and not all responses received gave detailed reasons or comments. Therefore, it was not possible (and nor was it intended) to give a detailed statistical breakdown of the responses beyond high-level summaries.

1.6 What Happens Next

The public feedback is analysed and incorporated into the draft IBC, which will recommend a preferred option.

Once the IBC has been endorsed by the Let's Get Wellington Moving programme partners, the outcome will be shared with the community and development of the Detailed Business Case (DBC) can start. The DBC will involve detailed analysis of the costs, risks and benefits of the preferred option and further stakeholder and public consultation.



2 Summary of Community Engagement Activities

2.1 Engagement Process



Figure 1: Engaging with the community at the Let's Get Wellington Moving open day in Newtown.

2.1.1 Engagement objectives

The public consultation was an opportunity for Let's Get Wellington Moving to check the technical assumptions with the community and gather feedback on the four proposed options to inform the IBC and help our partners agree on a preferred programme for detailed investigation.

2.1.2 The task

We needed to deliver a comprehensive and accessible engagement process that encouraged and enabled the participation of everyone with a stake in the city's transport network. We needed to encourage all Wellingtonians to take part, not just those who typically contribute. We needed to do things differently and we had six weeks to capture the attention of Wellingtonians. Consultation opened on Monday 1 November and closed on Friday 10 December, 2021.

2.1.3 The challenges

Wellingtonians feel a strong sense of ownership of their transport network and the proposed options would be transformative projects, so community accessibility to the engagement process was critical to meet high expectations.

2.2 The Context

2.2.1 Covid-19 restrictions

Wellington was at Covid-19 alert level 2 restrictions throughout November, with Auckland at level 3. There was uncertainty as to whether public engagement events would go ahead and so plans were made for them all to go online.

2.2.2 Other Let's Get Wellington Moving engagement

Previous consultations related to [Golden Mile \(June - August 2020\)](#), [Thorndon Quay & Hutt Road \(May – June 2021\)](#) and [Cobham Drive Crossing and SH1 Safer Speeds \(June – August 2021\)](#) attracted some criticism. Lessons learnt were reflected in the MRT engagement plan.

2.2.3 Our City Tomorrow activity

Wellington City Council consulted on the [Paneke Pōneke - Bike Network Plan](#) and the [Wellington City Council Draft District Plan](#) at the same time as the MRT engagement period, under the umbrella of Our City Tomorrow.



The connections between the three projects made sense and made it easy for Wellingtonians attending the open days to find out about related proposals, e.g. bike paths and urban development changes, and to understand the interdependencies.

Potentially, multiple engagement exercises may have resulted in consultation fatigue and cross-over of responses. The Let's Get Wellington Moving submissions were high but other consultations may have been impacted by the competition for submissions.

2.2.4 Complex subject matter

The consultation was not straightforward to communicate and engage on because:

- The options introduced a type of public transport (MRT) that Wellingtonians are unfamiliar with
- Option 2 Bus Rapid Transit appeared to cause some confusion with existing bus services
- The four options were not easy for some people to differentiate
- The investigation work associated with the IBC was not yet complete. We, therefore, presented a high-level of information on options and not the level of detail that can be expected at later stages.
- Information was indicative only and subject to change. Multiple options are still on the table and detailed impacts are unclear at this point.
- We presented 'options' but did not ask people to indicate which option they preferred. This may have felt counter-intuitive but was appropriate to the purpose of consultation at IBC stage.

We sought to mitigate these issues by providing quality information via a range of channels (digital, social and face-to-face) and a website that was easy to navigate, engaging and highly visual. The 85% approval rating of the website suggests this was achieved.

We monitored survey results throughout the consultation period and used social and digital channels to address knowledge gaps or misunderstandings.

Our approach

We wanted to provide people with good information and make it easy for them to find out what they need and want to know in order to provide qualitative feedback on the options, not just the option they prefer.

We had to make sure it was easy for people to take part in the process where, when and in a way that best suited them.

We wanted to be honest and transparent about:

- The impacts of the status quo
- The impacts of each option and the inevitable trade-offs
- Peoples' ability to influence decisions
- Next steps and what that means for them

2.2.5 Our success measures

Our success measures included:

- Community stakeholders feel they have good information and good opportunities to have input and believe their feedback will be taken into account.
- The IBC is more robust as community intel and insights are reflected in the recommendation.

2.2.6 International Association for Public Participation

Our approach to public participation reflects the core values of the International Association for Public Participation (IAP2).

IAP2 provides internationally recognised consultation best-practice principles. The community engagement spectrum of participation is based on the decisions to be made and the associated level of influence (if any) the community has on project decision-making.

Extensive engagement had already informed the four options and therefore 'consult' was the appropriate level of engagement for this stage.

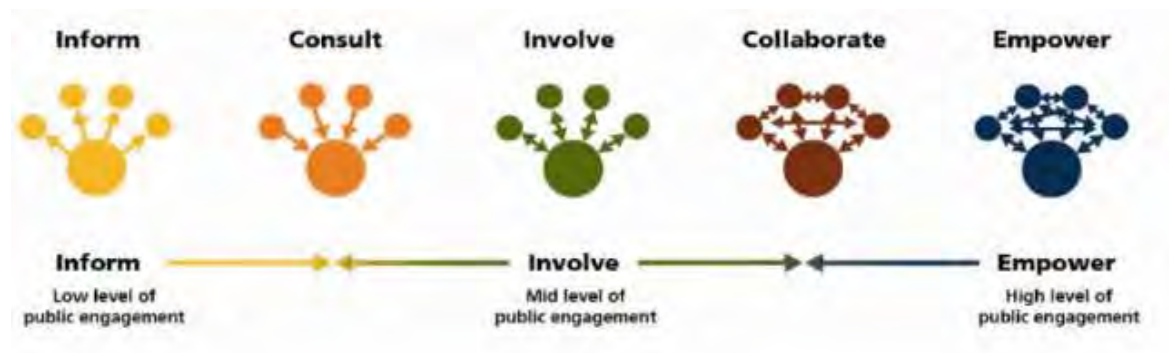


Figure 2: IAP2 Public Participation spectrum

Table 1: Summary of IAP2 spectrum levels

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Provide the audience with balanced and objective information to assist them in understanding the problem, preferred options, opportunities and/or solutions.	Obtain public / stakeholder feedback on analysis, alternatives and/or decisions.	Work directly with the public / stakeholder throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	Partner with the public/ stakeholder in each aspect of the decision including the identification of the preferred solution.	Place final decision-making in the hands of the public / stakeholder.

2.3 Who we kept informed

We held regular briefings for Let's Get Wellington Moving partners, regional and city councillors and local and central government representatives.

The organisations and individuals helped to promote the consultation/engagement opportunity and encouraged participation.



2.4 Who we engaged with

2.4.1 Key stakeholders, organisations, and potentially affected property owners / occupiers

A number of key stakeholders and potentially affected property owners/occupiers have been directly engaged to provide feedback on proposed improvements. This was done through face-to-face meetings, community open days, flyer mail drops and online feedback forms.

This is to ensure they are all made aware of what the potential options mean for them and have a channel for engaging directly with the project team. It was especially important to meet with schools, churches, and potentially affected landowners around the Basin Reserve precinct.

It was also important to start or continue building relationships with people with a specific interest in the proposed options, such as community groups, sector organisations and mode advocates.

Key stakeholders, organisations and potentially affected property owners / occupiers who have been engaged directly are listed below.

Table 2: Key stakeholders, organisations and property owners / occupiers who have been engaged directly

Automobile Association	Kilbirnie, Lyall Bay, Rongotai Residents Association	St Marks School
Baker Gramercy	KiwiRail	South Wellington Intermediate School
Basin Reserve Trust	Light Rail Transit Association	St Joseph's Church
Blind Citizens NZ	Living Streets	Te Papa
Capital and Coast District Health Board	Mt Victoria Residents Association	TramsAction
CCS Disability Action	Mt Cook School	Wellington Airport
Centre Port	Massey University	Wellington Boys College
Chinese Embassy	Ministry of Culture and Heritage	Wellington East Girls College
Department of Prime Minister and Cabinet	Ministry of Education	Wellington High School
Disabled Persons Assembly NZ	Newtown School - Te Kura o Ngā Puna Waiora	Wellington City Council Town Belt Trustees
Fair Intelligent Transport (FIT) Wellington	Progress Wellington	Wellington City Council Advisory Groups (combined)
Gazleys Mitsubishi	Property Council	Wellington City Multicultural Council
Heritage New Zealand Pouhere Taonga	Save the Basin	Wellington City Council Accessibility Advisory Group
Hutt Valley Cycling Network	SOS Courtenay	Wellington Tenths Trust



2.4.2 All Wellingtonians

All people in the Wellington region were encouraged to take part through a highly visible, high impact communications programme. We wanted participation from all ages and especially younger people, as they will experience the effects of the changes in future. Public engagement has been focussed on enabling people to:

- Understand why MRT is needed
- Consider the relative strengths and weaknesses of the MRT options from their own perspectives
- Provide feedback on the options, rapid transit route and mode, based on what matters to them
- Provide insights based on their own user experience, aspirations and journey patterns and what they value in a transport system.

2.5 How we engaged?

2.5.1 Promoting the engagement opportunity

A combination of owned, earned and paid media was used to raise awareness of the engagement process and why it was happening and to encourage people to take part.

All media continued to monitor public understanding and participation while consultation was live so that knowledge gaps or misunderstandings could be addressed with new or reinforced messaging. Examples include unpacking confusion around the differences between Light Rail Transit and Bus Rapid Transit and the projected impacts on carbon emissions of the four options.

These changes were supported with proactive communications such as subject specific webinars, EDMs and media releases (Appendix 6). The carbon emission 'climate friendly' leaf rating visual icons on the website hello.lgwm.nz were replaced with written descriptions to summarise more fully the projected impacts on carbon emissions of its four transformational options.

Digital and social media promotion was adjusted in real time if target audiences were not being reached - for example, when female participation in the survey was seen to be falling behind.

2.5.1.1 Owned media

Website

The interactive consultation website was the central destination for all communication over the six-week engagement period, as that was where the survey was housed. The website content had to give people the information they needed to feel informed to complete the survey, so had to be easy to navigate, engaging and highly visual. It was crucial that people become familiar with the information before jumping to the questions.

All communication encouraged people towards the engagement website with a strong call to action to review the options and submit feedback.

For a snapshot view of the interactive consultation website, refer to Appendix 1.

Video

A short video was developed to provide a high-level overview of why the community's views were being sought and what they were being asked to give feedback on. The video was used in presentations to groups, in webinars and on the website.



A link to the consultation video can be found in Appendix 2.

Brochure

A brochure was developed, large enough to include the four maps of each option and an associated explanation of each. There was a tear-out survey for those who preferred to submit feedback in writing.

An easy-to-read version was made available through the website and accessibility networks.

In total, we distributed 10,000 brochures at locations including council offices, community events, regional railways stations, local libraries, community centres and businesses along the proposed routes and throughout the greater Wellington region. We also distributed brochures through the partner networks. A translation service was offered if requested.

Refer to Appendix 3 for a copy of the brochure and feedback form.

2.5.1.2 Paid media

Advertising

Advertising was used to reach many people quickly to promote participation in the six-week consultation and explain where and how people could provide feedback.

Campaign creative concept

Prior to the launch, the 'Hello' creative platform was tested with a representative sample of Wellingtonians. Testing confirmed the message was clear and that they didn't want to hear the vision without the details. They wanted to see real progress.

The campaign was designed to inspire the public to the wider vision for the city bringing to life the tangible changes people would experience - such as MRT, a transformed Basin Reserve and new tunnels. The campaign showed how better infrastructure would improve lives for all Wellingtonians, whether walking, cycling or using public transport; and explained how better transport encouraged more housing development, crucial to addressing the current housing crisis.

The engagement campaign encouraged participation in the consultation process with a strong call to action that directed people to the website to complete the survey.

Media channels

- Out-of-home advertising - billboards, buses, trains, outdoor posters and bus shelters.
- Radio to capture commuters - including Māori radio and a partnership with Newstalk ZB's Nick Mills with his Welly Mornings show.
- Regional and community newspapers - proactively offering stories to various publications.
- Letterbox drop - 12,500 postcards delivered to residents along the proposed routes in the southern and eastern suburbs, encouraging locals to attend community events or visit the website to have their say.

Digital and social

The consultation page of the website was the engagement centrepiece, therefore digital channels were heavily used.



To reach a younger audience, we partnered with local social influencers, such as a Kāpiti Coast youth councillor with over 3,500 Instagram followers and a student studying environmental studies at Victoria University with over 1,600 Instagram followers.

Digital and social media re-marketing encouraged those who had started to engage to complete the survey.

Search engine marketing made sure that our messaging would appear if similar topics (e.g., transport improvements) were searched for.

Regular newsletters were sent to over 3,000 subscribers with more in-depth topics such as urban development, and the proposed changes at the Basin Reserve and Mt Victoria. These we also used to promote opportunities to engagement with the project team such as events and webinars.

Refer to Appendix 4 for a copy of the newsletters issued during the consultation period.

2.5.1.3 Earned media

Media briefings and a media launch event took place under the umbrella of Our City Tomorrow, the day before the consultation period commenced. For a copy of the media release that was issued on Monday 1 November to announce the start of public engagement, refer to Appendix 5.

Ongoing media engagement was deployed to maintain earned media coverage throughout the consultation period and key media advocates encouraged people to have their say.

Opinion pieces and proactive news pitches were linked to the engagement calendar to encourage public discussion around the options.

Key opinion leaders were encouraged to participate in the public discussion to help shape the narrative with more balanced voices – such as Thrive Wellington and First Retail Group.

2.6 Making it Easy for People to Participate

2.6.1 Face to face - meetings and presentations

We engaged with people with a specific interest in the options such as community groups, sector organisations and mode advocates.

It was especially important to meet with schools, churches, property owners / occupiers around the Basin Reserve precinct who may be potentially impacted by the options.

A total of 42 face-to-face meetings were held over the six-week period, led by programme and project team leads. All discussion points were recorded and entered into Consultation Manager, Let's Get Wellington Moving's customer relationship management system.

There were 41 formal submissions from stakeholders who participated in this engagement process (refer to Section 4 for a summary of each submission).

2.6.2 Community events and webinars



Figure 3: Engaging with the community at the Let's Get Wellington Moving open day in Newtown.

We wanted to give Wellingtonians the opportunity to meet the project team in an informal setting to encourage people to ask questions directly of the team.

We offered people a choice of venues, dates and times. We teamed up with the project teams from the Bike Network Plan and the Wellington City Council Draft District Plan at combined community open days. This allowed people to connect with experts for three consultations in one place and to see the interconnections between the projects.

Webinars offered more people access to information but also provided a contingency plan had a change in COVID-19 alert levels required the cancellation of in-person events (fortunately this did not eventuate).

High-quality production of webinars that were hosted by subject matter experts from the project team ensured relaxed and engaging presentations that attracted participants.

A New Zealand Sign Language interpreter was part of the webinar team. Recordings of the webinars and transcripts were made available on the website each following day.

In addition, people had the opportunity to ask questions about the proposed options in a live Facebook chat with programme and project team leads in a 30-minute event. This event was timed for after-work to allow as many people to join in as possible. We also answered questions gathered on Let's Get Wellington Moving's Facebook page to create a more meaningful live event.

Refer to Appendix 7 for a link to the recorded webinars.

Table 3: Public event locations and attendee snapshot

Event Type	Date	Number of Attendees
Wellington City Council roadshow event – Thorndon	03 November	40
Let's Get Wellington Moving pop up – Railway Station	04 November	15
Wellington City Council roadshow event – Tawa	04 November	35
Webinar 1 – Hello to Wellington's Transport Future	04 November	30
Let's Get Wellington Moving pop up – Basin Reserve	06 November	28
Facebook live - Hello to Wellington's Transport Future	7 November	



Event Type	Date	Number of Attendees
Let's Get Wellington Moving pop up – Prefab Hall	08 November	35
Webinar 2 – Hello to Wellington's Transport Future: Light Rail and Bus Rapid Transit	09 November	40
Wellington City Council roadshow event – Miramar	10 November	15
Wellington City Council roadshow event – Ngaio	11 November	70
Webinar 3 – Hello to Wellington's Transport Future	11 November	20
Let's Get Wellington Moving open day – ASB	13 November	65
Let's Get Wellington Moving pop up – Public Trust Hall	15 November	15
Wellington City Council roadshow event – Johnsonville	15 November	32
Wellington City Council roadshow event – Karori	17 November	35
Wellington City Council roadshow event – Island Bay	18 November	55
Webinar 4 – Hello to Wellington's Transport Future: Basin Reserve and Mt Vic Tunnels	18 November	49
Let's Get Wellington Moving open day – Newtown	20 November	80
Let's Get Wellington Moving open day – Prefab Hall	27 November	73
18 total events	732 total public attendance	

2.7 How we listened?

2.7.1 Face to face

Several one-on-one meetings (in-person or online) were held with key stakeholders, organisations and key potentially affected property owners / occupiers around the Basin Reserve precinct. Insights and feedback have been recorded and captured in Consultation Manager, the Let's Get Wellington Moving customer relationship management system.

The community open days gave people the choice of giving feedback face to face or by writing on post-its or tear-off maps, or online with iPads provided at each venue. Regardless of format, all feedback was recorded.

2.7.2 Email and contact number

The Let's Get Wellington Moving email address (info@lgwm.nz) and phone number (0800 110 130) provided a direct channel for the community and stakeholders to contact the project team. The contact details were printed on all external and internal communication to encourage people to email/call with any enquiries.



Over the six-week consultation period we received a total of 137 enquiries and requests. All interactions have been recorded in Consultation Manager.

2.7.3 Social listening

We used gathered insights from Facebook discussions, which allowed us to post 'myth-busters' and address misconceptions about the options.

Insights were gathered under the following key themes:

- **Promoting the submission process** - encouraging others to submit/ showing them where to find information
- **Listen to me** – people offering suggestions, ideas and alternatives to the proposed plans.
- **Lack of trust** - people expressing lack of trust in Let's Get Wellington Moving, the proposed plans, the consultation process or the timeline.
- **Issues conversation** - discussing the issues. News content announcing initiatives.
- **Support** - people voicing support for Let's Get Wellington Moving, the proposed plans, the consultation process or the Let's Get Wellington Moving values/vision.

2.8 Methodology

Public feedback was captured via the online survey, open days, the 0800 number and the project email inbox. Feedback was coded to themes against a wide range of topics, refer to Section 3.

Formal submissions from key stakeholders and organisations were reviewed and summarised individually (refer to Section 4).

The survey coding was quality-assured by an engagement professional and the number of comments were reported on per topic, recognising that:

- A single respondent would often make comments across a range of topics, both for and against
- When answering the question about what they liked, some people would also say what they disliked (and vice versa)
- Often a comment would appear in different themes, for example, carbon emissions may have been commented on under environmental performance (need to be reduced), timeline (need to act sooner for climate emergency) and Mt Vic tunnel (will encourage more car use).
- Responses were sometimes sarcastic (e.g. "Yes, I think we should build a tunnel for the 3 people who will use it") and needed to be coded accordingly.

This is not unusual for open-ended questions and had been allowed for.

Topics outside of the key themes and below a 10% response threshold, were captured but not included in this report to ensure it was both representative and meaningful for decision-making purposes.

Topics were then amalgamated into key themes and analysis was done on each theme. Like and dislike comments and suggestions were analysed together so that perspective and context could be given. A high-level summary was then produced for each theme, as well as an overall summary and suggestions for future engagement.



Not all fields were mandatory and not all responses received gave detailed reasons or comments and therefore it was not possible (and nor was it intended) to give a detailed statistical analysis breakdown of the responses beyond high-level summaries.



3 Summary of Feedback Received

Overall key stakeholders and community were supportive of the options. They recognise the strategic need for Mass Rapid Transit (MRT) and the inter-relationship with other transport infrastructure in south and east Wellington.

3.1 Number of Submissions

We received 5,692 submissions from the public; 5,446 were completed using the online or hard copy feedback form; 211 comments from social pinpoint and 35 detailed submissions were emailed to us or taken over the phone.

During the engagement, the Green Party of Aotearoa New Zealand filed a group submission from 441 people. All these submissions have been analysed as part of the public responses.

Generation Zero also promoted the opportunity for engagement and had a submission portal accessible from their website using the same survey questions. We received submissions from 269 people. All these submissions have been analysed as part of the public responses.

We received written feedback from key stakeholder groups and a good cross-section of the public, including those the proposed designs would directly and indirectly affect. This report includes a summary of key stakeholders' feedback.

3.2 What submitters told us about themselves?

We asked people to tell us about themselves before making a submission:

Their name, age, gender, what suburb they lived in and the main way they got to, and around, Wellington, e.g. walk, bicycle, bus, train, car, motorcycle, etc.

We also asked people to tell us what they thought was most important for the future of Wellington by ranking a series of statements (1 most important, 9 least important).

All fields were optional except for where they lived and how they got around the city.



3.3 Who provided us with feedback?

3.3.1 What gender do you identify as? (optional question)

We closely monitored the gender of the respondents throughout the consultation period and used digital and social channels to ensure parity.

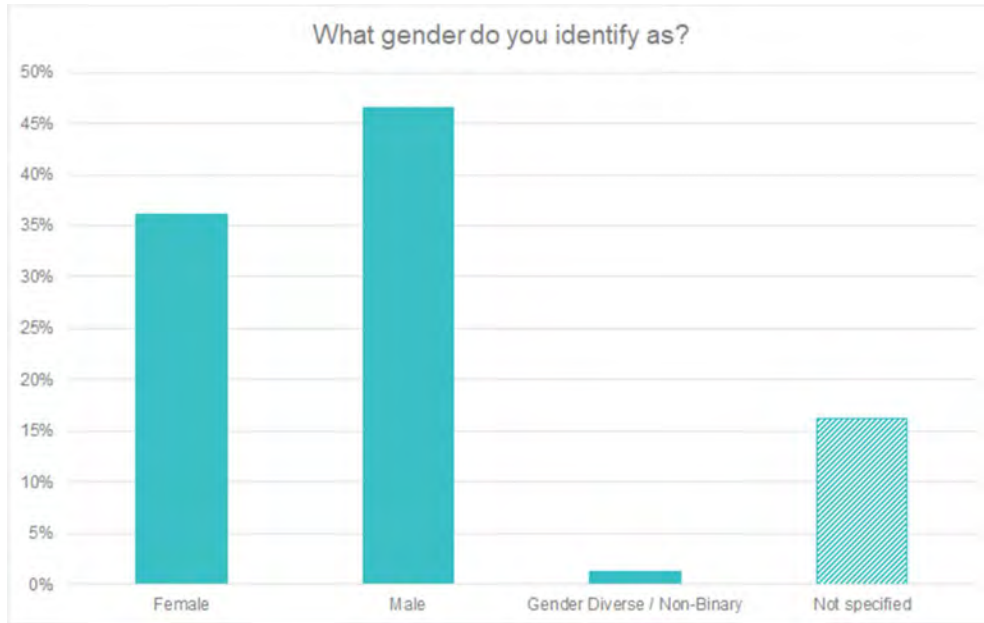


Figure 4: Summary of gender demographics



3.3.2 How old are you? (optional question)

Getting younger people to take part in consultations is always a challenge so uptake from younger Wellingtonians was both pleasing and important, as they will be the ones to benefit from the future changes.

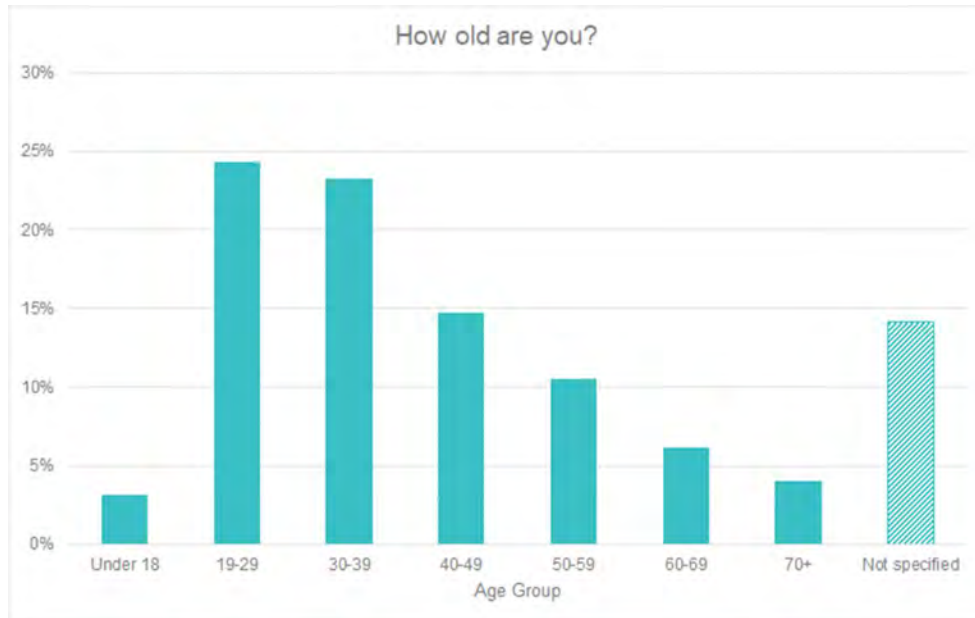


Figure 5: Summary of age demographics



3.3.3 What is the main way you get to and around Wellington? (mandatory question)

It's important to avoid tribalism and recognise that people who drive a car will also cycle or use public transport. Although this graph shows that most respondents used a car as their main form of transport, support of active modes was still strong in the feedback.

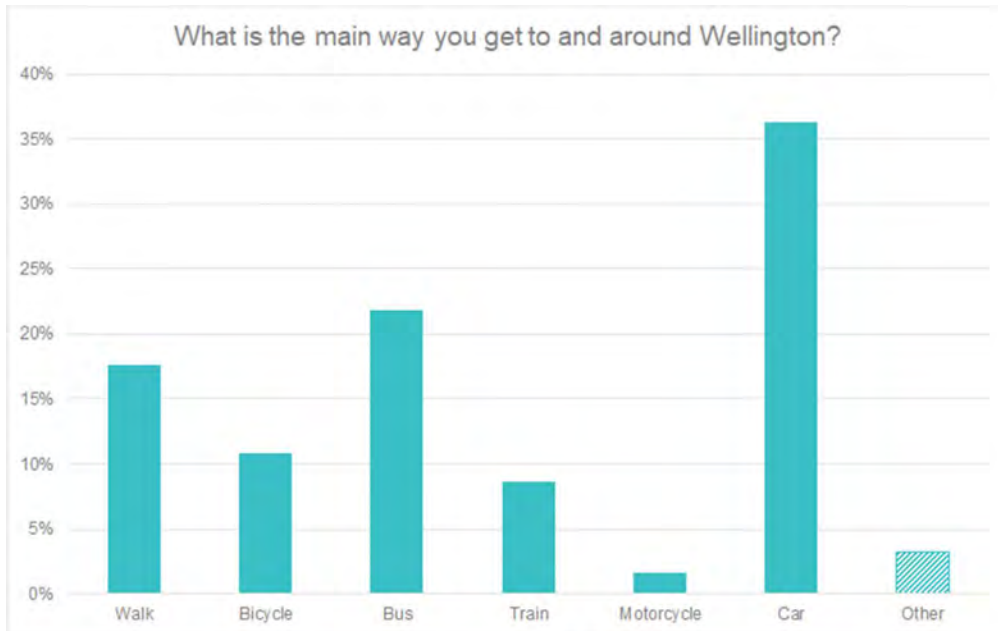


Figure 6: Summary of the different way's submitters travel to and around Wellington



3.3.4 Which suburb do you live in? (mandatory question)

The options were proposing changes to the city so getting a response from the regions was going to be a challenge. We distributed consultation material and used social channels to explain how the changes would improve their travel to places like the airport and the hospital.

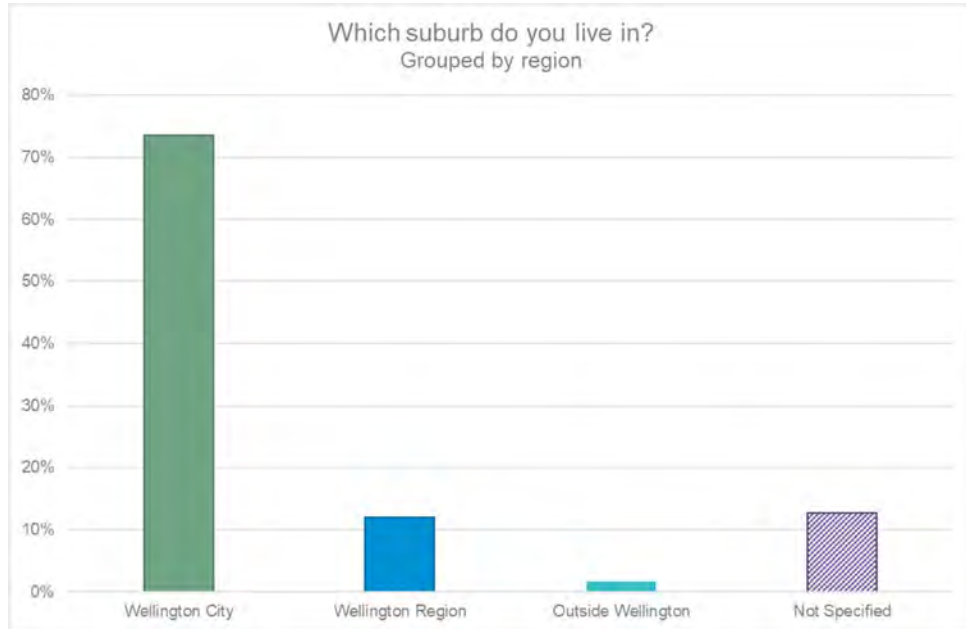


Figure 7: Summary of location grouped by region

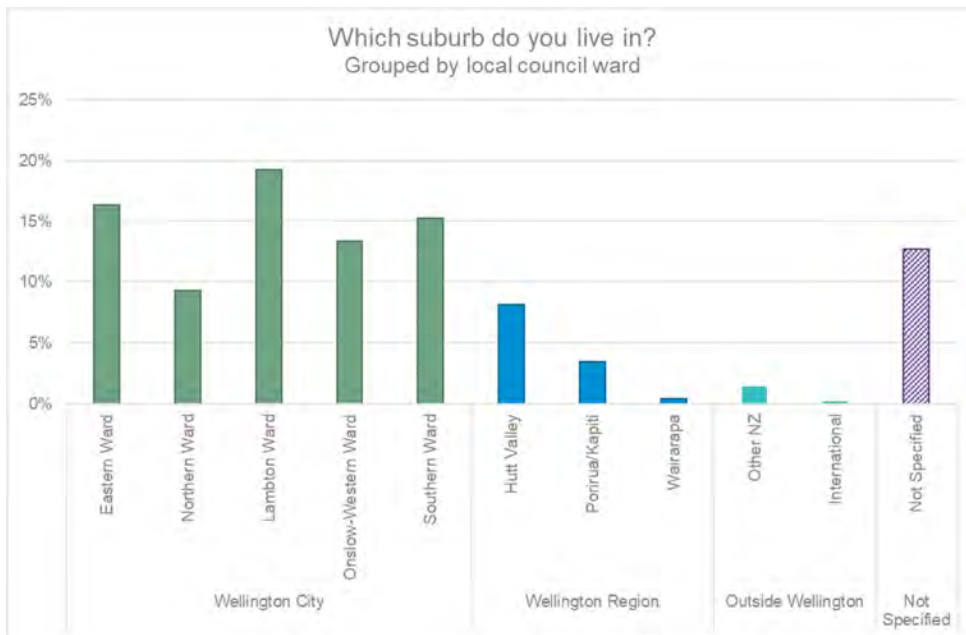


Figure 8: Summary of location grouped by local council ward



3.3.5 What do you think is most important for the future of Wellington? (optional question)

We asked people to rank a series of statements in level of importance to them, one being most important and nine being the least.

The statement “More housing closer to where you work and play” ranked higher amongst younger age groups and/or respondents from within the Lambton Ward (Wellington Central), but lower by respondents from older age groups.

Respondents from outside Wellington City ranked the statement “Making it easier to get to key destinations like the airport and hospital” higher, whereas that was rated much lower by respondents from within Wellington City.

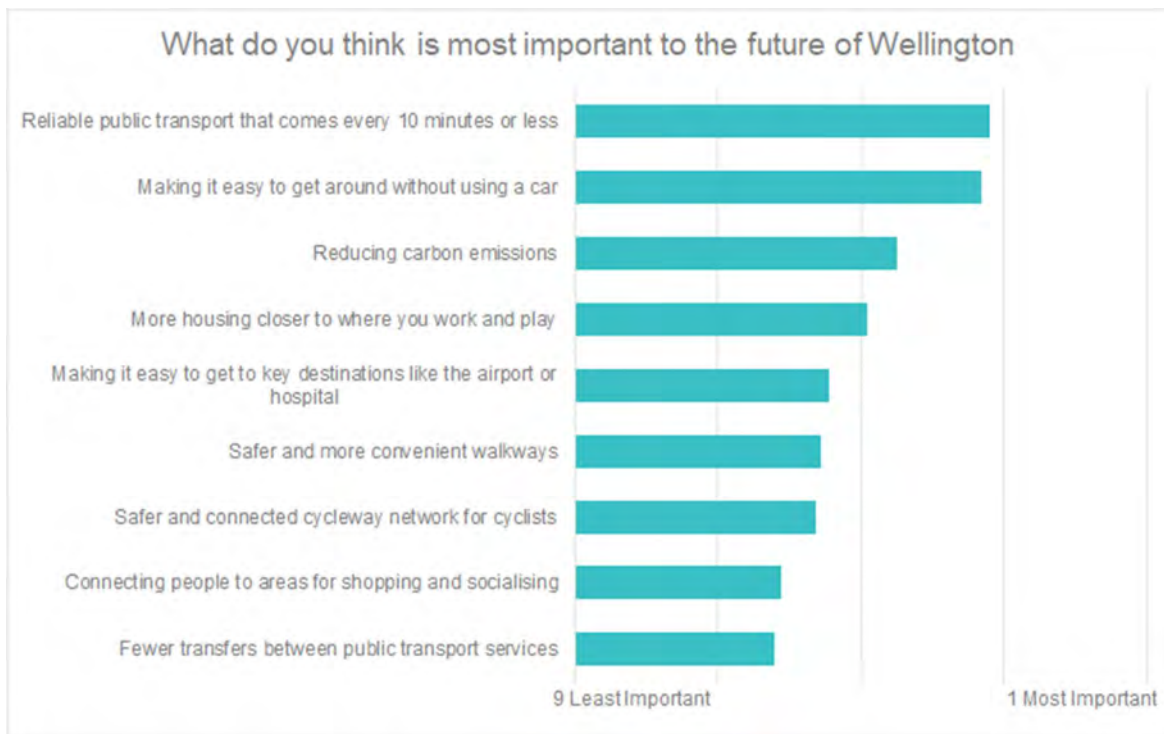


Figure 9: Ranking of statements from most important to least important for Wellington’s transport future



3.3.6 Did you find the information useful for giving feedback? (optional question)

We asked people to tell us if they thought the information provided was useful for giving feedback. Of the 3,473 people who responded to this question, around 85% of people told us that the information was helpful.

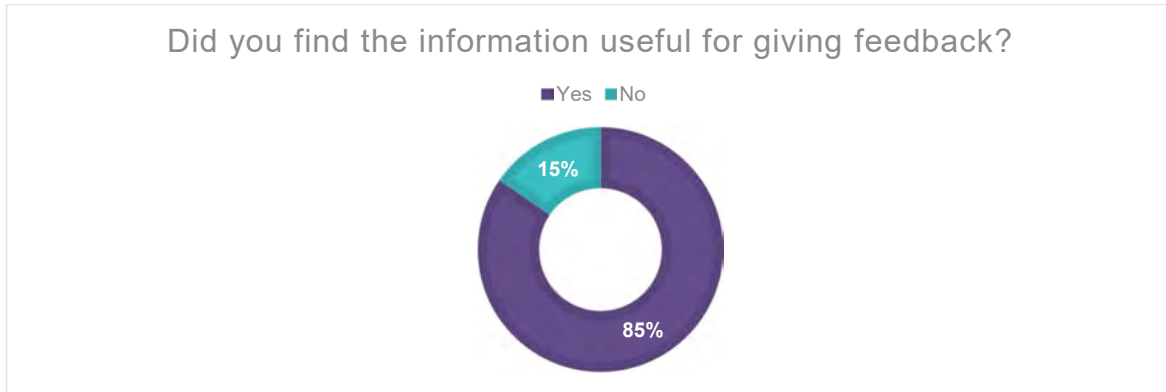


Figure 10: Percentage breakdown of how useful the information provided was in providing feedback

3.4 What people thought about the options?

To encourage richer qualitative feedback and to meaningfully inform the IBC, the questions we asked were open-ended. We were interested in what people thought and how they felt about the options, rather than simply which option they preferred. This is standard practice when engaging at IBC stage, as there is not enough confirmed detail available for people to make a definitive choice. The feedback was themed to give a flavour of community sentiment and be reflected in the final IBC, as well as the scoping for the next stage.

The only quantitative question focused on which type of MRT system/vehicle they preferred and explored why, recognising that the public was relying on information provided in the engagement material.

Not all fields were mandatory and not all responses received gave detailed reasons or comments and therefore it is not possible (and nor was it intended) to give a detailed statistical analysis breakdown of the responses beyond high-level summaries.

3.4.1 Survey questions

None of the fields were mandatory.

- Have a look at the four possible options. What do you like about these options? What don't you like about these options?
- Is there something missing?
- Which type of mass rapid transit do you prefer? Why?

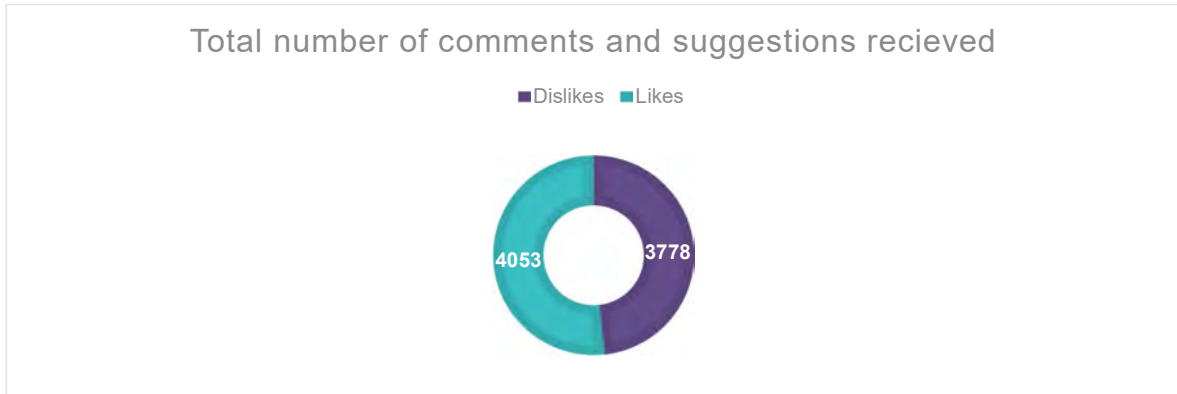


Figure 11: Total number of comments and suggestions received

3.5 Feedback Themes

There was a diverse number of comments across a range of topics raised during the engagement process (see methodology section 1.4). Despite the diversity of feedback, six key themes emerged:

- Quality urban growth and development
- Better environmental, carbon, social and liveability outcomes
- Quality public transport
- Timeframe, cost, and construction disruption
- Cyclist/scooter-friendly and walkable city
- Access for private vehicles and parking

In addition to the above, we received feedback in relation to the changes to the Basin Reserve and Mt Victoria tunnels.

As expected, there was overlap in people’s feedback between the different themes. For example, a person commenting on the need to future-proof transport infrastructure might also have expressed a view on the need to invest today for long-term benefits. They might have also commented on how future-proofing our environment means reducing carbon emissions, which we have captured under the environmental, social and liveability theme.



3.5.1 Quality urban growth and development

The focus for the public engagement material was on communicating how investment in transport infrastructure, such as MRT, would provide for the needs of future Wellingtonians, by enabling transformational change.

Wellington’s population is forecast to grow, and more homes are needed that are affordable and where people need and want to live. We know that, internationally MRT systems encourage cities and suburbs to flourish and grow and this was highlighted in the information provided. For example, the website showed how many new houses could potentially be built under each option.

There were 1977 comments and suggestions related to urban growth and development.

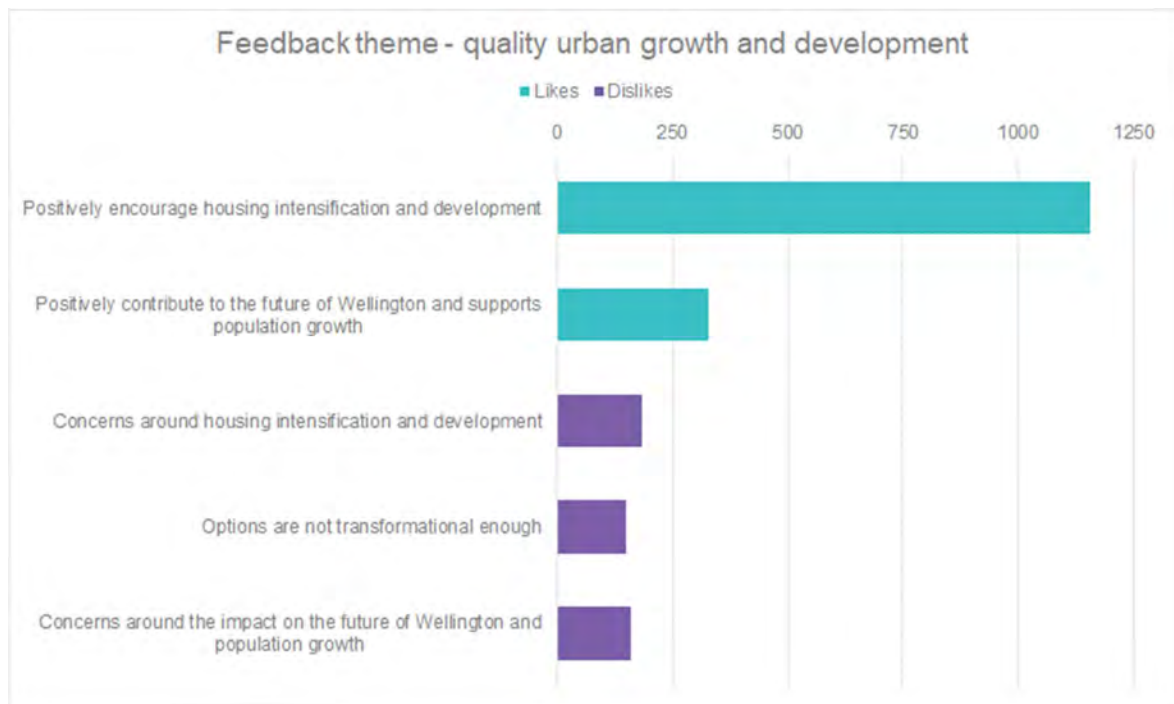


Figure 12: Comments and suggestions received in relation to urban growth and development

Prominent likes and dislikes are presented above. A total of 1,485 comments were favourable towards urban growth and development.

Of these, the greatest number of responses indicated that MRT will:

- Positively encourage housing intensification and development (1,156 comments)
- Positively contribute to the future of Wellington and supports population growth (329 comments)

A total of 492 questions or concerns were expressed in relation to growth and development.



The broad themes with the greatest number of responses were:

- Concerns around housing intensification and development (185 comments)
- Options are not transformational enough (148 comments)
- Concerns around the impact of future of Wellington and population growth (159 comments)

Respondents are very aware of the housing shortage in Wellington and want to see it addressed. Most people support MRT as helping to enable more housing intensification and urban development and agree it will help future-proof our infrastructure to meet the needs of a growing population.

However, concerns were raised about the nature of housing intensification and what this would mean for the community.

Others questioned whether the options went far enough to meet the long-term future needs of communities, and some people doubted whether Wellington's population would grow as is predicted.

3.5.2 Better environmental, carbon, social and liveability outcomes

Wellington needs to act now on climate change, so reducing carbon emissions is a key consideration. The website originally only provided a rating against each option in reducing carbon emission in the longer term, however this was supplemented with more detailed information on the effects on carbon emissions during the construction period (based on questions from the community).

Each option presented carbon and liveability/social outcomes. For example, MRT provides level boarding for people with access needs, and the potential green spaces at the Basin Reserve upgrade were emphasised, all potentially making Wellington a city where people are better connected with each other and happier and healthier as a result.

There were 2877 comments and suggestions related to environmental performance and achieving good social and liveability outcomes.

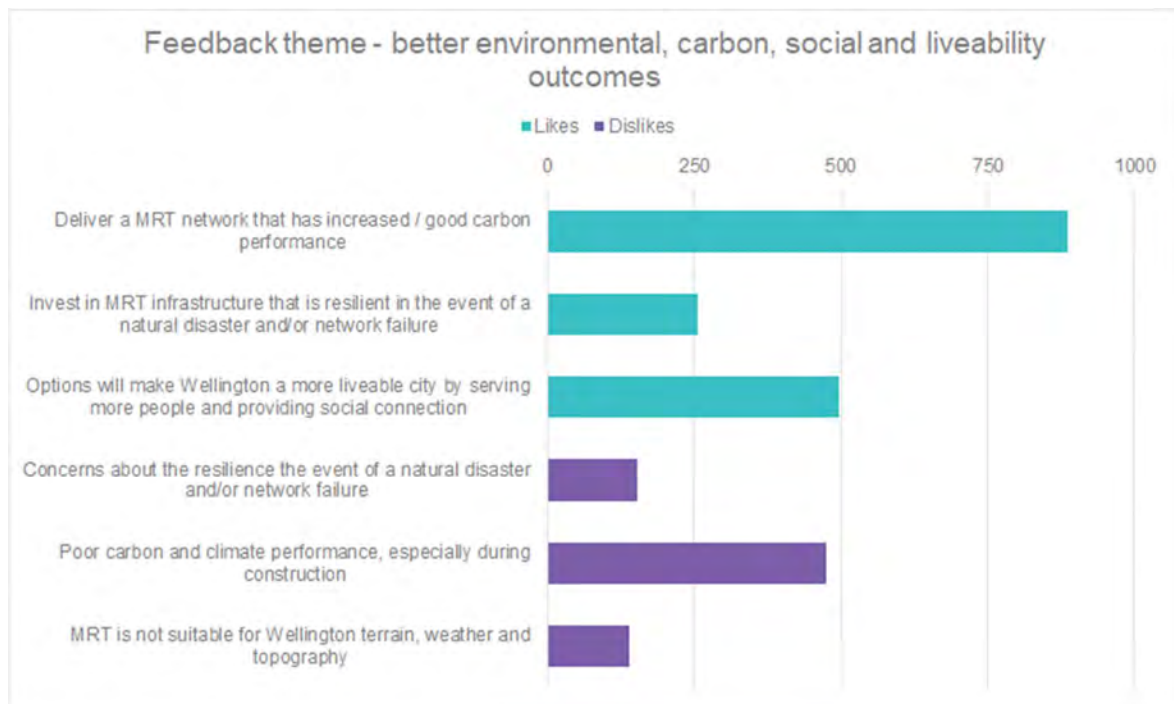


Figure 13: Comments and suggestions received in relation to better environmental, carbon, social and liveability outcomes

Prominent likes and dislikes are presented above. There were 1,950 comments favourable towards MRT delivering environmental performance and achieving positive social and liveability outcomes.

The broad themes with the greatest number of responses were:

- Deliver a MRT network that has increased / good carbon performance (887 comments)
- Important to invest in mass rapid transit infrastructure that is resilient in the event of a natural disaster / network failure (256 comments)



- Make Wellington a more liveable city by serving more people and providing social connection (498 comments)

A total of 927 comments raised questions or concerns related to environmental performance and achieving good social and liveability outcomes, with the broad themes being:

- Concerns around the resilience in the event of a natural disaster and/or network failure (154 comments)
- Poor carbon and climate performance, especially during construction (476 comments)
- Concerns about MRT's suitability for Wellington terrain, weather and topography (141 comments)

Many respondents see MRT as contributing positively to future environmental performance, carbon reduction and social and liveability outcomes. Respondents favoured a healthier and more liveable city with more green spaces where people could gather. Better walking and cycling facilities were important.

Respondents recognised the importance of reducing carbon emissions and the climate crisis was also mentioned in the survey under timeframe, cost, and construction disruption. Some questioned whether the proposed options would deliver a reduction in carbon emissions, especially during the construction period.

Respondents agree MRT needs to be able to cope with natural disasters or other disruption, but some people questioned whether the options provided for this resilience adequately enough.

Some people wondered whether the options would suit Wellington's climate, hills, and narrow, winding streets.

3.5.3 Quality public transport



Figure 14: Artist's impression of a MRT stop for illustrative purposes only

MRT that would significantly transform public transport is at the heart of each option. The information provided identified the route and the benefits of each MRT vehicle in terms of user experience and improved journey times for commuters. It also identified areas where the vehicles would have dedicated lanes and where they would share with other traffic.

MRT can deliver a top-quality user experience, which comes down to a range of factors and expectations, such as reliability, frequency, comfort, connectivity to key places and accessibility and inclusivity. This theme received the largest quantity of feedback.

There were 10,611 comments and suggestions related to quality public transport. This drew the highest number of comments overall.

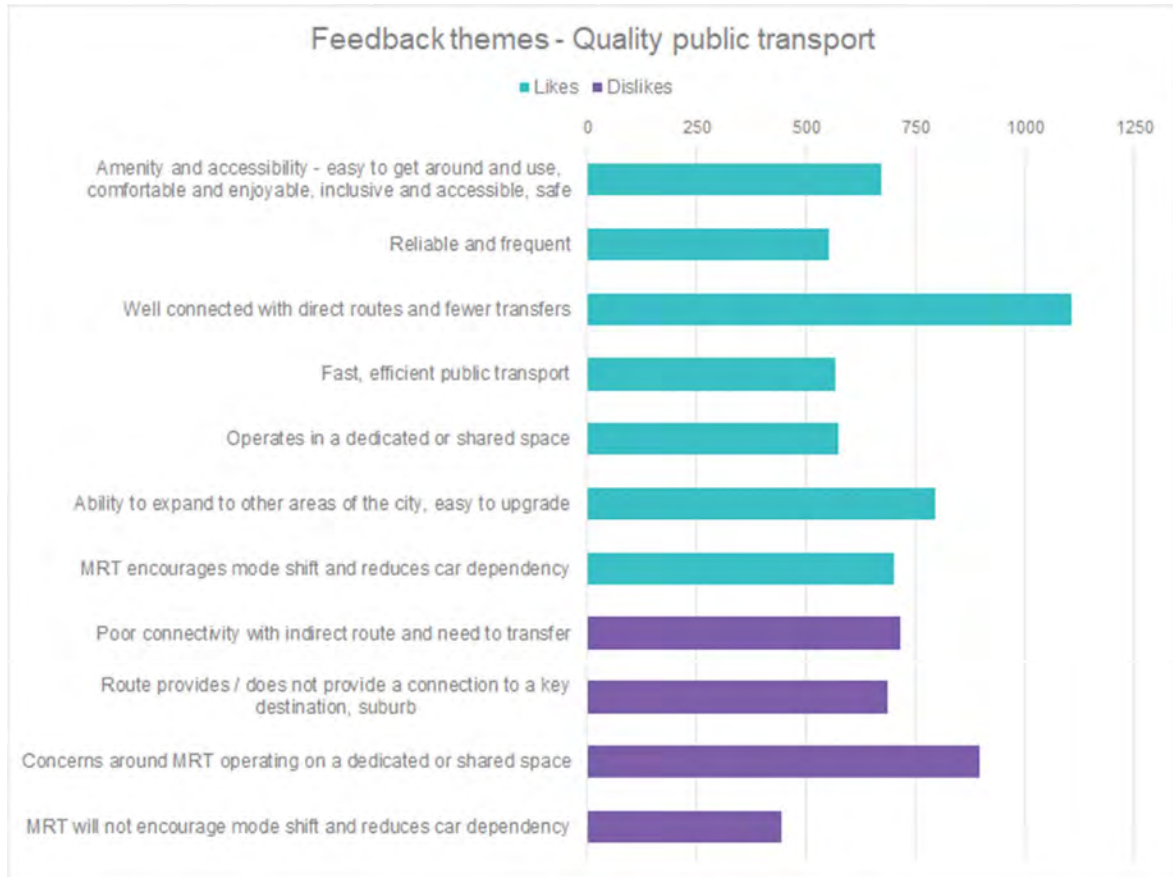


Figure 15: Comments and suggestions received in relation to quality public transport

Prominent likes and dislikes are presented above. A total of 6,519 comments included feedback on what people liked about the MRT vehicle options.



The broad themes with the greatest number of responses were:

- Amenity and accessibility - easy to get around and use, comfortable and enjoyable, inclusive, accessible and safe (670 comments)
- Reliable and frequent (553 comments)
- Well-connected with direct routes and fewer transfers (1,107 comments)
- Fast, efficient public transport (568 comments)
- Operates in a dedicated or shared space (547 comments)
- Ability to expand to other areas of the city, easy to upgrade (795 comments)
- MRT encourages mode shift and reduces car dependency (701 comments)

A total of 4,092 comments raised questions or concerns about what the options meant for future public transport.

The broad themes with the greatest number of responses were:

- Poor connectivity with indirect routes and need to transfer (714 comments)
- Route provides / does not provide a connection to a key destination, suburb (685 comments)
- Concerns around MRT operating on dedicated or shared space (896 comments)
- MRT will not encourage mode shift or reduces car dependency (444 comments)

Respondents had most to say about how to improve the type of public transport on offer in future, which is understandable since Wellingtonians are high users of public transport and new types of MRT are at the core of each option.

Respondents are positive about the prospect of high-quality public transport making it easier to get around without a car. Respondents strongly support public transport that offers more people, better connections to more places, more comfortably, frequently and reliably with fewer transfers needed.

Concerns were raised about reaching key destinations and the need for transfers to places such as the hospital. There was a preference from respondents for Light Rail Transit (LRT) direct to the airport.

Respondents like the combination of dedicated lanes and shared space for MRT. However, there were questions around how road sharing would work on Wellington's narrow and winding streets. Some saw shared lanes as still encouraging travel by car and thought the options needed to go further to encourage greener forms of transport.

Concerns were raised that MRT options seem to prioritise the southern and eastern suburbs over other parts of the city, and some queried the reasoning behind the proposed routes. Respondents would like to see improved public transport for other parts of the city, including those areas they live and work in beyond the proposed routes.

Respondents want an MRT system that could extend to other areas and encourage more urban growth and development. At the next stage of engagement, people would like more detail about construction staging and property impact.



3.5.4 Time, cost, and construction disruption

Transformational projects of this nature take time and investment. The information provided included the potential timeline to deliver MRT and the changes to the Basin Reserve and through Mt Victoria. It showed that the business case process, the design, and consent stages meant that construction would not start before 2028, with another eight to 15 years before completion.

Each option had an indicative 30-year cost that was also shared with the public. They ranged from \$5.8 billion to \$7.4 billion.

There were 4,661 comments and suggestions relating to the proposed timeline, level of investment and delivery process. This theme attracted the second highest number of responses.

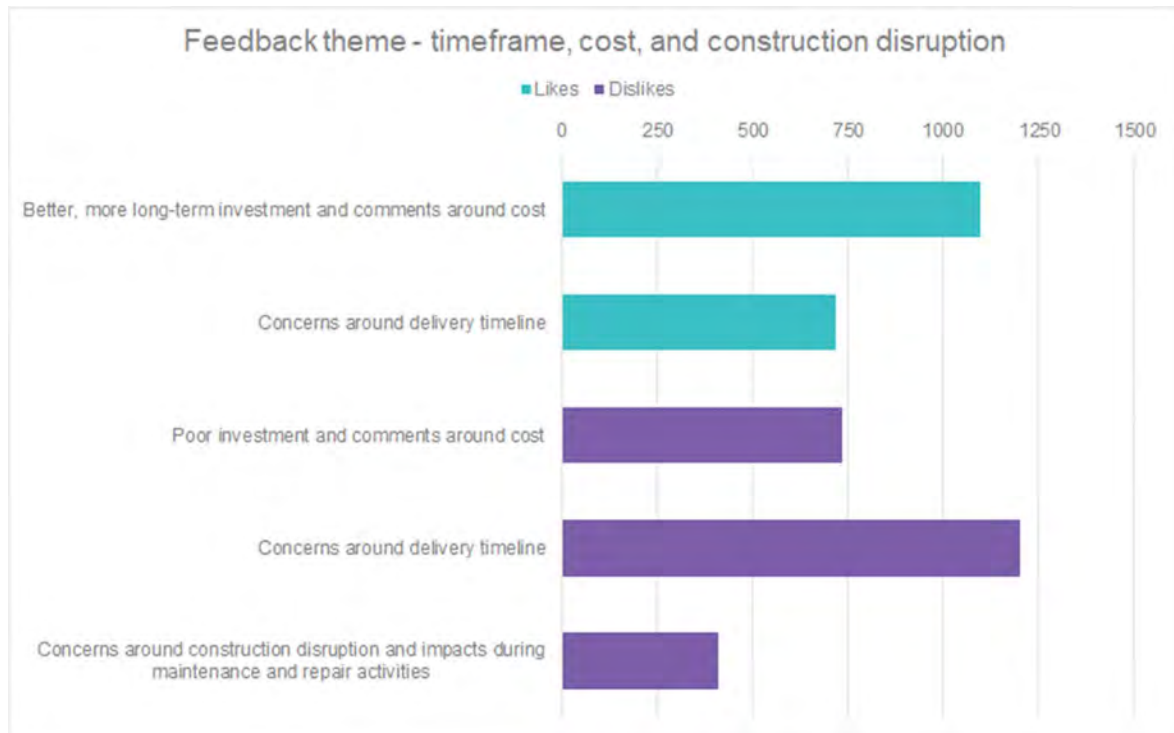


Figure 16: Comments and suggestions received in relation to timeframe, cost, and construction disruption

Prominent likes and dislikes are presented above. A total of 2,283 favourable comments were received regarding the timeline, investment level and delivery stages.

The broad themes with the greatest number of responses were:

- Better, more long-term investment and comments around cost (1,096 comments)
- Concerns around delivery timeline (719 comments)

A total of 2,378 comments raised questions or concerns about the timeline, investment level and delivery.



The broad themes with the greatest number of responses were:

- Poor investment and comments around cost (734 comments)
- Concerns around delivery timeline (1,201 comments)
- Concerns around construction disruption and impacts during maintenance and repair activities (409 comments)

Timing and cost attracted the second highest number of comments from respondents. There were divergent views, in support of, and with concerns about, the level of investment required. Some felt transformational change was important and that this would take a significant investment. Others thought the cost was too high and were looking for alternatives, such as delivering in stages, for example, starting with BRT and upgrading to LRT, delivering dedicated bus lanes first and upgrading to MRT later.

People want to know how any changes would be funded and the impact on ratepayers.

However, there was clear and unified feedback on the proposed timeline, with respondents concerned it is going to take too long to deliver any change. This was also reflected in the social listening feedback, especially from younger Wellingtonians. People want real change, much sooner.

There was feedback around the cost of ongoing maintenance and repairs, especially if disrupted during an earthquake or other natural disaster.



3.5.5 Cyclist/scooter-friendly and walkable city

The main aim of the Let's Get Wellington programme is to make it easier for more people to get around the city in healthier and greener ways. This means better public transport, less reliance on cars and making it safer for people to walk, cycle, scooter and even skateboard around the city.

The proposed changes to the Basin Reserve / Mt Victoria and along the MRT route include walking and cycling improvements, such as a dedicated tunnel through Mt Victoria, either refurbished or new.

There were 1,812 comments and suggestions about what the options meant for walking, cycling and active modes. This theme received the least amount of feedback overall.

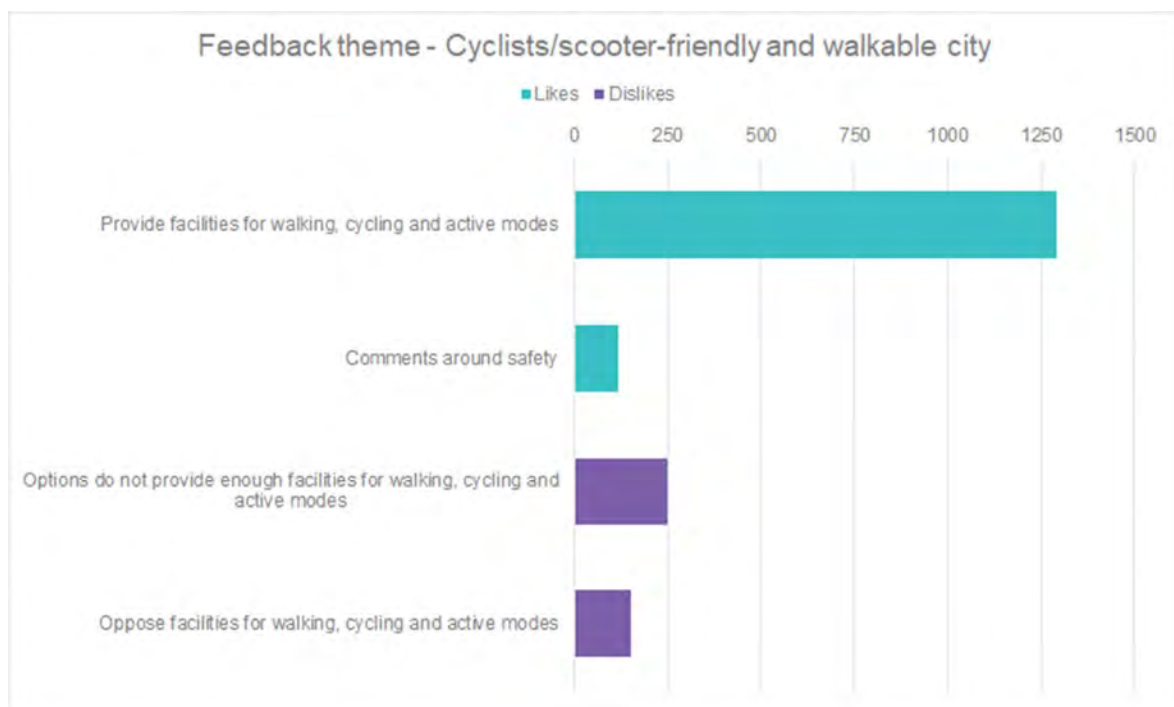


Figure 17: Comments and suggestions received in relation to cyclist/ scooter-friendly and walkable city

Prominent likes and dislikes are presented above. The provision for cycling and active modes drew 1,410 favourable comments and suggestions across two key themes:

- Provide facilities for walking, cycling and active modes (1,292 comments)
- Comments around safety (118 comments)

The provision for cycling and active modes drew 402 unfavourable comments and suggestions across two key themes:

- Options do not provide enough facilities for walking, cycling and active modes (251 comments)
- Oppose facilities for walking, cycling and active modes (151 comments)



Most respondents want a city that is well connected, enjoyable and safe for people to walk, cycle or scooter around. Whether there are dedicated lanes or shared space, personal safety is paramount.

It is not unexpected that this theme received the fewest responses given the separate consultation underway over the same period for the Wellington City Council's draft bike network plan, with more detail for people to comment on. However, many comments were received regarding the new walking and cycling tunnel at Mt Victoria, and most are in support of this (refer to section 3.6.2).

People less supportive of walking and cycling facilities feel the money would be better spent elsewhere on the transport network. They feel Wellington's climate and terrain is not cyclist-friendly and that the bike paths and walkways won't be used enough to justify the investment.

3.5.6 Access for private vehicles and parking

We want to encourage Wellingtonians to consider alternative ways of getting around, so that travel will be more reliable for those who will always need to use a vehicle (e.g., those with family commitments or mobility challenges) and to keep commerce moving.

Public engagement information showed how congestion would be eased at the Basin Reserve by separating local from state highway traffic and with a new tunnel shared with public transport through Mt Victoria. It also showed how MRT would share roads with general traffic where roads are narrower and/or traffic lighter.

There were 3,123 comments and suggestions about what the options meant for general traffic.

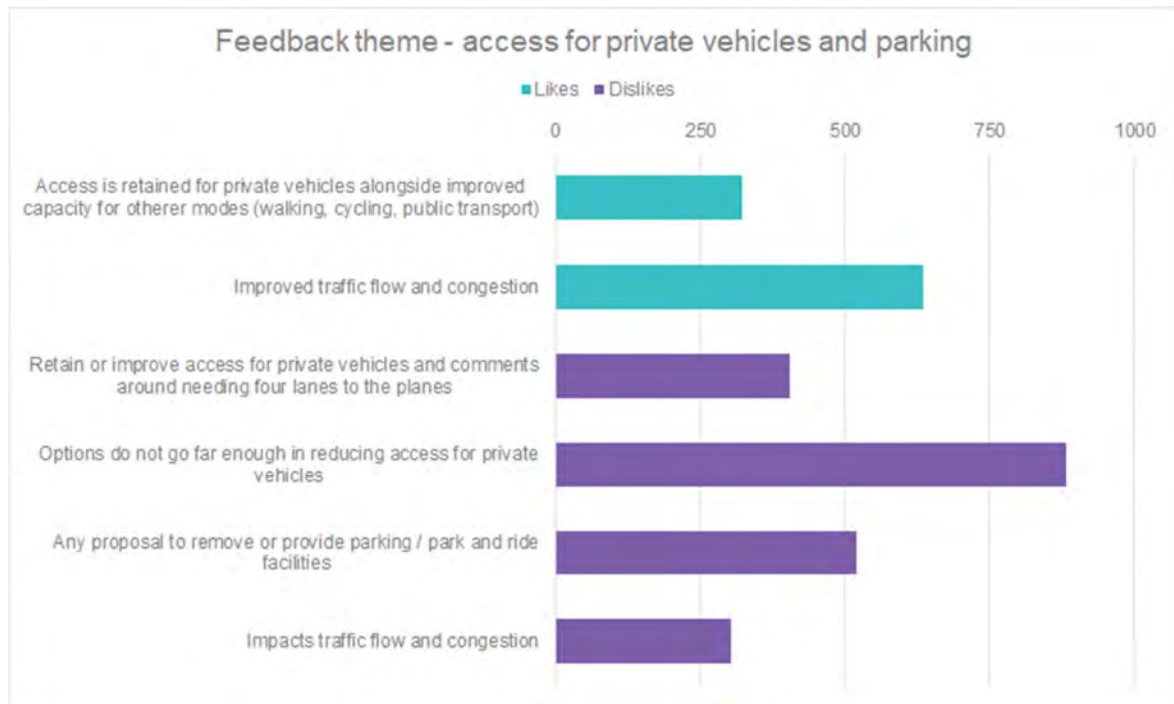


Figure 18: Comments and suggestions received in relation to access for private vehicles and parking

Prominent likes and dislikes are presented above. Changes related to general traffic / vehicles drew 1,014 favourable comments and suggestions across three key themes:

- Access retained for private vehicles alongside improved capacity for other modes (walking, cycling, public transport etc) (323 comments)
- Improved traffic flow and congestion (634 comments)



There were 2,109 concerns raised across four key feedback themes:

- Retain or improve access for private vehicles and comments around needing four lanes to the planes (404 comments)
- Options do not go far enough in reducing access for private vehicles (881 comments)
- Any proposal to remove or provide park and ride facilities (520 comments)
- Impacts traffic flow and congestion (304 comments)

This theme generated the most divergent views. Respondents acknowledge and support continued access for motor vehicles while reducing congestion and improving traffic flow. However, there was divided sentiment as to whether the goal should be to reduce or improve overall access to the network for vehicles.

Respondents see congestion as a problem that needs fixing and are concerned about options that won't address this or might make things worse. There was mention of electric vehicles and respondents questioned whether the options take this into account, especially around reducing carbon emissions.

Others feel that the options do not go far enough to remove or reduce car dependency and access.

Respondents commented on parking, and this too had divergent views.

Some feel that MRT needs dedicated lanes to run smoothly so removing parking is inevitable. Respondents also said consideration should be given to park and ride facilities to ensure MRT can be used by more people. Others are concerned about any loss of parking and the impact this could have on local residents and businesses.

In summary, respondents are wary of reduced private vehicle access and parking without credible, user-friendly alternatives.

3.6 Changes to the Basin Reserve and Mt Victoria Tunnels

The proposed changes at the Basin Reserve and an extra Mt Victoria Tunnel would deliver significant transport infrastructure capacity improvements at critical points in our transport network. The public engagement material used interactive tools, video, and illustrations to bring these components to life.

Basin Reserve

In options 1-3, local traffic would be physically separated from northbound state highway traffic at Arras Tunnel, meaning the Basin Reserve would no longer be a congested roundabout. In option 4, the Basin would remain a roundabout with only minor changes to lanes and an improved intersection at Adelaide Road.

New tunnel at Mt Victoria

All four options propose an extra Mt Victoria tunnel dedicated to different modes:

- Options 1 and 2 dedicated to public transport and general traffic (four lanes – a lane each way for general traffic / a lane each way for public transport).
- Options 3 and 4 dedicated to walking and cycling only.

Refurbish existing Mt Victoria tunnel

The existing tunnel would be adapted to allow for:

- Options 1 and 2 walking and cycling only.
- Options 3 and 4 general traffic only (public transport would use the existing bus tunnel at Hataitai).

There were 3,646 comments related to changes to the Basin Reserve and a new Mt Victoria tunnel.

3.6.1 Basin Reserve



Figure 19: Artist's impression of proposed changes to the Basin reserve for illustrative purposes only

Changes to the Basin Reserve drew 980 comments:

- 596 comments were supportive of the major changes where the Basin Reserve would no longer be a roundabout and have changes to lanes and an improved intersection at Adelaide Road.
- 384 comments were not supportive of any major changes and wanted the Basin Reserve to stay a roundabout.



Respondents are supportive of efforts to reduce congestion and improve traffic flow around the Basin Reserve and many are also keen to have an enhanced, people-centred, open space.

Respondents in Porirua and Hutt Valley see the proposed changes as making it easier for them to get to the hospital and the airport.

Those who were less supportive of major changes questioned whether the plans would fix the congestion problem, especially as traffic would continue to merge and bottleneck further north towards the Terrace Tunnel. In particular, the extension of the Arras Tunnel was seen as too costly in terms of construction-related carbon emissions. Some people were concerned that it would incentivise driving rather than the use of public transport, walking or cycling.

Others worry that any major changes at the Basin Reserve would delay investment elsewhere in the network.

3.6.2 New Mt Victoria tunnel

A new tunnel would have a positive contribution to encouraging mode shift away from cars by offering dedicated, safe and well-connected routes for walkers, cyclists and other active modes.

The proposal for a new Mt Victoria tunnel drew 1,616 (44%) comments:

- 1,119 (69%) comments were supportive of a new tunnel for MRT and general traffic.
- 497 (31%) comments were not supportive of a new tunnel for MRT and general traffic.

More respondents were in favour of a new tunnel than not. Some liked the focus given to MRT and that people who walk or cycle would be kept safely away from general traffic. Others saw the new tunnel as improving the connection between the city and the airport.

However, respondents who are concerned about better access for cars and other vehicles questioned why only a two-lane tunnel is proposed and would like to see four lanes for general traffic (two in each direction) because they believe this would future-proof the investment and support population growth and intensification.

Those who support the aim of getting cars off the road worry a new tunnel would be counter-productive to that goal, as it would encourage car use. There were concerns about the disruption that construction of a new tunnel would cause, as well as how long it would take to build and the carbon impacts during construction.

At the next stage of engagement, respondents would like more detail about entry and exit points.

3.6.3 New or refurbished tunnel for walking and cycling



Figure 20: Artist's impression of proposed new or refurbished tunnel for walking and cycling for illustrative purposes only

The proposal to provide a new tunnel or refurbishing the existing Mt Victoria Tunnel for walking and cycling attracted 1,049 comments and suggestions:

- 968 comments were supportive of a tunnel for walking and cycling.
- 81 people were not supportive of a new tunnel for walking and cycling.

Respondents who say they support a new cycling/walking tunnel see it as a critical link in a future network that is safe, healthy and contributes to carbon reduction. People commented that the current walking and cycling experience through Mt Victoria is noisy, polluted, dark and unsafe.

Of the few respondents who expressed concerns with the proposal for a new tunnel, they feel the money would be better spent elsewhere in the transport network, as any new tunnel would not be used enough to justify the investment.

A few people stated that the existing tunnel should be kept for car access (even if a new tunnel is provided).

3.7 Comparing Two Types of MRT

MRT was described in the public engagement material as state-of-the-art public transport. We used interactive tools, video content and illustrations to show what it looked like, where it would go, how it worked and the positive effect it would have on urban development.

MRT is the very latest type of public transport, meaning Wellingtonians would only have experienced it if they've had the opportunity to do so overseas. That's why it was crucial that we explained the transformational benefits of MRT, both for urban development and the exceptional user experience it can deliver (better connections to more places, with more comfort, frequency, and reliability). The proposed options featured two different types of MRT and people were asked which type they preferred, LRT or BRT.

The website compared the pros and cons of each MRT option in terms of passenger numbers, time to build, ability to extend to other routes, resilience and the effect on urban development.

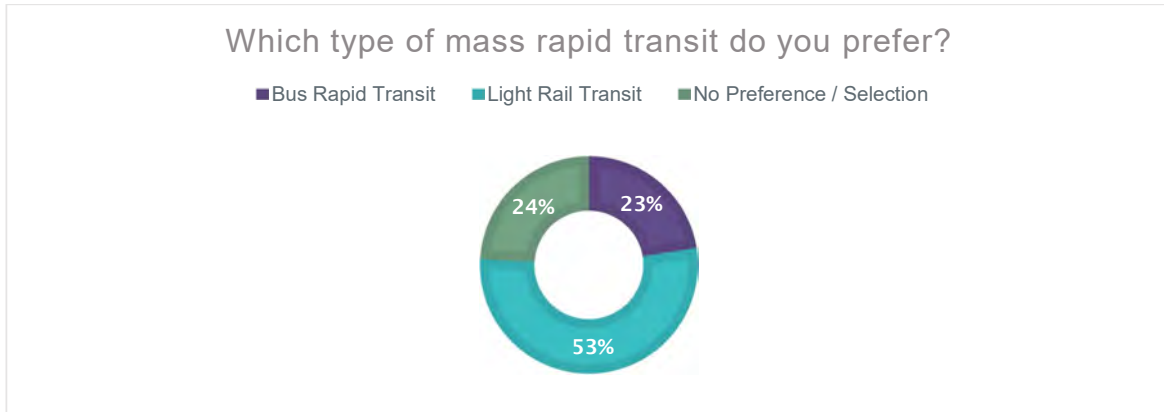


Figure 21: Breakdown of mass rapid transit preference

3,037 respondents preferred LRT as the best MRT solution for Wellington.

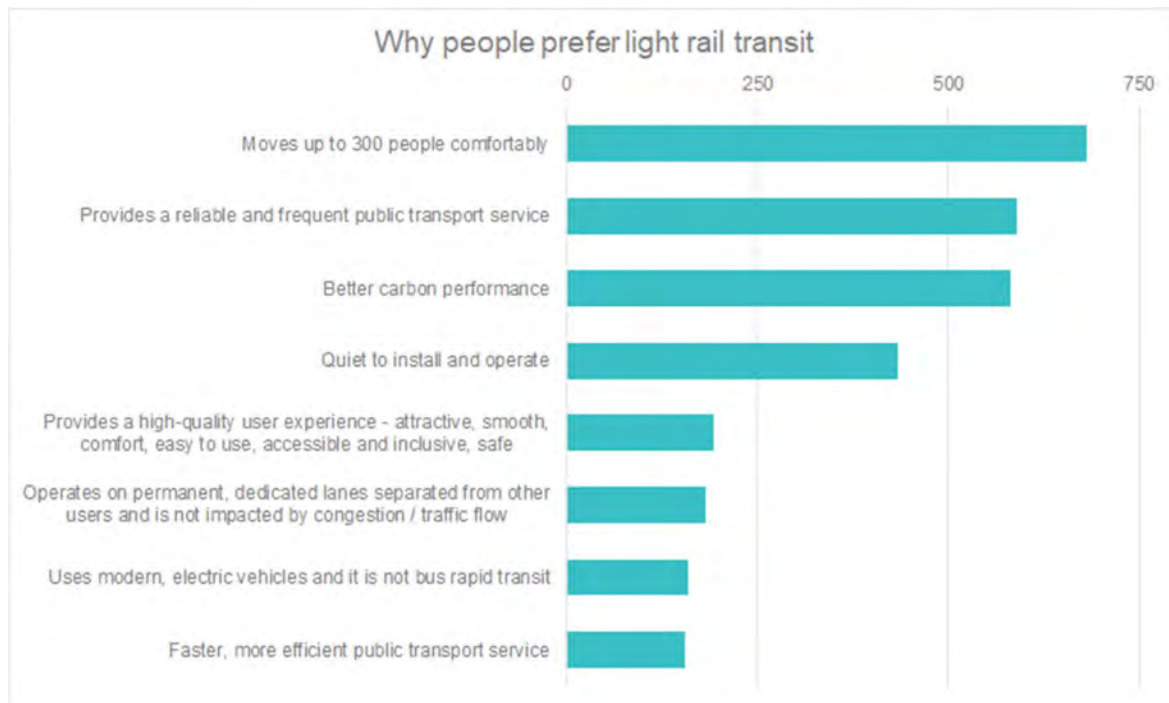


Figure 22: Comments and suggestions received in relation why respondents prefer light rail transit

Respondents provided 1,542 comments as to why they preferred LRT, based on the information we provided:

- Moves up to 300 people comfortably (681 comments)
- Provides a reliable and frequent public transport service (590 comments)
- Better carbon performance (581 comments)



- Quiet to install and operate (434 comments)
- Provides a high-quality user experience - attractive, smooth, comfort, easy to use, accessible and inclusive, safe (193 comments)
- Operates on permanent, dedicated lanes separated from other users and is not impacted by congestion / traffic flow (182 comments)
- Uses modern, electric vehicles and it is not BRT (159 comments)
- Faster, more efficient public transport service (155 comments)

1,283 respondents preferred BRT as the best MRT solution for Wellington.

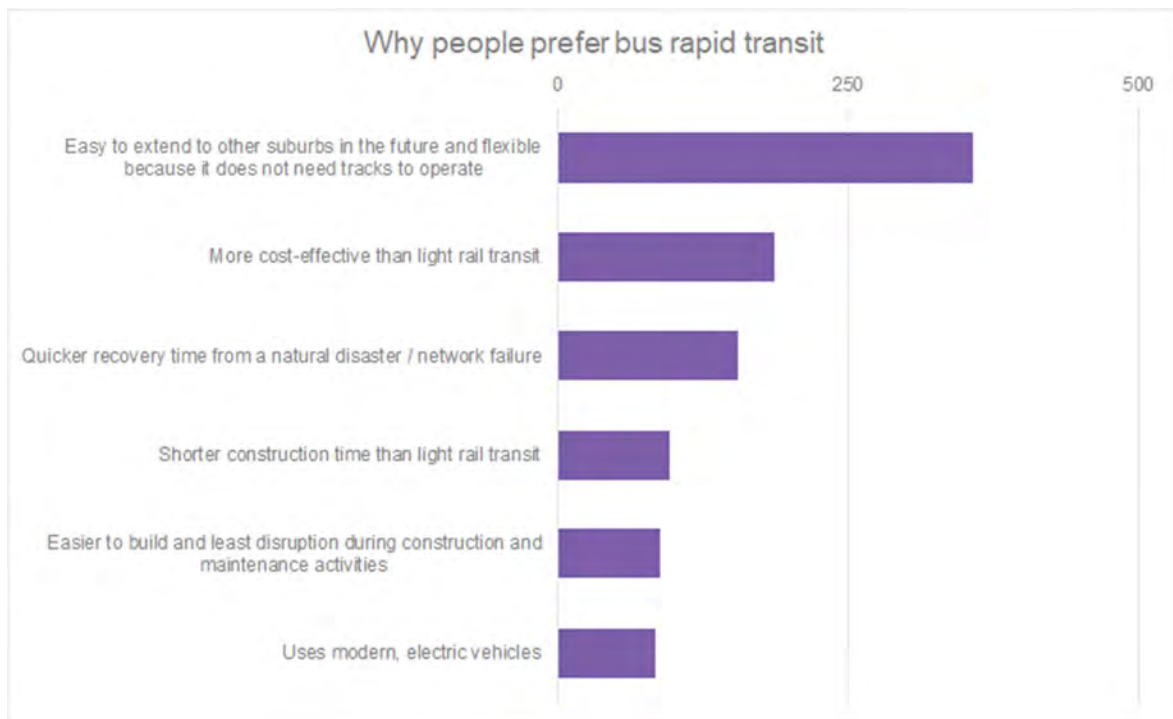


Figure 23: Number of comments and suggestions received in relation to why respondents prefer bus rapid transit

People provided 769 comments as to why they preferred BRT, based on the information we provided:

- Easy to extend to other suburbs in the future and flexible because it does not need tracks to operate (357 comments)
- More cost-effective than LRT (187 comments)
- Quicker recovery time from a natural disaster / network failure (155 comments)
- Shorter construction time than LRT (97 comments)
- Easier to build and less disruptive during construction and maintenance activities (88 comments)
- Uses modern, electric vehicles (84 comments)



Over half of respondent's support LRT because of its capacity (over 300 people per trip), reliability and frequency, as well as improved carbon performance.

People also positively commented about LRT being quiet to operate, despite the consultation information on the website advising that LRT can be noisier due to steel wheels on tracks.

The respondents who supported BRT did so largely because of its flexibility to be extended to more suburbs in the future. Others preferred BRT because it requires less investment and is faster to implement.

People also liked that BRT offers a quicker recovery time from a natural disaster because its rubber wheels allow it to be used on alternate routes and/or reinstated on existing routes quicker.

3.7.1 No preference / selection

1,124 people did not indicate a preference for LRT or BRT and gave feedback (104 comments) as to why.

Most respondents commented that they do not support any type of MRT as a suitable public transport solution for Wellington. Others suggested that Wellington needs both BRT and LRT to create a well-connected quality public transport service.



4 Summary of Key Stakeholder Feedback

We have received and summarised written submissions from the following key stakeholder groups.

Table 4: Summary of key stakeholder feedback

Organisation	Summary of Written Submission
Architectural Centre	<ul style="list-style-type: none"> • Comment that Option 4 avoids the high carbon emissions associated with building a new tunnel. Suggestion that the route should continue up Tory Street and connect to Adelaide Road at John Street. • Reducing carbon emissions is the most important issue for the future of Wellington, followed by the provision of safer and more convenient walkways and making it easy to get around without a car. • The priority for a future sustainable transport system should be walking. There must be better acknowledgement of the need to reduce traffic load and active suppression of private vehicle use, e.g. tolls at Arras Tunnel. • Feedback suggests that there is not enough information about the risks of sea-level rise and tsunami risk in relation to the options, traffic flows around the Basin Reserve or pinch-points in Berhampore. The rapid transit options are offered without any context for how the rest of the network will be supported.
Automobile Association (AA)	<ul style="list-style-type: none"> • Implementing any of the programme options will result in worse congestion and poorer travel time reliability for general traffic. • The AA does not support Option 3 or Option 4. • A new Mt Victoria tunnel is needed to improve public transport from the east, to support growth and to improve conditions for state highway users, including the link to the airport. • Grade separation at the Basin Reserve will address congestion, support forecast growth and provide improved access for active modes, particularly cycling. • An AA survey of members found a slight preference for Option 2, but more support for LRT than any other individual element of the options. • Option 2 slightly outperforms Option 1 when assessed against the programme objectives, but LRT has greater urban development potential than BRT. • If LRT is the preferred mode, consideration should also be given to opportunities for staging. • Feedback that Let's Get Wellington Moving needs to identify which elements will deliver the best combination of early benefits and overall value for money, and that can be sensibly staged ahead of the major works. This includes bringing forward grade separation of the Basin Reserve due to the benefits this will deliver for all modes. • The 2019 Let's Get Wellington Moving package included an extra terrace tunnel, undergrounding State Highway 1 at Te Aro and a fourth southbound lane between Ngauranga and Aotea Quay to divert cars from the city centre and enable better



Organisation	Summary of Written Submission
	<p>public transport, walking and cycling. These should be retained given their fit with the goal of removing traffic from city centre and given forecast traffic growth.</p> <ul style="list-style-type: none"> • Comment that there needs to be more transparency about the congestion impacts, the shift in focus from transport to housing, and the costs individuals can expect to face both to fund the programme and for congestion charges.
<p>Basin Trust Reserve / Cricket Wellington</p>	<ul style="list-style-type: none"> • Supports Option 1, notes that Option 2 and Option 3 have potential. • Option 1 will have a significant impact on the Cricket Wellington venue and surrounds. It will support carbon reductions generated by enhancing walking, biking, and public transport options. • Support any options that would enhance access, increase public transport options around the venue, improve general venue experiences, beautify the venue while respecting its heritage, and reduce risks to pedestrians. • More consideration needs to be given to venue entry points and maximising pedestrian safety.
<p>Blind Citizens NZ - Wellington Branch</p>	<ul style="list-style-type: none"> • Suggestion that once a preferred mode is identified, the design will need to be reviewed to ensure it complies with requirements for urban buses. • Platforms should have enclosed shelters and be wide enough to accommodate people waiting for a service with prams, mobility scooters, wheelchairs, and guide/assistance dogs. All platforms and stops must be free of any obstacles. • Signage must be highly visible at the stop and the accessible entry points, with tactile indicators, high-contrast colours, and access logo. Tactile indicators with the access logo should also be placed on platforms to indicate where to wait for boarding. • Each stop must have a controlled crossing to ensure people can cross safely from the footpath to the stop. When boarding or disembarking, there must be a direct, unencumbered, and covered route to the footpath. People should not have to cross cycle lanes. • MRT must be easily identified by high-contrast colour to ensure anyone with low vision can identify the vehicle approaching. Buttons to activate doors must be large, tactile and of high colour contrast and be at a height suitable for all users. If more than one vehicle uses the same stop, then it will require an audio announcement telling users the destination.
<p>Bus and Coach Association New Zealand (Inc.)</p>	<ul style="list-style-type: none"> • Option 2 is preferred with a suggested alternative solution for the Mt Victoria tunnel and more emphasis on public transport for multi-lane roads around the Basin Reserve and the airport. • Options should include bus priority lanes to Seatoun, Miramar North and Island Bay. Feedback that buses have the advantage of servicing suburbs and continuing current public transport routes. LRT requires the introduction of new hubs and transfers. • Comment that the new Mt Victoria tunnel should be the public transport tunnel because buses can travel in both directions at the same time, along with pedestrians.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • Supports Option 1 if the tunnel is four lanes with two lanes for bus use only. The Hataitai bus tunnel should become a cycling tunnel with travel for cyclists to travel in both directions. • Suggestion that bus priority should be introduced along Moxham Avenue and Pirie Street, noting that these roads are not suitable for BRT, even with parking removed at peak times. They not designed to be key thoroughfares and the Hataitai bus tunnel is only one lane. • Taranaki Street is more suitable for LRT as it is closer to urban areas and has good capacity. • Some shorter-term measures could increase the reliability of the public transport network. Priority lanes and improving travel time reliability would smooth the transition to whichever option is selected. • Bus lanes are recommended for the quays, Miramar Avenue to Rongotai Road, Cobham Drive (with a pedestrian bridge), Ira Street, Calabar Road, Park Road and Broadway, Taranaki Street, Featherston Street to Manners Mall. • Other improvements could include changes to central city traffic light timings to make the central city more hospitable to those on foot, including public transport users completing their journeys.
<p>Capital and Coast District Health Board (CCDHB)</p>	<ul style="list-style-type: none"> • Journeys to and from Wellington Regional Hospital make up around 20 percent of vehicle movements on Riddiford Street. • Connections between Wellington Railway Station and the hospital are included in all four options. Options 1 and 2 provide the best improvements for hospital staff, patients and visitors arriving by car, due to Basin Reserve and the Mt Victoria tunnel improvements. • More dedicated MRT lanes are needed between Island Bay and Wellington Regional Hospital to improve connectivity and reliability. • Design for universal access should be incorporated into decisions around mode, vehicle procurement and station design. • MRT through Mt Victoria, Newtown and Berhampore will support greater intensification of housing within walking distance of the Wellington Regional Hospital. The proposed MRT is also expected to enable intensification in Island Bay and other southern suburbs, further increasing the overall housing supply within easy access of the Hospital. CCDHB supports increased housing availability within easy public (or active transport) reach of the hospital and notes the emissions reduction associated with people living near their workplace. • All options will improve access to the hospital and improve staff access to local housing.
<p>CCS Disability Action Wellington</p>	<ul style="list-style-type: none"> • Favours Option 4 with a second choice of Option 3. It recommends the timeline for MRT be accelerated. • LRT gives certainty of the route and stops, and predictability for accessibility features at stops and infrastructure. Features could include audio announcements and live timetable information. • Comment that LRT provides better quality, comfort, better accessibility, travel-time reliability and frequency, and capacity to lower operating costs over time.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • MRT running along Taranaki Street will serve more people and more destinations and enable more housing. The goal should be reliable public transport that comes every 10 minutes or less. • Wellington Railway Station should be included in the scope of the project to avoid disconnect on travel routes and the accessible journey. There needs to be fewer transfers between public transport services and pedestrian priority at all major transport hubs • It opposes the construction of infrastructure that will increase emissions, and the building of the Mt Victoria tunnel for vehicles. • With the rapid development of autonomous vehicles and the long timeline of the MRT project it would like to see an impact statement on the ability to autonomise any of the options given.
Connect Wellington	<ul style="list-style-type: none"> • Supports Option 4 as the first stage of a LRT network and proposes changes to the route through central Wellington. • It suggests LRT be shifted from the quays with its heavy traffic to the Golden Mile as far as Taranaki Street where there are more people and more destinations. It should also be better integrated with the regional rail network. • Option 4 can be implemented most quickly and has the lowest overall greenhouse gas emissions. A well thought-out, connected public transport system will enable people to walk, cycle and use public transport. • There needs to be much faster implementation for the initial route to Newtown and Island Bay. This needs to be aligned with infrastructure and housing investment and coupled with a clear investment pipeline for further routes. • Option 4 invests in capacity that is clearly supportive of people being able to choose a combination of walking, cycling and public transport journeys. A new walking and cycling tunnel is needed ahead of any proposals that could later be converted into private vehicle capacity, such as Option 2. • The emphasis on MRT aligned with housing development needs to be carried through into the District Plan.
Different Spokes Pōneke / Rainbow Wellington / Cycle Wellington / InsideOut / Generation	<ul style="list-style-type: none"> • Public spaces we move through are as important as the destinations we're trying to reach. Feeling safe and included while moving through these spaces are paramount to LGBTQI+ people. • Public spaces should be welcoming, safe and inviting spaces, making clear the rainbow community belongs. This could take the shape of rainbow MRT shelters and crossings, public art/installations, landscape designs and interventions. • These public spaces should have adequate lighting, space and visibility, especially for more isolated or bushy areas, and for night-time. • A safe, well-connected public and active transport system would also play an integral part in strengthening the rainbow community and other marginalised groups. • The safety of public transport for the rainbow community would be increased by introducing safety and rainbow competency training for public transport staff.



Organisation	Summary of Written Submission
Zero Wellington	<ul style="list-style-type: none"> Public transport campaigns could focus on inclusivity, anti-discrimination, and safety for marginalised groups including the rainbow community. Any public transport needs to be reliable for it to be safe. We need public transport to arrive on time and have sufficient capacity, to decrease exposure to potential harm. LRT offers better quality, comfort, accessibility, travel-time reliability and lower operating costs. It has higher capacity than buses, so can move more people efficiently.
Disabled Persons Assembly NZ	<ul style="list-style-type: none"> Suggestion that once a preferred mode is identified, the design will need to be reviewed to ensure it complies with requirements for urban buses. Any redesign needs to reduce the number of transfers required. Pedestrian zones must include space for essential vehicles and drop-off points for taxis and parking spaces for mobility parking card holders/users. Bus access should also continue into the Golden Mile. Disabled and older people with mobility impairments find it difficult to come off feeder/side streets on to a carless street and walk any distance. Public transport must be integrated, and non-peak services receive equal priority to peak-time services. LRT needs accessible feeder bus services to areas beyond the spinal route. Platforms should have enclosed shelters and be wide enough for people with strollers, mobility scooters, wheelchairs, and guide/assistance dogs. All platforms and stops must be free of obstacles. Signage must be highly visible at the stop and the accessible entry points and doors of the MRT, with tactile indicators, sharp contrast colours and access logo. Each stop must have a controlled crossing to ensure people can cross safely from the footpath to the stop. When boarding or disembarking an MRT, there must be a direct, unencumbered and covered route to the footpath. People should not have to cross cycle lanes. MRT must be easily identified by high-contrast colour to ensure anyone with low vision can identify the MRT approaching. Buttons to activate doors must be large, tactile and of high colour contrast and be at a height suitable for all users. If more than one MRT uses the same stop, then the MRT should also have an audio announcement telling users the destination.
Fair Intelligent Transport (FIT) Wellington	<ul style="list-style-type: none"> Supports Option 4 as it creates an opportunity for future MRT to the east via Cambridge Terrace. Comment that LRT to Newtown and Island Bay via Taranaki Street is central with good development opportunities. It brings MRT close the Golden Mile, bypassing the Basin Reserve and simplifying changes there to improve active transport options. Comment that it is the cheapest option, with the earliest completion date. The biggest weakness in Option 4 is the alignment between Taranaki Street and Adelaide Road. A suggested alternative to running along Haining Street is to use the lane along the north edge of Pukeahu Park.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • Supports Option 3. However, the corner of Taranaki Street and Courtenay Place is an equally good location for a transit hub connecting rapid transit to Golden Mile buses. • Feedback that Option 2 should be discarded. If growth or mode-shift on the Island Bay corridor exceeds projections, Wellington would face expensive, technically challenging and disruptive works to upgrade the corridor. • Concern that leaving Vivian Street as the eastbound corridor for State Highway 1 traffic is a lost opportunity for unlocking the potential of Te Aro precinct. Suggestion that eastbound traffic should run along Karo Drive, making this a two-way thoroughfare from the Terrace Tunnel to the Basin Reserve. • Feedback that people will walk farther to catch a faster service and FIT suggests stations at least 600 metres and at most 1 kilometre apart, with an aim of achieving an average speed greater than 25 kmh. • Would like to see MRT delivered sooner.
Foodstuffs North Island (FSNI) Ltd	<ul style="list-style-type: none"> • Supermarkets are central to the prosperity of central Wellington and outlying commercial centres that support growing residential areas. Being able to access supermarkets by public transport or as part of a person's daily commute can drastically reduce the number of private vehicle trips and emissions. • Prefers the LRT for the southern suburbs because of it carrying capacity enabling greater growth and intensification, more comfort for passengers, more certainty for businesses on the route, and a greater reduction in carbon emissions. • Options 1 and 3 bring LRT along the full length of the quays. • MRT could be located outside New World Wellington City, New World Island Bay, Pak N Save Kilbirnie, Miramar New World and New World Newtown. These reflect existing land-use patterns and District Plan zoning that support transit-oriented development and are well suited to future precinct planning. • MRT should be prioritised along Miramar Avenue as it will reduce vehicle traffic more significantly than cycling. • The route through Newtown should follow Riddiford Street and Russell Terrace, rather than Rintoul Street, to better connect with Wellington Regional Hospital, Wakefield Hospital and Wellington Zoo. Whichever route is followed, Millward Lane should be upgraded to connect Riddiford and Rintoul streets. • Consider MRT stop locations at the same time as route determination, as potential stops are not only integral to the merit of route selection, but fundamental to transit-oriented development principles and urban regeneration.
Gazley Mitsubishi	<ul style="list-style-type: none"> • Very supportive of grade-separated options at Basin Reserve, Options 1, 2 and 3. • Beautifying the Basin Reserve and creating a hub is great. Supports the build of apartments in the area with commercial at ground level. • It's important to get it right and fix the issue, so Option 4 compromise is not favoured. The Mt Victoria tunnel needs two lanes to the eastern suburbs both ways.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> Walking and cycling through Hataitai tunnel would be more pleasant. Forecasting does not seem to take account of the uptake and huge demand for electric cars.
Gramercy Baker	<ul style="list-style-type: none"> Feedback that Berhampore is space-constrained and the key transport connections that pass through it and needs to be treated as such. Accommodating LRT will be difficult, and the infrastructure requirements will make the commercial area redundant. Supports priority for the safety and wellbeing of the community, recognising the needs of pedestrians and local school children and other active modes of transport. A strong preference is for a slow shared zone through Berhampore. BRT is preferred due to the reduced impacts on the infrastructure of the community centre and surrounding area. Comment that better control of traffic is needed through Berhampore, along with more effort to beautify the area and more support for businesses in the way of car parking, rubbish collection and the transportation of goods. Efforts must be made to reduce or compensate local businesses for the financial impact of the infrastructural changes and construction. Feedback that Gramercy Bakery will not support a significant loss of car parks, plans to remove right-hand turning intersections or a cycle lane through Berhampore village.
Heritage New Zealand Pouhere Taonga (HNZPT)	<ul style="list-style-type: none"> Options will potentially impact on heritage places and heritage values, including archaeology. At present HNZPT does not prefer any of the four options. The potential urban intensification around each route will have an impact on heritage and character areas, particularly in Newtown and Berhampore. If the existing heritage areas and character precincts are retained, the effects of heritage in terms of intensification should be acceptable. There are several road sections that are currently narrow and confined, and where it would be difficult to include additional transport options in the existing corridor. One is the northern-most section of Rintoul Street in Newtown, where the road is squeezed between Ashleigh Court (a Category 1 Historic Building), and a four-storey building under construction at 14–16 Rintoul Street. There are several key crunch points at the intersections of the MRT and roading network with heritage places. The Basin Reserve is a highly sensitive area, along with the Mt Victoria tunnel, Wellington Railway Station, the heritage buildings/areas along the quays, Canal Reserve along Kent/Cambridge terraces and heritage areas in Newtown. HNZPT reserves its opinion on which options may be most acceptable in terms of impacts on these places. The level of acceptability will come down to design details, including whether any heritage buildings or areas will be demolished or relocated, as well as impacts on the settings and surrounds of these and other heritage places.



Organisation	Summary of Written Submission
Historic Places Wellington (HPW)	<ul style="list-style-type: none"> Options involve transport, urban design, and development in large areas of established cultural heritage. These areas have recognised heritage status under the operative District Plan. They are a very large portion of Wellington’s cultural history. HPW supports their continued heritage status and proposes that transport and other urban development be sufficiently sensitive to and respectful of that heritage status. HPW opposes ‘facadism’ as an urban development mechanism that retains only partial fabric and form of those heritage structures. Such an approach nullifies the heritage value of the buildings, and results in poor remnants being retained that have no real heritage value. HPW also proposes the establishment of a heritage working group to provide early advice to Let’s Get Wellington Moving about heritage matters. Critical to all options is the treatment of the historic Basin Reserve. HPW has no preference for options without further information about specific effects on heritage matters.
Hutt City Council - Mayors Office	<ul style="list-style-type: none"> Transport issues must be solved at the regional level, and these options do not do that. The focus of the options is primarily on the public transport south of and connecting to central Wellington, neglecting the transport needs of the wider region. Options do not reduce the number of cars travelling from north of Wellington, perpetuating congestion in the Capital and ignoring the immediacy of addressing climate change. Hutt City Council does not support any of the options and suggests the scope should be broadened to include Lower Hutt and the wider region. Regional transport initiatives, such as the Cross Valley Connection and the Petone to Grenada Link, should have been included in the programme scope. Lower Hutt is one of the fastest-growing cities in New Zealand and that is putting a strain on transport infrastructure. There are factors from across the region that lead to choke points in the areas that Let’s Get Wellington Moving is targeting. Housing and infrastructure deficit is a regional issue and investing in transport infrastructure to support these challenges should be done regionally. Seaview is Wellington’s freight and industrial hub. More than 600 businesses service Wellington, the wider region and the rest of the country. But they face real challenges moving their goods and services around. The scope and timeframes for delivery ignore the immediacy required to tackle climate change.
Johnsonville Community Association	<ul style="list-style-type: none"> BRT is preferred along with fully grade-separated intersections at the Basin Reserve. Public transport commuters from Johnsonville and surrounding suburbs depend on bus services into and through the city centre. Limits on bus numbers on the Golden Mile will in future restrict buses entering the city centre from the north. Option 2 supports the second alternative bus route for buses carrying commuters from northern, western and eastern suburbs.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • There is no Wellington bus plan that outlines how all the future bus services will fit together to provide a reliable and effective public transport service to most of Wellington city. • There is no detail on the impact of each MRT option on the city's bus services that will carry most users through the city. Wellingtonians do not like being forced to change services during their journeys. • Option 1, 3 and 4 are not preferred because they do not support access to public transport for Wellingtonians living in northern and western suburbs. • LRT cannot provide a seamless north-south service for Wellington. Residents of Johnsonville travelling to the hospital will be forced to transfer under LRT options, but it may be possible to continue the successful #1 bus service from Churton Park to Island Bay under the BRT option. • The JCA is critical of the lack of detailed costings and benefit analysis for LRT and BRT.
<p>Light Rail Transit Association</p>	<ul style="list-style-type: none"> • Options do not address the issue of regional transport emissions, state highway congestion, urban liveability and urban sprawl. • Options stop at the edge of the central city. Favour an automated and integrated electric rail network, using tram-trains, to cover the whole of the Wellington region and beyond. • Feedback that LRT infrastructure must be compatible with the existing rail system to reduce costs and provide the maximum opportunity for future development. • Suggestion that the route for LRT must travel the western side of a pedestrianised Golden Mile to allow for faster and more convenient access for passengers. • Suggestion that the station at Wellington Railway Station should be located on the western side, by reconfiguring the existing platforms 1, 2 and 3. This would enable a direct entry to Lambton Quay via the existing bus terminal area. • Feedback that the existing Thorndon rail depot could be adapted to service and store LRT vehicles. Extra stabling space is more readily available elsewhere in the region, compared with a separate depot for LRT. • While a branch to Island Bay may be desirable eventually, the priority should be sustainable transport and decongestion, involving matching LRT to the reach of State Highway 1 to the airport and then Miramar. • The multi-modal Mt Albert tunnel should be reinstated as a viable option. This would provide the opportunity for housing intensification in southern Newtown and the upgrading of Newtown Park.
<p>Living Streets Aotearoa</p>	<ul style="list-style-type: none"> • Option 4 has the lowest carbon impact, achieves good outcomes, and can be added to in future. Action is needed on the Wellington bus priority plan so that an assessment of improvements to the eastern suburbs can be factored into the mass transit proposals. • LRT provides most capacity to move people and has the safest and most pleasant interactions with pedestrians.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • Preference is for a LRT route along the Golden Mile, with a second spine route along the quays for buses. This will help to solve bus congestion on the Golden Mile. • Many passenger destinations are along the Golden Mile and the walk catchment is bigger, providing more growth opportunity to a wider area. LRT is best for a pedestrian-friendly outcome. The route provides a predictable path and is accessible for all. • A quick journey along the Golden Mile is possible with all other vehicles removed. It works well with the focus on Wellington Railway Station to Wellington Regional Hospital route. • The Golden Mile is more protected from sea-level changes and other hazards, so is more resilient long term. • While vehicle speeds may be higher on the quays, people's journey times will be greater as they need to walk further. All stops should be located on the western side next to the footpath for ease of use and safety for passengers/pedestrians. A 400m spacing between high-quality stops should be the maximum. • Locating MRT along Taranaki Street may open new areas for development. Leave Kent and Cambridge Terraces for buses. • Improve liveability in the city centre by rerouting State Highway 1 and making Karo Drive through Arras Tunnel to the Basin Reserve two way.
Mt Victoria Historical Society	<ul style="list-style-type: none"> • Option 1 appears to impact least on southern Mt Victoria and may enhance the Basin Reserve. • There is support for a new diagonal tunnel for public transport to the south of the current tunnel if it cannot be converted to increase lanes for private vehicles. • With Option 4 fewer changes are needed at the Basin Reserve than the other options. However, there needs to be more detail about planned improvements at the Basin Reserve. • Support for a new tunnel for people walking and cycling, depending on how the heritage housing of Paterson Street is protected, as there is an opportunity to restore this area. • Both options should include expanding and enhancing the public pedestrian space in front of the Basin Reserve on Kent and Cambridge terraces. • No MRT plans should put the Canal Reserve land along Kent and Cambridge terraces at risk. This reserve land is designated as public recreation land and there is an opportunity to enhance this area to allow the public to easily reach it and walk the length of Kent and Cambridge terraces.
National Council of Women of New Zealand –	<ul style="list-style-type: none"> • Support Option 2 because of its connections and access to the eastern suburbs and the airport. However, it needs the addition of LRT. • Option 1 has the advantages of faster commutes to the city and the Wellington Railway Station, the removal of the roundabout at the Basin Reserve, and a new tunnel regarded as essential. • Concerns related to the cost of the projects relative to benefits and the length of time it will take to construct.



Organisation	Summary of Written Submission
Wellington Branch	
Newtown School - Te Kura o Ngā Puna Waiora	<ul style="list-style-type: none"> • Newtown School supports all measures to improve safety and encourage mode shift in travel to and from school away from private motor vehicles or towards climate-friendly options such as walking, cycling, and scooting. • Safety is a major concern. The school supports improved access to public transport and for this to be an affordable, reliable, and safe option for those coming to and leaving the school. The number of near misses and accidents with cars is unacceptably high. • Consider measures such as free transport for school pick-up and drop-off. • It urges lower speeds around schools as well as physical design decisions and treatments that support those who choose active transport options in our community and for children to be able to move around safely.
NZ Heavy Haulage Association	<ul style="list-style-type: none"> • The routes to and through central Wellington are limited due to the constrained nature. The Terrace tunnel and Mt Victoria tunnel on State Highway 1 are not legally permitted for use by oversize loads. • The routes used are often main arterial routes due to the carriageway width and height that is available. It is crucial to maintain these oversize freight routes in the design and construction of the MRT options. • Critical routes include waterfront quays to Wakefield Street to Cambridge Terrace; Cambridge to Adelaide; Adelaide to Newtown; Cobham Drive to Miramar / Airport; Adelaide Road from Berhampore to Island Bay. These must be maintained as an oversize route with 10m width and 5.5m in height in both directions. • The connection around the Basin Reserve seems the most difficult with the options presented. The western route around the Basin Reserve will have traffic in both directions, and there are some 90 degree turns where it will be a challenge to provide the required dimensions. • Dedicated transit lanes along the quays, Wakefield Street, Cambridge Terrace and Adelaide Road would remove one of the traffic lanes and possibly restrict the overall width in the remaining lanes. Infrastructure, such as passenger stops, would restrict the width. Overhead wires would be likely to restrict over-height loads. Power supplied through the rails is preferred. • Prefers Option 2 or Option 4. BRT would need less infrastructure with the rails installed in the ground and no overhead wires. Option 4 maintains access around the Basin Reserve.
Parents for Climate Aotearoa	<ul style="list-style-type: none"> • Option 4 provides a connected transport system that increases and prioritises walking, cycling and use of public transport. It also includes the smallest carbon footprint and will be able to be implemented faster, which is important because of the need for swift action to reduce carbon emissions.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • The needs of families, disabled and older people need to be highlighted, rather than those of commuters. For families, to decrease car dependency, the infrastructure must be put in place. • Option 2 doesn't encourage mode shift, seems to uphold the status quo and with increasing climate change impacts, it doesn't make sense to encourage increased housing in the east. • LRT should be shifted from the quays to the Golden Mile where the bulk of the people are. It is challenging enough to cross the road if you are a child, disabled or elderly person. It would be the most inclusive and accessible place and would encourage more people to use the service.
Progress Wellington	<ul style="list-style-type: none"> • Options from the city to the eastern suburbs and airport are not suitable for all users of the transport network, particularly for trucks, many of which must travel around Oriental Bay. • MRT via the quays will reduce space for vehicles, including trucks to the city, the eastern suburbs, the airport and Island Bay. • Option 2 is highlighted because of its affordable, flexible and seismically-resilient electric buses, which can move people faster along streamlined routes. Feedback that BRT could drive and stop on the left-hand side of the road to minimise impact on other traffic. • New Mt Victoria tunnel must be large enough to handle all trucks, except those carrying dangerous goods. The present tunnel should be refurbished to take pedestrians, cyclists, motor scooters and motor bikes. • More electric charging sites are needed around central Wellington and should be mandatory for all new public and private car parks. Introduce congestion charging on routes into Wellington, but no charges for public and private parking building owners. • The preferred option should detail all the flow-on consequences, including the impact on property owners, who may be impacted by parking changes. • Consider how to improve public transport to Karori and other suburbs. A one two-way tunnel in Karori is unlikely to meet future needs.
Te Herenga Waka - Victoria University of Wellington	<ul style="list-style-type: none"> • Supports the development of more student-friendly and affordable rental accommodation in the private market, and to make transport options to campuses quicker, more frequent services and more reliable. It is also important to maximise the mode shift to low-carbon transport options. • The University is a daily travel destination for 25,000 students and staff – 89% of our 22,500 students use sustainable transport options for commuting to and from campus (only 11% drive, or come as a passenger, in a private vehicle). Most – 77% – of our 3,100 staff also commute on foot, bike or by public transport. • Option 1, 3 and 4 offer the most housing development and greatest passenger capacity. The travel times are best for Option 3 and 4, and travel time to the airport is important for all staff and students.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> The Taranaki Street route in Option 4 brings the MRT slightly closer to our campuses, particularly Te Aro campus in Vivian Street. Carbon reduction from all four options, when factoring in embodied emissions from construction and the contribution of the other transport initiatives planned for the region, are very similar. Option 4 has the most cost-effective and the shortest construction time with less disruption to people, infrastructure, and nature.
Trams-Action	<ul style="list-style-type: none"> Trams-Action rejects all four options because they are so similar there is little genuine choice for the public to comment on. LRT is the logical MRT mode, which will cater to demands into the foreseeable future, but it must be 1067mm gauge to make it fully compatible with the existing heavy rail system. This will allow the use of the existing depot, stabling and maintenance facilities, and provide maximum flexibility for future region-wide expansion. Suggestion that LRT should not stop at the edge of the central city but be designed to run beyond the city on the existing heavy rail system for maximum use and to encourage people to use it. The Johnsonville line should be converted to LRT as an essential first step, extending to the other lines as heavy rail units are retired. Extending an existing system in small, manageable stages is much easier than starting a new line from scratch. The LRT route should go through the region of greatest pedestrian demand and away from car traffic. That is the Golden Mile, which is already destined to be pedestrianised. The route should run via Newtown and terminate in the eastern suburbs, the second largest area of existing demand after the north. It would serve the hospital and the airport. It opposes a new tunnel near the existing Mt Victoria tunnel. Regardless of the stated intentions behind a new tunnel, car traffic into town would increase. The worst place for a second tunnel is right next to the existing one. Efficient MRT serving the east will make a new Mt Victoria tunnel unnecessary. The long-term vision must be of a fully integrated continuous regional rail spine extending from the existing rails, through town and out the other side to Newtown and the east.
Transit Group	<ul style="list-style-type: none"> BRT will allow greater flexibility for suburban growth, provides future proofing, resilience, and value for money in public transport. Minor changes in road infrastructure will save costs and avoid the disruption caused by installing LRT. Option 2 is likely to be built before any LRT options are completed. Buses can continue to operate, while the infrastructure for BRT is constructed. BRT has the advantage of being able to move easily to a trackless tram option. Case studies show passengers experience a decline in frequency when LRT is chosen. With a greater number of people working from home, the requirement to shift a large number of passengers on one service is reduced. Frequency combined with passenger numbers is an important metric to consider. Resilience to earthquakes should be a key focus. The volume and frequency of train replacement services operated by buses should be considered as negative for Option 1, 3 and, 4. Transit sees any LRT option as being fragile.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • By the end of 2022, Route 1 will be fully electric during off peak, with a small number of diesel buses being used during the peak. With improvements to roading infrastructure to reduce travel times, Wellington City is a lot closer to a fully electrified MRT system. The electric buses can be charged within eight minutes and charging capacity can be doubled within six months. • Immediate improvements are required for bus priority lanes. Level boarding bus stops need to be introduced on the main routes. Future modes need to have both BRT and trackless trams so the infrastructure can be shared. • The airport service is the last priority for any of the four options due to low passenger demand.
Vic Labour	<ul style="list-style-type: none"> • MRT will play a vital role in inducing mode shift to meet carbon emissions 2050 targets. MRT is urgent and there should be a greater priority on quick delivery and short-term solutions until it is built. • Existing infrastructure and services induce car-dependence and gridlock. Public transport is unaffordable, unreliable and impractical for many, and active transport unattractive, unsafe and inaccessible. • LRT meets Wellington's needs because of greater capacity, expansion over time, and greater certainty for housing development. • The housing crisis must be a key consideration in transport planning. MRT will unlock significant housing density around stations both by triggering higher-density planning and by making housing in the area more attractive for both developers and potential residents. House prices will start to lower as people are able to move further away from the centre without concerns of a large commute. • A more modest active transport tunnel should be built to encourage mode shift instead of a new four-lane vehicle tunnel through Mt Victoria with a greater cost and impact on the area, and higher emissions. This four-lane tunnel could quickly be turned into a four-lane private vehicle tunnel, rather than having two lanes for public transport. • Option 4 involves fewer intensive works at the Basin Reserve. Taranaki Street is more central than Kent/Cambridge terraces, providing an accessible and frequent transport service for people to the most popular and employment-concentrated parts of the city. Any impact of MRT on the Te Aro Pā or the stream under Kent/Cambridge terraces should be shared publicly, and the programme partners should take a Te Tiriti o Waitangi partnership approach.
Victoria University of Wellington Students' Association	<ul style="list-style-type: none"> • Option 4 presents the best way to get Wellington moving for students, the climate and the future. This option will result in lower carbon emissions from construction and also as a result of people walking, biking and using public transport. • Option 4 is the most affordable and has the shortest construction time because it does not require Basin Reserve works. • LRT is the most cost-effective, climate-friendly and efficient way to improve the lives of commuters and make space for new housing and infrastructure. LRT can move nearly three times as many people as BRT and is future-focused. It should be extended to the northern and eastern suburbs.



Organisation	Summary of Written Submission
and Ngāi Taura	<ul style="list-style-type: none"> • Supports the option of a dedicated walking and cycling Mt Vic tunnel to increase the uptake of active transport. It does not support roading development that increases the use of cars. • Travel costs and time inhibit taura Māori (students) from being able to engage fully in their study along with work, whanau support, health and personal pursuits of mātauranga Māori. • An efficient and accessible LRT network will likely reduce both current travel times and costs that often see taura Māori opting for vehicle transport or off-campus study.
Property Council New Zealand	<ul style="list-style-type: none"> • A whole-of-system approach to reduce emissions is required, rather than focusing solely on private vehicle transport emissions. This would involve introducing EV charging stations, congestion charging, T2 and T3 transit lanes and a supply chain strategy. • Option 2 is a more flexible and affordable option with potentially less maximum disruption to Wellington. It is the only option with a dedicated lane public transport lane to Wellington Airport. • More thought needs to be given to the future role of private vehicles (e.g., a move towards EVs and hybrids), the introduction of congestion charging and alternative transport routes in and out of the city. Transmission Gully highway will encourage greater private vehicle use into the city centre. • Future public transport options are decades away, short-term over-reliance on private vehicle use will still occur. Introducing T2 or T3 transport lanes would encourage carpooling and other more efficient private vehicle use. Provide opportunities for EV charging stations and car parks within the city. A car park levy would have adverse flow-on effects to the Wellington economy, with more people choosing to work from home and reduced income for businesses. • There is lack of detail on how the proposals will affect Wellington's landscape and housing options, and how to best use current and future connections for freight movement. The consultation documents lack a proposed supply chain strategy for the continued movement of freight (i.e., from the airport to the city and north of the city). • Wellington City Council needs to re-evaluate the infrastructure required for housing density and how to fairly finance the project.
Retail NZ	<ul style="list-style-type: none"> • BRT provides a flexible solution that will use existing public transport infrastructure and minimise the cost and time associated with implementing LRT. This option will cause the least disruption and provide better support for freight from the airport via the new Mt Vic tunnel. This is the only option that provides a dedicated transport lane to and from Wellington Airport. • LRT is expensive and impractical for Wellington. Seismic activity reduces the viability of this option and the cost is of significant concern to retailers given the expectation that rates will need rise to accommodate this cost.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> Protecting supply chains is a key consideration. Private vehicle access to the city centre is impacted by the loss of car parks and removal of loading zones proposed in the Golden Mile Improvements. Retailers are facing increasing barriers to accessing freight. Provide clarity on interaction between different Let's Get Wellington Moving transport plans for Wellington City and the compounding economic impact for retailers. Would like more information on the plan for managing the influx in private vehicles to the city because of Transmission Gully and future population growth. Review stance on parking levy and congestion rates. The levy will result in more people working from home (less spending) and another cost for businesses providing employee parking. Removing private vehicles from the city puts initiatives such as congestion charging at risk of being redundant. Complete an economic Impact report on the disruption associated with construction/development of the project and loss of car parks on businesses, residents, and commercial property. Pause the Golden Mile project until bigger projects like MRT are implemented and impact on retailers assessed.
Save the Basin Campaign	<ul style="list-style-type: none"> Option 4 is preferred as it would result in the least changes to the Basin Reserve precinct. It has the lowest overall emissions, can be consented and constructed relatively quickly, is the most affordable, and has the potential to enable more walking, cycling and public transport in and near the Basin. More detail is need about proposed extra lanes, walking and cycling access changes and the design and placement of the proposed new walking and cycling tunnel. A tunnel should include a safe, separated footpath for pedestrians and a safe, separate cycleway for cyclists and users of micro mobility devices. Options 1, 2 and 3 would all result in substantial changes near the Basin Reserve and more detail is needed on the implications. Does not support further expenditure on state highway infrastructure for private cars. The location of the western end of the new diagonal tunnel could have substantial effects on the Basin Reserve precinct and nearby schools, substantial embedded emissions, and the effects on the Town Belt may be substantial. Intensification of the eastern suburbs under Option 2 seems unwise given sea-level rise, liquefaction and other resilience issues. Whichever option is chosen, there will be implications for Wellington's mana whenua and post-colonial heritage. Minimising these effects should be a high priority for the development of the preferred option.
Wellington Airport	<ul style="list-style-type: none"> Support for Option 2, which provides wider benefits for BRT, particularly through to the airport, and could future-proof the corridor for LRT later. This option would be enhanced by allowing taxis and rideshare to use BRT lanes, particularly at the tunnel pinch points.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • Transport hubs at the airport need to be flexible to allow for conversion to LRT in the future. • Convenient and reliable transport to the airport is also vital for private vehicles, taxis and rideshare as the vehicle fleet is increasingly decarbonised. Public transport will never suit all travellers, particularly those north of the city centre or families travelling with luggage and children. • Heavy vehicles will be affected by increased congestion. Many are unable to use the Mt Victoria tunnel, and any new tunnel proposals must take this into account. The impact on freight needs to be considered in more detail. • Travel times for general traffic to the airport will be more unreliable and take far longer. The proposed options do not address worsening congestion. Other impacts on motorists include an assumed 33 percent increase in vehicle operation costs, 100 percent increase in car parking costs, the suggestion of congestion charges for CBD travel at both peak and off-peak times, and managed road space. • Additional vehicle lanes through the Terrace and Mt Victoria tunnels are critical enablers of MRT and carbon reduction and should be reinstated as immediate priorities. • The proposed Basin Reserve and Arras Tunnel improvements are essential and should proceed now. • The proposed timing for MRT is much too late and much too long.
Wellington City Council Environmental Reference Group	<ul style="list-style-type: none"> • MRT is an essential part of mode shift in Wellington to achieve carbon-reduction goals. To encourage mode shift, public and active transport must be more appealing than private vehicles. • The higher capacity of LRT makes it a more future-proofed option. It provides certainty to developers, communities and businesses. • Do not support the diagonal tunnel or State Highway 1 improvements at the Basin Reserve. Private vehicle capacity must be reduced in any new transport decisions. The saved costs should be used for improving active and public transport connections to the eastern suburbs. • Option 4 promotes mode shift by improving public transport at a faster rate than roads designed for private vehicle use. It has the best outcomes for reducing CO2 emissions from transport as well as the fewest embodied emissions. • MRT must have efficient, easy and accessible connections with the northern railway system and the Golden Mile. • The route should allow for future daylighting of rivers, e.g. in the valley through Berhampore and Island Bay. • Profits from development along the MRT should be partially diverted to improving public transit in Wellington, e.g. towards a second MRT line. • The timeframe needs to be improved. Wellington has consistently shown that it wants LRT so consultation times can be reduced. Interim solutions, such as bus lanes, should be accelerated to allow faster mode shift.



Organisation	Summary of Written Submission
Wellington City Youth Council	<ul style="list-style-type: none"> • LRT it is preferred to ensure long-term capacity, housing development, mode shift and emissions reductions. • A new or repurposed tunnel for active transport through Mt Victoria would unlock active transport between central and eastern Wellington. • The net effect on emissions of a new four-lane vehicle tunnel would depend on the extent of emissions produced or saved in the short and long term. It is unclear when the Hataitai bus tunnel is expected to reach capacity, how much additional housing would be expected or what alternative means of improving bus provision could be pursued. • It is unclear whether the MRT route and Basin Reserve transformation envisaged under Options 1 to 3, or the alternative under Option 4, best meets the need for sustainable mode shift and emissions reduction. • Option 4 is preferred because it is more central and likely to be convenient. However, it is not clear whether Basin Reserve transformation could occur alongside the more central route. • Changes at the Basin Reserve should consider the expected effect on mode shift, emissions, any delay this would cause to a start on MRT and how much active transport and safety could be improved under different options. • The timeline for MRT should be reduced by shortening the business case and design stages. We also recommend careful consideration of whether a new four-lane Mt Vic Tunnel and the Basin Reserve transformation are justified given any time delays these could cause. • More details are needed on expected housing, mode shift and emissions outcomes from different components of the MRT options to make contrasts more transparent. • The potential cultural implications of constructing MRT near the Te Aro Pā and/or along Kent/Cambridge terraces should be considered.
Wellington Civic Trust	<ul style="list-style-type: none"> • The proposals do not include options to improve and integrate other key routes, such as from Karori and the northern and western suburbs. To achieve an integrated plan, the needs of the various suburbs and how best to serve them should be included. • Public transport corridors need to be identified and protected, and where necessary designated, immediately. Otherwise, development may make future public transport systems more difficult and expensive to implement. • An immediate start must be made to reach the 2030 carbon reduction targets. A range of pragmatic options needs to be in place within a much shorter timeframe. • Major projects, such as the proposed the Arras tunnel extension at the Basin Reserve for Options 1, 2 and 3, should be put on hold (other than the protection of land needed). The investment for these projects can then be spent to fast-track options in the next three to five years. Fast-track options could include implementing as many bus priority lanes as possible in the next two years, extending BRT to Miramar, encouraging car-sharing schemes, having transport on demand options in place to take people to main transport routes and adjacent suburbs.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • Introduce integration in payment, convenient transfer between modes and efficient scheduling as early as possible, based on existing systems but transferring over time to the modified and improved systems.
Wellington Chamber of Commerce	<ul style="list-style-type: none"> • The transport solutions focus on Wellington, but a true future-focused transport solution must also include impacts on regional transport. People in the Wairarapa or Upper Hutt fear that they will not easily be able to do business in Wellington city when parking is reduced with no associated transport solutions for years. • Average journey times between the airport and city centre have increased. Let's Get Wellington Moving's projections show journey times will continue to increase under all scenarios. State Highway 1 improvements are required at the Terrace and Mt Victoria tunnels pinch points. • There is no true economic impact analysis on business, and consequently no real analysis or true calculation of the costs of this project. More information is needed on the impact on businesses, community organisations and residential and commercial property owners of disruption caused by development and the reduction of car parks; the number of car parks that will be removed; and the increase in the number of private vehicles as a result of Transmission Gully. • An ineffective approach to carbon-reduction will drive up costs for businesses and hamper economic recovery. Vehicle fleet efficiency and electrification will have a greater impact on carbon output than any of the proposals. • Bus rapid transit is the only option that has a dedicated public transport lane to the airport. Option 2 will also reduce freight traffic around Oriental Bay, provided that the new tunnel can accommodate freight movement. This option could future-proof the corridor for LRT later. Taxis and rideshare should be able to use BRT lanes. Option 2 also includes an additional four-lane tunnel through Mt Victoria. If any tunnel were to be converted to walking and cycling, the existing bus tunnel is more appropriate.
Wellington NZ	<ul style="list-style-type: none"> • Option 2 offers the best solution for Wellington's residents, businesses and visitors due to the connectivity it offers across the city and the potential to further enhance this in future. • BRT moves fewer passengers, but that high frequency is more important to encouraging mode-shift. • Population increases are expected in the eastern and western growth corridors as well as the southern part of Wellington. Options which focus solely on residential outcomes in the southern growth area to Island Bay will have less benefits than those that encompass broader regional connectivity. • Strongly support a direct connection between the airport and the railway station to connect the region. The final route should have one mode of transport to increase the efficiency for visitors and residents, be aligned with the major attractions/event centres and with integrated ticketing and easy to use for out-of-towners. • The preferred solution should include facilities for bikes/buggies/wheelchairs/scooters to improve accessibility and mode-shift.



Organisation	Summary of Written Submission
	<ul style="list-style-type: none"> • Compensation for businesses negatively impacted by works and a decline in business, needs to be factored into project delivery. Temporarily relocating some businesses should be part of project planning, and work needs to be carried out in a way that minimises disruption, both on businesses and on major events.
<p>Young Greens Victoria University</p>	<ul style="list-style-type: none"> • Option 4 is most climate-friendly and promotes the most mode shift. • Support LRT for its higher capacity, speed and convenience. A new type of service can encourage those who do not have confidence in the buses to use it. • The solution to congestion at the Basin Reserve is not more roadworks, which will cause larger delays, but to promote mode shift away from cars to better public and active transport options. • Transport is contributing to high emissions and want to see MRT help to lower this. • Having LRT along Tasman, Tory and Taranaki streets is a great opportunity for more students at Massey Wellington to use public transport, and for those living near Massey to travel into the city centre. Walkable catchment areas around the LRT may contribute to more housing in Mt Cook, so students can live near their place of study. • In future, LRT should be extended north to Johnsonville. • A walking/cycling only tunnel through the Mt Victoria may feel unsafe for many people. Attention should be given to how to improve safety, e.g., a public transport lane or security cameras. • MRT as outlined will take too long and needs to happen faster.



5 Next Steps

The public feedback is analysed and incorporated into the draft IBC which will recommend a preferred option.

Once the IBC has been endorsed by the Let's Get Wellington Moving programme partners, and the outcome shared with the community, development of the DBC can start. This will involve detailed analysis of the costs, risks and benefits of the preferred option and further stakeholder and public consultation.

5.1 Recommendations for Future Engagement

This consultation project uncovered valuable insights as to the imperatives for future engagement.

The overarching vision for the future of Wellington's transport system and what that means for Wellingtonians needs to be consistently reiterated – particularly around reducing our reliance on, and use of, private motor vehicles.

We need to make the vision for MRT relatable. Create multiple scenarios for different types of users and suggest what the proposed transport solutions would mean for them. Build a picture that makes sense to the family with multiple sport and school pick-ups and drop-offs, students looking for the cheapest way to get around, airport commuters, people living further afield rather than in the city, and so forth.

Provide more information and evidence as to why some things are in the plan (MRT route to Island Bay) and why some things are not (four lanes to the planes / LRT to the airport) so that people have enough context to feel confident to give feedback.

Whichever option is decided on, we need to clearly communicate the rationale in terms of investment level and how the timeline could be expedited.





Appendix



Appendix 1 – Snapshots from the interactive consultation website






 Kei te kaha mātou ki te mahi me ō mātou hapori katoa. Ki te hiahia koe i ēnei mōhiohio i whakamāoritia ki te reo Māori, whakapā mai i konei: info@lgwm.nz 

Together, we're building a city, not just a transport system.

Mā tātau tāhi e waihanga ake nei he taone, ehara i te mea he pūnaha kawē tangata kau.

Let's Get Wellington Moving is bringing together central and local government movers and shakers, transport and urban design experts, mana whenua, and passionate people like you. Our goal is to build a world-class capital to be proud of, where more people can get around more easily and reliably, with streets that are beautiful and safe so that new housing and business will flourish. We won't need to use our cars as often so will cut back on carbon emissions. This is about building a better future for the city, the region and the planet we love.





 **The future of Wellington transport**
Ko te anamata Kawe
Tāngata o Te
Whanganui-a-Tara

We've worked with experts from Wellington City Council, Greater Wellington Regional Council and Waka Kotahi NZ Transport Agency to come up with the best four options, taking on board what locals care about. We are doing this work with the support of our mana whenua partners Taranaki Whānui and Ngāti Toa.

You have four options, with a mix of different transport modes and routes, that you can provide feedback on.





How the engagement process works
Te āhukatanga whakahaere o te pūnaha whakawhiti ngātahitanga

By moving more people with fewer vehicles, we're helping create a better connected, more vibrant and resilient city and region. To do this, we need you to tell us how you want to move through the city, and the routes you want.

[Find out more about the project timeline →](#)

2018-2020
This is a continuation of the work we started in 2018.


WE'RE HERE **Now – 10th December**
Your feedback will be used to inform which of the four options should go through to the next stage.

2022-2024
We will update you on the outcome of this engagement in early 2022, and come back to you for your thoughts on a more detailed proposal.

2024-2027
Based on your feedback, we'll finalise the designs and plan for construction.

2028
Construction begins! Depending on the final decision, this will take 8-15 years.






Say hello to a new Wellington

Mihi mai ki te Te Whanganui-a-Tara hōu


We'll be moving more people around our city, connecting with the rest of the region and changing what Wellington looks like. Imagine a cleaner, greener, dynamic city. Picture a world-class capital flourishing with:




MORE HOUSING CHOICE IN THE CITY AND THE SUBURBS




NATIVE PLANTINGS AND GREEN SPACES FOR PEOPLE TO GATHER




BEAUTIFUL BOULEVARDS



THRIVING BUSINESSES




SAFE PATHS TO WALK AND CYCLE ON



A BETTER QUALITY OF LIVING



Our 'New World of Wellington' is a representation of the 'New World'.



It's all possible.

This transport project is just one of many ways we can enable transformation of our city. You can also have your say about the [Wellington City Council Draft District Plan](#) and the [Bike Network Plan](#).



Provide us with feedback on the Wellington you love

This is a once in a lifetime opportunity to help shape our region and redesign the city we live in. We want you to make the best decision possible, so take the time to read through the information before you provide your feedback.

What you need to know


Possible types of mass rapid transit

Possible routes for mass rapid transit

The Basin Reserve

Mt Victoria Tunnel

[Skip to consultations](#) →



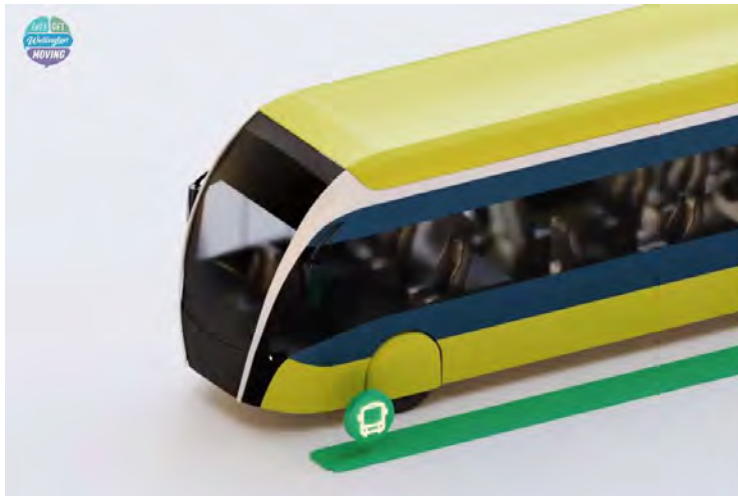


Possible types of mass rapid transit

We know that internationally, state-of-the-art mass rapid transit systems encourage cities and suburbs to flourish and grow.

We've researched which kind of transport is right for the people using it, the climate crisis, and best meets Wellington's challenging geography and geology.

All options include modern electric vehicles with lots of space and a smoother ride.



Bus Rapid Transit Light Rail

Hello Bus Rapid Transit

Bus Rapid Transit vehicles are spacious elongated buses. They don't move as many people as light rail but are more flexible because they don't need tracks.

- Moves up to 110 people comfortably and frequently
- Level boarding and priority seating for people with mobility challenges
- Supports new housing on the Island Bay and eastern routes
- Quieter than light rail
- Could be extended to other suburbs in the future
- Shorter construction time than light rail
- Quicker recovery time from a natural disaster

[Explore Light Rail](#)



Bus Rapid Transit **Light Rail**

Hello Light Rail

The light rail system can move the most people - up to 300 people per vehicle. Light rail runs on steel tracks so they take longer to install.

- Moves up to 300 people comfortably and frequently
- Level boarding and priority seating for people with mobility challenges
- Enables the most housing along the Island Bay route
- Future proofs the corridor as can provide extra capacity beyond 30 years
- Can be noisier outside the vehicle due to steel wheels
- Challenging to extend to other suburbs in the future
- Longer recovery time after a natural disaster

[Explore Bus Rapid Transit](#)



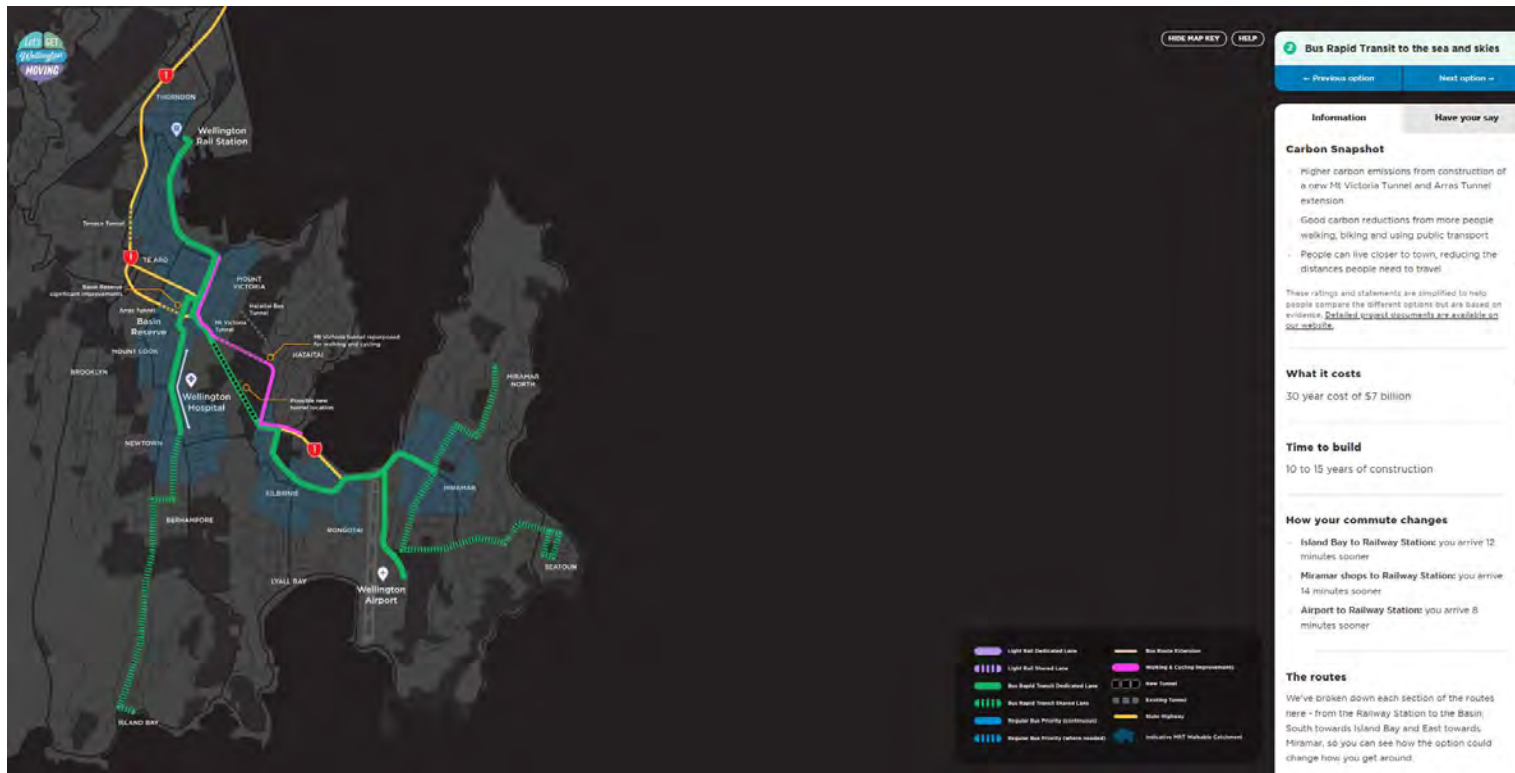


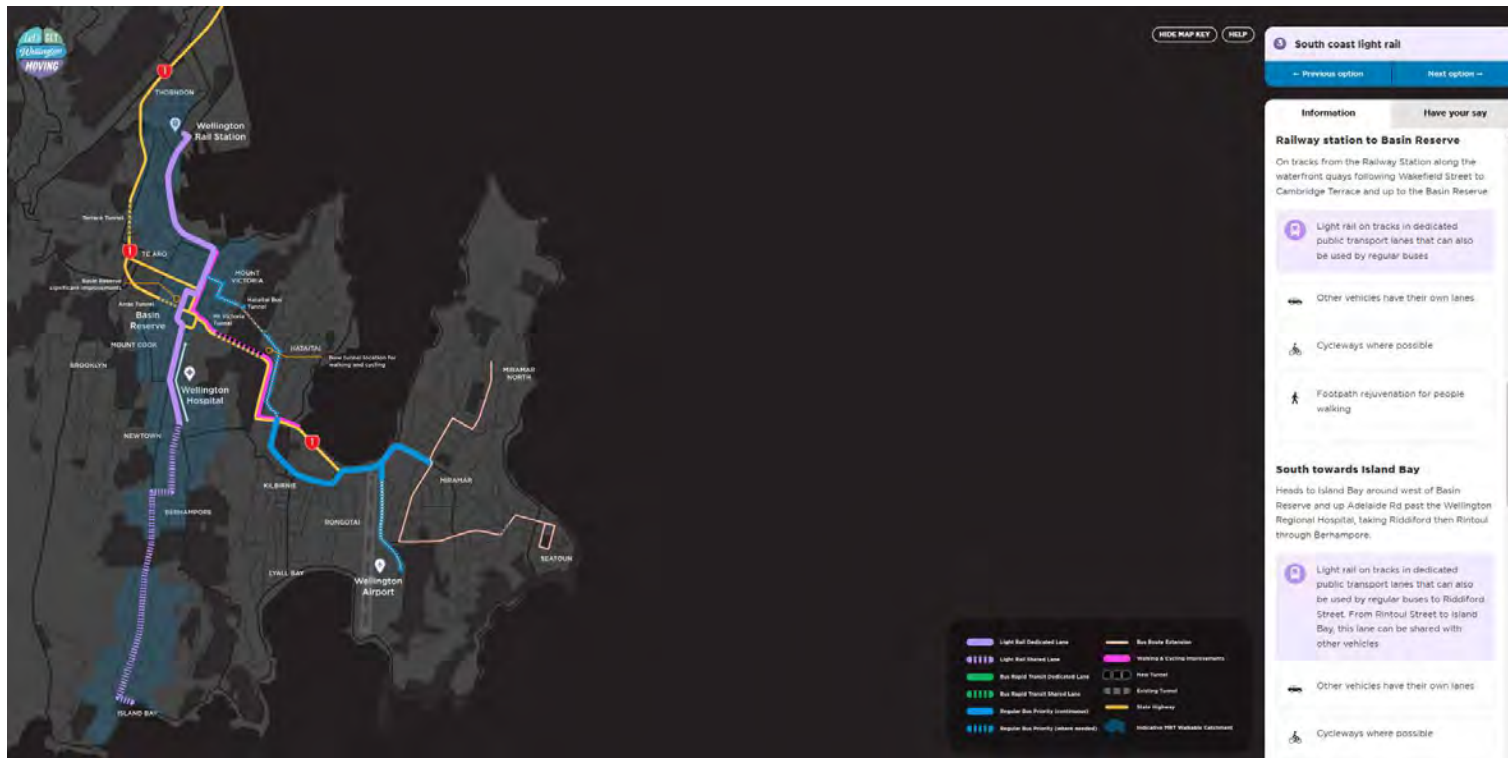


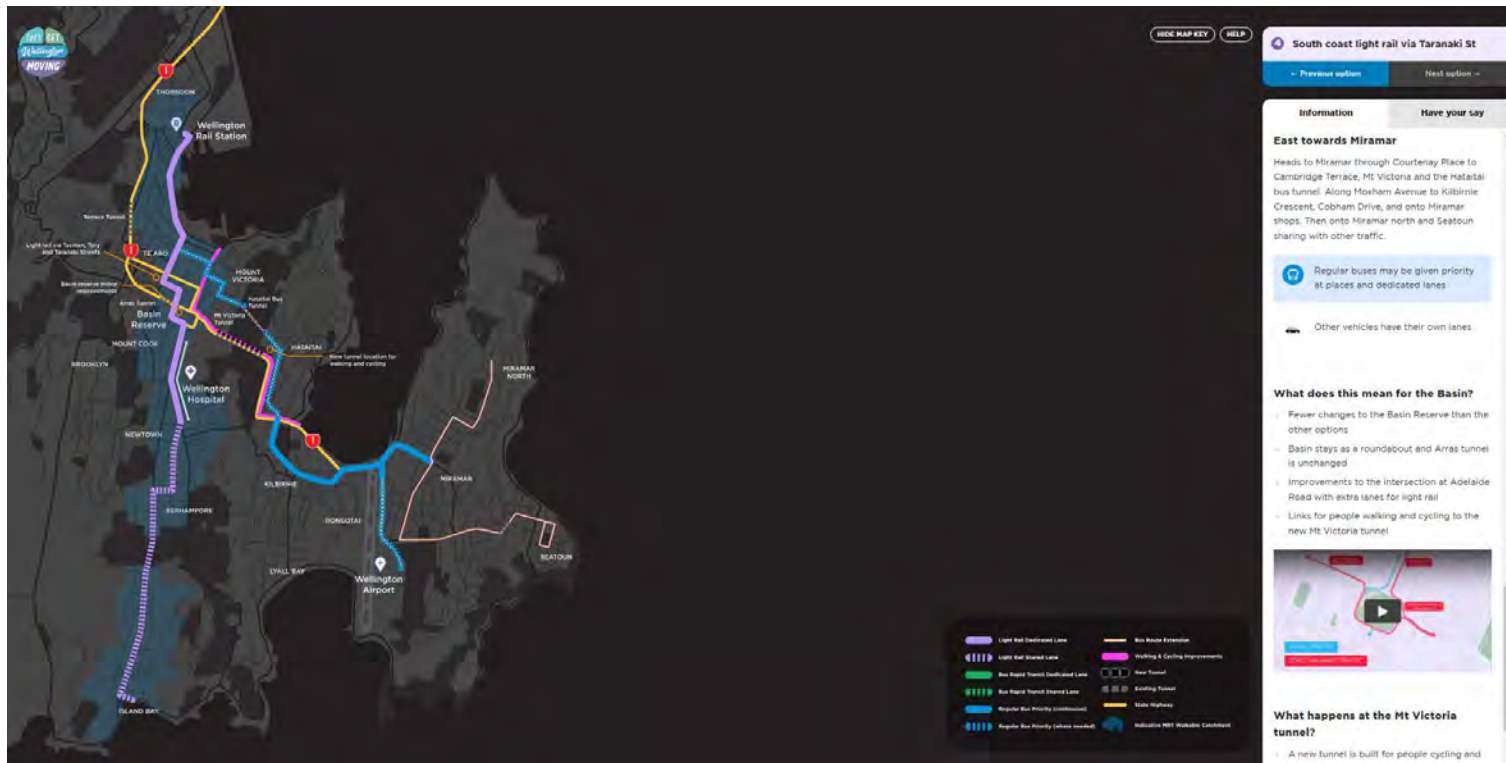


The screenshot displays a digital engagement interface for the 'South coast light rail + new public transport tunnel' project. On the left, a map of Wellington shows the proposed route in various colors (purple, pink, blue, orange) connecting the city center to the coast. Key locations marked include Wellington Rail Station, Basin Reserve, Mt Victoria, and the Wellington Airport. The right-hand panel provides details for the selected option:

- Information:** South coast light rail + new public transport tunnel. Includes a 'Have your say' section with a photo of a light rail vehicle and a 'Previous option' / 'Next option' navigation.
- Ratings:**
 - Light Rail: 4/5 stars
 - Regular bus priority: 3/5 stars
- Option Snapshot:**
 - Light rail from Railway Station to Island Bay
 - Challenging to extend to other suburbs in the future
 - Basin Reserve is beautified and not a roundabout
 - Aras tunnel is made longer to make getting around the Basin easier
 - New tunnel built at Mt Victoria
 - Regular buses take priority to Miramar and the airport
 - New walking and cycling paths









Appendix 2 – Consultation video

<https://vimeo.com/640951055>



Attachment 3 to Report 22.227

Appendix 3 – Brochure and feedback form



HELLO to the future of Wellington
Mihī mai ki te anamata o Te Whanganui ā Tara

As Wellington's population grows, we'll need to build more homes that we can afford and are closer to where we need to be. And we need to get more people powered by New Zealand's highly renewable electricity that can move more of us around Wellington more quickly and reliably.

Transforming how we get around
Te pānui hōwhiri a te āhau hōwhiri hōwhiri
Most people travel 2000+ times a year around town. That's a lot of trips. We can make it easier to get around the city. Apart from light rail, other ways to get around town are to use a bus, a bicycle, or a car. There are a lot of ways to get around town. We're looking for ideas to make it easier to get around town.



Transforming where we go
We're also looking for ideas to make it easier to get around town. We're looking for ideas to make it easier to get around town. We're looking for ideas to make it easier to get around town.



The Basin Reserve and Mt Victoria
The Basin Reserve and Mt Victoria are critical parts of our transport network. We're looking for ideas to make it easier to get around town. We're looking for ideas to make it easier to get around town.



Changing the way Wellington travels
We want to encourage Wellingtonians to consider other ways of getting around, so we're working with schools and workplaces to provide exciting new options. Ideas include bringing in new ways of getting around, like bicycles, scooters, and more. We're looking for ideas to make it easier to get around town.



Option 1 South coast light rail
Having the most people possible to Island Bay, beautifying the Basin Reserves, supporting the most housing and urban development, and bettering our streets for everyone.



Option 2 Bus Rapid Transit to the sea and skies
Moving more people out to Island Bay, the eastern suburbs and the airport on longer buses, but with less housing and urban development than option 1.

Appendix 4 – Newsletters issued during the consultation period

2 November 2021 – Hello to the future of getting around



Artistic impression for illustrative purposes only.

We want your feedback

We've made it easy for you to tell us what you think about the options we're proposing. Here's how to get involved:

Engagement survey: open now

Head over to our [website](#) and complete the online survey. You'll be asked a series of short questions where you can tell us what you like or dislike about the options we've put forward.

Open Days and Pop Ups

For the next six weeks, we'll be holding open days and popping up all over the city and the suburbs so you can tell us what you think in person. Take a look at our [events page](#) to see where we'll be.

*Events will be held in compliance with the New Zealand government's COVID-19 restriction guidelines.

Webinars

Can't make it to one of our pop ups or open days? Chat to our team at one of our four [online webinars](#).

[Find out more](#)





5 November 2021 - Ask us a question - mass rapid transit webinars

HELLO

Have a korero with the mass rapid transit team

Have a question about one of the mass rapid transit options? Want to know more what the proposed changes could mean for your commute? Join us at one of our online webinars and have your questions answered.

Webinar: Light Rail and Bus Rapid Transit

A deep dive about the proposed mass rapid transit vehicles, light rail and bus rapid transit, by our experts.

- When: Tuesday 9 Nov 6pm – 7.30pm
- Where: online

Register for this webinar

Webinar: Hello to Wellington's Transport Future

A general overview of the mass rapid transit options we've proposed, by our experts.

- When: Thursday 11 Nov 6pm – 7.30pm
- Where: online
- Registration is not required

Join the conversation

Webinar: Basin Reserve and Mt Vic Tunnels

A deep dive about the proposed changes to Basin Reserve and Mt Vic tunnels, by our experts.

- When: Thursday 18 Nov 6pm – 7.30pm
- Where: online

Register for this webinar

We will be recording the online webinars and making the recordings available on our website.

You can also come along to one of our open days or pop up events happening throughout the city. Check out the event schedule [here](#).

If you have any questions, drop us a line at info@lgwm.nz

WAKA KOTAHU Greater Wellington Absolutely Positively Wellington City Council

12 November 2021 - What's the difference between light rail and bus rapid transit?

HELLO

Get to know your mass rapid transit modes

We know from cities like ours overseas that mass rapid transit encourages economic growth, more housing and urban development, and helps suburbs flourish and grow. It transforms how people live their lives.

Find out more about the proposed mass rapid transit vehicles from our team of experts.

Light rail or Bus Rapid Transit?

Mass rapid transit moves people around more efficiently than ever before. We're considering two types of state-of-the-art public transport vehicles that can change the way we get around the city.

Both modes are modern electric vehicles with lots of space and a smoother ride.


Artful impression for illustrative purposes only

Light Rail

The light rail system can move the most people - up to 300 people per vehicle. Light rail runs on steel tracks so they take longer to install.

- Moves up to 300 people comfortably and frequently
- Level boarding and priority seating for people with mobility challenges
- Enables the most housing along the Island Bay route
- Future proof: the corridor as can provide extra capacity beyond 30 years
- Can be noisier outside the vehicle due to steel wheels
- Challenging to extend to other suburbs in the future
- Longer recovery time after a natural disaster


HEARD to Wellington's transport future



CHRIS MENE
FACILITATOR

Let's GET Wellington MOVING

Got it. I'm ready to have my say.



We want your feedback

We've made it easy for you to tell us what you think about the options we're proposing. Here's how to get involved:


Engagement survey: open now
 Head over to our [website](#) and complete the online survey. You'll be asked a series of short questions where you can tell us what you like or dislike about the options we've put forward.

Open Days and Pop Ups
 We're holding open days and popping up all over the city and the suburbs so you can tell us what you think in person. Take a look at our [events page](#) to see where we'll be.

**Events will be held in compliance with the New Zealand government's COVID-19 restriction guidelines.*

Webinars
 Can't make it to one of our pop ups or open days? Chat to our team at one of our [online webinars](#).

Ready to have your say?




Artistic impression for illustrative purposes only.

Bus Rapid Transit

Bus Rapid Transit vehicles are spacious elongated buses. They don't move as many people as light rail but are more flexible because they don't need tracks.

- Moves up to 110 people comfortably and frequently
- Level boarding and priority seating for people with mobility challenges
- Supports new housing on the Island Bay and eastern routes
- Quieter than light rail
- Could be extended to other suburbs in the future
- Shorter construction time than light rail
- Quicker recovery time from a natural disaster

Tell us what you think



16 November 2021 - Final call on Basin Reserve and Mt Vic webinar registrations

Let's GET Wellington MOVING

HELLO

Join us for our final webinar on proposed changes to Basin Reserve and Mt Vic tunnel

A deep dive about what the proposed mass rapid transit plans could mean for the Basin Reserve and Mt Vic tunnels, led by our experts.

- When: Thursday 18 Nov 6pm – 7.30pm
- Where: online - registration required

[Register for this webinar](#)

We will be recording the online webinars and making the recordings available on our website.

You can also come along to one of our open days or pop up events happening throughout the city. Check out the event schedule [here](#).

If you have any questions, drop us a line at info@lgwm.nz

WAKA KOTAHU
Greater Wellington
Absolutely Positively Wellington City Council

18 November 2021 - Hello to more housing




HELLO

Say hello to a new Wellington

Over the next 30 years, 50,000 to 80,000 more people will call Wellington home. We need to start changing now to fix existing transport problems and support our city's growing population.

This is our chance to future-proof the city we love for future generations by turning Wellington into a zero carbon emission capital with more housing, greener streets, and a higher quality of life for all.



We want your feedback

We've made it easy for you to tell us what you think about the options we're proposing. Here's how to get involved:

Engagement survey: open now
 Head over to our [website](#) and complete the online survey. You'll be asked a series of short questions where you can tell us what you like or dislike about the options we've put forward.

Open Days and Pop Ups
 We're holding open days and popping up all over the city and the suburbs so you can tell us what you think in person. Join us at the Newtown [Salvation Centre](#) this Saturday from 11am to 3pm or take a look at our [events page](#) to see where else we'll be.

**Events will be held in compliance with the New Zealand government's COVID-19 restriction guidelines.*

Webinars
 Can't make it to one of our pop ups or open days? Chat to our team at the online [webinar](#) on the Basin Reserve and Mt Vic Tunnel this evening at 6pm or check out one of our earlier [online webinars](#).

[Find out more](#)



Artistic impression for illustrative purposes only.

We're building a city, not just a transport system

We know from cities like ours overseas that [mass rapid transit](#) encourages more housing and urban development at a lower environmental footprint, and helps suburbs flourish and grow. It transforms how people live their lives.

Street renewal from the Railway Station to Island Bay, to Miremar and Seaton will improve footpaths, cycle facilities, and urban design. By implementing a forward-thinking mass rapid transit system, we have the opportunity to replace pipes, improve intersections, enable more housing to be built and make our streets cleaner and greener. More housing close to mass rapid transit will ease pressure on the transport system, reduce emissions, encourage more physical activity and improves health and wellbeing.

Head over to our [website](#) for more information about all of the options, and to have your say.

[Find out more](#)




25 November 2021 - Hello to a better Basin Reserve an extra Mt Victoria tunnel

Let's GET Wellington MOVING

HELLO

Together, we'll breeze through the Basin

Improvements at the Basin Reserve and an extra Mt Victoria Tunnel are two of the proposed changes to help transform Wellington with a mass rapid transit system.




A better Basin Reserve

Our plans all include improvements at the Basin Reserve - a critical point in our transport network.

In [options 1, 2 and 3](#), local traffic would be physically separated from northbound state highway traffic (as illustrated above). The Basin Reserve would no longer be a busy roundabout but would be completely transformed with new walking and cycling paths to make it easier for everyone to breeze around, through or beside the Basin.

In [option 4](#), the Basin would remain a roundabout. Improvements would be made to the layout such as extra lanes, a new intersection at Adelaide Road, and ways for people walking and cycling to link up with the extra Mt Victoria Tunnel.

Find out more and have your say



An extra Mt Victoria tunnel

All four options will result in an extra tunnel at Mt Victoria with the existing tunnel being completely refurbished.

This will mean we can keep vehicle traffic separate from people walking and cycling, and add new dedicated lanes for public transport, making daily commutes safer and more enjoyable.

Find out more and have your say

We want your feedback




We've made it easy for you to tell us what you think about the options we're proposing. Here's how to get involved:

Engagement survey: open now
Head over to our [website](#) and complete the online survey. You'll be asked a series of short questions where you can tell us what you like or dislike about the options we've put forward.

Open Days and Pop Ups
We're holding our final Open Day this Saturday, at Prefab Hall, 14 Jessie St, Te Aro at 11am - 3pm.

**Events will be held in compliance with the New Zealand government's COVID-19 restriction guidelines.*

Ready to have your say?



7 December 2021 - Time is running out to have your say

Let's GET Wellington MOVING

HELLO

Time's running out to have your say!

You've got until 5pm Friday 10 December to let us know what you think about the options we're proposing to future-proof the city you love.

What you think matters to us. It only takes a few minutes to give us your feedback.

[Have your say now](#)

WAKA KOTAHU
Greater Wellington
Absolutely Positively Wellington City Council

10 December 2021 - Thank you for having your say

Let's GET Wellington MOVING

HELLO

Thanks for sharing your feedback with us

Consultation has closed

We'll now go through all the feedback and pull together an Engagement Report to share what people thought of the options we've presented. We'll be in touch to make this consultation report available to you in the coming months.

Your feedback will help us decide which option moves forward for more detailed investigation.

This isn't the only time we'd be asking you what you think. There will also be further opportunities to have your say on more detailed proposals in the next stage. Check out the project timeline [here](#).



Appendix 5 – Media Release issued on Monday, 1 November 2021

Help us decide on Wellington City's future

Media Releases / 01 November 2021

Over six weeks from 2 November to 10 December Let's Get Wellington Moving is making it easy for people to have their say on four options to enable the transformation of Wellington, alongside Wellington City Council's Our City Tomorrow engagements on proposed District Plan and bike network changes.

"This is a once-in-a-lifetime opportunity to help shape our region and redesign the city we live in. We want to make the best decisions possible, so we encourage everyone to provide feedback" say Let's Get Wellington Moving acting programme director David Dunlop.

More information about the Let's Get Wellington Moving public engagement will be available at lgwm.nz/hello.

Transport Minister Michael Wood says "Our Government is committed to Let's Get Wellington Moving and helping Wellington achieve its potential – part of that vision is a giving the city great public transport and walking and cycling options.

"Importantly, development of mass rapid transit will support more housing and intensification, helping more people to live close to where they work and play. Each option reduces carbon emissions and will support up to 21,000 homes.

"Also, Let's Get Wellington Moving is projecting that up to 500 vehicles could be removed in the morning peak hour – helping to ease congestion for freight and those that will still have to drive.

"I encourage everyone to engage with the options and to have their say to support the programme to make the right choices for Wellington," says Michael Wood.

More information about Wellington City's Draft District Plan and Paneke Pōneke, the plan for a citywide network of safe biking and scootering routes, is available at wcc.nz/tomorrow.

Wellington Mayor Andy Foster says "This is truly integrated, transformational planning, setting our city up for the future. Our growing population needs more housing, good quality, well designed, well located housing. We're putting inclusive climate action at the centre of all urban decision-making to create thriving and inclusive communities for everyone.



“Our aspiration is for more people living close to work, great public facilities and public transport. That allows further growing the proportion of trips on foot, by bike and on public transport, reducing pressure on transport and infrastructure networks, and our carbon emissions. A compact, walkable city is critical if we are to achieve that.

“Having strong residential communities in and around our central city, and suburban centres, is also critical to their vitality, especially given the challenges Covid is throwing at us. The plans we are releasing today bring together urban planning for more housing with options for mass rapid transit, state highway improvements, bus priority, and safe biking and scootering routes.

“I encourage everyone to take a close look at these interconnected plans. Please share your thoughts and let's do this acknowledging there will be a wide range of views and life circumstances. We need to listen respectfully to the diversity of opinion, so that together we can design our city for the future.

“Let's think about how these three proposals work together, so we can build inclusive, sustainable communities, and provide for the diverse housing, transport, health, lifestyle and environmental needs of today and of generations to come,” said Mayor Foster.

Chair of Greater Wellington Regional Council Daran Ponter says “There's been a lot of noise and lobbying around the Let's Get Wellington Moving programme so it's exciting to reach this milestone and give people a real opportunity to voice their preferences. This is about giving people all of the information they need so they can provide their feedback on options for moving the city and our region forward.

“This truly is a once-in-a-generation opportunity to get our transport, urban development and carbon goals inline and I encourage everyone to take the opportunity to get involved and shape the future of Wellington,” says Mr Ponter.

Waka Kotahi Director of Regional Relationships Emma Speight says “the Let's Get Wellington Moving options are about connecting Wellingtonians, people from the region, visitors, and everyone travelling through the city to the places they need to be.

“We're taking a joined-up approach to create a regional transport system that's fit for the future.

“We want to be providing real transport choice for people by creating new opportunities to walk, cycle, or use public transport, while also improving our existing state highway infrastructure to help keep people and business moving,” says Ms Speight.



Chief Executive of Port Nicholson Block Settlement Trust, Lee Hunter says “We need to invest in our city’s future and take a long-term view of what’s important. I hope all members of Taranaki Whānui and the whole community get involved and share their thoughts on the future of transport, housing and how the next generation will live in Te Whanganui-a-Tara.”

Chief Executive of Te Rūnanga o Toa Rangatira Helmut Modlik says “These plans represent a significant opportunity for the Wellington region. I encourage all members of Ngāti Toa and all Wellingtonians to have their say and help create a more prosperous, healthier and greener Wellington for future generations.”

People can learn more about the Let’s Get Wellington Moving options, Draft District Plan and the Bike Network Plan by coming along to one of many events over the next six weeks.

Public open days

Eastern Suburbs: Saturday 13 November, 11am–3pm, ASB Sports Centre Kilbirnie

Newtown: Saturday 20 November, 11am–3pm, Salvation Army Centre

Central City: Saturday 27 November, 11am–3pm, Prefab Hall

Public webinars - Let’s Get Wellington Moving focus

Online webinar: Thursday 4 November, 6pm–730pm

Online webinar: Thursday 11 November, 6pm–730pm

WCC Our City Tomorrow roadshow

Thorndon: Wednesday 3 November, 4pm – 7.30pm, Loaves and Fishes

Tawa: Thursday 4 November, 4pm – 7.30pm, Tawa Community Centre

Miramar: Wednesday 10 November, 4pm – 7.30pm, Miramar Community Centre

Ngaio: Thursday 11 November, 4pm – 7.30pm, Ngaio Town Hall

Johnsonville: Monday 15 November, 4pm – 7.30pm, Collective Community Hub

Karori: Wednesday 17 November, 4pm – 7.30pm, Karori Community Centre

Island Bay: Thursday 18 November, 4pm – 7.30pm, Island Bay Baptist Church

Let’s Get Wellington Moving will also be hosting a series of pop-up events in the central city.

Dates are subject to change. To find out more about our events and webinars, or how to have your say, go to:

For Let’s Get Wellington Moving at lgwm.nz/hello

For District Plan and cycleway network changes at: wcc.nz/tomorrow

Appendix 6 – Media Release issued on Friday, 12 November 2021

Let's Get Wellington Moving replaces leaf rating visuals with written descriptions

Media Releases / 12 November 2021

Let's Get Wellington Moving has removed the 'climate friendly' leaf rating visual icons on its engagement website hello.lgwm.nz and replaced these with written descriptions to summarise more fully the projected impacts on carbon emissions of its four transformational options.

"Determining potential carbon emissions for the programme options is a complex process incorporating many variables. The four options have different outcomes over different time scales, but all options will reduce carbon emissions in the longer term," says Let's Get Wellington Moving acting programme director David Dunlop.

"All of the options will result in more people taking public transport, more people walking and cycling, and more people living closer to the central city and travelling shorter distances," says Mr Dunlop.

"We attempted to tell this complex story simply on one line using visual leaf icons, but we acknowledge that we over-simplified the story and obscured some of the important findings of our analysis.

"We encourage people who would like to learn more about the projected impacts on carbon emissions of our options to read the full suite of technical documents on our website," says Mr Dunlop.

Anyone who would like to resubmit their engagement survey feedback informed by the written descriptions of projected impacts on carbon emissions is welcome to do so.

Let's Get Wellington Moving will attempt to contact those people who have completed the engagement survey to date, draw their attention to the written descriptions on the website, and invite them to resubmit their feedback if they wish.



Carbon snapshot

Option 1

- Higher carbon emissions from construction of a new Mt Victoria Tunnel and Arras Tunnel extension
- Very good carbon reductions from more people walking, biking and using public transport
- More people can live closer to town, reducing the distances people need to travel

Option 2

- Higher carbon emissions from construction of a new Mt Victoria Tunnel and Arras Tunnel extension
- Good carbon reductions from more people walking, biking and using public transport
- People can live closer to town, reducing the distances people need to travel

Option 3

- Much lower carbon emissions from construction
- Good carbon reductions from more people walking, biking and using public transport
- More people can live closer to town, reducing the distances people need to travel

Option 4

- Much lower carbon emissions from construction
- Very good carbon reductions from more people walking, biking and using public transport
- More people can live closer to town, reducing the distances people need to travel



Appendix 7 - Recorded webinars

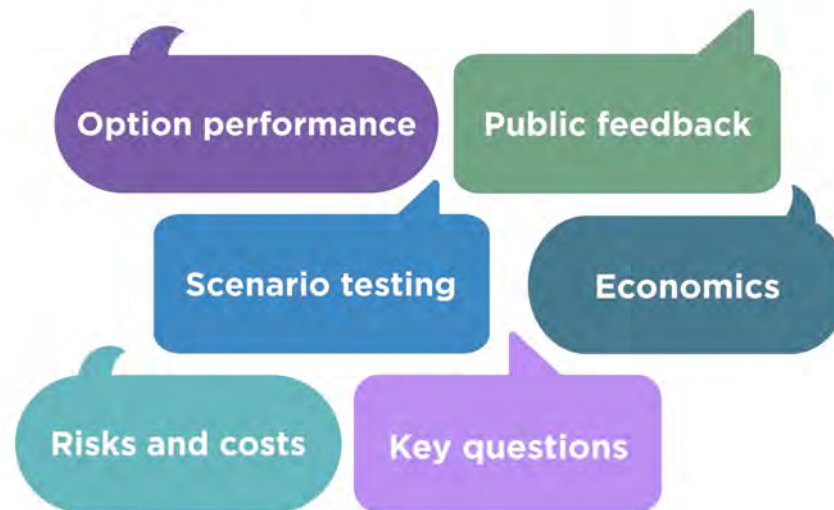
<https://lqwm.nz/all-projects/mass-rapid-transit/events/>



The engagement feedback is one of six key inputs our partners will balance when deciding on a preferred option. These include:

- **Option performance** – overall how the four options perform against the programme objectives
- **Public feedback** – the feedback the public gave us on the four options
- **Scenario testing** – what each of the four options might mean in different possible futures (different growth scenarios, the way we might build things etc)
- **Economics** – looking at the benefits and costs of the four options
- **Risk and costs** – considering the risks the four options might have and how much control we will have over their costs
- **Key questions** – what are the answers to the key differences between the options – MRT, the Basin Reserve, and an extra Mt Victoria Tunnel.

Inputs that will be used to select the preferred programme option



Attachment 4 to Report 22.227
JANUARY 2022

Let's Get Wellington Moving

Engagement study

TRA

PURPOSE

To get a representative view of Wellingtonians thoughts and feelings towards 4 possible transport solutions.

KEY DETAILS

Let's Get Wellington Moving launched an internal public consultation survey to understand Wellingtonians views towards 4 possible transport solutions.

To supplement feedback from public consultation, LGWM commissioned an identical study to recruit a representative view of the Wellington public through an online panel.

By using an identical survey we are able to directly compare performance between the two data sources.

This report focuses on data collected from the representative study only.



TRA

WHAT

A 10-minute online survey amongst a representative sample of n=1,228 Wellingtonians, aged 18+.

Conducted between:
10th December 2021 – 7th January 2022

The survey data has been ‘weighted’ by age, gender, and region to ensure results are representative of Wellington. Weighting parameters sourced from the Stats NZ 2018 Census of Population and Dwellings.

	Sample (n)	Population Weight (%)
Female, 18-34	168	16%
Female, 35-54	327	18%
Female, 55+	254	18%
Male, 18-34	81	16%
Male, 35-54	144	17%
Male, 55+	248	16%

	Sample (n)	Population Weight (%)
Wellington City	574	41%
Outside Wellington city	654	59%

Only statistically significant differences (at the 95% confidence level) are commented on.

Margin of error +/- 2.8% at a 95% confidence interval.



We asked Wellingtonians for their opinions on four possible transport solutions

OPTION 1:



South coast light rail + new public transport tunnel

- Light rail from Railway Station to Island Bay
- Challenging to extend to other suburbs in the future
- Basin Reserve is beautified and not a roundabout
- Arras tunnel is made longer to make getting around the Basin easier
- New tunnel built at Mt Victoria
- Regular buses take priority to Miramar and the airport
- New walking and cycling paths

OPTION 2:



Bus Rapid Transit to the sea and skies

- Bus Rapid Transit to Island Bay, the airport, Miramar and Seatoun
- Could be extended to other suburbs in the future
- Basin Reserve is beautified and not a roundabout
- Arras tunnel is made longer to make getting around the Basin easier
- New tunnel built at Mt Victoria
- New walking and cycling paths

OPTION 3:



South coast light rail

- Light rail from Railway Station to Island Bay
- Challenging to extend to other suburbs in the future
- Basin Reserve is beautified and not a roundabout
- Arras tunnel is made longer to make getting around the Basin easier
- New tunnel built at Mt Victoria for people cycling and walking
- More regular bus priority through Hataitai
- New walking and cycling paths

OPTION 4:



South coast light rail via Taranaki St

- Light rail from Railway Station to Island Bay
- Challenging to extend to other suburbs in the future
- Basin Reserve stays as a roundabout and fewer changes needed
- New tunnel built at Mt Victoria for people cycling and walking
- More regular bus priority through Hataitai
- New walking and cycling paths

Agenda

1

What Wellingtonians
like about the
transport solutions

2

What Wellingtonians
dislike about the
transport solutions

TRA

Attachment 4 to Report 22.227

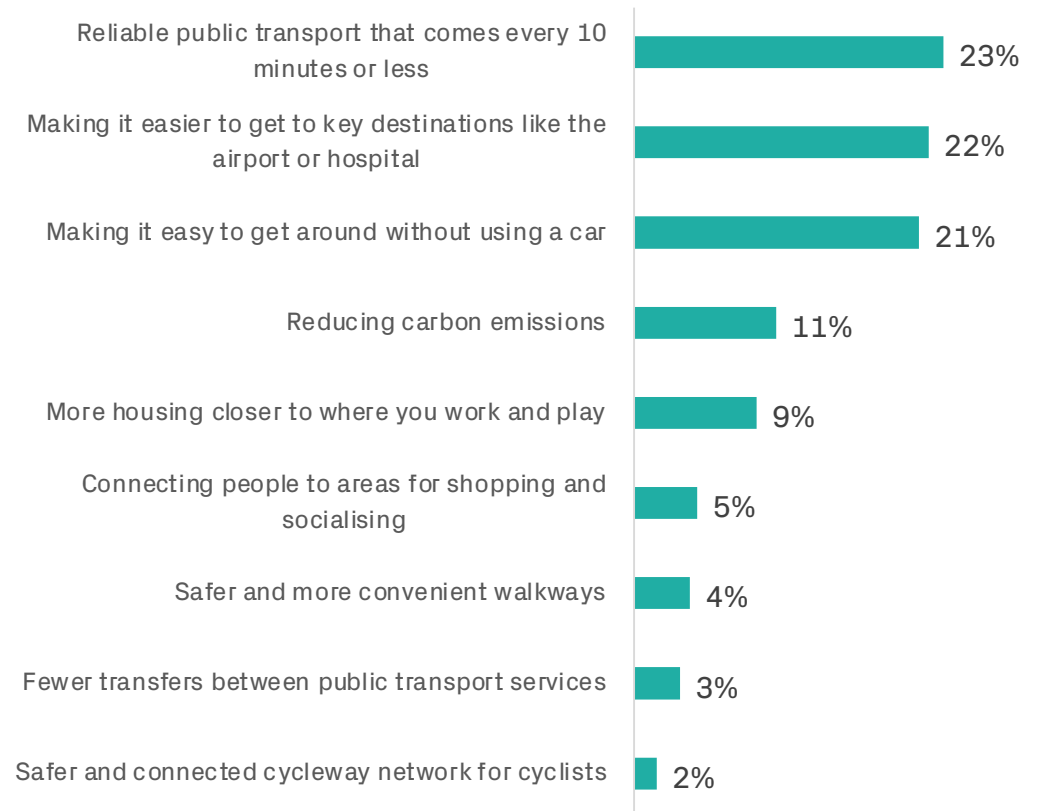
What Wellingtonians like about the transport solutions

TRA

From a transport system, reliability and ability to access key locations without relying on a car, are fundamentally important to the region

Supplementary to this, addressing carbon emissions and housing is important.

Most Important for Wellington (#1 ranking)



Source: Engagement representative study; WLG_IMPT. What do you think is the most important for the future of Wellington? (#1 ranking)
Base n=1,228

What's important changes by generation, location and current behaviour

Addressing housing becomes of heightened importance to younger Wellingtonians, whilst those over 55 care more about accessibility to key destinations. Similarly, those who live out of the city also want greater access.

No significant differences by gender.

Most Important for Wellington (#1 ranking) by subgroups

	Total	Under 35	35-54	Over 55	Wellington City	Outside Wellington City*	Uses public / active modes**	Uses private modes**	NZ European	NZ Māori / PI	Asian	Other ethnicity
Reliable public transport	23%	17%	25%	27%	24%	22%	23%	23%	23%	24%	28%	27%
Easy to get to key destinations	22%	17%	19%	30%	16%	26%	15%	27%	24%	20%	12%	23%
Easy to get around without a car	21%	23%	24%	17%	23%	20%	27%	17%	21%	16%	23%	17%
Reducing carbon emissions	11%	14%	10%	7%	11%	10%	12%	9%	10%	17%	9%	10%
More housing	9%	16%	8%	3%	11%	8%	10%	9%	9%	10%	10%	11%
Connecting to areas for shopping and socialising	5%	4%	3%	7%	5%	5%	2%	6%	4%	3%	7%	5%
Safer and more convenient walkways	4%	4%	5%	4%	4%	4%	4%	4%	4%	5%	3%	3%
Fewer transfers	3%	3%	4%	3%	3%	4%	4%	3%	3%	1%	5%	2%
Safer and connected cycleways	2%	2%	2%	2%	2%	1%	2%	2%	1%	4%	3%	1%
Sample	1,228	254	472	502	574	654	486	716	928	121	135	145

Source: Engagement representative study; WLG_IMPT. What do you think is the most important for the future of Wellington? (#1 ranking)

Significance tested at a 95% confidence interval; Green = significantly higher than total | Red = significantly lower than total

Total Sample Base n=1,228

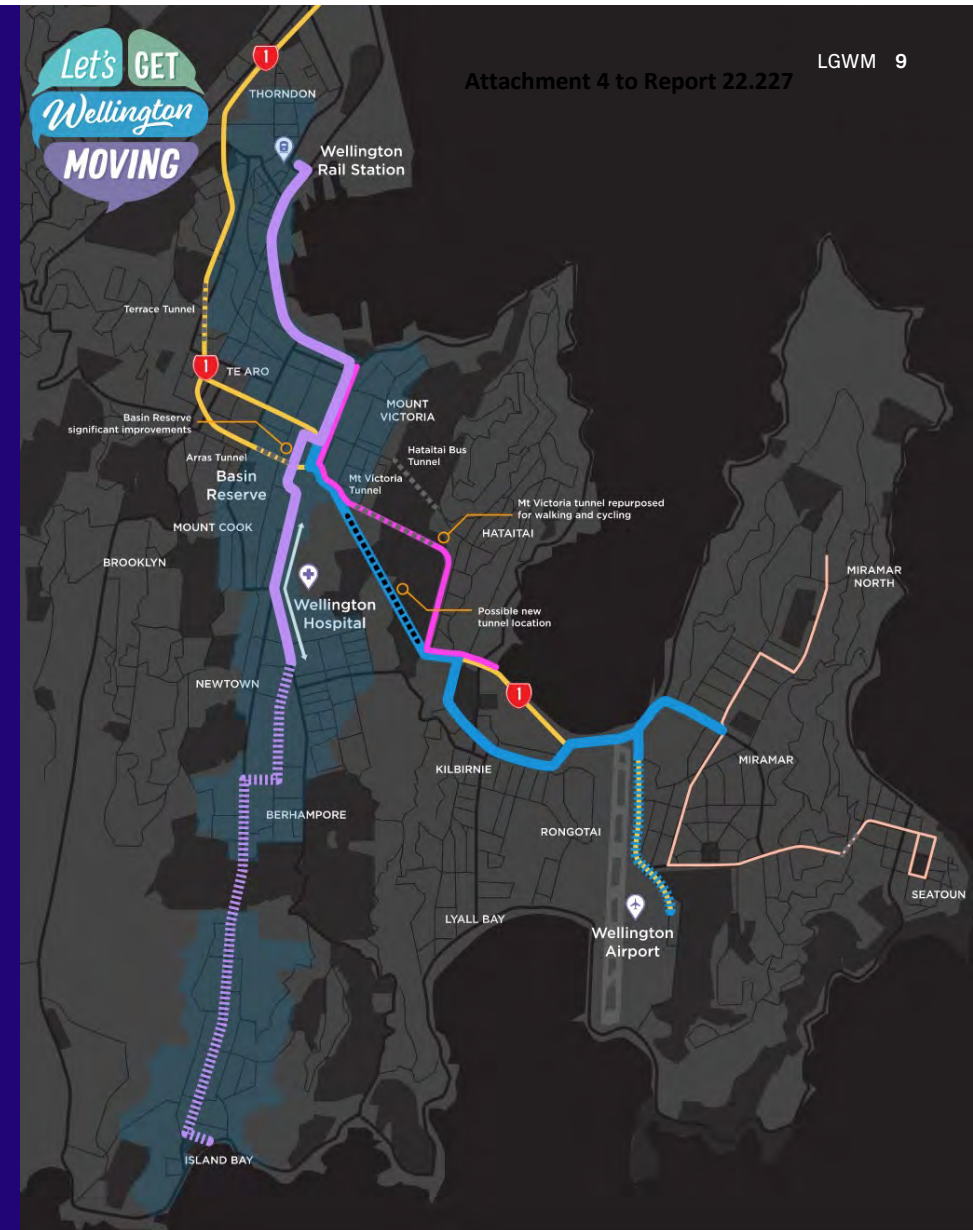
*Outside Wellington city includes those who live in either Porirua, Hutt, Kapiti, or Wairarapa

**What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

TRA

After showing people our 4 transport solutions, and getting a broader understanding on areas of focus for the region, we then asked them more specifically what they liked about these transport solutions collectively

This was collected through an open-ended question, which we then grouped responses into overarching master themes.



Largely our transport solutions are well liked as they link closely to what people want to see from the region

What Wellingtonians like about our transport solutions

1. Improved Public Transport



42%

An improved system with better coverage, reliability, convenience and accessibility

2. Airport & hospital access



19%

Greater access to and from key locations, particularly for those who live outside the CBD

3. Traffic system



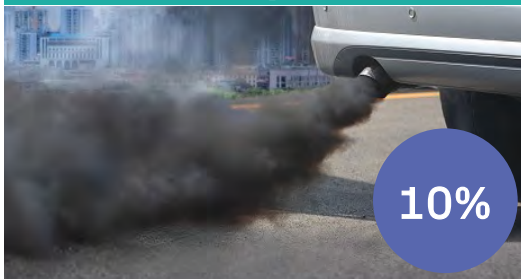
11%

Freeing up the city of traffic, using reliable public transport as a substitute to cars

**6%
Other**

- Like the idea of having another Mt Vic tunnel
- Better roading
- Keeping cars as a transport mode
- Accessibility for the disabled / elderly

4. Sustainability



10%

Added green spaces and fewer cars to lessen carbon emissions and improve air quality

5. Safe to get around



7%

Having infrastructure to safely support active modes of transport such as cycling or walking

6. Housing



6%

It's ability to create more (affordable) housing, closer to the city



1. Improved public transport

Wellingtonians have an appetite for faster, more reliable and accessible public transport. Such that, almost 1 in 4 citizens called out reliable public transport as the most important aspect for the future of the city. And a similar proportion wanting getting around the city without a car made easier.

Our current options are well liked as they are perceived to make commuting around the city without a car more seamless and efficient. Better connections with the new Mt Vic tunnel is also appreciated.

“Reliable public transport that comes every 10 minutes or less. Otherwise, I have to wait another half an hour for an hour trip to the city.”

“I like the idea of reliable and frequent bus services.”

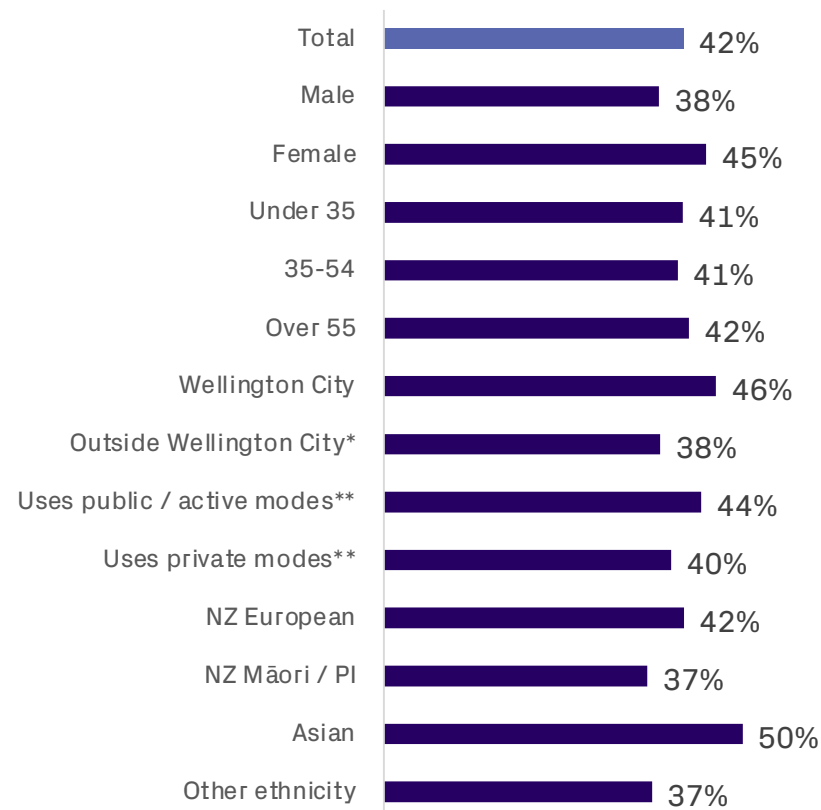
“More flexibility and connectivity across public transport.”

“Reliable and more accessible and easier public transport means people can live outside the city corridor.”

Source: Engagement representative study; WLG_LIKE: What do you like about these options?
 WLG_IMPT. What do you think is the most important for the future of Wellington?
 Significance tested at a 95% confidence interval; Green = significantly higher than total | Red = significantly lower than total
 Base n=1,228

*Outside Wellington city includes those who live in either Porirua, Hutt, Kapiti, or Wairarapa
 **What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

No significant skews, with this an area most subgroups like about our potential transport solutions.





2. Airport & hospital access

Wellingtonians feel a sense of embarrassment that their city appears to be one of the few without public transport access to and from key destinations, like the airport and hospital, particularly for those who live outside of the city.

Better access to the airport feels like it will help put Wellington more on the map as a key tourism destination and better access to the hospital feels like it should be a hygiene factor for the city's residents.

This is an aspect Wellingtonians find important for the region to focus on for its future and one of our transport solutions lean into addressing.

"Having public transport to and from the airport is so important and it's embarrassing that Wellington doesn't have anything."

"I really want reliable and frequent public transport, and to be able to get from the train station to the airport easily."

"Rapid bus - it address airport connection and suburbs with a reliable, dedicated service. It has future potential for expansion. I like that it has dedicated lines - this is important for reliability and making sure PT remains a competitive alternative."

Source: Engagement representative study: WLG_LIKE: What do you like about these options?
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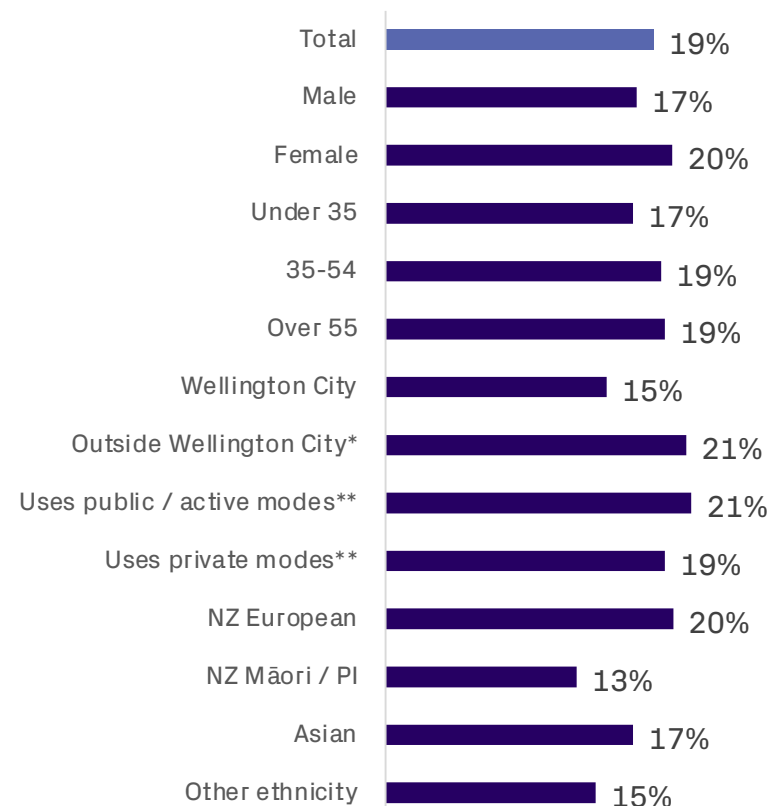
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**What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

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LGWM 12

No significant skews by subgroups, but we know that the Older (55+) generation and those living outside the city are more likely to place importance on hospital / airport access.



TRA



3. Traffic management

Freeing up the city of traffic through reliable public transport as a substitute to cars is important to Wellingtonians. Currently, over half feel that a lack of reliability, accessibility, and coverage of the current transport system force them to use their cars as their main mode of transport. Particularly those who live outside the city.

Wellingtonians like that our proposed transport solutions are increasing the efficiency of the public transport system to create a valid alternative to driving.

"I really like the way that there will be less traffic and it will be easier to get from position A to position B."

"Cuts out traffic, streamlined to connect all issues around increasing the use of public transport."

"Being able to get around without much waiting time for transport. Making it easy to get to Airport and hospitals. Less fumes etc in the air we breathe. Freeing up the city with less traffic in it."

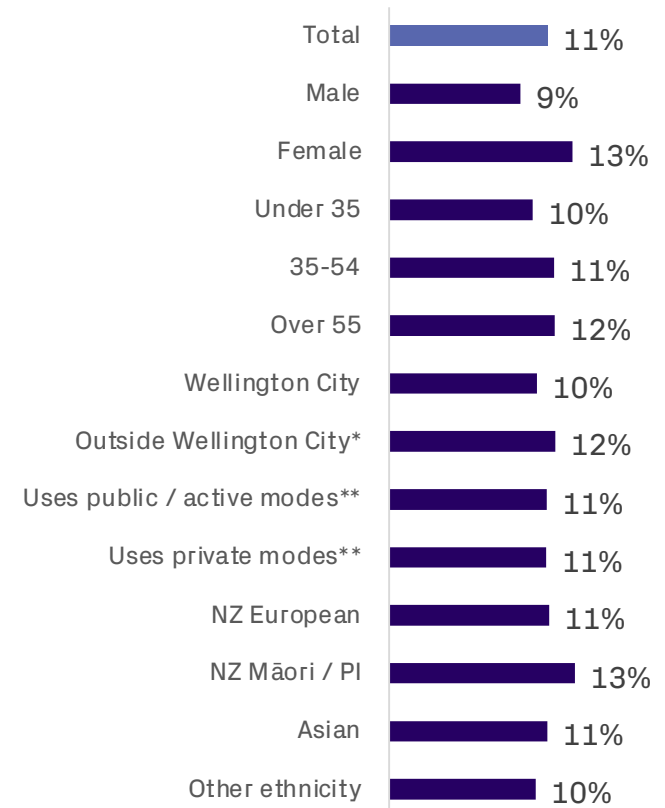
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LGWM 13

No significant skews, most subgroups feel that the options will be good at reducing traffic congestion by taking cars off the roads.



TRA



4. Sustainability

Taking more cars off the road will lessen emissions and improve air quality in the city. Although not considered at the forefront of important aspects for Wellington's future, lowering emissions, increasing green spaces within the city, and looking to green alternatives for transport was mentioned often as an aspect they liked about our current transport solutions.

Ensuring our transport solutions offset in the long-term the emissions they produce when being implemented will be important.

"I think it is worthwhile to make it easy to get around without a car, this will reduce emissions which is really important to do, and I feel more public transport is one of the best ways to help achieve this."

"Most important for the future is reducing our carbon emissions and our impact on the environment. Making it easier, cheaper and more efficient to take public transport."

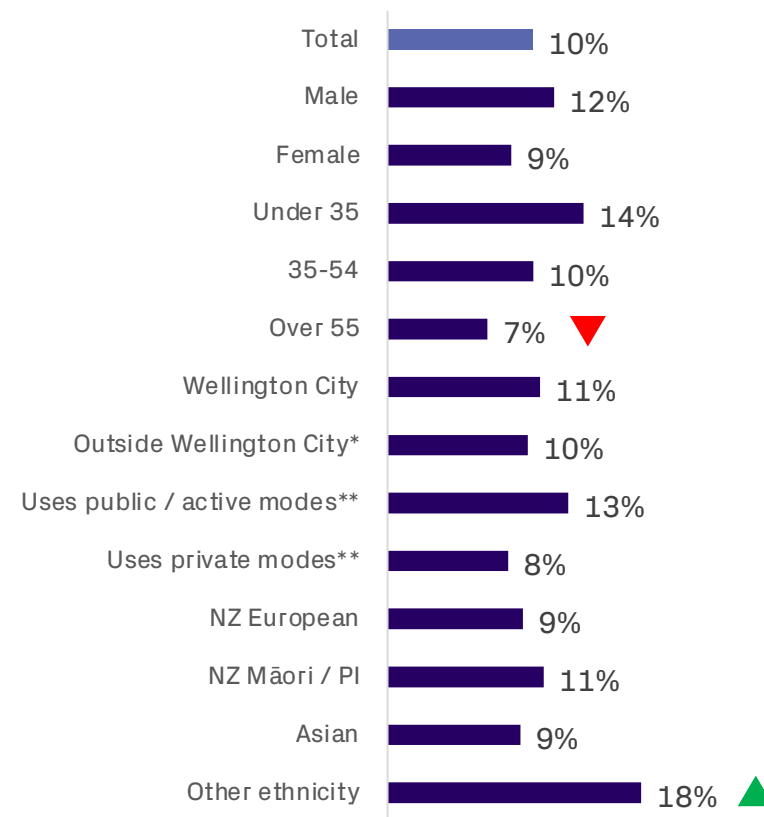
"Commitment to balancing the carbon emissions of building the option with the benefits of implementing the option in the long-term."

"Reducing carbon emissions should be at the forefront of all future decisions."

Source: Engagement representative study; WLG_LIKE: What do you like about these options?
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Those over 55 are significantly more likely to find reduction of carbon emissions less appealing than other subgroups.





5. Safe to get around

Currently only 13% of Wellingtonians say they walk or cycle as their main mode of transport. Wellingtonians recognise the need for alternative active modes of transportation such as cycling and walking. The key barrier to these is safety.

Whether this is a lack of street lighting for walking home after work or absence of cycle pathways to avoid traffic collisions, there is a need to address these to facilitate accessibility, particularly for the less able-bodied.

Removing the barrier to these active modes through our transport solutions will help convert people from private transport modes.

"Making it easier and safer to get around Wellington on foot will encourage people to leave their cars at home when they come into the city."

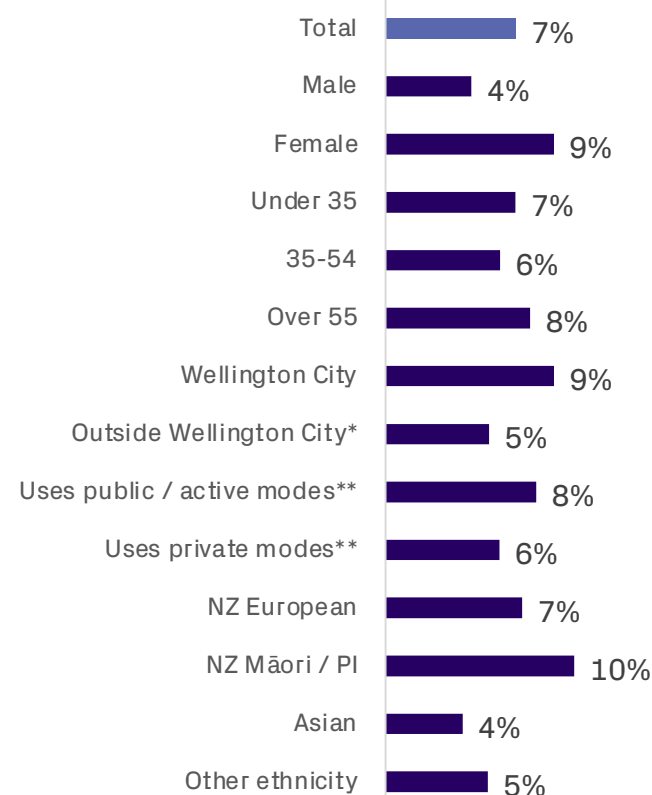
"I like the safer and connected cycleways because I also cycle and it is so dangerous being a cyclist in Wellington. I have near misses more often than not."

"Safe carless travel. By safe, I mean travel that women can do by themselves at night which they can feel they won't be attacked. Otherwise there is no suitable replacement for a private vehicle."

Source: Engagement representative study; WLK_LIKE: What do you like about these options?
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No significant skews, but females and NZ Māori / PI are more likely to say this is an aspect they like about our transport solutions.





6. Housing

Wellingtonians, and broader New Zealand, see a real need for more, affordable, housing. With this a fundamentally important issue to address alongside public transport system improvements.

Housing and reliable public transport accessibility to and from the Wellington City are not mutually exclusive. Better public transport felt like it would ease the burden of commuting for citizens priced out of the CBD.

Our South coast transport solutions providing the strongest potential for new housing development, so of greater appeal to the Wellingtonians who value closer housing to where they work and play.

“Housing will be the most pivotal area to grow to make sure current residents aren't priced out of the market.”

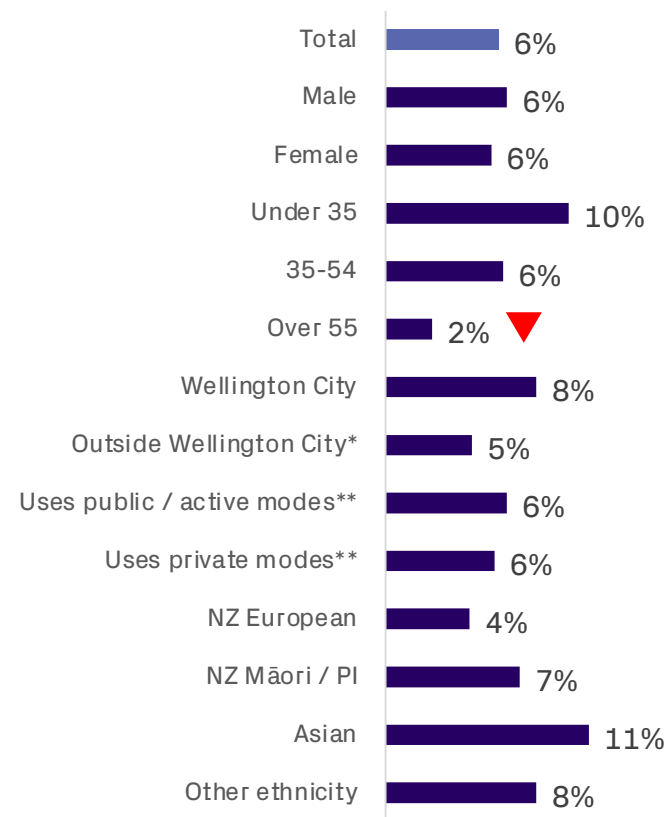
“Having more housing closer to the city so that we can make housing more affordable in Wellington City.”

“With housing issues, the least we can provide is to make it easier for people who have to move further from the centre to travel.”

Source: Engagement representative study; WLG_LIKE: What do you like about these options?
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Older 55+ Wellingtonians are significantly less likely to see housing as a benefit from the options provided.



TRA

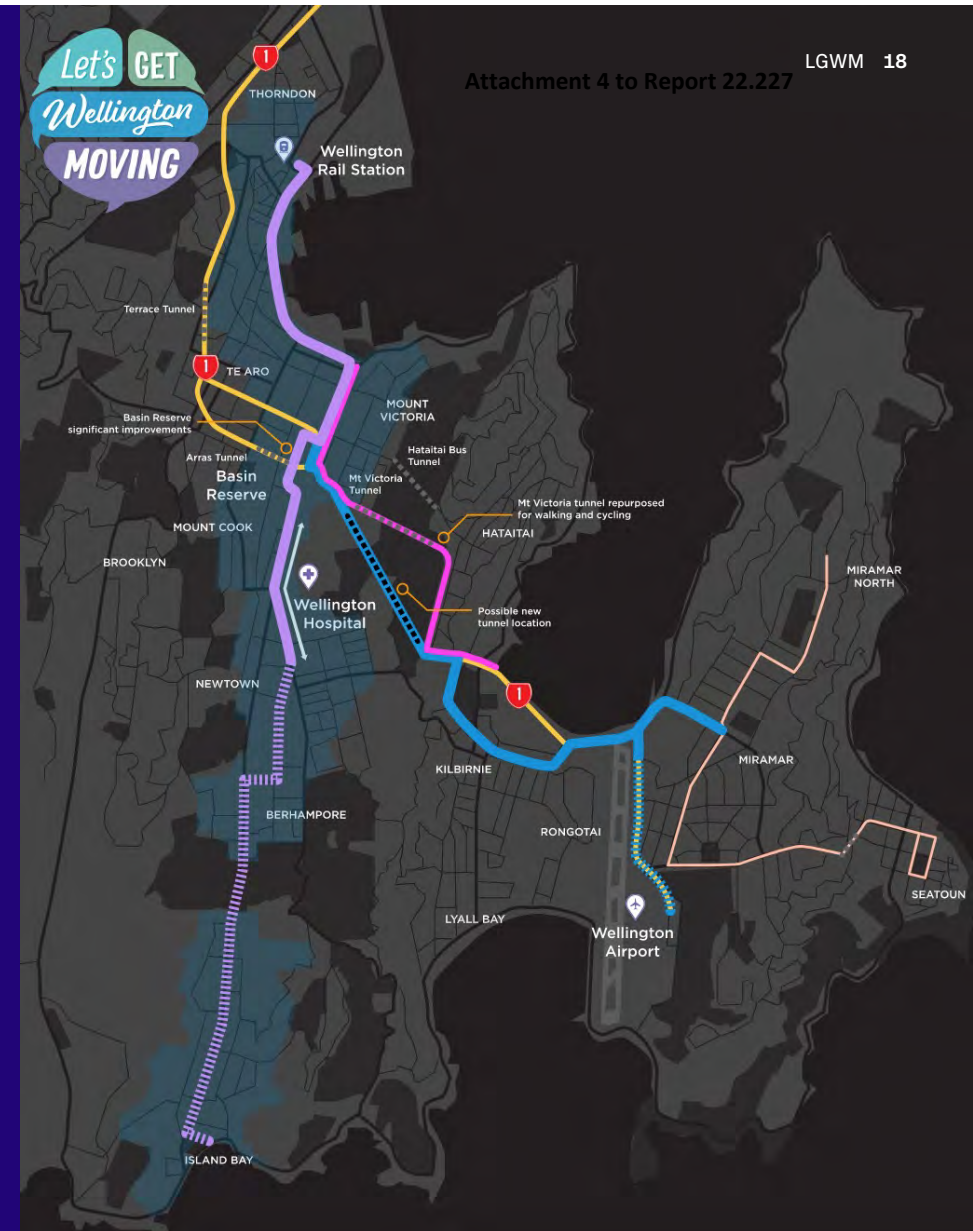
What Wellingtonians dislike about the transport solutions

2

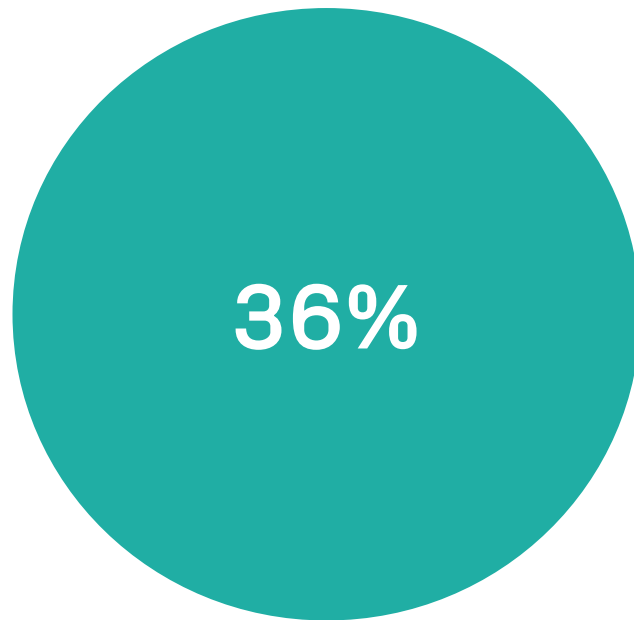
TRA

Similarly, we identified what Wellingtonians disliked about our potential transport solutions collectively through an open-ended response

Again, grouping these responses into overarching master themes.



When asking the Wellington public what they disliked about the options, almost 4 in 10 didn't hold a negative opinion



*% of Wellingtonians who liked all options,
OR didn't have an opinion*

This is particularly true for females (41%), and those who already engage with public and/or active modes of transport around the city (40%).

As expected, those who prefer the light rail vs bus rapid transit are also more likely to lean into the proposed transport solutions (40%).

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options?
Base n=1,228

But there are some evident aspects Wellingtonians dislike

What Wellingtonians don't like about the 4 options

1. Focus on cycling



14%

Feel there are enough existing cycleways already that are underutilised and dangerous


2. Investment and feasibility



10%

Natural concerns around the cost and practicality of the solutions, as well as how long they will take to implement


3. Need for cars



9%

Recognise not everyone can take public transport, with still a need for cars, concerns around parking and transfers

4. Housing density



7%

Concerns around increased housing density in the city, some wanting to expand housing in the wider region instead

5. Wider Wellington inclusion



5%

With solutions focussed on Southern and Eastern suburbs, many feel ignored

6. Light rail vs Bus transit



4%

Concerns around the implementation and resilience of the light rail

17%
Other

- *Don't care about carbon emissions*
- *Don't care about having fewer transfers*
- *Want to know fares and timetables*
- *Other areas outside of transport need to be the focus for Wellington*

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options?
Base n=1,228



1. Focus on cycling

There are tensions with transport solutions that focus on increased cycleways. Wellingtonians feel that enough are already in place around the city, and are currently being underutilised by the small subset of the population who cycle.

Introducing more cycleways are not perceived as a benefit to the majority, and in fact have perceptual drawbacks by further narrowing Wellington roads – restricting the use of cars.

Negative connotations already surround ‘cyclists’, seeing them as a danger on and around Wellington roads. This negative perception of cyclists is not unique to Wellington, with Auckland Transport in fact referring to cyclists as ‘people who ride bikes’ to bring back the human element.

“I dislike any focus on cycle paths. With sufficient public transport and pedestrian paths, cycling should not be given any priority.”

“Cycleways There are already enough in the Wellington area & they are used by only a small number of people.”

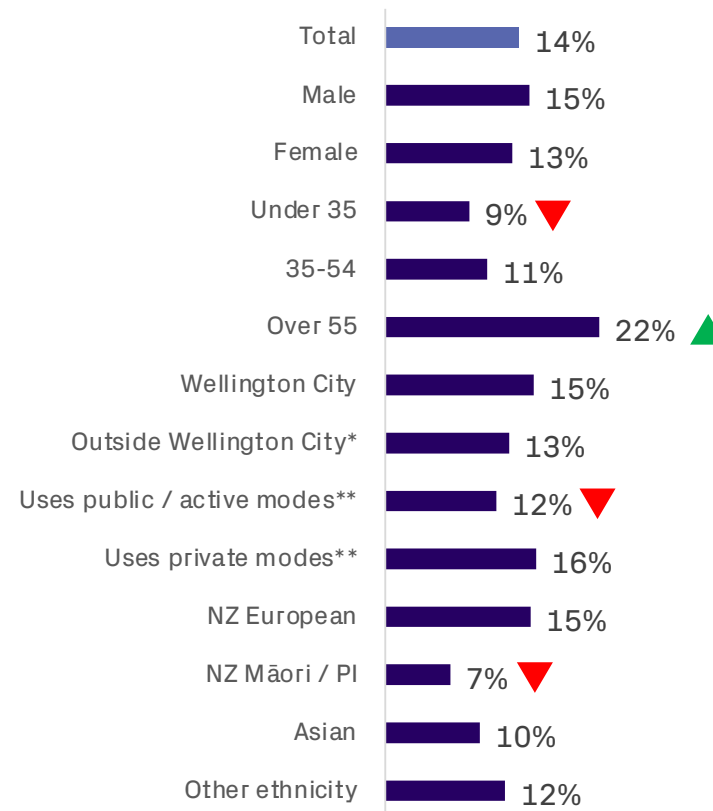
“Cycleways are a waste of money and are under utilised. Cycling is dangerous in Wellington.”

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options? Significance tested at a 95% confidence interval; Green = significantly higher than total | Red = significantly lower than total Base n=1,228

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**What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

Older generations (55+) significantly more likely to be disgruntled by the focus on cycleways.





2. Investment and feasibility

With any change to the transport system there are natural concerns from the public around the level of investment needed, and the impact this cost will have on ratepayers.

Alongside cost, there is also concern around the amount of time these solutions would take to implement and the disruptions they will cause. This is especially prevalent with long-term projects where Wellingtonians won't feel benefits for extended periods.

Another aspect playing on Wellingtonians minds is whether these solutions will work, with people's past experiences causing them to be pessimistic towards progress.

“They will take a long time and a lot of money to complete. I know this is necessary to build resilience, but it will cause significant disruptions.”

“Going to take too long to become real. I don't believe it'll actually happen, like the transmission highway I'm extremely disappointed and sad in the delay.”

“It seems like this is going to cost a lot of money for benefits we aren't going to see for a long time. Shouldn't the money be invested in something with a quicker payoff?”

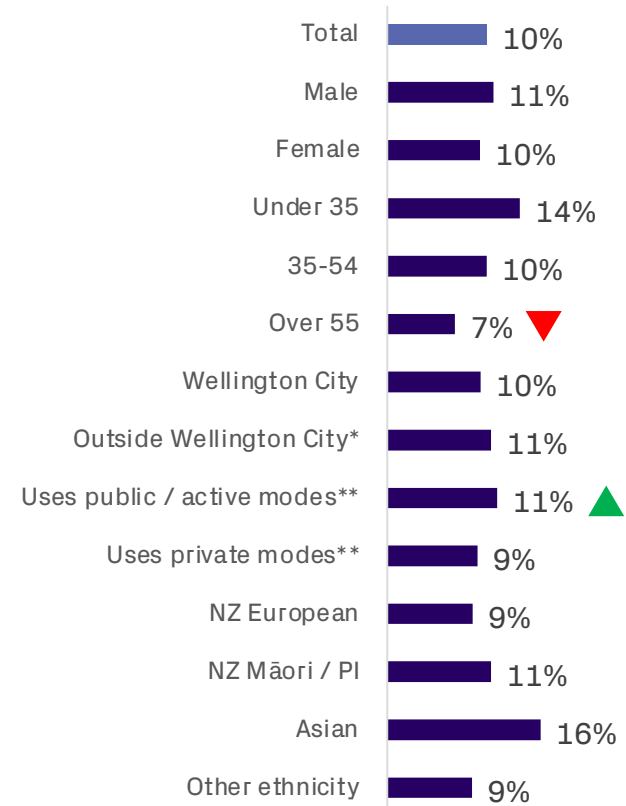
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Attachment 4 to Report 22.227

Existing public transport users significantly more likely to be concerned by investment and disruptions





3. Need for cars

LGWM’s vision focuses on moving more people with less cars, as such the transport solutions proposed hold a skew towards public and active modes of transport.

However, Wellingtonians feel that there is a delicate balance, with an important need to ensure these solutions work harmoniously with cars. Recognising that there are some groups that won’t be able to benefit from these solutions, due to their necessary reliance on cars – specifically those with disabilities, elderly, families and those visiting from out of the city.

With a necessity for cars, parking in the city still needs to be considered. This is an area Wellingtonians feel is overlooked and underdeveloped.

“It seems like it will clutter roads and make it harder for cars? I know we want less private cars on the road but there are always going to be situations where people need them.”

“There’s no consideration for disabled people who have to use a car.”

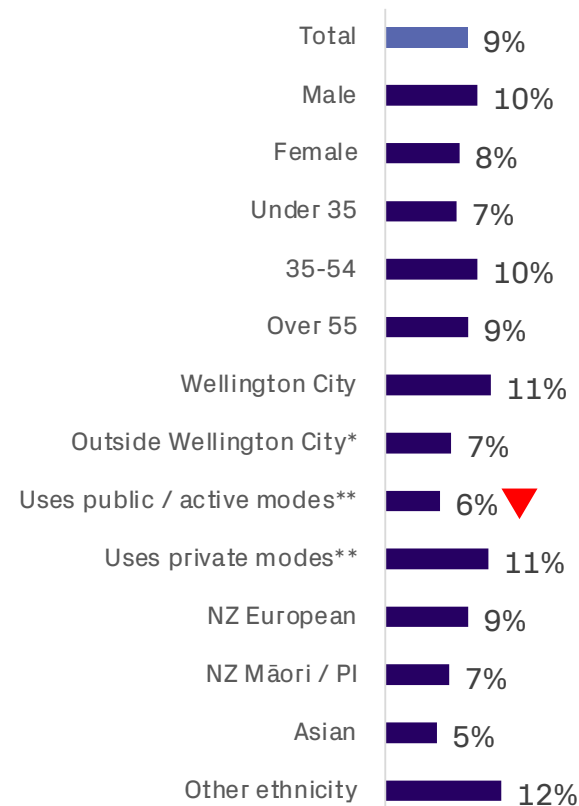
“Still need support for cars and car parking in the CBD.”

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options? Significance tested at a 95% confidence interval; Green = significantly higher than total | Red = significantly lower than total Base n=1,228

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**What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

Existing public transport users significantly less likely to feel the need for cars in the city





4. Housing density

Whilst access to affordable housing is super important to Wellingtonians, a portion of the public feel that building houses within the CBD and surrounding suburbs will just add to the congestion and promote further population growth in an already overwhelmed city.

Some people are adverse to density housing and instead want houses to be built in the wider region with efficient transport options that make it easier to get into the city.

Particularly with the increase in working from home, Wellingtonians are more happy to create distance between where they live vs work / play.

“We don't need to move the houses closer to work, we need to make it easy to get to work.”

“Don't like the idea of more housing in the city, its congested and will require more infrastructure like supermarkets etc.”

“Higher density housing will encourage population growth in Wellington. Population is already too high for the environment.”

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options?
Significance tested at a 95% confidence interval; **Green** = significantly higher than total | **Red** = significantly lower than total
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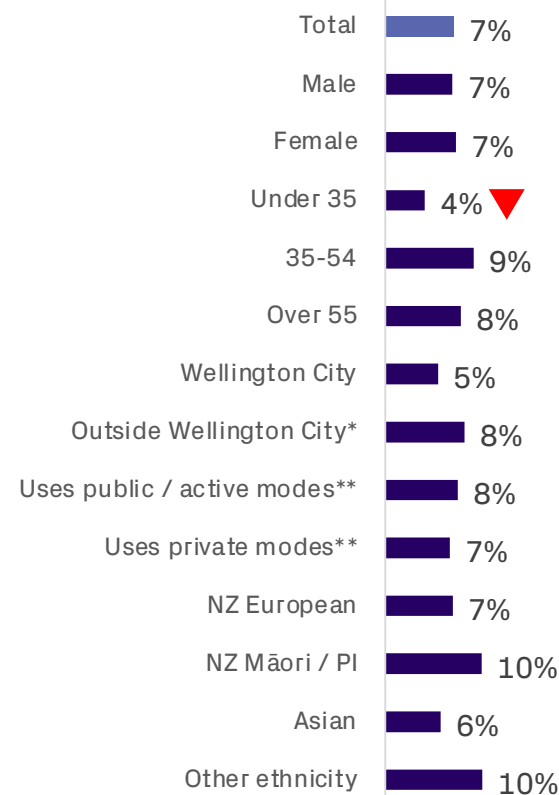
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Attachment 4 to Report 22.227

LGWM 24

Younger Wellingtonians (under 35) less likely to be concerned by denser housing in the CBD - aligned to being an important area of focus for them for the region.





5. Wider Wellington inclusion

Alongside the importance of including cars within our transport solutions, Wellingtonians want consideration for other suburbs in the CBD and the wider region.

Feeling left out of the plans, with their own transport tensions on their front doorstep that they want to see addressed. Those that commute in areas not addressed in the current plans want to see action and a plan for how they could be integrated in the future.

“Cars are important and shouldn't be left out of the plans as some people live too far out of town to use other forms of transport i.e. Kapiti and the Wairarapa. Not everyone lives around central Wellington.”

“It doesn't include the Hutt region where the public transportation is not very good.”

“They only focus on the south side of Wellington. What about the rest of Wellington?”

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options?
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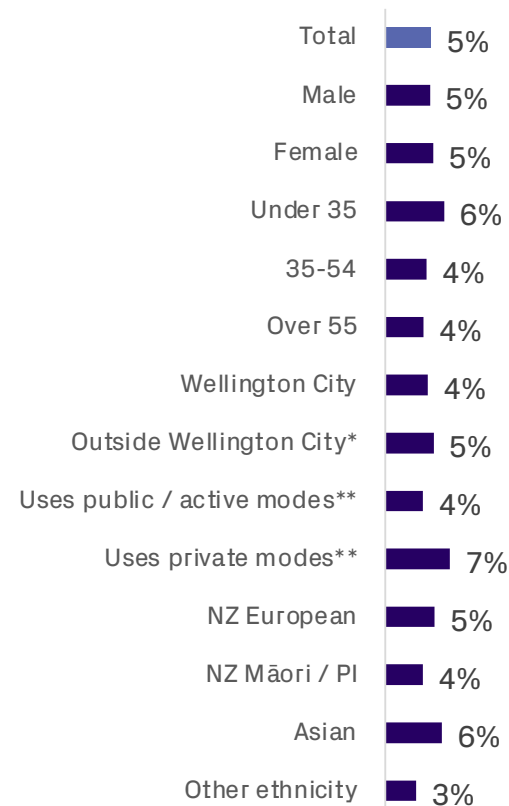
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**What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

Attachment 4 to Report 22.227

LGWM 25

Wanting inclusion to the northern suburbs in the CBD and the wider Wellington region, sees this as an equal issue for both those who reside in and out of the city.



TRA



6. Light rail vs Bus rapid transit

Whilst just over the majority of Wellingtonians prefer the light rail to bus rapid transit, due to it feeling more novel, reliable and greener. There are concerns with what a light rail could mean for the city.

Concerns around the light rails expense and low expectations around resilience, makes people feel it is not worth the investment. It's inflexibility to add to the system and the time it would take to implement also concerning.

The impact earthquakes may have on the rail system also a raised concern to its practicality within the region.

“Dedicated tracks - we live in an earthquake prone city. When we had the earthquakes the buses were hardly affected. The trains were all shut down until all the tracks were checked. Earthquake in the morning on a nice day - not too much of an issue. An earthquake mid/late afternoon - commuter chaos.”

“Rapid rail transport is not really feasible in crowded Wellington - there isn't enough space for such an inflexible system.”

“I have nothing against adding more rail in, but I have also lived overseas in countries who have added light rail and its hugely expensive and thoroughly under utilised and I worry this will be the same.”

Source: Engagement representative study; WLG_DISLIKE: What don't you like about these options? Significance tested at a 95% confidence interval; **Green** = significantly higher than total | **Red** = significantly lower than total Base n=1,228

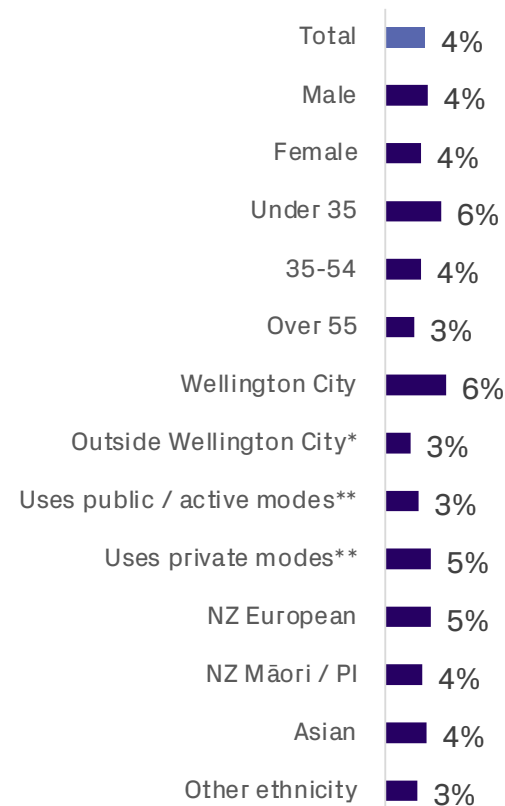
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Attachment 4 to Report 22.227

LGWM 26

Whilst not significant, concerns around light rail heightened amongst those who live in the city and those younger.

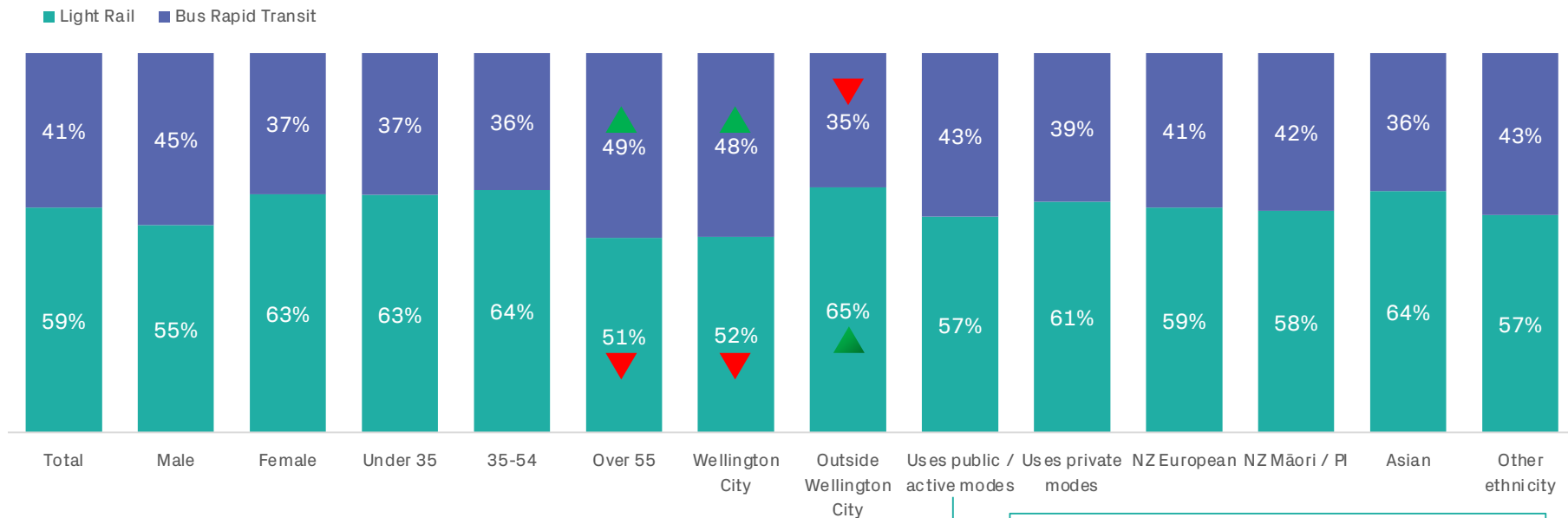


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Despite concerns, light rail modes of transport are preferred by the majority of Wellingtonians

Light rail preference particularly strong amongst Wellingtonians under 55, and those who live outside the CBD.

Light Rail vs Bus Rapid Transit Preference



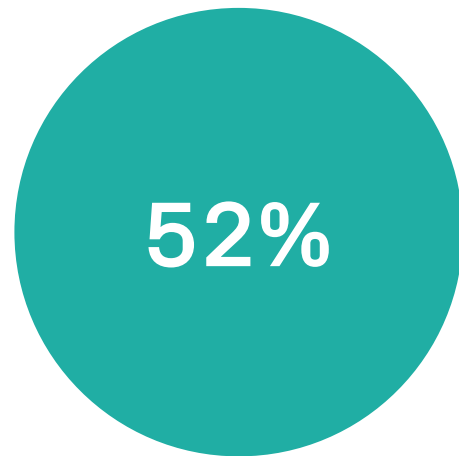
Those who already use buses as their main way to commute are significantly more likely to prefer Bus Rapid Transit (55%)

Source: Engagement representative study; PREFER_MODE: Which type of mass rapid transit do you prefer?
 Significance tested at a 95% confidence interval; Green = significantly more preferred than total | Red = significantly less preferred than total
 Base n=1,228
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 **What's the main way you get to and around Wellington? Uses public / active modes includes walk, Bicycle, Bus and Train; Uses private modes includes car or motorcycle

Beyond there dislikes, we asked Wellingtonians if they felt anything was being missed by these transport solutions

Majority felt the transport solutions covered all aspects.
But for the rest, the areas to improve upon linked closely to addressing their dislikes.

What Wellingtonians felt were missing about the 4 options



% of Wellingtonians who don't think anything is missing

This is particularly true for females (56%), and those who already engage with public and/or active modes of transport around the city (58%).

Source: Engagement representative study; WLG_MISSING: Is there something missing?
Base n=1,228

Key themes

1. Accessibility for all

Linking to the dislike of cars still being needed. Wellingtonians feel that considerations for those that are disabled or in circumstances where they need to drive are currently being missed.



2. Wider region inclusion

Linked to a dislike people have towards the transport solutions. Wellingtonians outside the city and in northern suburbs want to see how they fit into the plan.



3. Further information

Beyond our current information on the transport solutions, Wellingtonians want a greater understanding of the fare structure and timetables. With this desired to be as cheap as possible in order to become a desired alternative.



TRA

Let's talk

TRA

Attachment 5 to Report 22.227

Urban Development Objectives and Commitments

Urban Development objectives

The urban development objectives expand on the LGWM ‘liveability’ objective to articulate shared goals for growth and housing in the MRT corridor catchment summarise what we are aiming to achieve in relation to growth and housing along the corridor. The objectives will be refined as our work on urban development progresses. as ‘guiding objectives’ that will be refined as our work on urban development progresses. Whilst these sit under LGWM’s Liveability objective, they contribute to all of the programme objectives (eg, higher land use in the corridor reduces carbon emissions and increase mode shift at a faster pace).

LGWM Objectives

Objectives	LIVEABILITY	ACCESS	CARBON EMISSIONS AND MODE SHIFT	SAFETY	RESILIENCE
<i>A transport system that...</i>	Enhances urban amenity and enables urban development outcomes	Provides more efficient and reliable access for users	Reduces carbon emissions and increases mode shift by reducing reliance on private vehicles	Improves safety for all users	Is adaptable to disruptions and future uncertainty
<i>Weighting</i>	20%	15%	40%	15%	10%

Urban Development Objectives

Type	Objective	Measure
Enabled growth target	Land use controls and infrastructure upgrades help enable 18,000 to 21,000 new homes to be built within 10 minutes’ walk of MRT stations over the next 30 years	Forecast dwellings WCC Housing Model (updated May 2022)
Intervening to facilitate homes	LGWM partners facilitate between 2,000 to 5,000 new homes to be built near MRT stations (total across the corridor) over the next 30 years where the market would not otherwise deliver them to scale, pace, quality	Informed by City to Newtown Corridor Development Plan
Assisted/affordable housing	Assisted and affordable housing is encouraged and where appropriate developed in the project area to give opportunities to live in affordable, accessible, good quality housing.	Informed by Proposed District Plan settings/WCC
Public and social housing	Public and social housing is facilitated to meet targets and settings in Kāinga Ora and WCC plans	Informed by Proposed District Plan/Kāinga Ora Plans
Māori housing and papakāinga	TBC with iwi partners (eg, commercial opportunities, Māori housing, papakāinga) - work commencing with PNBST and Ngāti Toa	TBC
Quality environment	New public spaces, retain or improve recreation, health, education, social services particularly in proximity to MRT stations	4.95 m2 p.p. public urban green space
Quality buildings	Commercial and residential buildings actively facilitated by partners have low embodied carbon, are energy efficient and are accessible	Rated at least 3-star Lifemark and 8 Homestar (for homes) and 4 Green Star (for commercial)

Attachment 5 to Report 22.227

Expressions of commitment (collective and individual)

The parties involved in LGWM cross-agency work on urban development have reaffirmed their commitment to continue working together to progress the urban development opportunity.

Collectively, the parties will:

- Advance LGWM as a regional priority, supporting the work occurring through the Wellington Regional Leadership Committee on Complex Development Opportunities (CDOs), noting that the LGWM Courtenay to Newtown section of the corridor has been confirmed as one of seven regional CDOs
- Support public announcements on the preferred MRT option
- Contribute resources (staff, expertise, funding) to a working group to develop a Corridor Development Plan throughout 2022 and associated business case for urban development
- Continue to partner to advance the LGWM urban development mahi at LGWM Board, Urban Development Steering Group and Working Group levels including on developing a proposal for a Specified Development Project (SDP) under the Urban Development Act.

There are a number of actions/commitments sitting with individual organisations in support of LGWM urban development mahi, including for example:

- For Wellington City Council: notify the Proposed District Plan, including giving effect to the NPS-UD and MDRS (and varying the District Plan as MRT stops are confirmed) and ongoing work associated with redevelopment of WCC sites, Te Kāinga and Community Housing Provider opportunities
- For Greater Wellington Regional Council: Varying the RLTP to include MRT stops when confirmed.
- Kāinga Ora – with the LGWM partners will (where appropriate) align and share investigations and studies that the parties are commissioning in Central Wellington to avoid duplication and replication of work in supporting the Corridor Development Plan and work on an SDP proposal.
- Ministry of Housing and Urban Development – provide strategic and policy input into the development of the business case for the MRT corridor with a particular focus on the urban development tools and affordable housing opportunities



Peer Review Cover Note

Date: 10 June 2022

Subject: Preferred Programme Options Report Peer Review

Purpose

This note provides a very brief summary of the Peer Review process undertaken on the Preferred Programme Options Report (PPOR).

Peer Review Process

s 9(2)(a) from Alchimie was commissioned to provide a peer review of the Preferred Programme Option Report and appendices in April 2022. s 9(2)(a) is a very experienced practitioner and peer reviewer and has peer reviewed many previous LGWM reports.

The peer review was undertaken on behalf of the Let's Get Wellington Moving Partners. The peer review followed the Waka Kotahi requirements and included conclusions based on the information reviewed, and recommendations about further work that should be undertaken.

The peer review report was undertaken on the draft PPOR report issued on 28 April 2022. s 9(2)(a) had provided comment on an earlier draft and also attended a number of meetings between the authors, programme team and partner technical advisory group (TAG) members to help inform his knowledge of the project, process and any particular concerns from the partners.

The peer review report was issued on 5 May 2022. This is included as Appendix A.

All comments on the peer review were entered into a tracking table and a response to each individual comment was prepared by the report authors. This was shared with the peer reviewer and a meeting was held to further clarify the comments and responses. s 9(2)(a) subsequently added further responses to enable all comments to be closed out appropriately. This table is included as Appendix B.

Peer Review Outcome

In summary all comments have been closed out to the satisfaction of the programme team, the authors and the peer reviewer.

This has been done in a number of ways:

- Noting the comment without any further action being needed
- Agreeing to the comment and making changes to the PPOR or appendices
- Agreeing to the comment but noting that it will be addressed in the combined MRT/SHI Indicative Business Case later in 2022.

Attachment 6 to Report 22.227

- Agreeing to the comment but noting that it will need to be investigated further in the Transformational Programme Detailed Business Case (DBC) which is currently being scoped.

There were no fundamental disagreements between the parties.

Key Conclusions

Overall, the peer reviewer acknowledged the conclusions of the PPOR are understandable but recommends that further work is undertaken in the DBC to confirm the approach, particularly due to the current uncertainties around the level of housing intensification that could be achieved. He also noted that further work will be required in the IBC and DBC stages on risk management to ensure that the programme can be delivered successfully.

The report authors and programme team agree with these comments and are ensuring the future phases are appropriately scoped to include these elements.

Adam Nicholls

Technical Director
Let's Get Wellington Moving





Preferred Programme Option Report Peer Review Report

Let's Get Wellington Moving

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1. Introduction

This Peer Review Report contains comments and conclusions about the LGWM Preferred Option Report (PPOR) issued on 28th April 2022, together with the updated Programme Level Carbon Considerations for Let's Get Wellington Moving and Economics Technical Report: Strategic CBA Review dated 29th April 2022.

Reference was also made to several supporting documents available as part of the public engagement process earlier this year, as noted in the reference document list in Section 6.

The Peer Review has been undertaken on behalf of the Let's Get Wellington Moving Partners, Wellington City Council, Greater Wellington Regional Council and Waka Kotahi. The format of this review has followed the Waka Kotahi requirements for peer reviews. It includes conclusions based on the information reviewed, and recommendations about further work that should be undertaken before a decision about a preferred programme option is reached.

2. Summary of Peer Review Findings

The scale of the LGWM programme is such that it will be the most significant transformational programme in Wellington for at least a generation. The critical parameters that inform the choice of preferred programme option start from the scale and location of residential development and employment opportunities within the city. **The decision around the preferred programme is, therefore, a decision about what the future urban form of Wellington will be**, all as part of bringing to fruition the vision of "a great harbour city".

The PPOR currently concludes that *"The preferred option that should be progressed to detailed business case is a High Capacity Mass Transit solution with a new tunnel through Mt Victoria and improvements at the Basin Reserve. This is consistent with Option 1 but is recognises that BRT could provide similar outcomes to LRT if designed properly."*

Based on the considerable volume of data and assessments to date, this conclusion is understandable, given the level of knowledge and confidence around several key questions, including:

- Acceptance that a significantly intensified land use scenario for Wellington City is appropriate, realistic and achievable (in terms of community acceptance, consenting, demand and funding).
- Appreciation of the risks related to the forecast patronage for the intensified land use scenario (including mode shift, integration with the regional transport network, service quality, etc)
- Understanding of the potential for BRT to adequately serve an intensified land use scenario

However, it is the conclusion of this Peer Review, that given the current uncertainty around the scale of land use intensification and relatively small differences between the performance of options in the MCA, further work will be required in the DBC to confirm a preferred programme option. This work should include identifying how the preferred option will respond to the key questions above.

Investment in transport system infrastructure should be based on desired outcomes; an omission from the current document is a clear description of the outcomes sought from the LGWM Programme, i.e.,



what outcomes are sought from the programme objectives. This omission should be rectified as quickly as possible and should be clearly shown in the comparison of programme option performance.

The report needs to include a holistic assessment of programme risk. This topic should be given careful consideration in determining a preferred programme, given the scale, complexity and potential consequences of getting it wrong. The key programme risks could be expected to include:

- Urban Development and land use scenario - is it realistic, is it viable?
- changing Government Policy over the next several years during which the programme will be implemented
- cost escalation
- patronage forecasting
- technological developments
- failing to meet programme objectives

Each of these risks should be quantified as far as possible, in terms of probability and potential consequences to schedule and cost. Each risk should also have an outline mitigation strategy, so that decision makers can be confident that key risks can be appropriately managed through the development process.

3. Detailed Comments / Observations on PPOR Sections

3.1 PPOR Structure

The structure and content of the PPOR enables the reader to gain a good appreciation of the assessments of programme options, the evidence informing the assessments and the logic behind the conclusions. **However, the report conveys a strong focus on transport solutions, without giving priority to the underpinning Urban Development narrative and the desired outcomes system interventions should achieve.** This point needs to be addressed for decision makers and the wider PPOR audience.

3.2 Introduction (Section 1)

Section 1.2, Figure 1 does not really appear to be Preferred Programme Option Assessment Criteria. A more accurate description would be “key inputs used in the programme assessment process”.

3.3 Strategic Context (Section 2)

Section 2.6, Why LGWM Matters in the Regional Context includes forecast population and employment growth data. Given the importance of land use and urban development to the LGWM programme, extracts including diagrams and tables from the Urban Development Summary could be useful, although it is understood that the latest City Council data are currently being updated.



3.4 Work Completed to Date (Section 3)

Section 3 illustrates the development of transport improvement packages since 2018 (**Figure 3**). The narrative should also highlight key steps in urban development, including progress on the Spatial Plan and updating the WCC District Plan, to demonstrate how these mutually informing workstreams have progressed. The narrative should also highlight the key factors which led to the latest programme objectives, and their respective weightings. Given the importance of understanding the trade-offs involved with selecting a preferred programme, it is important that decision makers fully understand the relative weightings for each of these objectives, their implications for the future Wellington Urban Landform and the Regional Transport System.

3.5 Development of Programme Options (Section 4)

Prior to describing programme option development in **Section 4** (which might better be described as development and assessment of programme options), the narrative should discuss the investment objectives which flow from the problem statements. Investment in transport system infrastructure should be based on desired outcomes rather than outputs, as derived from the programme objectives. There should also be a discussion about how programme options were developed in response to the outcomes sought from investment in the transport system.

The text states that the option performance against project objectives will be presented in traffic light coloured tables; **are these the tables in Section 8?** If so, that should be stated, **OR** the reader should be directed to where they can be found.

The narrative explains how a decision on a preferred programme option will be determined (**page 12**). This is a crucial part of the report and would better fit under its own heading, as it clearly goes beyond option development. Text in **Section 4 (page 12)** states that:

"The preferred option will be the one that best achieves the vision for Wellington, whilst providing value for money. It will be the option where any outstanding risks (such as uncertainties, costs, environmental effects) can be appropriately managed."

The narrative then notes that while Multi Criteria Assessments (MCAs) have been used to understand option performance, it is not proposed to use MCAs to decide on a preferred programme option because there are only a few significant differentiators. At the bottom of page 12, there is a list of questions which are relevant to the choice of a preferred programme, which have emerged from a range of sources. **Have the Board indicated these are the key questions THEY want to determine a preferred programme option?**

Section 4 should provide clear advice to decision makers about the key factors and determinants for deciding a preferred option. Urban development, consentability, funding, delivery timeframe and risk are all factors that should feature in this discussion (noting they are implied indirectly through reference to the earlier MCA assessments).



3.6 Programme Options (Section 5)

Section 5 highlights the key features of each of the shortlisted programmes, which appear to be same options from the PASLO report. It would be helpful to confirm this is correct.

The Programme Option Summary in **Figure 6** show the four shortlisted programme options. Titles for each of these options should be revised for clarity and should clearly distinguish between the key features of each programme. Also, the key defining the proposed interventions needs to be reviewed; for example, the distinction between new and existing tunnel is hard to read.

Questions or comments on each of the options shown in figure 6 are as follows:

Option 1:

- Who would be able to use the new Mt. Victoria Tunnel? The text isn't clear whether it will be available for general traffic.
- Will the current HAITAITAI bus tunnel remain in its current configuration?
- What is proposed for the Terrace Tunnel?
- What does "bus priority where needed", extended down to Wellington Airport, look like?

Option 2:

All relevant comments from Option 1 plus the following:

- What is the distinction between Bus Rapid Transit and Bus Priority shown on Option 1 east of Mount Victoria Tunnel?
- Why does this option have Bus Rapid Transit to the airport, but not Option 1?

Option 3:

- Is the key difference between this option and Option 1 the location of the new Mt Victoria tunnel?

Option 4:

- Is the lack of grade separation at the Basin Reserve which forces the LRT route to use Taranaki Street?

General:

- Are there opportunities to take the best elements of these four programmes and combine them into a fifth option?

3.7 Outcomes from Community Engagement (Section 6)

Section 6 describes findings from the recent community engagement process and views about the key issues about travelling in Wellington. The feedback obtained included methods and outcomes to address current deficiencies in the system; for example, reliable public transport emerged as a key theme and light rail emerged as a preference to BRT. It isn't clear from the narrative how this information was obtained, given that comparison of different modes is complex. There is an inference some of the responses may have resulted from misunderstandings about what is proposed.



For the purposes of confirming a preferred programme, it is suggested that **the focus should be on community feedback about preferred network outcomes**. This would avoid any misunderstanding which may have arisen around future passenger transport solutions.

There is mention of feedback from over 40 different stakeholders whose comments have been considered. How has this feedback influenced the assessment outcome?

Section 6.1 Online Panel Survey describes a 10 minute survey of a large group of Wellingtonians, and states that the panel had some very similar thoughts to the public. However, the responses presented in Figure 8 differ in some respects, notably easier to get to key destinations like the airport or hospital and reducing carbon emissions.

3.8 Technical Assessments (Section 7)

Section 7.1 describes the different land use scenarios which have been used in the technical assessments which follow. The narrative would benefit from some clarification, as follows:

- What is the purpose for the four different levels of “development capacity” described on **page 19**? It isn’t clear how they relate to the land use scenarios developed by LGWM and used in the subsequent assessments of programme options.
- **What land use scenario has been used for the “do minimum” scenario?** This is a crucial factor, to give decision makers an appreciation of the difference between the do minimum and programme options.
- Over what period would the projected growth across the city occur? Would there be a lag between enabling this level of development and it becoming operational (delivering patronage, etc)?
- Is the relationship between the different scenarios linear?
- Does the Core Development Scenario reflect the current Wellington City Council Spatial Plan? It is defined as “business as usual growth with the level of development distribution agreed in November 2019” but the terminology changes frequently through the document. The same terminology should be used throughout.
- **Figure 9** suggests that with the intensified forecast population (should be number of households), the absolute number of households along the MRT corridors would double. Presumably this is across both the southern and eastern corridors? Did the capacity analysis prepared by the Property Group in January 2021 confirm this is a realistic scenario (i.e., the realisable capacity (demand))?
- **Table 2** indicates growth in the Eastern Corridor will be significantly smaller than the Southern Corridor, with the difference between the Eastern Core and Intensified scenarios being 1,000 dwellings (12.5% and 20% compared to existing, respectively). Does this imply that options which go to the east are less likely to attract additional patronage?
- Is there a reason why the intensified, UDS – BRT and UDS LRT scenarios for the eastern corridor are the same?



Section 7.2.1 describes the updated mode share analysis from the updated transport modelling, which shows increased PT patronage from additional residential development, which is to be expected. **Figure 10** suggests that 2046 car mode share achieved by options one to four inclusive for are about the same, at about 15% - 20% less than the do minimum. **This would indicate that all the options (including Option 1 with the intensified land use scenario) will reduce VKT to a similar degree. Presumably this has an influence on the carbon analysis, which should be discussed given this is a key outcome sought by the programme.**

Section 7.2.2, Figure 11 shows predicted PT patronage. The distinction between the dark and light blue colours labelled on the histogram as high and low should be explained. **Figure 12** shows similar metrics for the Eastern Corridor, which also shows a significant increase above the do minimum. **This is slightly surprising given that the difference in the number of households in both scenarios are not as substantial as for the Southern Corridor.**

A key point from this analysis is that the PT network capacity to the Eastern Suburbs will need to be increased above its current capacity, sometime between 2036 and 2046, from which it is concluded that a new bus tunnel will be needed. **This is an argument in support of options which include this feature.**

Section 7.2.3 describes the latest accessibility modelling. It isn't clear why accessibility to the airport has been taken to be a key metric for this attribute, when it isn't intended to significantly enhance PT access to the airport with any option. It may be more informative to show the respective performance of the options by assessing the number of people living within a certain travel time of the City Centre.

Section 7.2.4 describes how AIMSUN modelling shows the need for grade separation at the Basin Reserve to realise the benefits of a new Mt. Victoria Tunnel. **The linkage between these two interventions should be further stressed, to highlight the significance of these components for programme performance.** It would be easier to present travel time changes in minutes and for completeness, show the change in travel time for the Station to Island Bay journey.

Section 7.3 outlines the programme option costs with a breakdown of each of the four options shown on **Table 5**. Detailed cost estimates were not provided for review, so it is not possible to comment in detail about these estimates. However, it would be expected that the difference between the smallest and largest options 4 – 1 (noting that the table heading has Option 3 listed twice) would be greater. Why are the costs for the MRT improvements to the east greater for options 2,3 and 4 compared to Option 1? **These points should be checked urgently.** Other questions about this section include:

- Will separate packages such as City Streets etc have separate funding from the main elements of the programme?
- have the benefits of City Streets and other packages been considered, or they are they all now rolled into one economic assessment?
- Are these estimates P95 level (text on page 28 suggests they are)? How do they relate to the risk assessment? Are the risks between options different?
- **The affordability threshold is \$7.4 billion which is just above the whole of life cost (WOLC) for Option 1. What are the implications if predicted costs increase above this amount? Would it change a decision about a preferred option?**



Section 7.4 updates the Programme Economic Analysis, based on the Economics Technical Report (reviewed below). **Figure 15** shows monetised benefits for each of the four options with the core land use scenario and Option 1 (only) with the intensified land use scenario. With the intensified model the level of benefits almost doubles for Option 1 between intensified and core land use. Would other options see a similar increase, if the option had sufficient capacity (or could be modified to suit) the intensified scenario?

The information in **Figure 15** is worthy of more discussion. For example, what influences the relative option performance for private vehicle travel time savings, safety, health benefits, etc? Agglomeration is a key benefit of Option 1, but there is little information about the composition and nature of these benefits. **While some of these benefit outcomes appear to be intuitive, some aren't and need some further explanation, particularly to distinguish between options. Table 6 is easier to understand and may be a preferable way to preface the narrative, noting that the dimensions and scale of the numbers shown should be confirmed, i.e., NPV values, millions, etc.**

The discussion of the results on page 30 includes the economic performance range of options 1,2 and 4 with the intensified land use scenario. Option 1 has the greatest benefit range, although not by a large degree. A critical statement at the end of paragraph 2 is that **"Nevertheless, it does highlight the importance of high levels of intensification to achieve a BCR above one"**. **This statement should inform the conclusions about the choice of a preferred option.**

The first four bullet points in **Section 7.5** summarise the updated carbon analysis and states that total regional emissions would reduce by a total of 7% with the intensified (land use) scenario. It also states that the VKT production for Wellington city would change by 1.5%. It isn't immediately obvious how the statements link to what follows. The last sentence of the fourth bullet point, about a higher proportion of growth taking place in the city, needs to be explained further.

Figure 16 shows important results from updated carbon analysis, which shows that the maximum of carbon emission reduction for the programme would be around about 4.2% by 2075, with the intensified land use scenario, 2075. Contrary to the second bullet on page 30, Figure 16 also shows that greater carbon emissions would be achieved by Option 4 than Option 1, presumably because less construction is involved. Neither option shows a net reduction in carbon emissions until 2045.

Given that reducing carbon emissions is the highest weighted programme objective, an obvious question would be what other interventions would be more effective? Clearly other interventions need to be considered, if the city and the Region are to achieve their carbon reduction goals. **Also, as carbon reduction is the highest weighted objective for the programme, it would be prudent to continue to evaluate Options 3 and 4, which have better performance in this regard, before selecting a preferred option.**



3.9 Programme Options Analysis (Section 8)

Section 8 summarises the programme objectives analysis. Key observations are as follows:

- The “do minimum” option is stated to mean there would be “no changes in Wellington”. **It is important to clarify what this means in terms of land use assumptions, committed changes to the regional transport network (i.e., rail upgrade package, etc).**
- **Third bullet on page 34** states that options 1,2 and 4 received the highest scores for carbon emission reductions. However, figure 16 shows Option 4 performs better than Option 1, albeit to a minor degree. It would help to explain this decision further, and what consideration led to a lower score for Option 3.
- **Table 8 highlights the land use scenario as the key factor influencing the best performing programme option, which switches from Option 2 to Option 1 with the intensified land use scenario.**
- The text beneath **Table 8** states that the relative scores reflect the assumed characteristics of MRT in Option 1, namely the highest level of capacity and quality to the south and a significant improvement to the east. **Surely Option 2 would be considered to have better access to the east, given the distinction between bus rapid transit (Option 2) and bus priority (Option 1).**

3.10 Updated Analysis Summary (Section 9)

Section 9 brings together conclusions based on the analysis described in Section 8, which are summarised in four bullet points at the **top of page 38**. Comments in respect of each of these points are as follows:

- The analysis provides strong evidence that land use along the MRT corridors is a key part of the investment story.
- Evidence provided in this report (i.e., figure 6) appears to contradict the statement about intensification better delivering on carbon and mode share objectives.
- the range of BCRs is similar across the options. Given the range and nature of the uncertainties related to key factors in the analysis, including a preferred land use scenario, **it may be too soon to state which programme would achieve the highest BCR**
- the degree of intensification **will** influence the choice of MRT technology. However, this is a separate issue in the context of when a decision about specifications and characteristics will be made.
- Regarding the public responding positively to intensification, was the engagement process designed to obtain feedback with sufficient confidence to support this statement, which would stand scrutiny? For example, to what extent did the public appreciate the scale and intent of the intensified land use scenario, given that the public engagement process was designed around the transport programme?



3.11 Other Key Questions (Section 10)

Section 10 addresses other key questions that have arisen from a variety of sources, including the public engagement process. Observations on each of these points follows below (other than those covered previously):

Form of MRT: The distinction between rail based and road based transit systems should draw on the conclusions of the Mode Option Report. It is understood that work is continuing to assess the relative merits of these modes, but as the technology advances the distinction between these two systems is becoming blurred. Whichever option is chosen as preferred; **it is essential that the system design, development and optimisation processes determine the final form and specifications for the preferred MRT solution.**

Why does MRT not go to the airport? it would be worthwhile to amplify the point by restating what appears in earlier reports about passenger demand to the airport, as part of prioritising access to residential areas and the CBD.

Are large scale or minor improvements preferred at the Basin Reserve? The narrative would benefit from more explanation about the constraints affecting access to the east if grade separation is not provided. It should also highlight why LRT options would be constrained to Taranaki Street rather than Cambridge / Kent Terrace. The narrative should also use consistent terminology; for example, the conclusion discusses the Arras Tunnel Extension although the section heading is Basin Reserve.

Is a new Mt Victoria tunnel needed? In the description of the two alternatives under consideration the text is confusing about the new tunnel configuration, including whether lanes for general traffic will be provided or retained in the existing tunnel. The functionality of the existing Haitaitai Bus Tunnel should be included to complete the picture. The discussion in the table at the bottom of **page 47** is based on the intensified land use scenario only. What are the implications of a less intense land use scenario?

How will the projected Urban Development be achieved? This narrative is an important component of the overall urban development story. It suggests that the current Spatial Plan anticipates 10,000 new households rather than 16,000 as stated in the text, which in turn implies that the difference between the intensified scenario and the spatial plan number is 16,000 new households. This point should be clarified in the narrative.

Section 10.4.2 notes the need for other infrastructure upgrades to accommodate the Spatial Plan and the intensified land use scenario. There is no discussion about the scale, complexity and cost implications related to these upgrades. **To what extent (if any) has this been considered in the options analysis?**

Section 10.4.4 discusses growth elsewhere in the region. It states that the intensified scenario will better deliver on the regional 2050 climate change targets. Information presented earlier in the report suggests that the timing and scale of development will struggle to meet these targets, so other interventions will be needed to achieve them. This topic requires more investigation and presumably is being considered at a regional level. At this point it would be fairer to say that all the options will contribute to those targets, but the preferred option should complement other interventions that will be required.



Integration with the wider transport system: It is surprising that this factor has received less attention in the narrative. Most trips into the city are from the north. The potential to extend an LRT network would be very limited. The extent to which access for the wider region into the city area has been considered in the option assessment is unclear but given that the actual land use scenario may change over time, flexibility in the system coverage would be beneficial. In this regard, Option 2 has advantages over Option 1. The text should include a holistic view about how the programme will integrate with the Regional Transport System, including how the options could be extended if possible or will connect to existing (or future) systems beyond the geographic limits of the programmes.

Are parking levies or congestion charging proposed? Section 10.6 indicates that a congestion charge would reduce traffic entering the city and increase PT patronage by over 2000 per hour. **If a congestion charge was introduced with any of the MRT options, what would that do in terms of performance, especially in regard of carbon emissions and economics?**

3.12 Uncertainties and Risk (Section 11)

Section 11 includes a qualitative discussion on these topics; there is no information about the scale of risk in terms of time, cost and other consequences. It does not appear to address the fundamental drivers which might affect the items highlighted, for example the factors which would influence the actual land use that will eventuate over the next decades (viability, demand, etc). Nor are there any strategic mitigation strategies to manage these key factors. While the text is helpful to identify some of the key programme risks, it is considered that there is insufficient information here to provide confidence to decision makers around the scale of the risks that may eventuate and their potential impact on the success of implementing a preferred programme. **This matter needs to be addressed urgently.**

3.13 Selecting the Preferred Programme Option (Section 12)

Section 12 summarises the key factors from the option analysis described previously and notes that the preferred programme options from the MCA analysis were Options 1 and 2. Observations and comments on the points made in this section of the report are as follows (noting only matters not previously covered):

High intensity Land Use. There are several matters that need consideration before a preferred programme option can be confirmed, including:

- The need to accept that a significantly intensified land use scenario for Wellington City is appropriate, realistic and achievable (in terms of community acceptance, consenting, demand and funding).
- That the consequential patronage forecasts for the intensified land use scenario will eventuate (including mode shift, integration with the regional transport network, service quality)
- That BRT would have insufficient capacity to service the actual patronage that will result from the LGWM programme (including infrastructure, vehicle performance, operational constraints).



Taken together, the question is whether there is sufficient information at this time to allow decision makers to form a view about these issues?

The carbon analysis for Option 4 shows that it was overall the better performing option of the four options considered. It also has the lowest cost. **Given that carbon reduction has the highest weighting for the programme, these factors suggests that Option 4 should not be discarded at this stage.**

3.14 The Preferred Programme Option (Section 13)

Section 13 states that:

“The preferred programme option that should be progressed through to detailed business case is a High Capacity Mass Transit solution with a new tunnel through Mt Victoria and improvements at the Basin Reserve. This is consistent with Option 1 but recognises that BRT could provide similar outcomes if designed properly”. **Given the previous narrative and the assessments described in the PPOR, THIS CONCLUSION APPEARS TO BE SOUND. However, a question which remains is whether Options 3 and 4 should be discarded at this stage, particularly as Option 4 scores well for carbon reduction performance and is the lowest cost to implement.**

From a superficial inspection, it may be possible for Option 3 to be developed as a first stage of either options 1 and 2, i.e., the system might be extended to either options 1 or 2 if land use reached the scale anticipated by the intensified scenario or other factors related to the implementation of the project.

Section 14 sets out how the programme will be delivered. This section has yet to be carefully investigated but a critical factor should be **providing greater certainty and confidence around the preferred land use scenario, to complement a preferred LGWM transport programme.** This report highlights the dependency of one upon another and therefore these factors need to be determined hand in hand. To that end the key questions for the DBC should be carefully considered including a time frame for implementation, recognising the constraints that will prevail with respect to the formal adoption of the WCC District Plan over the next few years.

4. PPOR Supporting Reports

This section includes comments on the supporting documents for the PPOR. This part of the review has focused on high level issues, rather than a detailed review of each document.

4.1 Preferred Option Report – Modelling Appendix

Section 2 summarises the full programme options. Terminology should be consistent with other reports, for example the reference to bus capacity as distinct from Bus Rapid Transit or Enhanced Bus. The land use scenarios used in the assessment also need to be checked for consistency between reports.

Section 3 outlines recent modifications to improve model performance. It would be helpful to clarify the basis for making these changes, for example travel time surveys, capacity measurements, etc. It would also be helpful to include reference to validation processes undertaken to demonstrate how these changes have improved model performance, to provide greater confidence in the model outputs.



In general, the text uses the future tense, which implies that these modifications have yet to be made. It is important to clarify if this is the case, or if the results presented in the PPOR have taken these changes into account. It would also be helpful to include statements clarifying the materiality of changes to travel demand made recently and the implications for each of the four programme options.

For active modes, the report states changes have been made by considering additional information about the nature of planned development along the corridors. Is it now assumed that there will be additional road space available for dedicated cycle lanes across more sections of the transport network? Has the cost of these changes (property acquisition?) been reflected in the economic assessment?

How has the different land use assumptions been used to develop the adjustments for the Active Travel Sector to Sector Mode Specific Constants **shown in Table 1?**

What is the basis for the amended car ownership rate adjustments **in Table 2?**

Table 3 illustrates changes to population and employment assumptions for the intensified land use scenario. These need to be checked for consistency with work currently underway on the urban development summary. Table 3 also suggests that population and employment growth in the eastern suburbs has significantly reduced but has increased in Island Bay and CBD / Te Aro. Does this change reflect the intensified land use anticipated with light rail (as distinct from BRT)? if not what factor or factors have influenced this change?

Section 3 concludes with a statement about PT investment which needs to be amended for clarity. MRT could stimulate faster population and economic growth on the MRT corridor but would need to be taken together with other factors that will influence the speed of intensification, including national and regional economic factors.

Section 3 would benefit from a summary about which modelling assumptions will require legislative or policy changes, so that the decision makers understand the implications arising from the modelling outputs.

The modelling approach outlined in **Section 4** needs clarification. Why does Step 2 involve the AIMSUN model again after step one? What is the feedback from the strategic model? When will step three be undertaken?

Section 5 highlights the distinction between strategic and AIMSUN (microsimulation) modelling. If the purpose of microsimulation is to make the strategic model more faithfully reflect the difference between the options, this should be expressly stated.

Table 4 summarises which of the output metrics from the models have been used in the programme option assessment. Interesting to note that pedestrian level of service is not considered a differentiator between the programme options.

Section 6 covers the key points which emerged from the most recent modelling. This is helpful as the full results presented in the appendices A and B are very long. It would be helpful to structure the discussion in the order of the attributes summarised in table 4.

The document needs a description of the do minimum and / or reference cases used in the transport modelling. **Decision makers need to understand what assumptions have been made about the do**



minimum, including other parts of the LGWM Programme, the regional rail package, travel demand interventions and other significant interventions which are committed or planned that may have a significant impact on the performance of the transport system.

The Summary Table of Key Metrics on pages 21 and 22 (table number needed) highlights the key transport differentiators between Options 1 and 4. The discussion should be expanded, if only in a qualitative sense, to highlight key differentiators between these two options AND between options 2 and 3, so that the merits of ALL FOUR programme options can be understood.

4.2 LGWM Carbon Analysis Update for May 2022

Page 4 paragraphs 2 and 3 cite regional and City Council targets for reduced emissions. Wellington City is committed to a 57% reduction in emissions by 2030. **These targets suggest that programme options that will significantly reduce emissions quickly would be preferred.**

Figure 2 shows the predicted rate of carbon emission reductions for light vehicles. It is slightly misleading in that half of the X axis relates to historic levels (pre 2022) when electric vehicles were not generally available. It may be helpful to relate this figure back to the VKT metrics in Figure 1, to get a better appreciation of the scale of the problem. It is also important to include the references for this information.

Figures 4 and 5 show the impact of programme options on carbon reduction. Option 4 is shown to reduce emissions more than Option 1 and more quickly, although the difference appears to be minor in the context of regional emissions. Table 2 confirms this summary although it isn't clear what assumptions have been used regarding the timeframe for land use intensification. **This is a critical conclusion, considering that this is the highest weighted attribute in the programme objectives.**

The Comparative Cities Analysis on **page 14** highlights the potential for change in locations with high non-car mode share. It isn't clear from the narrative how the introduction of a specific MRT intervention contributed to the overall results, although presumably it would be a significant factor.

The report conclusion on page 15 is that the main difference between the options relates to embodied CO2 emissions from construction. Option 1 involves more construction, therefore will involve more construction emissions. However, the narrative explains that in the longer run the operational emissions from Option 1 would be less than Option 4, assuming it attracts greater patronage. **How has this statement been taken regarding the overall assessment of option performance informing the recommendation for a preferred programme option?**

4.3 LGWM Strategic CBA Review Annex – draft version 0.3 4 April 2022

The comments below are of a general nature related to how they inform the PPOR and the decision about a preferred programme.

The **final paragraph of section 3.2** discusses impacts explored by EY and where some impacts have been excluded from "core" CBA results. It isn't clear what this exclusion relates to; presumably standard Waka



Kotahi procedures for assessment of the economic performance of each programme option have been adopted?

Section 4 para 3 states that Option 3 did not have an economic evaluation because it scored lowest against the programme objectives in the MCA. Decision makers may want to understand the economic performance of this option if they want to consider alternatives to the recommendation in the PPOR. Is it possible to provide a commentary on the likely range of BCRs for this option?

Table 4.1 highlights the general parameters and assumptions in the CBA. The project opening year is stated to be 2031. **Is this assumption reasonable for all four programmes?**

In **table 4.2** Option 2 it states that for the high land use scenario an adjustment was made to reflect reduced potential for stimulating urban intensification compared to Option 1. What adjustment was made and how was it determined? There is also a comment that the outputs for the HLU scenario have been revised downwards by 20%. Specifically which outputs are referred to?

Table 4.3 outlines the economic performance of three programme options. The BCR values excluding agglomeration show the options are broadly similar to values derived in earlier programme analysis in the range of 0.46 to 0.53. Agglomeration values to add significantly to these values. **Do the BCRs quoted in the main report INCLUDE forecast land value uplifts for each option? If not, how will this factor be considered?**

The assessed safety benefits in **table 4.3** appear to be low. Given that safety is one of the five core programme objectives, this is disappointing: currently they represent less than 5% of the total benefit stream.

Tables 4.3 and 4.4 set out the preliminary CBA results for the core and high land use scenario. Do the costs include funding that would be required to service the higher land use scenario? This could be an important point, although the infrastructure costs for the higher land use scenario may come from separate funding. **The agglomeration benefits are high by comparison with other benefit streams, so it is important to understand what they represent. It may also use be useful to explain the health benefits for additional walking trips as these benefits are also high.**

Section 6.1 outlines the importance of the do minimum. It is not clear what has been agreed to be the do minimum case (also see comment related to the modelling report). Have the do minimum and the reference case previously defined (2020) been amended for the latest analysis?

Section 6.2 covers high population growth in New Zealand and how historic forecasts underestimated the rate of population growth. It isn't clear what the purpose of this text is other than to highlight to decision's makers something which may underpin population growth and by extension, patronage forecasts.

Section 6.4 discusses wider economic benefits (WEBS), but the narrative is unclear about what assessment was made for the programme options. Where uplifted land values included in the assessment? **These points need to be clarified for the decision makers.**

Section 6.4.1 argues in favour of adopting dynamic land use analysis to assess the benefits of the LGWM Programme. In principle, this is a good approach, given the scale and potential impact of a transport intervention of this scale in the region. However as noted in the report, this would take time to



complete. For an IBC the approach adopted is pragmatic and gives a reasonable forecast of the land use and transport interactions to allow a comparison of the relative performance of each of the four programme options.

Sections 7 and 8 outline how the economic assessment could be improved. These ideas could be useful, but they are unlikely to provide additional information to help distinguish between the four options presented in the PPPOR within a short timeframe. **Therefore, it is concluded that subsequent stages of the business case development should carefully consider these and other potential enhancements to the economic assessment methodology, which would need to be agreed with potential investors, Programme Partners and key stakeholders before progressing, given the complexity and effort required.**

Section 9 discusses the completed sensitivity analysis in the economic assessment and concludes that, the mode specific preferences, inflation forecasts and population projections are reasonably sound for the purposes of comparing the programme options. **Section 9.4** discusses some of the technicalities related to the transport modelling system, but it isn't quite clear what is critical with respect to the difference between the Wellington and Auckland models. A separate response about this point should be sought from the transport modelling team as to whether (or not) this issue is material to the results of this evaluation.

5. Conclusions and Recommendations

The critical parameters that inform the choice of preferred programme option start from the scale and location of residential development and employment opportunities within the city. The decision around the preferred programme is, therefore, a decision about what the future urban form of Wellington will be, all as part of bringing to fruition the vision of “a great harbour city”.

The PPOR currently concludes that *“The preferred option that should be progressed to detailed business case is a High-Capacity Mass Transit solution with a new tunnel through Mt Victoria and improvements at the Basin Reserve. This is consistent with Option 1 but is recognises that BRT could provide similar outcomes to LRT if designed properly.”*

Based on the considerable volume of data and assessments to date, this conclusion is understandable, given the level of knowledge and confidence around several key questions, including:

- Acceptance that a significantly intensified land use scenario for Wellington City is appropriate, realistic and achievable (in terms of community acceptance, consenting, demand and funding).
- Appreciation of the risks related to the forecast patronage for the intensified land use scenario (including mode shift, integration with the regional transport network, service quality, etc))
- Understanding of the potential for BRT to adequately serve an intensified land use scenario

However, it is the conclusion of this Peer Review, that given the current uncertainty around the scale of land use intensification and relatively small differences between the performance of options in the MCA, further work will be required in the DBC to confirm a preferred programme option. This work should include identifying how the preferred option will respond to the key questions above.



As the main reference document, **the PPOR needs to provide clear advice** about the key factors and determinants for deciding a preferred option. Urban development, consentability, funding, delivery timeframe and risk are all factors that should feature in this report, alongside the comprehensive assessment of transport system performance for each of the options.

The narrative should discuss the **investment objectives** which flow from the problem statements described early in the report. Investment in transport system infrastructure should be based on desired outcomes; a key omission from the document is a description of the outcomes sought from the LGWM Programme. This omission should be rectified as quickly as possible and should be included in the comparison of programme option performance.

Carbon reduction is the highest weighted objective of the LGWM Programme and the narrative states that any of the options would achieve a small reduction in total transport carbon emissions in Wellington. Therefore, other interventions should be considered, which may have more impact than the programme options presented here, either alone or working in combination with the options presented here. This will be an important point for decision makers.

The report needs to include a holistic assessment of programme risk. This topic should be given careful consideration in determining a preferred programme, given the scale, complexity and potential consequences of getting it wrong. The key programme risks could be expected to include:

- Urban Development and land use scenario - is it realistic, is it viable?
- changing Government Policy over the next several years during which the programme will be implemented
- cost escalation
- patronage forecasting
- technological developments
- failing to meet programme objectives

Each of these risks should be quantified as far as possible, in terms of probability and potential consequences to schedule and cost. Each risk should also have an outline mitigation strategy, so that decision makers can be confident that key risks can be appropriately managed through the development process.

s 9(2)(a)

5th May 2022

LGWM PPOR Peer Review Report PEER REVIEWER RESPONSE TO THE REPORT TEAM – 24th May 2022

Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
Summary of Peer Review Findings			
<p>However, it is the conclusion of this Peer Review, that given the current uncertainty around the scale of land use intensification and relatively small differences between the performance of options in the MCA, further work will be required in the DBC to confirm a preferred programme option. This work should include identifying how the preferred option will respond to the key questions above.</p>	<p>Agreed – more work will be required at the DBC stage to confirm the specifics of the preferred option. However, the work undertaken to date has identified an indicative preferred option which will form the basis for the DBC</p>	<p>Noted. An observation would be that the indicative preferred option in the PPOR is based upon the assessment related to the intensified land use scenario. On the assumption that the Programme Partners agree that this is the basis upon which the DBC should proceed, the report team response is appropriate, noting that the further work required at the DBC stage should include updating the key performance parameters of other options, to confirm that the conclusion about a preferred option for the LGWM Programme remains sound. If, for any reason, it is subsequently determined that an alternative land use scenario is more appropriate, then the preferred option recommendation may need to be reassessed.</p>	<p>To be done in DBC (once the Proposed Land Use Scenario is agreed during the DBC, options will be retested).</p>
<p>Investment in transport system infrastructure should be based on desired outcomes; an omission from the current document is a clear description of the outcomes sought from the LGWM Programme, i.e., what outcomes are sought from the programme objectives. This omission should be rectified as quickly as possible and should be clearly shown in the comparison of programme option performance.</p>	<p>This is indicating that targets should be specified – the project made a decision not to specify targets at an earlier stage. Achievement of IOs, as much as possible is provided in Section 10 – Key Questions. Can look to provide more discussion on this in IBC.</p>	<p>Targets are not essential, but outcomes are important. In the final IBC the outcomes could be presented as metrics in respect of the key factors related to each of the investment objectives (without necessarily declaring targets).</p>	<p>To be done in IBC</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>The report needs to include a holistic assessment of programme risk. This topic should be given careful consideration in determining a preferred programme, given the scale, complexity and potential consequences of getting it wrong. The key programme risks could be expected to include:</p> <ul style="list-style-type: none"> • Urban Development and land use scenario - is it realistic, is it viable? • changing Government Policy over the next several years during which the programme will be implemented • cost escalation • patronage forecasting • technological developments • failing to meet programme objectives <p>Each of these risks should be quantified as far as possible, in terms of probability and potential consequences to schedule and cost. Each risk should also have an outline mitigation strategy, so that decision makers can be confident that key risks can be appropriately managed through the development process.</p>	<p>Already a risk section. Of these noted by peer reviewer, only patronage forecasting and failing to meet project objectives are the two that are not discussed. Failing to meet programme objectives would be due to one or more other risks anyway. Peer review comments also indicate concern about cumulative effect of risks. This will be discussed in the PPOR narrative.</p> <p>We can add more on patronage forecasting risk as well.</p> <p>High priority</p> <p>However, full quantification of these risks is too detailed for this report and may not be possible with existing information.</p> <p>Can add to PPOR that a more in depth discussion on risks will be in IBC and DBC. PPOR to present the risk management strategy going forward and who owns the risk.</p>	<p>Agree with the proposed approach to include a full discussion of the risk issues in the final IBC (as described in the Peer Review Comment).</p>	<p>To be done in IBC</p>
Detailed Comments / Observations on PPOR Sections			
<p>PPOR Structure</p> <p>The structure and content of the PPOR enables the reader to gain a good appreciation of the assessments of programme options, the evidence informing the assessments and the logic behind the conclusions.</p> <p>However, the report conveys a strong focus on transport solutions, without giving priority to the underpinning Urban Development narrative and the desired outcomes system interventions should achieve. This point needs to be addressed for decision makers and the wider PPOR audience.</p>	<p>Yes this is a report primarily focused on the transport outcomes as this is the focus of the majority of the KPIs.</p> <p>If additional focus was needed on how to best achieve urban development outcomes, significant additional work would be needed on land use scenario modelling on a regional basis, which is currently outside the scope of LGWM. However, we are proposing additional work at the start of the DBC to help reinforce these outcomes.</p> <p>The peer review has commented that the report should start and end with urban development. The report will be updated to acknowledge this gap, and it will be covered in the risk section and that gap will be filled in DBC.</p>	<p>Agree with the proposed approach. The timeline for the urban development workstream of the DBC will need to take account of the external inputs, including development of the WCC District Plan, Stakeholder inputs, etc.</p>	<p>Report updated</p>
<p>Introduction (Section 1)</p> <p>Section 1.2, Figure 1 does not really appear to be Preferred Programme Option Assessment Criteria. A more accurate description would be “key inputs used in the programme assessment process”.</p>	<p>Will change figure title</p>	<p>Noted.</p>	<p>Action closed</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Strategic Context (Section 2)</p> <p>Section 2.6, Why LGWM Matters in the Regional Context includes forecast population and employment growth data. Given the importance of land use and urban development to the LGWM programme, extracts including diagrams and tables from the Urban Development Summary could be useful, although it is understood that the latest City Council data are currently being updated.</p>	<p>Would be useful but doesn't change the outcome.</p> <p>Low priority</p>	<p>Noted.</p>	<p>No change to report.</p>
<p>Work Completed to Date (Section 3)</p> <p>Section 3 illustrates the development of transport improvement packages since 2018 (Figure 3). The narrative should also highlight key steps in urban development, including progress on the Spatial Plan and updating the WCC District Plan, to demonstrate how these mutually informing workstreams have progressed. The narrative should also highlight the key factors which led to the latest programme objectives, and their respective weightings. Given the importance of understanding the trade-offs involved with selecting a preferred programme, it is important that decision makers fully understand the relative weightings for each of these objectives, their implications for the future Wellington Urban Landform and the Regional Transport System.</p>	<p>Can add:</p> <ul style="list-style-type: none"> • Progress on spatial plan and WCC district plan • More info on objective development and weightings <p>Low priority</p>	<p>Agree with the proposed approach.</p>	<p>Report updated</p>
<p>Development of Programme Options (Section 4)</p> <p>Prior to describing programme option development in Section 4 (which might better be described as development and assessment of programme options), the narrative should discuss the investment objectives which flow from the problem statements. Investment in transport system infrastructure should be based on desired outcomes rather than outputs, as derived from the programme objectives. There should also be a discussion about how programme options were developed in response to the outcomes sought from investment in the transport system.</p>	<p>Can add:</p> <ul style="list-style-type: none"> • "and assessment" to the title (Done) • Investment objectives (but these are the programme objectives) • How options were developed (but this needs to come from LGWM direct) <p>Low priority</p>	<p>If it is impractical to include information into the PPOR, the proposed approach may be acceptable if the Programme Partners are comfortable. However, the narrative in the final IBC should clearly set out the investment logic (noting that programme objective is the adopted terminology) AND the option development process that flows from the objectives.</p>	<p>To be done in IBC</p>
<p>The text states that the option performance against project objectives will be presented in traffic light coloured tables; are these the tables in Section 8? If so, that should be stated, OR the reader should be directed to where they can be found.</p>	<p>This paragraph no longer exists.</p>	<p>Noted.</p>	<p>Action closed</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
The narrative explains how a decision on a preferred programme option will be determined (page 12). This is a crucial part of the report and would better fit under its own heading, as it clearly goes beyond option development.	Title of section changed	Noted.	Action closed
Text in Section 4 (page 12) states that: <i>"The preferred option will be the one that best achieves the vision for Wellington, whilst providing value for money. It will be the option where any outstanding risks (such as uncertainties, costs, environmental effects) can be appropriately managed."</i> The narrative then notes that while Multi Criteria Assessments (MCAs) have been used to understand option performance, it is not proposed to use MCAs to decide on a preferred programme option because there are only a few significant differentiators. At the bottom of page 12, there is a list of questions which are relevant to the choice of a preferred programme, which have emerged from a range of sources. Have the Board indicated these are the key questions THEY want to determine a preferred programme option?	As written, "These questions have come from within the LGWM team, the programme partners, stakeholders and the public" No changes proposed	Noted.	No change to report
Section 4 should provide clear advice to decision makers about the key factors and determinants for deciding a preferred option. Urban development, consentability, funding, delivery timeframe and risk are all factors that should feature in this discussion (noting they are implied indirectly through reference to the earlier MCA assessments).	Can add a paragraph on MCA criteria in this section. Medium priority	Agree with proposed approach.	Report updated
Programme Options (Section 5) Section 5 highlights the key features of each of the shortlisted programmes, which appear to be same options from the PASLO report. It would be helpful to confirm this is correct.	Will add.	Noted.	Action closed
The Programme Option Summary in Figure 6 show the four shortlisted programme options. Titles for each of these options should be revised for clarity and should clearly distinguish between the key features of each programme. Also, the key defining the proposed interventions needs to be reviewed; for example, the distinction between new and existing tunnel is hard to read.	Can alter, but will need graphics support Low priority	Noted.	Agreed not to alter as image was for public consultation



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Questions or comments on each of the options shown in figure 6 are as follows:</p> <p>Option 1:</p> <ul style="list-style-type: none"> Who would be able to use the new Mt. Victoria Tunnel? The text isn't clear whether it will be available for general traffic. Will the current Hāitaitai bus tunnel remain in its current configuration? What is proposed for the Terrace Tunnel? What does "bus priority where needed", extended down to Wellington Airport, look like? 	<ul style="list-style-type: none"> Table 1 outlines assumption Yes, but with fewer services due to MRT Nothing See footnote to Table 1 <p>More detail available in PASLO report. Add clarification/graphic</p>	<p>Noted. PPOR should be edited to cover these points.</p>	<p>Report updated</p>
<p>Option 2:</p> <p>All relevant comments from Option 1 plus the following:</p> <ul style="list-style-type: none"> What is the distinction between Bus Rapid Transit and Bus Priority shown on Option 1 east of Mount Victoria Tunnel? Why does this option have Bus Rapid Transit to the airport, but not Option 1? 	<ul style="list-style-type: none"> See footnote to Table 1 Because it is affordable with BRT to do two routes, but not with LRT <p>No changes proposed</p>	<p>Noted.</p>	<p>No changes to report</p>
<p>Option 3:</p> <ul style="list-style-type: none"> Is the key difference between this option and Option 1 the location of the new Mt Victoria tunnel? 	<p>There is no new tunnel in this option</p> <p>Check terminology</p>	<p>A new tunnel is shown on Figure 6, Option 3 – see the black dotted line across Mt Victoria Tunnel. Is this meant to be a duplication of the existing tunnel? If not, the black dotted line should be deleted.</p>	<p>Black dotted line is actually a grey dotted line for "existing tunnel. Agreed not to alter as image was for public consultation</p>
<p>Option 4:</p> <ul style="list-style-type: none"> Is the lack of grade separation at the Basin Reserve which forces the LRT route to use Taranaki Street? 	<p>Yes</p> <p>Add clarification</p>	<p>Noted.</p>	<p>Report updated</p>
<p>General:</p> <ul style="list-style-type: none"> Are there opportunities to take the best elements of these four programmes and combine them into a fifth option? 	<p>The best elements are already in and out of the four options. Not sure what other opportunities are available. No significant desire for this was evident from partner, stakeholder or public feedback.</p> <p>No changes proposed</p>	<p>Noted.</p>	<p>No changes to report</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Outcomes from Community Engagement (Section 6) Section 6 describes findings from the recent community engagement process and views about the key issues about travelling in Wellington. The feedback obtained included methods and outcomes to address current deficiencies in the system; for example, reliable public transport emerged as a key theme and light rail emerged as a preference to BRT. It isn't clear from the narrative how this information was obtained, given that comparison of different modes is complex. There is an inference some of the responses may have resulted from misunderstandings about what is proposed.</p>	<p>More detail is available in the Engagement Report. No changes proposed</p>	<p>Noted that more information is contained in the Engagement Report (not reviewed). It would be helpful to expand the narrative in the final IBC to cover this point.</p>	<p>To be done in IBC</p>
<p>For the purposes of confirming a preferred programme, it is suggested that the focus should be on community feedback about preferred network outcomes. This would avoid any misunderstanding which may have arisen around future passenger transport solutions.</p>	<p>A table could be prepared to outline how well each of the options contributes to the outcomes presented in Figure 7. But this would need to be qualitative at this stage. Medium priority</p>	<p>Noted.</p>	<p>Report updated with how the important considerations translate to our programme objectives</p>
<p>There is mention of feedback from over 40 different stakeholders whose comments have been considered. How has this feedback influenced the assessment outcome?</p>	<p>It has been summarised in engagement report and considered by decision makers. No specific weighting was given to it. No changes proposed</p>	<p>Noted.</p>	<p>No changes to report</p>
<p>Section 6.1 Online Panel Survey describes a 10 minute survey of a large group of Wellingtonians, and states that the panel had some very similar thoughts to the public. However, the responses presented in Figure 8 differ in some respects, notably easier to get to key destinations like the airport or hospital and reducing carbon emissions.</p>	<p>No changes proposed</p>	<p>Noted. It would be helpful to expand the narrative in the final IBC to comment on the differences between responses in the two surveys.</p>	<p>To be done in IBC</p>
<p>Technical Assessments (Section 7) Section 7.1 describes the different land use scenarios which have been used in the technical assessments which follow. The narrative would benefit from some clarification, as follows:</p>			<p>N/A</p>
<ul style="list-style-type: none"> What is the purpose for the four different levels of "development capacity" described on page 19? It isn't clear how they relate to the land use scenarios developed by LGWM and used in the subsequent assessments of programme options. 	<p>Agreed that the narrative is relatively complicated – Amy to clarify (or remove if it doesn't add anything) Low priority</p>	<p>Noted.</p>	<p>Bullet points removed</p>
<ul style="list-style-type: none"> What land use scenario has been used for the "do minimum" scenario? This is a crucial factor, to give decision makers an appreciation of the difference between the do minimum and programme options. 	<p>Clarified in report</p>	<p>Noted.</p>	<p>Action closed</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<ul style="list-style-type: none"> Over what period would the projected growth across the city occur? Would there be a lag between enabling this level of development and it becoming operational (delivering patronage, etc)? 	<p>Not possible to answer at this stage. Further work will be required</p> <p>Medium priority</p> <p>No change required</p>	<p>For now, the PPOR should clarify the assumption used in the assessment, i.e., development would proceed in tandem with delivery of the preferred option. This factor should be explained in the final IBC and should be the subject of further assessment for the DBC.</p>	<p>Report updated.</p> <p>To be done in IBC</p> <p>To be done in DBC</p>
<ul style="list-style-type: none"> Is the relationship between the different scenarios linear? 	<p>No inference can be made about the relationship between the scenarios. They are not intended to be detailed forecasts and more work will be required at the next stage.</p> <p>Medium priority</p> <p>No change required</p>	<p>Noted.</p>	<p>No changes required</p>
<ul style="list-style-type: none"> Does the Core Development Scenario reflect the current Wellington City Council Spatial Plan? It is defined as “business as usual growth with the level of development distribution agreed in November 2019” but the terminology changes frequently through the document. The same terminology should be used throughout. 	<p>Agreed that clarity should be provided – Amy/Alan to clarify</p> <p>Medium priority</p>	<p>Clarification awaited.</p>	<p>Report updated</p> <p>The core scenario “is reflective of the level and distribution of growth indicated in the WCC Spatial Plan.”</p>
<ul style="list-style-type: none"> Figure 9 suggests that with the intensified forecast population (should be number of households), the absolute number of households along the MRT corridors would double. Presumably this is across both the southern and eastern corridors? Did the capacity analysis prepared by the Property Group in January 2021 confirm this is a realistic scenario (i.e., the realisable capacity (demand))? 	<p>Yes although reference to the TPG report has now been removed. Amy to consider how this is described</p> <p>Low priority</p>	<p>Assuming the Programme Partners want to proceed based on the intensified land use scenario, deleting reference to the TPG report in the PPOR is a reasonable approach.</p>	<p>Reference deleted</p>
<ul style="list-style-type: none"> Table 2 indicates growth in the Eastern Corridor will be significantly smaller than the Southern Corridor, with the difference between the Eastern Core and Intensified scenarios being 1,000 dwellings (12.5% and 20% compared to existing, respectively). Does this imply that options which go to the east are less likely to attract additional patronage? 	<p>Correct and this has been discussed in the urban development report</p> <p>Low priority</p> <p>No change required</p>	<p>Noted.</p>	<p>No changes required</p>
<ul style="list-style-type: none"> Is there a reason why the intensified, UDS – BRT and UDS LRT scenarios for the eastern corridor are the same? 	<p>Further work will be required to determine the extent to which BRT will stimulate further growth to the east compared to enhanced bus.</p> <p>Low priority</p> <p>No change required</p>	<p>Noted. Clarification about this point will be needed for the final IBC.</p>	<p>To be done in DBC</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
Section 7.2.1 describes the updated mode share analysis from the updated transport modelling, which shows increased PT patronage from additional residential development, which is to be expected. Figure 10 suggests that 2046 car mode share achieved by options one to four inclusive for are about the same, at about 15% - 20% less than the do minimum. This would indicate that all the options (including Option 1 with the intensified land use scenario) will reduce VKT to a similar degree. Presumably this has an influence on the carbon analysis, which should be discussed given this is a key outcome sought by the programme.	Partially correct. The graph only shows mode share from the S+E suburbs. It's worth noting that the intensified scenario reduces VKT from the north and the west (due to lower levels of growth in these locations) and this results in carbon benefits. Medium priority to be clarified in report	Noted.	Report updated
Section 7.2.2, Figure 11 shows predicted PT patronage. The distinction between the dark and light blue colours labelled on the histogram as high and low should be explained. Figure 12 shows similar metrics for the Eastern Corridor, which also shows a significant increase above the do minimum. This is slightly surprising given that the difference in the number of households in both scenarios are not as substantial as for the Southern Corridor.	Clarification already provided	Noted.	Action closed
A key point from this analysis is that the PT network capacity to the Eastern Suburbs will need to be increased above its current capacity, sometime between 2036 and 2046, from which it is concluded that a new bus tunnel will be needed. This is an argument in support of options which include this feature.	Agreed No change required	Noted.	No change to report
Section 7.2.3 describes the latest accessibility modelling. It isn't clear why accessibility to the airport has been taken to be a key metric for this attribute, when it isn't intended to significantly enhance PT access to the airport with any option. It may be more informative to show the respective performance of the options by assessing the number of people living within a certain travel time of the City Centre.	It is intended to improve PT access to the airport under all options. The airport is a significant regional destination and access is improved by the Mt Vic Tunnel and Basin (which this graphic demonstrates). Clarification has already been provided	Noted.	Action closed
Section 7.2.4 describes how AIMSUN modelling shows the need for grade separation at the Basin Reserve to realise the benefits of a new Mt. Victoria Tunnel. The linkage between these two interventions should be further stressed, to highlight the significance of these components for programme performance. It would be easier to present travel time changes in minutes and for completeness, show the change in travel time for the Station to Island Bay journey.	Agreed – clarifications should be made with reference to previous work on this Medium priority – further work will be required	Noted. Clarification about these points will be needed for the final IBC.	To be done in IBC



<p>Section 7.3 outlines the programme option costs with a breakdown of each of the four options shown on Table 5. Detailed cost estimates were not provided for review, so it is not possible to comment in detail about these estimates. However, it would be expected that the difference between the smallest and largest options 4 – 1 (noting that the table heading has Option 3 listed twice) would be greater. Why are the costs for the MRT improvements to the east greater for options 2,3 and 4 compared to Option 1? These points should be checked urgently. Other questions about this section include:</p> <ul style="list-style-type: none"> • Will separate packages such as City Streets etc have separate funding from the main elements of the programme? • have the benefits of City Streets and other packages been considered, or they are they all now rolled into one economic assessment? • Are these estimates P95 level (text on page 28 suggests they are)? How do they relate to the risk assessment? Are the risks between options different? • The affordability threshold is \$7.4 billion which is just above the whole of life cost (WOLC) for Option 1. What are the implications if predicted costs increase above this amount? Would it change a decision about a preferred option? 	<p>The differences in the east should be explainable as follows:</p> <ul style="list-style-type: none"> • Option 1, the Enhanced Bus investment physically starts at the Hamilton Rd / Kilbirnie Cres intersection, then heads east. The bus lanes in the new tunnel are considered part of the tunnel costing, and any treatment between the Basin and the Golden Mile are considered as part of the MRT costs. • Option 2, the geographic extents are the same as Option 1, but the intensity of investment is higher per km. Plus there's more scope to the airport (Calabar Rd), plus depot costs. • Options 3 and 4, are the same as Option 1 east of the Kilbirnie Cres intersection, but also includes works between Kent Tce and Wellington Rd. <p>This will be clarified in the report "Will separate packages such as City Streets etc have separate funding from the main elements of the programme?"</p> <p>Each project and phase of the individual project is subject to individual funding partner approval processes.</p> <p>"Are these estimates P95 level (text on page 28 suggests they are)? How do they relate to the risk assessment? Are the risks between options different?"</p> <p>P95 cost estimates were used. MRT and SHI cost estimates followed Waka Kotahi cost estimate processes (SMO 14) and were priced by quantity surveyors using available design detail.</p> <p>Parallel cost estimates were sought for most project capital cost estimates. Therefore, from a cost estimate perspective, they have similar cost certainty risk.</p> <p>Programme costs are more than just cost estimates provided by the Work Package consultants. Programme costs are on a whole of life basis (30 years from 2020/21). The following sets out the process used and implicit QA of the model:</p> <ul style="list-style-type: none"> • the financial model built by PwC to provide arithmetic and logical rigour. • it was populated using the capital cost estimates developed by professional cost estimators and these estimates have been peer reviewed. Forecasts have been developed using the upper range cost estimate (P95) with inflation applied. • Benchmarks have been applied to build up whole of life costs to capture, both the up-front capital investment and, the longer-term impact on funding partner budgets. 	<p>For option 1 the terminology used on Figure 6 is bus priority rather than enhanced bus investment. For option 2 the intensity of investment appears to be three times higher than option 1. Is that correct?</p> <p>The question about benefits of other packages doesn't appear to be addressed. The point was to gain clarity about whether costs AND benefits are assessed at package level OR programme level.</p> <p>This response suggests that at this stage all options have a similar risk profile. Is this correct? The risk differential between options would be expected to be greater for the larger, more complex options; for example, risks related to consenting, land purchase, tunnelling, track bed construction, etc will be different between options.</p> <p>Has the PwC Model (unsighted) been peer reviewed by others?</p> <p>These points highlight the need for a comprehensive risk assessment and narrative. If it is impractical to include further information into the PPOR, this should be included in the final IBC.</p> <p>Noted.</p>	<p>Yes, enhanced bus = <i>continuous</i> bus priority. Enhanced Bus has lower ride quality and customer experience without pavement upgrades, level boarding stations and other associated infrastructure. Have changes terminology to be consistent through report as "Continuous Bus Priority"</p> <p>The benefits of other packages have been considered but only at a high level, more specific benefits for each packaged are included in their business cases. This report has assessed everything top down rather than bottom up.</p> <p>The larger options do have larger risk, but all options have very large risk due to the nature of the overall programme, these are reflected in the P95 cost estimate for known risks.</p> <p>To be done in IBC.</p>
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Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
	<ul style="list-style-type: none"> The use of the model has then been through a further PwC review. <p>“The affordability threshold is \$7.4 billion which is just above the whole of life cost (WOLC) for Option 1. What are the implications if predicted costs increase above this amount?”</p> <p>At this point our position is as set out on page 29.</p> <p>There is different affordability threshold “headroom” between programme options. That is the difference between programme cost and the affordability threshold (\$7.4b). No decision has been made if this affordability threshold (\$7.4b) could be increased.</p> <p>If this threshold represents a cap for funders, then the lower cost programmes will have an additional buffer. Funders have a range of choices to address breaching the affordability threshold, including providing more funding or reducing the scope of delivery.</p>		
<p>Section 7.4 updates the Programme Economic Analysis, based on the Economics Technical Report (reviewed below). Figure 15 shows monetised benefits for each of the four options with the core land use scenario and Option 1 (only) with the intensified land use scenario. With the intensified model the level of benefits almost doubles for Option 1 between intensified and core land use. Would other options see a similar increase, if the option had sufficient capacity (or could be modified to suit) the intensified scenario?</p>	<p>Model runs for other options under the intensified scenario have not been produced although further text has been provided based on some sensitivity test analysis.</p> <p>No further changes required</p>	<p>Noted.</p>	<p>No changes to report</p>
<p>The information in Figure 15 is worthy of more discussion. For example, what influences the relative option performance for private vehicle travel time savings, safety, health benefits, etc? Agglomeration is a key benefit of Option 1, but there is little information about the composition and nature of these benefits. While some of these benefit outcomes appear to be intuitive, some aren't and need some further explanation, particularly to distinguish between options. Table 6 is easier to understand and may be a preferable way to preface the narrative, noting that the dimensions and scale of the numbers shown should be confirmed, i.e., NPV values, millions, etc.</p>	<p>Andrew to review in the context of the economics report – medium priority</p> <p>Some changes already incorporated re description of table 6</p>	<p>Noted.</p>	<p>No changes to report</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>The discussion of the results on page 30 includes the economic performance range of options 1,2 and 4 with the intensified land use scenario. Option 1 has the greatest benefit range, although not by a large degree. A critical statement at the end of paragraph 2 is that “Nevertheless, it does highlight the importance of high levels of intensification to achieve a BCR above one”. This statement should inform the conclusions about the choice of a preferred option.</p>	<p>Agree.</p> <p>Clarification to be provided in the PPOR</p> <p>The intention here is that we reinforce our conclusions along these lines – or at least ensure that we’re happy that the conclusions are sufficiently clear in this regard.</p>	<p>Noted.</p>	<p>This is re-enforced in 11.2</p>
<p>The first four bullet points in Section 7.5 summarise the updated carbon analysis and states that total regional emissions would reduce by a total of 7% with the intensified (land use) scenario. It also states that the VKT production for Wellington city would change by 1.5%. It isn't immediately obvious how the statements link to what follows. The last sentence of the fourth bullet point, about a higher proportion of growth taking place in the city, needs to be explained further.</p>	<p>Agree.</p> <p>Clarification to be provided in PPOR</p> <p>Intensification is the most important contributor to carbon emissions savings compared to the do minimum. More growth occurring along the MRT route concentrates people and trips around infrastructure supporting non-car modes, and consequently makes car-based transport less attractive. This is seen from the significant drop in VKT in the region compared to the VKT drop in Wellington City: more people living in Wellington City compared to the Do Minimum concentrates trips in Wellington City; the corollary is that there will be less people living further out of Wellington city compared to the Do Minimum (footnote: the total population is the same under the do minimum, core and intensified land use scenarios – the difference comes from where we assume those people live)</p>	<p>Noted. Important to highlight in the clarification what the “significant drop in VKT in the region compared to the VKT drop in Wellington City” is predicted to be, and how it influences the overall outcome.</p>	<p>Report updated</p>
<p>Figure 16 shows important results from updated carbon analysis, which shows that the maximum of carbon emission reduction for the programme would be around about 4.2% by 2075, with the intensified land use scenario, 2075. Contrary to the second bullet on page 30, Figure 16 also shows that greater carbon emissions would be achieved by Option 4 than Option 1, presumably because less construction is involved. Neither option shows a net reduction in carbon emissions until 2045.</p>	<p>Agree.</p> <p>No action required.</p>	<p>Noted.</p>	<p>No changes to report</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Given that reducing carbon emissions is the highest weighted programme objective, an obvious question would be what other interventions would be more effective? Clearly other interventions need to be considered, if the city and the Region are to achieve their carbon reduction goals. Also, as carbon reduction is the highest weighted objective for the programme, it would be prudent to continue to evaluate Options 3 and 4, which have better performance in this regard, before selecting a preferred option.</p>	<p>Disagree.</p> <p>The scope of the programme is not to reduce carbon emissions – that is just one, albeit the highest weighted, objective, along with increasing mode shift away from private vehicles. It is not within the scope of this programme to advocate for other carbon reduction options – like banning fossil-fuel powered vehicles, or improving methane capture at Wellington City landfill.</p> <p>If desired, we could emphasise that LGWM will not be sufficient for the City or the Region to meet its carbon reduction objectives. The carbon technical report does this.</p> <p>Carbon reduction isn't the highest weighted objective: carbon reduction <i>and increasing mode shift away from private vehicles</i> is. The sub criteria weighting as agreed with the TAG means that enabled emissions contribute to 45% of the score and embodied emissions contribute to 15% of the score. The remaining score is attributable to mode shift</p> <p>With that in mind, we don't agree that we should continue to evaluate Options 3 and 4 rather than resolve to a preferred option. If we also look at mode shift, Options 3 and 4 do not perform in the same way as 1 and 2, which have substantially superior PT performance to the East.</p>	<p>Interventions such as banning fossil fuel powered vehicles from parts of the city, congestion charging, or other travel demand strategies could achieve some (not all) of the desired outcomes. The point behind the comment was to highlight that the narrative should explain why they would not be sufficient to meet ALL the objectives, in isolation from other interventions.</p> <p>For the final IBC it will be important to explain the distinction in the programme objective between the carbon emissions factor and the mode shift factor, and the evidence related to each aspect.</p> <p>Noting the Project Team's response about not continuing to evaluate Options 3 and 4, it will be important to continue to evaluate the indicative programme option through the final IBC and DBC, to confirm that it remains the option which best meets all the LGWM Programme Objectives.</p>	<p>To be done in IBC</p>
<p>Programme Options Analysis (Section 8)</p> <p>Section 8 summarises the programme objectives analysis. Key observations are as follows:</p> <ul style="list-style-type: none"> The "do minimum" option is stated to mean there would be "no changes in Wellington". It is important to clarify what this means in terms of land use assumptions, committed changes to the regional transport network (i.e., rail upgrade package, etc). 	<p>Agreed, although this is described further in some of the more technical reports. Minor clarification incorporated in document</p>	<p>Noted.</p>	<p>Action closed</p>
<ul style="list-style-type: none"> Third bullet on page 34 states that options 1,2 and 4 received the highest scores for carbon emission reductions. However, figure 16 shows Option 4 performs better than Option 1, albeit to a minor degree. It would help to explain this decision further, and what consideration led to a lower score for Option 3. 	<p>Further commentary can be provided Low priority</p>	<p>Noted.</p>	<p>Action closed</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<ul style="list-style-type: none"> Table 8 highlights the land use scenario as the key factor influencing the best performing programme option, which switches from Option 2 to Option 1 with the intensified land use scenario. 	Noted – no change required	Noted.	No changes to report
<ul style="list-style-type: none"> The text beneath Table 8 states that the relative scores reflect the assumed characteristics of MRT in Option 1, namely the highest level of capacity and quality to the south and a significant improvement to the east. Surely Option 2 would be considered to have better access to the east, given the distinction between bus rapid transit (Option 2) and bus priority (Option 1). 	Option 1 has “enhanced bus” which is the same level of bus priority as the BRT option. Very little difference between the two in terms of access to the east for PT No change required	Figure 6 clearly shows Option 1 has bus priority to the east, not enhanced bus. Terminology should be clarified in the PPOR.	Replaced all reference of Enhanced Bus and replaced with Continuous Bus Priority.
<p>Updated Analysis Summary (Section 9) Section 9 brings together conclusions based on the analysis described in Section 8, which are summarised in four bullet points at the top of page 38. Comments in respect of each of these points are as follows:</p> <ul style="list-style-type: none"> The analysis provides strong evidence that land use along the MRT corridors is a key part of the investment story. 	Agreed No change required	Noted.	Action closed
<ul style="list-style-type: none"> Evidence provided in this report (i.e., figure 6) appears to contradict the statement about intensification better delivering on carbon and mode share objectives. 	The over-riding conclusion is that intensification delivers on the carbon and mode share objectives so it would be good to understand where this is contradicted	Understood. However, it is suggested that the narrative includes a statement about the relative carbon emission performance of options in Figure 6 (currently the figure only shows a greyed area, which does not distinguish between options).	We don't have enough outputs to be able to comment on different options under the intensified land use scenario. Further text provided on sub-categories in report.
<ul style="list-style-type: none"> the range of BCRs is similar across the options. Given the range and nature of the uncertainties related to key factors in the analysis, including a preferred land use scenario, it may be too soon to state which programme would achieve the highest BCR 	Noted – will soften the statement in the report Medium priority	Noted.	Currently says intensification is required to maximise BCR, doesn't comment on particular options.
<ul style="list-style-type: none"> the degree of intensification will influence the choice of MRT technology. However, this is a separate issue in the context of when a decision about specifications and characteristics will be made. 	Noted No change required	Noted.	No change to report
<ul style="list-style-type: none"> Regarding the public responding positively to intensification, was the engagement process designed to obtain feedback with sufficient confidence to support this statement, which would stand scrutiny? For example, to what extent did the public appreciate the scale and intent of the intensified land use scenario, given that the public engagement process was designed around the transport programme? 	Sarah R to comment on this	Comment awaited.	Comment softened in report.



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Other Key Questions (Section 10)</p> <p>Section 10 addresses other key questions that have arisen from a variety of sources, including the public engagement process. Observations on each of these points follows below (other than those covered previously):</p> <p>Form of MRT: The distinction between rail based and road based transit systems should draw on the conclusions of the Mode Option Report. It is understood that work is continuing to assess the relative merits of these modes, but as the technology advances the distinction between these two systems is becoming blurred. Whichever option is chosen as preferred; it is essential that the system design, development and optimisation processes determine the final form and specifications for the preferred MRT solution.</p>	<p>Agreed No changes proposed</p>	Noted.	No changes to report
<p>Why does MRT not go to the airport? it would be worthwhile to amplify the point by restating what appears in earlier reports about passenger demand to the airport, as part of prioritising access to residential areas and the CBD.</p>	<p>Agreed Medium priority</p>	Noted.	Report updated
<p>Are large scale or minor improvements preferred at the Basin Reserve? The narrative would benefit from more explanation about the constraints affecting access to the east if grade separation is not provided. It should also highlight why LRT options would be constrained to Taranaki Street rather than Cambridge / Kent Terrace. The narrative should also use consistent terminology; for example, the conclusion discusses the Arras Tunnel Extension although the section heading is Basin Reserve.</p>	<p>Agreed Medium priority</p>	Noted.	Report updated
<p>Is a new Mt Victoria tunnel needed? In the description of the two alternatives under consideration the text is confusing about the new tunnel configuration, including whether lanes for general traffic will be provided or retained in the existing tunnel. The functionality of the existing HAITAITAI Bus Tunnel should be included to complete the picture. The discussion in the table at the bottom of page 47 is based on the intensified land use scenario only. What are the implications of a less intense land use scenario?</p>	<p>Agreed Medium priority</p>	Noted.	Report updated



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>How will the projected Urban Development be achieved? This narrative is an important component of the overall urban development story. It suggests that the current Spatial Plan anticipates 10,000 new households rather than 16,000 as stated in the text, which in turn implies that the difference between the intensified scenario and the spatial plan number is 16,000 new households. This point should be clarified in the narrative.</p>	<p>Agreed need to clarify Medium priority</p>	<p>Noted.</p>	<p>Report updated</p>
<p>Section 10.4.2 notes the need for other infrastructure upgrades to accommodate the Spatial Plan and the intensified land use scenario. There is no discussion about the scale, complexity and cost implications related to these upgrades. To what extent (if any) has this been considered in the options analysis?</p>	<p>It hasn't as these would be costs and benefits of land use intensification not transport system development. No changes proposed</p>	<p>This approach implies that a decision to invest in a programme which relies on the intense land use scenario requires funding that may not be realised. While it may be sufficient for the PPOR to cover this point as written, it will be an issue that will need to be addressed in the final IBC.</p>	<p>To be done in IBC</p>
<p>Section 10.4.4 discusses growth elsewhere in the region. It states that the intensified scenario will better deliver on the regional 2050 climate change targets. Information presented earlier in the report suggests that the timing and scale of development will struggle to meet these targets, so other interventions will be needed to achieve them. This topic requires more investigation and presumably is being considered at a regional level. At this point it would be fairer to say that all the options will contribute to those targets, but the preferred option should complement other interventions that will be required.</p>	<p>Agreed Low priority</p>	<p>Noted.</p>	<p>Commentary discussed intensification in general rather than a specific option. No change to report.</p>
<p>Integration with the wider transport system: It is surprising that this factor has received less attention in the narrative. Most trips into the city are from the north. The potential to extend an LRT network would be very limited. The extent to which access for the wider region into the city area has been considered in the option assessment is unclear but given that the actual land use scenario may change over time, flexibility in the system coverage would be beneficial. In this regard, Option 2 has advantages over Option 1. The text should include a holistic view about how the programme will integrate with the Regional Transport System, including how the options could be extended if possible or will connect to existing (or future) systems beyond the geographic limits of the programmes.</p>	<p>Agreed, but will need direction on this from programme team. Medium priority</p>	<p>Clarification about this point will be needed for the final IBC.</p>	<p>To be done in IBC</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Are parking levies or congestion charging proposed? Section 10.6 indicates that a congestion charge would reduce traffic entering the city and increase PT patronage by over 2000 per hour. If a congestion charge was introduced with any of the MRT options, what would that do in terms of performance, especially in regard of carbon emissions and economics?</p>	<p>This hasn't been modelled so can't include at this stage. Can provide more analysis in the IBC. No changes proposed.</p>	<p>Clarification about this point should be included in the final IBC</p>	<p>To be done in IBC</p>
<p>Uncertainties and Risk (Section 11) Section 11 includes a qualitative discussion on these topics; there is no information about the scale of risk in terms of time, cost and other consequences. It does not appear to address the fundamental drivers which might affect the items highlighted, for example the factors which would influence the actual land use that will eventuate over the next decades (viability, demand, etc). Nor are there any strategic mitigation strategies to manage these key factors. While the text is helpful to identify some of the key programme risks, it is considered that there is insufficient information here to provide confidence to decision makers around the scale of the risks that may eventuate and their potential impact on the success of implementing a preferred programme. This matter needs to be addressed urgently.</p>	<p>This document has focussed on the impact on choosing the 'wrong' option rather than time, cost etc. Quantifying each risk for each option is a large amount of work. It is suggested that this form of risk assessment be present in the IBC rather than here. No changes proposed.</p>	<p>Noted. Also see previous comment related to risk assessment required for the final IBC.</p>	<p>To be done in IBC</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Selecting the Preferred Programme Option (Section 12) Section 12 summarises the key factors from the option analysis described previously and notes that the preferred programme options from the MCA analysis were Options 1 and 2. Observations and comments on the points made in this section of the report are as follows (noting only matters not previously covered):</p> <p>High intensity Land Use. There are several matters that need consideration before a preferred programme option can be confirmed, including:</p> <ul style="list-style-type: none"> • The need to accept that a significantly intensified land use scenario for Wellington City is appropriate, realistic and achievable (in terms of community acceptance, consenting, demand and funding). • That the consequential patronage forecasts for the intensified land use scenario will eventuate (including mode shift, integration with the regional transport network, service quality) • That BRT would have insufficient capacity to service the actual patronage that will result from the LGWM programme (including infrastructure, vehicle performance, operational constraints). <p>Taken together, the question is whether there is sufficient information at this time to allow decision makers to form a view about these issues?</p>	<p>Agreed that that is the question. Our way of addressing that is to provide bookend land use scenario outcomes and showing decision makers that, if they want the best outcomes, then the high intensity land use is needed. We believe the information is clear that high capacity MRT is needed if high intensity land use is desired. Not sure what the peer reviewer wants us to do with this. Ensure that this is covered by updated risk approach.</p>	<p>Noted. These points will need to be addressed in either the final IBC or DBC.</p>	<p>To be done in IBC or DBC</p>
<p>The carbon analysis for Option 4 shows that it was overall the better performing option of the four options considered. It also has the lowest cost. Given that carbon reduction has the highest weighting for the programme, these factors suggests that Option 4 should not be discarded at this stage.</p>	<p>But it is only because it has lower embedded carbon. It does not provide the same level of annual carbon decreases. We are also looking at very small changes here ~0.5% of Do Minimum as the difference between the options. More text will be provided.</p>	<p>Noted. The final IBC should include discussion about this point, including the materiality of this attribute in the choice of preferred option.</p>	<p>To be done in IBC</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>The Preferred Programme Option (Section 13) Section 13 states that: <i>“The preferred programme option that should be progressed through to detailed business case is a High Capacity Mass Transit solution with a new tunnel through Mt Victoria and improvements at the Basin Reserve. This is consistent with Option 1 but recognises that BRT could provide similar outcomes if designed properly”.</i> Given the previous narrative and the assessments described in the PPOR, THIS CONCLUSION APPEARS TO BE SOUND. However, a question which remains is whether Options 3 and 4 should be discarded at this stage, particularly as Option 4 scores well for carbon reduction performance and is the lowest cost to implement.</p>	<p>12.3 attempts to answer this question. The only positives for option 4 are carbon and cost. It just doesn't meet the other objectives particularly if there is high land use. If there is low land use then we shouldn't be progressing MRT. Will review 12.3 and strengthen if appropriate</p>	<p>The key point in section 12.3.7 is that Options 3 and 4 have been discarded as they would have insufficient capacity for intensification (i.e., intense land use scenario). However, if a less intense land use eventuates, all of the options would perform to a similar degree. Therefore, to emphasise the point, it would be helpful to add to the section 12.3.7 about these options being <i>“fall back positions if, at the end of the DBC, circumstances have changed”</i>, to note that a different future land use scenario could be one of those circumstances.</p>	<p>PPOR updated, action closed.</p>
<p>From a superficial inspection, it may be possible for Option 3 to be developed as a first stage of either options 1 and 2, i.e., the system might be extended to either options 1 or 2 if land use reached the scale anticipated by the intensified scenario or other factors related to the implementation of the project.</p>	<p>Agreed, there is nothing to prevent Option 3 to be implemented after the DBC. This is stated in 12.3.7. No change</p>	<p>Noted.</p>	<p>No change to report</p>
<p>Section 14 sets out how the programme will be delivered. This section has yet to be carefully investigated but a critical factor should be providing greater certainty and confidence around the preferred land use scenario, to complement a preferred LGWM transport programme. This report highlights the dependency of one upon another and therefore these factors need to be determined hand in hand. To that end the key questions for the DBC should be carefully considered including a time frame for implementation, recognising the constraints that will prevail with respect to the formal adoption of the WCC District Plan over the next few years.</p>	<p>Agreed. Land use is one of the key questions for the DBC stated in 14.3 No change</p>	<p>Noted.</p>	<p>No change to report</p>
<p>PPOR Supporting Reports This section includes comments on the supporting documents for the PPOR. This part of the review has focused on high level issues, rather than a detailed review of each document.</p>	<p>Noted</p>	<p>Noted.</p>	<p>No change to report</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
Preferred Option Report – Modelling Appendix			
<p>Section 2 summarises the full programme options. Terminology should be consistent with other reports, for example the reference to bus capacity as distinct from Bus Rapid Transit or Enhanced Bus. The land use scenarios used in the assessment also need to be checked for consistency between reports.</p>	<p>Clarification provided in modelling appendix Agreed, text to be updated and reviewed to ensure alignment with PPOR and other documents.</p> <p>Land use scenario assumptions will be clearly documented in modelling appendix – 26,000 dwellings vs 10,000 for core - with review to confirm consistency with PPOR, and reference to core and high land use being “bookend” scenarios</p>	<p>Updated Modelling Appendix unsighted. Comments below are based only on team response provided in this spreadsheet.</p>	<p>Appendix updated</p>
<p>Section 3 outlines recent modifications to improve model performance. It would be helpful to clarify the basis for making these changes, for example travel time surveys, capacity measurements, etc. It would also be helpful to include reference to validation processes undertaken to demonstrate how these changes have improved model performance, to provide greater confidence in the model outputs.</p>	<p>Clarification provided in modelling appendix Clarification is provided in the report but will be reviewed:</p> <ul style="list-style-type: none"> • MVT capacity adjustment – based on AIMSUN and SIDRA modelling of Wellington Rd / Kilbirnie Crescent intersection • Hataitai / Bus Tunnel – based on benchmarking against current and future spreadsheet modelling <p>Second spine – adjustment to ensure consistency with spreadsheet models</p>	<p>Noted. Assumed that the clarification includes details of the validation processes adopted for changes to the models.</p>	<p>Appendix updated</p>
<p>In general, the text uses the future tense, which implies that these modifications have yet to be made. It is important to clarify if this is the case, or if the results presented in the PPOR have taken these changes into account. It would also be helpful to include statements clarifying the materiality of changes to travel demand made recently and the implications for each of the four programme options.</p>	<p>Clarification provided in modelling appendix</p> <p>Changes have been made to the report.</p> <p>Materiality of changes have been noted - in general they are small changes in the context of a transformational programme</p>	<p>Noted.</p>	<p>Appendix updated</p>
<p>For active modes, the report states changes have been made by considering additional information about the nature of planned development along the corridors. Is it now assumed that there will be additional road space available for dedicated cycle lanes across more sections of the transport network? Has the cost of these changes (property acquisition?) been reflected in the economic assessment?</p>	<p>Clarification provided in modelling appendix</p> <p>Active mode assumptions have been developed at a very high level, reflecting uncertainty around the scale of potential increases in walking / cycling</p> <p>Cost of changes associated with additional road space for cycling will be captured as part of the City Streets and Transformational programme costing</p>	<p>Noted. For consistency, the cost of changes for additional road space (and any other changes) should be reflected in the programme cost estimates for the PPOR, which sets out total programme costs (including City Streets).</p>	<p>Appendix updated</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
How has the different land use assumptions been used to develop the adjustments for the Active Travel Sector to Sector Mode Specific Constants shown in Table 1?	<p>Clarification provided in modelling appendix</p> <p>The active mode adjustments have been developed at a high level and are common across the different options.</p> <p>The latest version of the modelling report outlines the scenario based approach that has been taken – with three scenarios corresponding to different assumptions around working from home and active mode uptake – reflecting future uncertainty.</p> <p>The modelling assumes a higher uptake for active modes under an intensified scenarios as more people would live and work within work / cycling distance, and it is assumed that the active mode infrastructure improvements would be of a higher standard and more comprehensive under an intensified land use scenario</p>	Noted.	Appendix updated
What is the basis for the amended car ownership rate adjustments in Table 2?	<p>Clarification provided in modelling appendix</p> <p>HTS analysis and benchmarking against current car ownership in areas of the CBD – this is now clarified in the report</p>	Noted.	Appendix updated
Table 3 illustrates changes to population and employment assumptions for the intensified land use scenario. These need to be checked for consistency with work currently underway on the urban development summary. Table 3 also suggests that population and employment growth in the eastern suburbs has significantly reduced but has increased in Island Bay and CBD / Te Aro. Does this change reflect the intensified land use anticipated with light rail (as distinct from BRT)? if not what factor or factors have influenced this change?	<p>Clarification provided in modelling appendix</p> <p>Yes, the revised assumptions reflect a scenario that assumes LRT to the south and enhanced bus to the east.</p> <p>Options 2, 3 or 4 would likely deliver different UD outcomes – commentary has been added in the report to provide words to this effect, however more detailed work is required for the DBC to develop more robust scenarios for the preferred option and any other options that might be tested.</p>	Noted. Agree with proposed approach, noting that scoping of UD work for the DBC will need to be carefully developed to ensure it captures the key factors (and necessary decisions) related to how it would be delivered.	Appendix updated
Section 3 concludes with a statement about PT investment which needs to be amended for clarity. MRT could stimulate faster population and economic growth on the MRT corridor but would need to be taken together with other factors that will influence the speed of intensification, including national and regional economic factors.	<p>Clarification provided in modelling appendix</p> <p>Agreed and re-worded</p>	Noted.	Appendix updated
Section 3 would benefit from a summary about which modelling assumptions will require legislative or policy changes, so that the decision makers understand the implications arising from the modelling outputs.	None of the assumptions require legislative change per se (but I am not an expert on what change might be required to enable UD)	Not a key issue for the PPOR but will be an important point for the management case in the final IBC.	To be done in IBC



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
The modelling approach outlined in Section 4 needs clarification. Why does Step 2 involve the AIMSUN model again after step one? What is the feedback from the strategic model? When will step three be undertaken?	Clarification provided in modelling appendix We have really focussed on Step 2 (AIMSUN using WTSM demand derived from PPOR model runs) – Step 1 was a stop-gap measure, all reporting has been done on Step 2 so have removed reference to Step 1 to make things clearer	Noted.	Appendix updated
Section 5 highlights the distinction between strategic and AIMSUN (microsimulation) modelling. If the purpose of microsimulation is to make the strategic model more faithfully reflect the difference between the options, this should be expressly stated.	Clarification provided in modelling appendix Section 4 updated accordingly	Noted.	Appendix updated
Table 4 summarises which of the output metrics from the models have been used in the programme option assessment. Interesting to note that pedestrian level of service is not considered a differentiator between the programme options.	Noted – pedestrian provision was considered to be sufficiently similar across all options – therefore there are no differences in scoring	Noted.	No change to appendix
Section 6 covers the key points which emerged from the most recent modelling. This is helpful as the full results presented in the appendices A and B are very long. It would be helpful to structure the discussion in the order of the attributes summarised in table 4.	Clarification provided in modelling appendix Have re-ordered accordingly	Noted.	Appendix updated
The document needs a description of the do minimum and / or reference cases used in the transport modelling. Decision makers need to understand what assumptions have been made about the do minimum, including other parts of the LGWM Programme, the regional rail package, travel demand interventions and other significant interventions which are committed or planned that may have a significant impact on the performance of the transport system.	Clarification provided in modelling appendix This detail is provided in the IBC; however a summary is provided in Section 3. In brief, the DM does not assume any significant transport investment over and above what is currently funded. It does not assume any rail improvements to the north	Noted. Section 3 of the draft modelling appendix sets out modifications to the modelling approach but does not summarise the do minimum.	Appendix updated
The Summary Table of Key Metrics on pages 21 and 22 (table number needed) highlights the key transport differentiators between Options 1 and 4. The discussion should be expanded, if only in a qualitative sense, to highlight key differentiators between these two options AND between options 2 and 3, so that the merits of ALL FOUR programme options can be understood.	Clarification provided in modelling appendix	Noted.	Appendix updated



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
LGWM Carbon Analysis Update for May 2022			
Page 4 paragraphs 2 and 3 cite regional and City Council targets for reduced emissions. Wellington City is committed to a 57% reduction in emissions by 2030. These targets suggest that programme options that will significantly reduce emissions quickly would be preferred.	Agree in part This is true for WCC – no evidence it is for Waka Kotahi. No change proposed.	Noted.	No change in Technical Report
Figure 2 shows the predicted rate of carbon emission reductions for light vehicles. It is slightly misleading in that half of the X axis relates to historic levels (pre 2022) when electric vehicles were not generally available. It may be helpful to relate this figure back to the VKT metrics in Figure 1 , to get a better appreciation of the scale of the problem. It is also important to include the references for this information.	Agree in part. The figure is intended to show that technological change – both EVs and improving efficiency of ICEs – has flattened our emissions per km, but that on its own, its not enough. I think that makes the earlier years important. Agree on references - noted	Noted.	No change in Technical Report
Figures 4 and 5 show the impact of programme options on carbon reduction. Option 4 is shown to reduce emissions more than Option 1 and more quickly, although the difference appears to be minor in the context of regional emissions. Table 2 confirms this summary although it isn't clear what assumptions have been used regarding the timeframe for land use intensification. This is a critical conclusion, considering that this is the highest weighted attribute in the programme objectives.	Agree in part Option 4 is better under the core land use assumptions – but not under the intensified assumptions. Should we be more explicit that at the rolled up 'carbon reduction and mode shift' level that option 4 does not perform as well as Options 1 and 2? This is not a conclusion I necessarily expected to be discussed at the "carbon" level, but at the overall level. The assumptions for the urban intensification are very clear in the modelling report (and the urban development sections) but we can cross-reference these.	Figures 4 and 5 don't differentiate between options with regard to performance under the intensified land use scenario (option performance for the intensified land use scenario is "greyed" out). The statement that Option 4 does NOT perform better than other options under this scenario is important. The narrative should highlight this point.	Technical Report updated, as per my comment above on page 13.
The Comparative Cities Analysis on page 14 highlights the potential for change in locations with high non-car mode share. It isn't clear from the narrative how the introduction of a specific MRT intervention contributed to the overall results, although presumably it would be a significant factor.	No action required While I don't disagree with this point, the Comparative Cities work has not sought to attribute cause and effect. I'm happy for people to come to this conclusion themselves – I don't think we can baldly state it though.	Noted.	No change in Technical Report
The report conclusion on page 15 is that the main difference between the options relates to embodied CO2 emissions from construction. Option 1 involves more construction, therefore will involve more construction emissions. However, the narrative explains that in the longer run the operational emissions from Option 1 would be less than Option 4, assuming it attracts greater patronage. How has this statement been taken regarding the overall assessment of option performance informing the recommendation for a preferred programme option?	Agree. I'm not sure I can answer the question. My answer would be that this work shows that under the core land use assumptions, none of the options deliver much more than the other, but that options 1 / 2 have substantially more embodied carbon. I think that this statement then flows into the wider assessment that balances between all the objectives – not just carbon and mode shift – and has resulted in Option 1 being preferred.	The earlier response about how the carbon emissions and mode share objective was scored answers this point.	No change in Technical Report



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
LGWM Strategic CBA Review Annex – draft version 0.3 4 April 2022			
The comments below are of a general nature related to how they inform the PPOR and the decision about a preferred programme.			
The final paragraph of section 3.2 discusses impacts explored by EY and where some impacts have been excluded from “core” CBA results. It isn’t clear what this exclusion relates to; presumably standard Waka Kotahi procedures for assessment of the economic performance of each programme option have been adopted?	<p>Clarification to be provided in Technical Report</p> <p>“Their exclusion...” is perhaps not the correct terminology – they haven’t been identified, calculated and then not included. They’re benefits or classes of benefits that are bespoke / complex, and so wouldn’t normally be calculated at the IBC stage. The intention is to forecast their consideration at DBC.</p> <p>Draft text: “They have not been calculated at the IBC stage because their calculation requires bespoke analysis that is of a scope and magnitude that it is best quantified once detailed design at the DBC stage has decreased programme uncertainty and risk. The identification of these benefits at IBC stage is intended to provide confidence that a range of benefits commensurate with the scale of the programme have been identified conceptually, those able to be calculated at IBC stage have been considered, and those most appropriately considered at DBC stage will be assessed if the programme advances.”</p>	The peer review comment was directed towards understanding WHAT impacts have been excluded at this stage. A simple statement of what “they” are would suffice.	Change made in Technical Report
Section 4 para 3 states that Option 3 did not have an economic evaluation because it scored lowest against the programme objectives in the MCA. Decision makers may want to understand the economic performance of this option if they want to consider alternatives to the recommendation in the PPOR. Is it possible to provide a commentary on the likely range of BCRs for this option?	<p>Clarification to be provided in Technical Report</p> <p>I’m unkeen to be forced into this kind of speculation. Can we respond to this the other way round:</p> <p>“Option 3 was not progressed to formal economic evaluation through CBA. As Programme transport modelling results have, in general, been aligned with the findings of MCA assessment, we have no reason to believe that an economic evaluation of Option 3 would identify material benefits over Options 1, 2 and 4. Similarly, as the cost of Option 3 is not significantly lower, it is unlikely to exceed the BCR range for Option 1.”</p>	Noted. The final IBC will need to address this point.	Change made in Technical Report To be done in IBC
Table 4.1 highlights the general parameters and assumptions in the CBA. The project opening year is stated to be 2031. Is this assumption reasonable for all four programmes?	I think this is an averaged timeframe assumption that recognises that the various components of the programme will open across the entire construction period. Further explanation to be provided	Noted.	No change made in Technical Report



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>In table 4.2 Option 2 it states that for the high land use scenario an adjustment was made to reflect reduced potential for stimulating urban intensification compared to Option 1. What adjustment was made and how was it determined? There is also a comment that the outputs for the HLU scenario have been revised downwards by 20%. Specifically which outputs are referred to?</p>	<p>Further clarification to be provided. Option 1 was the only scenario that was fully tested with the high land use scenario. Option 2 was tested using a sensitivity test assumption that BRT would only be able to achieve 80% of the urban development of LRT (hence the 20% reduction). Option 4 was tested using a sensitivity test assumption that the eastern elements in option 1 contribute 7% of the benefits (on the basis that they contribute to 7% of the uplift) This is likely to be a conservative assumption as option 4 does not provide the level of PT Capacity to accommodate 93% of the full demand</p>	<p>Noted. This narrative should be included in the final IBC.</p>	<p>To be done in IBC</p>
<p>Table 4.3 outlines the economic performance of three programme options. The BCR values excluding agglomeration show the options are broadly similar to values derived in earlier programme analysis in the range of 0.46 to 0.53. Agglomeration values to add significantly to these values. Do the BCRs quoted in the main report INCLUDE forecast land value uplifts for each option? If not, how will this factor be considered?</p>	<p>Table 4.3 does not include forecast land value uplift. Advice from Deloitte economists during the development of economic analysis to August 2021 ("Programme Report") identifies the risk of double-counting economic benefits if both agglomeration and land value uplift are factored into the economic analysis.</p>	<p>Noted.</p>	<p>Clarification provided in Technical Report</p>
<p>The assessed safety benefits in table 4.3 appear to be low. Given that safety is one of the five core programme objectives, this is disappointing: currently they represent less than 5% of the total benefit stream.</p>	<p>No action required although further safety analysis will be undertaken as part of the DBC</p>	<p>Noted.</p>	<p>To be done in DBC</p>
<p>Tables 4.3 and 4.4 set out the preliminary CBA results for the core and high land use scenario. Do the costs include funding that would be required to service the higher land use scenario? This could be an important point, although the infrastructure costs for the higher land use scenario may come from separate funding. The agglomeration benefits are high by comparison with other benefit streams, so it is important to understand what they represent. It may also use be useful to explain the health benefits for additional walking trips as these benefits are also high.</p>	<p>Clarification to be provided in Technical Report</p> <p>No attempt has been made to quantify costs associated with enhancements to other infrastructure or to ensuring the delivery of additional housing. This could be noted in the report as something that will be examined in more detail in the DBC.</p> <p>Proposed text: Examining the detail of the CBA reveals a substantial increase in health benefits for users of active modes of transport. Walking and cycling benefits are distributed across the city but concentrate in and around the CBD where pedestrians and cyclists gain significantly improved infrastructure, leading to greater demand. The high land use scenario also introduces a noticeable additional increase in health benefits for pedestrians and cyclists from the core land use scenario.</p>	<p>Noted. This point will need to be highlighted in the final IBC, as the investment story could be deemed deficient if the recommendation is contingent on an uncommitted / unfunded separate UD programme.</p>	<p>Change made in Technical Report.</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
Section 6.1 outlines the importance of the do minimum. It is not clear what has been agreed to be the do minimum case (also see comment related to the modelling report). Have the do minimum and the reference case previously defined (2020) been amended for the latest analysis?	No action required The do minimum remains as previously defined - Section 6.1 identifies additional work in the DBC to account for the limitations of the Do Min in such a long programme of projects as contained in LGWM.	Noted. Peer reviewer has not had access to a recent document which defines the do minimum case.	Minor clarification made in Technical Report
Section 6.2 covers high population growth in New Zealand and how historic forecasts underestimated the rate of population growth. It isn't clear what the purpose of this text is other than to highlight to decision's makers something which may underpin population growth and by extension, patronage forecasts.	No action required That's the point.	Noted.	Minor clarification made in Technical Report
Section 6.4 discusses wider economic benefits (WEBS), but the narrative is unclear about what assessment was made for the programme options. Where uplifted land values included in the assessment? These points need to be clarified for the decision makers.	Clarification to be provided in PPOR	Noted.	Noted
Section 6.4.1 argues in favour of adopting dynamic land use analysis to assess the benefits of the LGWM Programme. In principle, this is a good approach, given the scale and potential impact of a transport intervention of this scale in the region. However as noted in the report, this would take time to complete. For an IBC the approach adopted is pragmatic and gives a reasonable forecast of the land use and transport interactions to allow a comparison of the relative performance of each of the four programme options.	Noted.	Noted.	Noted.
Sections 7 and 8 outline how the economic assessment could be improved. These ideas could be useful, but they are unlikely to provide additional information to help distinguish between the four options presented in the PPPOR within a short timeframe. Therefore, it is concluded that subsequent stages of the business case development should carefully consider these and other potential enhancements to the economic assessment methodology, which would need to be agreed with potential investors, Programme Partners and key stakeholders before progressing, given the complexity and effort required.	Agreed.	Noted.	Noted



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Section 9 discusses the completed sensitivity analysis in the economic assessment and concludes that, the mode specific preferences, inflation forecasts and population projections are reasonably sound for the purposes of comparing the programme options. Section 9.4 discusses some of the technicalities related to the transport modelling system, but it isn't quite clear what is critical with respect to the difference between the Wellington and Auckland models. A separate response about this point should be sought from the transport modelling team as to whether (or not) this issue is material to the results of this evaluation.</p>	<p>Clarification to be provided in appendix</p>	<p>Noted.</p>	<p>Clarification made in Technical Report</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Conclusions and Recommendations</p> <p>The critical parameters that inform the choice of preferred programme option start from the scale and location of residential development and employment opportunities within the city. The decision around the preferred programme is, therefore, a decision about what the future urban form of Wellington will be, all as part of bringing to fruition the vision of “a great harbour city”.</p> <p>The PPOR currently concludes that <i>“The preferred option that should be progressed to detailed business case is a High-Capacity Mass Transit solution with a new tunnel through Mt Victoria and improvements at the Basin Reserve. This is consistent with Option 1 but is recognises that BRT could provide similar outcomes to LRT if designed properly.”</i></p> <p>Based on the considerable volume of data and assessments to date, this conclusion is understandable, given the level of knowledge and confidence around several key questions, including:</p> <ul style="list-style-type: none"> • Acceptance that a significantly intensified land use scenario for Wellington City is appropriate, realistic and achievable (in terms of community acceptance, consenting, demand and funding). • Appreciation of the risks related to the forecast patronage for the intensified land use scenario (including mode shift, integration with the regional transport network, service quality, etc) • Understanding of the potential for BRT to adequately serve an intensified land use scenario <p>However, it is the conclusion of this Peer Review, that given the current uncertainty around the scale of land use intensification and relatively small differences between the performance of options in the MCA, further work will be required in the DBC to confirm a preferred programme option. This work should include identifying how the preferred option will respond to the key questions above.</p>	<p>Agreed.</p> <p>All programme options should be tested again during the DBC once some of the key questions are answered.</p> <p>We can add this proposal into the PPOR</p> <p>High priority</p>	<p>Noted.</p>	<p>Report updated</p>



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
As the main reference document, the PPOR needs to provide clear advice about the key factors and determinants for deciding a preferred option. Urban development, consentability, funding, delivery timeframe and risk are all factors that should feature in this report, alongside the comprehensive assessment of transport system performance for each of the options.	The report provides clear advice about the factors that were determined to be important to decision makers. Quantification of outcomes for all options was not possible due to time, land use assumptions and modelling constraints. No change High priority	As noted above, these points highlight the need for a comprehensive risk assessment and narrative in the final IBC.	To be done in IBC
The narrative should discuss the investment objectives which flow from the problem statements described early in the report. Investment in transport system infrastructure should be based on desired outcomes; a key omission from the document is a description of the outcomes sought from the LGWM Programme. This omission should be rectified as quickly as possible and should be included in the comparison of programme option performance.	Can add more discussion around Programme Objectives and how they were addressed through the MCA High priority.	Noted.	Report updated
Carbon reduction is the highest weighted objective of the LGWM Programme and the narrative states that any of the options would achieve a small reduction in total transport carbon emissions in Wellington. Therefore, other interventions should be considered, which may have more impact than the programme options presented here, either alone or working in combination with the options presented here. This will be an important point for decision makers.	Agreed, but outside the scope of this report. No change High priority.	Should be included in the final IBC.	To be done in IBC
The report needs to include a holistic assessment of programme risk. This topic should be given careful consideration in determining a preferred programme, given the scale, complexity and potential consequences of getting it wrong. The key programme risks could be expected to include: <ul style="list-style-type: none"> Urban Development and land use scenario - is it realistic, is it viable? changing Government Policy over the next several years during which the programme will be implemented cost escalation patronage forecasting technological developments failing to meet programme objectives 	Already a risk section. Of these noted by peer reviewer, only patronage forecasting and failing to meet project objectives are the two that are not discussed. Failing to meet programme objectives would be due to one or more other risks anyway. Can add more on patronage forecasting risk. High priority	See previous comments about risk assessment.	To be done in IBC



Peer Review comment	Report team response	Peer Reviewer response 24 May 2022	Status
<p>Each of these risks should be quantified as far as possible, in terms of probability and potential consequences to schedule and cost. Each risk should also have an outline mitigation strategy, so that decision makers can be confident that key risks can be appropriately managed through the development process.</p>	<p>Quantification of these risks is too detailed for this report and may not be possible with existing information. Would better be in the IBC or DBC. No change High priority</p>	<p>See previous comments about risk assessment.</p>	<p>To be done in IBC</p>



**Council
6 July 2022
Report 22.307**



For Information

LOCAL ELECTORAL (ADVERTISING) AMENDMENT ACT 2022

Te take mō te pūrongo

Purpose

1. To inform Council of the Local Electoral (Advertising) Amendment Act 2022.

Te horopaki

Context

2. Report 22.160 – Greater Wellington’s Communication Policy for the 2022 Pre-election Period – considered by Council on 26 May 2022, referenced the provisions of section 113 of the Local Electoral Act 2001 then in effect regarding election advertising: at that time section 113 required persons undertaking election advertising to state their place or residence or business in such advertising.
3. In early June 2022 the Government introduced the Local Electoral (Advertising) Amendment Bill (the Bill). It advised that the policy objective of this Bill was to address safety concerns related to the publication of residential addresses on local election campaign advertisements, while continuing to provide for accountability and transparency in electoral advertising.
4. On Tuesday, 28 June 2022, the House of Representatives completed its deliberations on the Bill, which is now enacted as the Local Electoral (Advertising) Amendment Act 2022, with its provisions in effect from 1 July 2022.
5. The Local Electoral (Advertising) Amendment Act 2022 amends section 113 of the Local Electoral Act so that the contact details requirement for an advertisement authorisation statement can now be met by providing one or more of the following:
 - a a residential or business address
 - b an email address
 - c a post office box number
 - d a phone number
 - e a link to a page on an Internet site, if the page contains one or more of the details in a. to d.
6. The updated requirements of section 113 of the Local Electoral Act 2001 will be detailed in Greater Wellington’s Candidate Handbook for the 2022 elections, which is about to be made publicly available.

7. Consistent with Greater Wellington's long-standing approach of ensuring fairness, transparency and consistency in electoral processes, candidates for Greater Wellington's elections are not permitted to utilise Greater Wellington's details for the purposes of an electoral advertisement authorisation statement.

Ngā kaiwaitohu

Signatories

Writer	Francis Ryan, Manager, Democratic Services
Approver	Luke Troy, General Manager, Strategy

He whakarāpopoto i ngā huritaonga Summary of considerations
<i>Fit with Council's roles or with Committee's terms of reference</i> It is appropriate for Council to be kept informed of legislative changes.
<i>Contribution to Annual Plan / Long Term Plan / Other key strategies and policies</i> None
<i>Internal consultation</i> None
<i>Risks and impacts - legal / health and safety etc.</i> There are no known risks or impacts arising from this report.

Council
6 July 2022
Report 22.302



For Decision

RESOLUTION TO EXCLUDE THE PUBLIC

That Council excludes the public from the following part of the proceedings of this meeting, namely:—

Appointment of member to the Wairarapa Committee – Report PE22.194

The general subject of each matter to be considered while the public is excluded, the reasons for passing this resolution in relation to each matter and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 (the Act) for the passing of this resolution are as follows:

Appointment of Member to the Wairarapa Committee – Report PE22.194	
<i>Reason for passing this resolution in relation to each matter</i>	<i>Ground(s) under section 48(1) for the passing of this resolution</i>
<p>Information contained in this report includes personal and identifying information about a proposed candidate for appointment to the Wairarapa Committee. Release of this information prior to Council's decision is likely to prejudice the privacy of natural persons as releasing this information would disclose their consideration for appointment as a member of the Committee.</p> <p>Greater Wellington has considered whether the public interest outweighs the need to withhold the information and has determined that there is no public interest favouring disclosure of this particular information in public proceedings of the meeting that would override the need to withhold the information.</p>	<p>The public conduct of this part of the meeting is excluded as per section 7(2)(a) of the Act - to protect the privacy of natural persons, including that of deceased natural persons.</p>

This resolution is made in reliance on section 48(1)(a) of the Act and the particular interest or interests protected by section 6 or section 7 of that Act or section 6 or section 7 or section 9 of the Official Information Act 1982, as the case may require, which would be prejudiced by the holding of the whole or the relevant part of the proceedings of the meeting in public.