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MINISTRY OF TRANSPORT

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Optioneering Report

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Table of Abbreviations and Glossary

Term	Description	Term	Description
AEE	Assessment of Environmental Effects	**MCA**	Multi-Criteria Analysis
AIAL	Auckland International Airport Limited	**MHX**	Manakau Harbour Crossing
AIR	Auckland International Airport	**MSM**	Macro Strategic Model
ALR	Auckland Light Rail	**MoT**	Ministry of Transport
AM	Ante Meridien	**MTC**	Māngere Town Centre
ARTP	Auckland Regional Transport Plan	**MUS**	Isthmus – Corridor Segment
AUP	Auckland Unitary Plan	**NPS-UD**	National Policy Statement – Urban Dev.
AWHC	Additional Waitematā Harbour Crossing	**NPV**	Net Present Value
BBC	Better Business Case	**ONE**	Ōnehunga
CapEx	Capital Expenditure	**OpEx**	Operational Expenditure
CAR	Context Analysis Report	**OSD**	Over Station Development
CBC	Corridor Business Case	**PSD**	Platform Screen Door
CBD	Central Business District	**PSL**	Potential Station Location
CC2M	City Centre to Māngere	**PSZ**	Potential Station Zone
CHI	Cultural Heritage Inventory	**PT**	Public Transit
CMJ	City Motorway Junction	**PWF**	Preferred Way Forward
COO	Concept of Operations	**RFR**	Right of First Refusal
CRL	City Rail Link	**RLTP**	Regional Land Transport Programme
CTC	City Centre – Corridor Segment	**RTN**	Rapid Transport Network
DBC	Detailed Business Case	**RTO**	Roskill to Ōnehunga – Corridor Segment
DCM	Dynamic City Model	**RMA**	Resource Management Act
EPD	Environmental Product Declaration	**ROM**	Rough Order of Magnitude
EPO	Emerging Preferred Option	**SCO**	Segment Corridor Option
EW	East-West	**SH20**	State Highway 20
FAV	Favona	**SME**	Subject Matter Expert
GFA	Gross Floor Areapsd	**TBM**	Tunnel Boring Machine
GIS	Geographic Information System	**WES**	Wesley
IBC	Indicative Business Case		
IC	Intermediate Comparator		
ILM	Investment Logic Map		
IMS	Investment Management System		
KPI	Key Performance Indicator		
KR	KiwiRail		
LSF	Living Standards Framework		
LRV	Light Rail Vehicle		
LUTI	Consultants, undertaking modelling		

The following terms are used throughout the Optioneering Report, particularly in the Urban Response Optioneering in Phase 3 of the document.

Term used in business case	Definition
Active Investment Option	The amount of investment and *Growth* which is anticipated to be deenlivered within the CC2M corridor by 2051, in the event that ALR is delivered alongside a significant package of *Urban Interventions*.
Corridor Strategic Framework	The overarching framework which sets out the future vision and aspirations for the transformation of the ALR corridor, including articulation of the project's *Urban Outcomes* through Corridor Strategies (which set out urban strategies across seven different topics), Provisional Catchment Development Frameworks (which set out spatial strategies for each station location), and a Context Analysis Report (which contains extensive anaylsis of existing opportunities and constraints across the corridor). It provides direction as to how ALR can contribute to a thriving Auckland over the next 30 years, and beyond.
Growth	The increases in population, households and jobs which are anticipated to occur across Auckland in the future and which have been factored-in when establishing *Growth Options*. These quantums are derived from LUTI modelling informed by Auckland Council's Growth Scenario i11.6 (2020).
Growth Options	The various options for *Growth* and the distribution of that growth within the CC2M corridor which have been considered within the *Urban Optioneering Process*.
Incremental Growth	The amount of *Growth* above the *Transport Do Minimum* level which will occur within the CC2M corridor, as a result of the delivery of ALR and *Urban Interventions*.
Incremental Investment Option	The amount of investment and *Growth* which is anticipated to be delivered within the CC2M corridor by 2051, in the event that ALR is delivered alongside a moderate package of *Urban Interventions*.
Land Value Uplift	The increase in the value of land which results from land use changes, which occur as a result of the delivery of ALR and accompanying investment in *Urban Enabling Infrastructure* and *Urban Interventions*.
Transport Do Minimum Option	The *Growth* anticipated to be delivered within the CC2M corridor by 2051, in the event that ALR is not constructed. *NB: This is consistent with the definition of Do Minimum in the 2021 IBC, when the Do Minimum option was to not build ALR.*
Urban Enabling Infrastructure	The urban infrastructure necessary to enable increasing amounts of *Incremental Growth* within the CC2M corridor, outside of the NoR boundary. In the context of ALR, enabling infrastructure costing does not address improvements to service level / environmental outcomes of existing infrastructure, only expansion of infrastructure capacity for incremental growth.
Urban Interventions	The various interventionary measures required to achieve the *Incremental Growth* under each *Growth Option*.
Urban Minimal Investment Option	The *Incremental Growth* anticipated within the CC2M corridor by 2051 in the event that ALR isered without any additional *Urban Interventions* by ALR, and which is therefore is a minimal option relative to the *Incremental Investment Option* and *Active Investment Option*. The

Term used in business case	Definition
	Urban Outcomes delivered would therefore only be those resulting from the transport investment. *NB: This is distinct from the definition of Do Minimum in the 2021 IBC and Transport Do Minimum in this document.*
Urban Optioneering Process	The assessment of potential *Growth Options*, through analysis and appraisal, which resulted in shortlisted options that have been assessed as part of the Economic Case.
Urban Outcomes	The desired urban end-state of the CC2M Corridor following the construction of ALR and the delivery of *Incremental Growth*, as articulated through the *Corridor Strategic Framework*.
Urban Response	The selected urban *Growth Options* emerging from the *Urban Optioneering Process* and which are assessed in the Economic Case, which also factor investment in *Urban Enabling Infrastructure* and *Urban Interventions*.

In early stages of the Urban Optioneering Process, the three Growth Options had different names. These have been refined as work has progressed to better reflect the intention of each option:

- **The Urban Minimal Investment Option was initially referred to as 'Urban Do Minimum'**
- **The Incremental Investment Option was initially referred to as 'Do Something'**
- **The Active Investment Option was initially referred to as 'Do Something Plus'.**

These previous names appear in any appendices to the Optioneering Report which are records of discussions that took place at that time, such as workshop slides. They have otherwise been superseded.

Introduction

Background

In June 2020, Cabinet agreed that the City Centre to Māngere Project be taken forward through a public service delivery approach [CAB-20-MIN-0300]; the cabinet paper noted that the Project needs to establish processes for working with Mana Whenua as Treaty partners over the life of the Project, given its likely impact on:

- Treaty settlements, potentially including rights of first refusal and activity in the marine and coastal areas where the route crosses the Manukau Harbour at Onehunga / Māngere; and
- Matters of national importance under the Resource Management Act specifically the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.

Given its scale and duration, the Project represents a significant opportunity to make a step change in how the Crown and Māori work in partnership on major projects by embedding practices that move from engaging to empowering mana whenua.

The Auckland Light Rail (ALR) Indicative Business Case (IBC) (submitted October 2021) investigated a rapid transit solution along the City Centre to Māngere (CC2M) corridor. The CC2M corridor is part of the Auckland Regional Transport Plan (ARTP) which aims to:

- Relieve congestion in key north-south routes in the isthmus
- Reduce travel times to and from south of Manukau Harbour
- Provide fast and reliable public transport options.

The IBC developed the CC2M corridor to enable higher density and better-quality urban development, leading to stronger, more resilient communities, improved liveability and attractive, compact urban form. The ALR Urban Ambition articulated the scale of change likely from the different modes analysed, with a light metro system expected to deliver fewer stations, concentrating urban regeneration in key areas along the corridor.

The IBC explored a wide range of options including modes of public transport such as light rail, light metro, heavy rail and bus rapid transit[1]. Several route options were identified and assessed using multi-criteria analysis (MCA). This identified the Tunnelled Light Rail as offering the best balance of costs and benefits.

Endorsing the IBC in December 2021, Cabinet confirmed that further investigations should follow, with increased focus on the integration of transport and urban development to optimize outcomes, as well as further analysis of the benefits and costs of grade-separated options.

[1] ALR Indicative Business Case Appendix 5 Long List Report

As part of the development of the IBC, Mana Whenua with interests along the route were engaged and asked to identify the opportunities, aspirations, issues and challenges they saw arising from the Project. These were reflected in Te Rautaki Huanga Māori (Māori Outcomes Strategy)[2] which sets out the aspirations for Mana Whenua and Māori for CC2M. Te Rautaki Huanga Māori sets Ngā Uara: Values; Ngā Mātāpono: Principles for Engagement and Ngā Putanga: Māori Outcomes for the Project and has helped to set the strategic direction for the Optioneering process.

Corridor Business Case

The City Centre to Māngere Corridor Business Case (CBC) represents a change in how large infrastructure projects are developed in Aotearoa, New Zealand. As well as ascertaining the costs and benefits of the transport infrastructure, it also seeks to understand and identify the potential for complimentary integrated urban investments that can accelerate and increase the realisable benefits achievable through investment in transport alone. The transport infrastructure component of the Corridor Business Case will respond to Detailed Business Case requirements, while the urban components will reflect at Indicative Business Case thresholds.

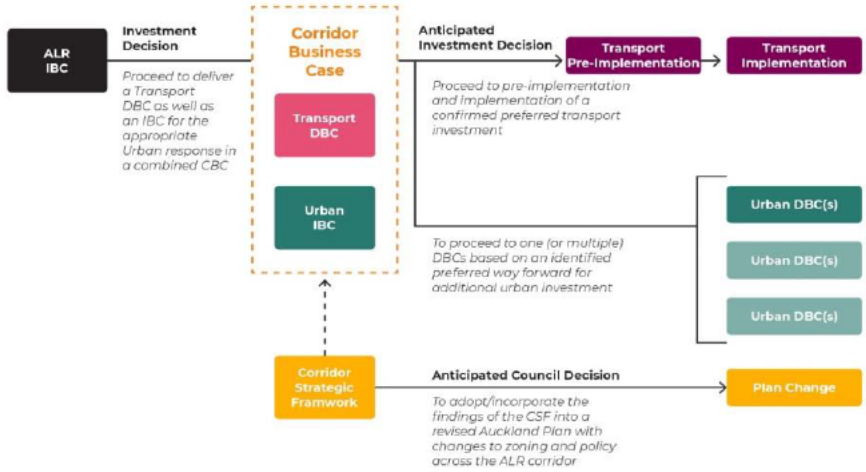


Figure 0-1 The Corridor Business Case combines a transport DBC and urban IBC to fully realise an integrated solution to support long-term benefits realisation in Tāmaki Makaurau.

The CBC – the first of its kind in Aotearoa - recognises that the benefits of transport infrastructure can only be fully realised when combined with urban interventions that amplify community adoption.

Purpose of this Report

This report presents the option development and assessment process that was implemented to respond to the problems and investment objectives identified in

[2] See Appendix B-E

the CBC, and to satisfy the requirements of the Resource Management Act (1991). A description of the process objectives and approach is presented in *Section 0.4*.

Option development and assessment Phases

The options development and assessment approach for ALR CC2M was a multi-stage process moving from high-level analysis through to greater detail encompassing:

- Phase 0: Point of entry and approach
- Phase 1: Corridor options development and assessment
- Phase 2a: Catchment options development and assessment
- Phase 2b: Total project components development and assessment
- Phase 2c: Emerging Preferred Option and intermediate comparator(s)
- Phase 3: Urban response optioneering

A summary of this process is shown below, with each Phase subsequently described in brief.

Summary of optioneering process

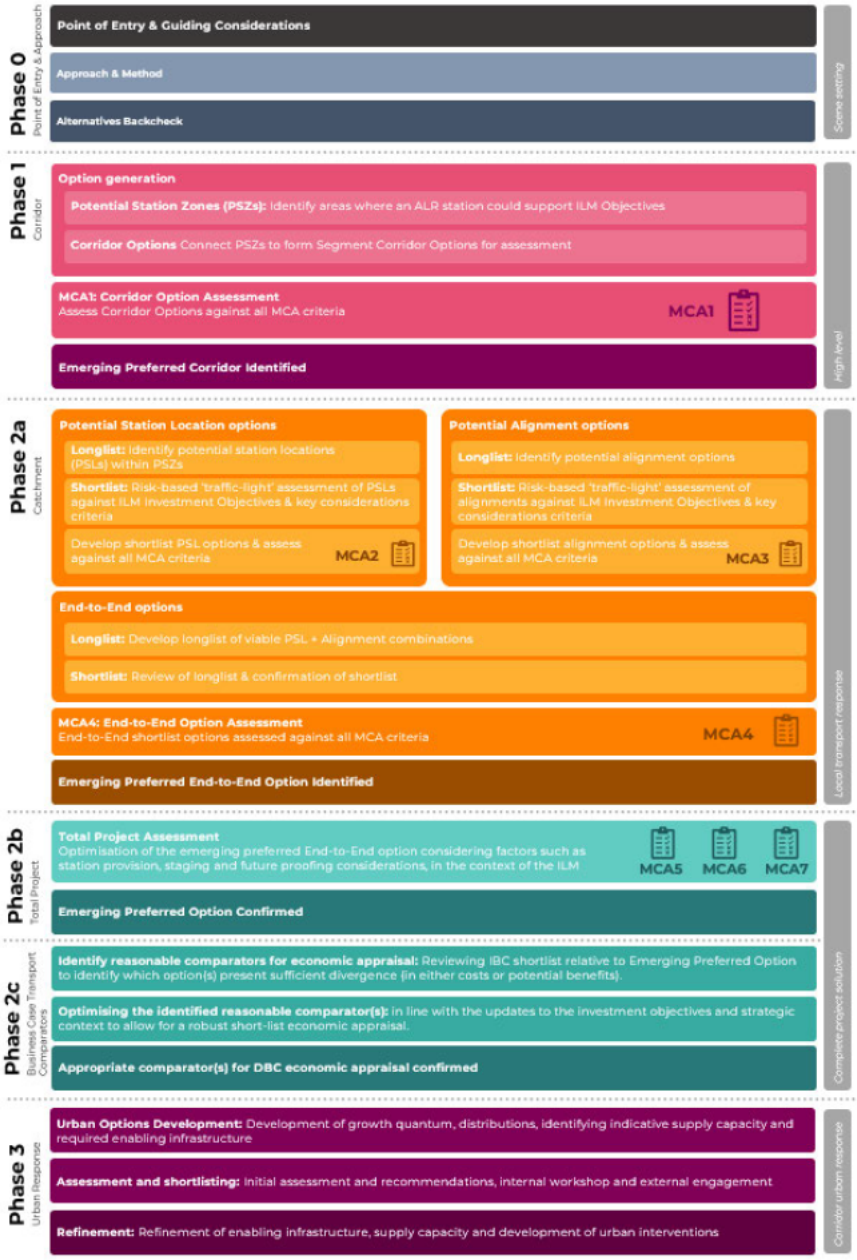


Figure 0-2: The optioneering process moving from high level-analysis to detailed assessment

Phase 0: Point of entry and approach

The point of entry for the optioneering process was defined by the CC2M IBC and the subsequent Cabinet Paper[3] and Ministerial Letter[4] (December 2021 and June 2022 respectively). The project's Investment Logic Map (ILM) was refreshed and an 'alternatives backcheck' was performed on the IBC findings to check against new information and the revised ILM.

Reflecting NZ Treasury and Waka Kotahi guidance, two core objectives were set for the optioneering process and a series of MCAs was identified as the approach. Project-specific MCA criteria were developed based on the ILM, Te Rautaki Huanga Māori Māori Outcomes Strategy and the requirements of the Resource Management Act. These were deployed consistently across the MCA assessments.

Phase 1: Corridor options development and assessment

Phase 1 identified a number of potential station zones (PSZs) within a 1.4km width running from Waitematā Harbour in the north and Auckland Airport in the south. Through the corridor assessment process, emerging preferred potential station zone options were identified. The corridor optioneering process involved three steps:

- Corridor option development (by geographic segment)
- Corridor option assessment (by geographic segment)
- Whole corridor assembly

Phase 2a: Catchment options development and assessment

Building on the outputs from Phase 1, the Phase 2a catchment optioneering identified the preferred locations of ALR stations to a circular resolution of around 200m diameter. It also identified the preferred alignment of the route connecting the stations. The catchment optioneering comprised:

- Potential station location option development and assessment
- Alignment option development and assessment
- Station and alignment combination option development
- End-to-end route and station finalisation

Phase 2b: Total project components

Having established an initial emerging preferred end-to-end route option in Phase 2a, a review of the whole route identified opportunities to optimise the project's impacts and value. Further analysis of key route-wide considerations included:

- AWHC and airport integration
- Station optimisation
- Location of depot
- Staging

[3] See Appendix B-B
[4] See Appendix B-C

Phase 2c: Emerging preferred option and intermediate comparator(s)

After the emerging preferred option was identified in Phase 2b, the IBC shortlist schemes were reviewed for suitability as realistic intermediate comparators as part of the Transport DBC in line with NZ Treasury and Waka Kotahi guidance.

Phase 3: Urban Response optioneering

With confirmation of an emerging preferred option and a confirmed intermediate comparator, Phase 3 sought to identify the Urban Response Growth Options that would best enhance outcomes from the transport investment. The following elements informed the urban optioneering process:

- The quantum and distribution of urban growth
- The necessary urban enabling infrastructure
- The testing of theoretical capacity and supply of land for development
- The anticipated urban interventions required to achieve the opportunities for urban uplift

Phase 0: Point of entry and approach

0.1. Point of entry

IBC shortlist and recommended option

In 2021, the CC2M Rapid Transit IBC identified the form of rapid transit that would best meet the desired outcomes of the ALR project. An initial shortlist option assessment[5] identified the three best-performing options as:

1. Light Rail
2. Light Metro
3. Tunnelled Light Rail.

A detailed assessment of these three options demonstrated that all options had the potential to deliver the outcomes sought by the Investment Objectives and could be justified economically. The IBC findings have been imported and are shown in Table 0-1.

Table 0-1 Summary assessment of three IBC shortlisted options

Summary Assessment of IBC Shortlisted Options (From 2021 IBC)			
	Street Running Light Rail	Light Metro	Tunnelled Light Rail
	Why you would choose this option		
Objectives	Delivers step change in accessibility in the corridor and a moderate level of additional capacity in the corridor and slowest journey times Delivers reduced carbon reliance in the corridor Enables high quality urban form and additional urban capacity in the corridor	Delivers step change in accessibility in corridor and highest level of transport capacity in the corridor through full separation of the system Delivers reduced carbon reliance in the corridor Along with other interventions, enables high quality urban form and highest urban capacity in the corridor	Delivers step change in accessibility in corridor through full separation in the city centre and central isthmus and high level of transport capacity in the corridor Delivers reduced carbon reliance in the corridor Enables high quality urban form and capacity in the corridor

[5] For more detail on the IBC Option Assessment Process please refer to the IBC and appendices 005 Long list options and 008 Short list options

Value	It is economically justifiable At $9Bn ($7.1Bn NPV) is the least costly of the options, providing opportunity for investment elsewhere in the Rapid Transit Network in Auckland Delivers the lowest total benefits at $8.0Bn (NPV)	It is economically justifiable Focuses investment to maximise long term outcomes in this corridor and provides future proofing in the city centre for wider Auckland Rapid Transit Network at a cost of $16.38Bn ($11.1Bn NPV) Delivers the highest level of benefits at $13.9Bn (NPV)	It is economically justifiable Provides opportunity for high levels of urban uplift and future proofing in city centre for wider Auckland Rapid Transit Network for a cost of $14.6Bn ($10.4Bn NPV) which is approximately $2Bn ($0.78Bn NPV) less than the Light Metro option Delivers $11.7 Bn (NPV) of benefits, approximately $2.2Bn (NPV) less than the Light Metro option
Things to be aware of with this option			
	Level of disruption during implementation along the entire route and at town centres Potential need for further longer-term investment in the corridor to meet transport and urban demand	Level of disruption during implementation at station locations and tunnel portals as well as surface separated segments Very high level of investment in a single corridor Suggests that further investment in the Auckland Rapid Transit Network will be Light Metro to maximise the benefits of this investment.	Level of disruption during implementation at station locations and tunnel portals as well as surface separated and non-separated segments High level of investment in a single corridor, that has lesser capacity than Light Metro option

To agree a preferred way forward (PWF), various trade-offs were considered including:

- costs
- climate change
- urban intensification and regeneration
- disruption
- road transport network (RTN) integration
- transport capacity.

After comparing the trade-offs for each scheme, noting all three shortlisted options performed well economically, the **Tunnelled Light Rail option** was selected as the PWF, given its service-capacity, flexibility, limited disruption, and relative affordability.

The PWF was presented to the project sponsors (see below), noting it was selected based on the IBC with greater detail over costs and benefits realisation still to be confirmed. The IBC acknowledged that precise details would be subject to change throughout the detailed business case (DBC) and consenting processes. Additionally, opportunities to optimise the design through route and station selection, staging and phasing needed to be considered in later stages.

Cabinet Paper (December 2021)

In response to the recommendations that project sponsors received from the ALR Establishment Unit, the Hon Grant Robertson, Minister of Finance, and the Hon Michael Wood, Minister for Transport, put forward a Cabinet Paper[6] in December

[6] See Appendix B-B

2021. This paper sought agreement for an integrated programme of work that would develop a preferred option through technical project design and development, policy implementation and decision-making, delivered within a broader urban transformation approach along the CC2M corridor.

Minister Robertson and Minister Wood recommended that Cabinet agree to progress the ALR project on the basis of the Indicative Business Case. It was noted that the IBC focused on the transport intervention and did not contain detailed analysis or options to realise the urban development benefits. Additionally, the Paper asked Cabinet to agree that a Tunnelled Light Rail solution was the preferred way forward, with detailed work to follow to refine the Establishment Unit's recommended alignment along the Sandringham Rd corridor.

Ministerial Investment Management System Letter (June 2022)

In June 2022, Minister Michael Wood issued a letter[7] to the ALR Establishment Unit Board to confirm that Tunnelled Light Rail, as set out in the IBC, should be the broad 'point of entry' for the Corridor Business Case (CBC).

The letter confirmed the indicative route and separation of the IBC Preferred Option but noted that the business case should assess updated option information (where appropriate) to confirm the validity of the IBC recommendation. Further exploration and refinement of options was requested in the following areas:

- **Mode choice** – Any information identified that challenged the Light Rail mode recommendation from the IBC, to be raised with sponsors. The range of mode options within the Light Rail definition (i.e. rolling-stock type) was also to be assessed.
- **Route alignment** – Further exploration and refinement of the IBC alignment to ensure optimised value for money and benefit realisation, especially in the tunnelled sections.
  Station locations – Station locations to be further refined, balancing the costs and benefits of related transport and urban development infrastructure.
- **Staging** – Exploration of project staging to identify opportunities for earlier delivery of benefits, reduce risk and to manage affordability.
- **Grade separation** – Tunnelled section through the central isthmus to Puketāpapa Mt Roskill was not to be revisited, but grade separation options further south were to be further explored.
- **Integration with AWHC[8]** – The ALR business case should show how the two projects integrate to allow sponsors to make informed decisions on the options at the end of the detailed planning phase and at critical points through the business case process.

[7] See Appendix B-C
[8] AWHC – Additional Waitematā Harbour Crossing is a proposed additional crossing of Auckland Harbour to support the Auckland Harbour Bridge which is almost at capacity. It proposes a fully multi-modal solution for people wanting to walk, cycle, travel by bus or light rail, drive or transport freight. This crossing would connect with ALR CC2M.

- **Urban development and local bulk infrastructure** – Further exploration and refinement of options including density and distribution of housing and jobs, local bulk infrastructure investment, and the dynamics of housing and employment enablement within the corridor over time.

0.2 Guiding Considerations

There is a series of Guiding Considerations which underpin the project, including the Investment Logic Map, Te Rautaki Māori which sets out the aspirations and considerations for Mana Whenua and Māori, and the Resource Management Act, as well as other feasibility considerations. These Guiding Considerations sit at the heart of the optioneering process and are directly applied through the multi-criteria analysis framework[9] used to assess options.

Investment Logic Map

Investment Logic Mapping is a process that ensures the story of any proposed investment makes sense. It also tests and confirms that the rationale for a proposed investment is evidence-based and sufficiently compelling to convince decision makers to invest. The Investment Logic Map (ILM) that results is a simple flowchart that sets out the problems that the investment is seeking to address, then maps these to the benefits and objectives of investment to promote fit-for-purpose and outcome-driven solutions.

The IBC ILM was reviewed in July 2022, following NZ Treasury Business Cases guidance, with particular focus on the inclusion and integration of urban development factors. The facilitated workshop was attended by representatives from all the ALR Establishment Unit's partner organisations. Attendees were provided with updated evidence to support any revisions. The output, the updated ILM, is shown below.

[9] See Section 0.5

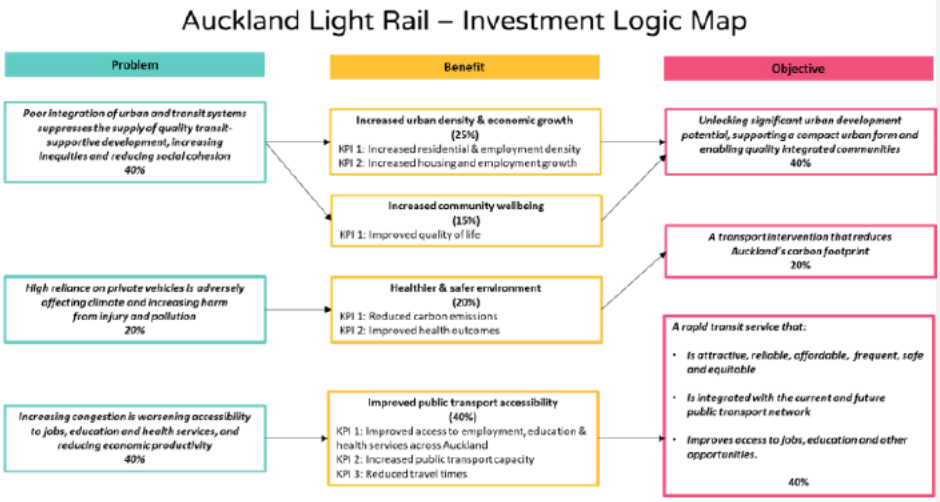


Figure 0-1 The updated Investment Logic Map underpins the Corridor Business Case and is a Guiding Consideration for the ALR Optioneering

Beyond minor structuring adjustments and some re-wording, key changes to the ILM were:

- Specific identification of urban development benefits, including residential and employment density, increased housing and employment growth
- Specific reference to reduced carbon emissions as a key benefit
- Identification of measurable benefits that emerge from improved efficiency and utilisation, such as increased public transport capacity and reduced travel times

A full summary of changes made to the IBC ILM can be found in the ILM Review Board Paper[10].

The updated ILM was a critical input to all ALR optioneering processes with a set of qualitative and quantitative criteria derived from the ILM. This enabled an understanding of the extent to which the options addressed the identified problems and delivered the benefits sought, thereby meeting the investment objectives.

[10] See Appendix B-D

Te Rautaki Huanga Māori[11]

(Te Rautaki Māori) the Māori Outcomes Strategy outlines Ngā Putanga Māori (Māori Outcomes) **across environmental, social, economic and cultural domains, and Te Ao Māori values**, that were identified by Mana Whenua leadership as important during the IBC. In addition, it sets out Ngā Mātāpono, Māori engagement principles and success factors to help maintain a strong relationship with Mana Whenua as influential ALR partners.

Resource Management Act

The requirements of the RMA Criteria assessing the impacts of options, linked to a set of project objectives with qualitative and quantitative information, to support the Assessment of Environmental Effects and broader consenting process.

Feasibility

Other **feasibility** considerations specific to engineering design and affordability.

0.3 Urban and transport evidence base and context

An extensive existing urban and transport evidence base has been used to support the entirety of the optioneering process. The evidence base consists of wide-ranging understanding developed during the IBC phase, together with information from relevant external works. Table 0-2 shows a selection of key evidence base sources.

Table 0-2 Key evidence base and context sources

Key Evidence Base and Context Sources (Not comprehensive)			
Source	Author	Status	Key areas of information
Auckland Plan 2050	Auckland Council	Published 2018	Primary spatial plan and policy for managing growth and increasing prosperity across Auckland
Auckland Transport Alignment Project	Central Government & Auckland Council	Refreshed and Published 2021	Outlines specific transport issues and investment priorities responding to the Auckland Plan 2050 and the key origin and destination patterns related to future demand
Te Tāruke-ā-Tāwhiri: Auckland Climate Plan	Auckland Council	Published 2020	Outlines core goals and approach to delivery to respond and adapt to climate change impacts
Kia Ora Tamaki Makaurau	Auckland Council	Published 2021	Identifies specific Māori aspirations, outcomes and focus areas where Auckland Council can influence and support.

The key sources above have been combined with numerous other supplementary policy documents and data sets to form the core context and evidence base that

[11] See Appendix B-E

underpinned all aspects of the optioneering process. The evidence base compiled and made accessible through the **Context Analysis Report** (CAR) covers and extends beyond all three investment objectives identified in the ILM, to provide a breadth of background information and analysis for the ALR project. It is a live report and GIS portal which is updated over time as and when new evidence and information comes to light. The CAR includes evidence and information across seven disciplines:

- Built form
- Economic ecosystems
- Sustainability
- Social and cultural
- Local movement network
- Urban infrastructure
- Public realm and open space

Content within the CAR was generated through desktop analysis, GIS mapping and input from technical specialists within ALR and from many Partner organisations and infrastructure providers.

The spatial structuring of the CAR ensures the evidence and information is considered at city, corridor and catchment levels. It includes both reports and a live GIS platform. At city and corridor levels, the CAR establishes the 'aspiration' across a number of disciplines.

Developing this content informed the understanding of the spatial distribution of the urban opportunity and realisable urban benefit through all phases of the optioneering process.

Specifically, the CAR pinpoints key opportunities and constraints within the ALR corridor in order to guide the urban ambition of achieving improved urban outcomes along the corridor.

0.4 Option development and assessment approach

Better Business Case™ and Resource Management Act

The option development and assessment (optioneering) process for Auckland Light Rail is fully aligned with Te Tai Ōhanga NZ Treasury Better Business Case™ (BBC) guidance. The optioneering process also complies with the requirement to give due consideration to alternatives under the Resource Management Act (RMA) Assessment of Environmental Effects (AEE) consent submission requirement.

Both Te Tai Ōhanga (NZ Treasury) and Waka Kotahi (NZ Transport Agency) provide advice and recommendations for interpreting BBC guidance in preparing project

business cases for their respective approval. This advice has been closely considered in formulating our approach.

The ministerial direction[12] for this project required a Corridor Business Case (CBC) to be developed which gave due consideration to both the transport and urban elements of the project in a single integrated business case. The ministerial direction states that the transport elements of the CBC be progressed from an Indicative Business Case (IBC) to a Detailed Business Case (DBC) stage and that the urban elements of the scheme should be developed to an IBC level of detail.

A fit-for-purpose optioneering approach

The Corridor Business Case represents a new way of considering integrated transport and urban investment for Aotearoa. Reflecting this innovative step forward in infrastructure planning and delivery, the optioneering process to support the CBC has been carefully developed to reflect advice of both Te Tai Ōhanga and Waka Kotahi in interpreting BBC guidance, while ensuring the approach is fit for purpose.

Furthermore, ALR Limited was mandated to develop the CBC in parallel with the preparation of a Notice of Requirement under the RMA.

Waka Kotahi and Te Tai Ōhanga Guidance on moving from an IBC to a DBC

As a proposed transport solution moves from IBC to DBC to enable an investment decision from sponsors, Waka Kotahi guidance states that optioneering in the DBC stage should seek to mitigate risk and further ready the recommended solution for implementation (see box to right[13]).

In line with this Waka Kotahi guidance, the optioneering process described here is focused on optimising, reviewing and de-risking the identified preferred option from the IBC.

As described in Phase 0.1 (point of entry), the ALR IBC identified three shortlisted options that were all considered economically viable, but ultimately recommended the *Tunnelled Light Rail* option as the preferred way forward (PWF).

Waka Kotahi optioneering requirements for a DBC

"A DBC involves more detailed analysis of the costs, risks, and benefits of the recommended option(s) and the do minimum option – rather than all the options listed in an indicative business case (IBC). Sometimes the IBC identifies more than one recommended option and is difficult to distinguish between them based on the IBC level of analysis. In this case the DBC will explore more detailed analysis of both options alongside the do minimum so the best option can be identified."

Te Tai Ōhanga NZ Treasury expects a DBC to include consideration of appropriate comparator option(s) alongside the emerging preferred option to ensure value for money. Since all three IBC shortlisted options were considered economically viable, they are suitable as potential inclusion as comparator options for full economic appraisal (including cost-benefit analysis).

[12] See 0.1 Point of Entry
[13] Waka Kotahi Detailed Business Case Phase Guidance

The table below summarises the range of options that Te Tai Ōhanga NZ Treasury guidance anticipate should be included in a DBC economic appraisal to ensure sponsors are presented with sufficient information to make a decision:[14]

Table 1-0-3: NZ Treasury Guidance for DBC Economic Assessment

NZ Treasury Guidance on Options for Full Economic Assessment within DBC

Do Nothing	Do Minimum	Intermediate Comparator(s)	Emerging Preferred Option
Not included for transport investments due to the nature of a continually present transport network (as per Waka Kotahi Guidance)	The analysis of required costs and likely (dis)benefits if the project does not proceed.	A realistic and achievable option that meets the core needs and essential requirements for the investment but may not be the PWF	The identified preferred way forward to deliver the investment objectives (Multiple variants may be considered if significant variation in the level of ambition)

Objectives of ALR optioneering process

Three primary objectives were identified for the optioning process. These were aligned with the BBC and RMA requirements and Waka Kotahi guidance:

The three core objectives of the optioneering process

1. **Review, refinement and optimisation** of the **identified preferred way forward** from the IBC to **confirm an appropriate emerging preferred option** for inclusion in the complete economic appraisal. Particular consideration will be given to areas highlighted in the ministerial letter and changes to the strategic context and project direction since the completion of the IBC. This process should work within broadly the same affordability envelope as IBC PWF.

2. **Review the options shortlisted by the IBC**, to identify the **appropriate comparator(s)** for economic appraisal, mindful of the need to ensure that there is **sufficient variation** between comparators to warrant appraisal. The economic appraisal of the shortlist is not intended to relitigate previous MCA assessments.

3. **Understand, identify and review** options for how transport improvements can be integrated with urban investment to create conditions which would **fully realise the urban potential of ALR**. This includes identifying different options around zoning densities and housing along the corridor, as well as local bulk infrastructure investment that can be considered through the complete economic appraisal.

[14] NZ Treasury DBC Template & Guidance

Objective 1 was the focus of Phases 1, 2a, and 2b of the optioneering process. Objective 2 was addressed through Phase 2c and Objective 3 was addressed through Phase 3.[15]

0.5 Assessment methodology

Multi-Criteria Analysis

BBC guidance, Waka Kotahi and Te Tai Ōhanga NZ Treasury guidance all recommends undertaking Multi-Criteria Analysis (MCA) to support the optioneering process. Reflecting the two primary objectives of the optioneering process identified above, MCA assessment was used in this optioneering exercise to:

- Support optimisation and review of the preferred way forward options by looking at the component parts of the PWF from the IBC
- Assess the performance of the complete option.

Multiple MCA assessments were required to facilitate this multi-dimensional approach and have been carried out at varying levels of analysis. These can be summarised into three core MCA categories:

Table 0-4 MCA Categories

MCA Categories	Description
Scheme Component MCAs	These assessments focused on identifying the preferred way forward for a particular component of the project (eg individual station locations, key alignment sections, etc.)
Segment MCAs	These assessments focused on identifying the preferred way forward for one of the four geographic corridor segments
Full-Scheme MCAs	These assessments focused on reviewing complete ALR options at particular stages of development (eg an appropriate end-to-end scheme, appropriate staging of the scheme etc.)

To ensure consistency and avoid assessment bias, a single set of project MCA criteria (*The MCA Framework*) was defined covering all assessments. The measures and methods used for assessing these criteria were reviewed and tailored for each assessment, enabling the most appropriate analysis to be undertaken at each step.

The figure below outlines the seven MCAs that were performed and their alignment to the Phases of the optioneering process, as well as the sections of this report where these assessments are summarised.

[15] Refer to diagram on page 8 for more detail on the phases of the optioneering process.

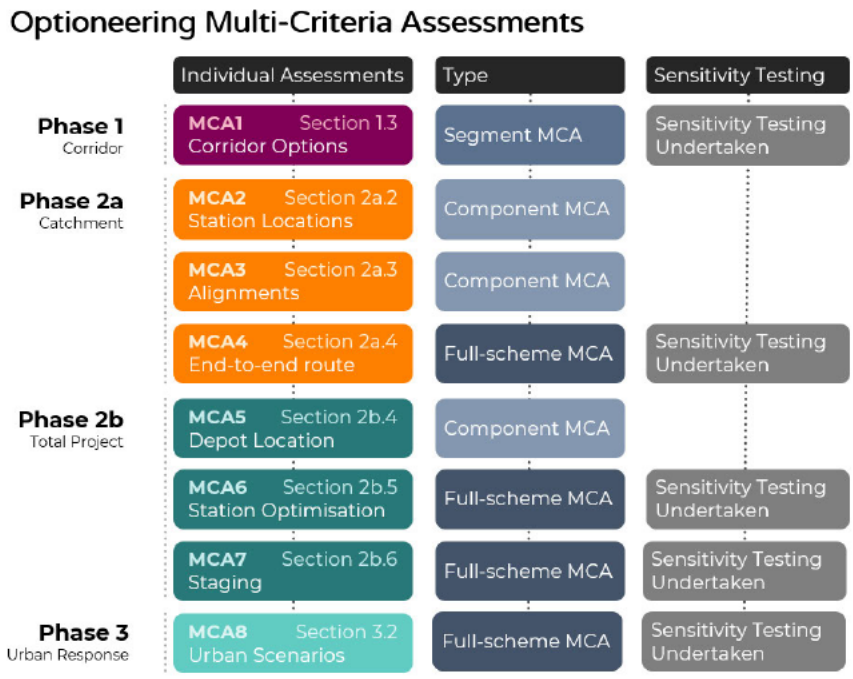


Figure 1-0.5-5: Optioneering MCA Summary Diagram

The multi-dimensional MCA approach enabled both a wide array of scheme components (e.g. individual stations and alignments) and complete project solutions to be evaluated. This sequencing allowed for an appropriate and optimised set of shortlisted options to be carried through to full economic appraisal.

The MCA Framework

The economic appraisal in the CBC includes assessment of monetised benefits through cost-benefit analysis (CBA) and non-monetised impacts.[16] In close alignment with BBC best practice and Waka Kotahi guidance, the MCA Framework uses individual criteria to capture the potential impact of decisions on the subsequent cost-benefit analysis. At the same time, the Framework equally accounts for broader consideration of non-monetised impacts as well as other Business Case considerations such as affordability and deliverability.

The MCA Framework was developed collaboratively across the ALR project team to ensure the MCAs satisfied the Guiding Considerations and BBC guidance through a single, integrated optioneering process.

Using the Guiding Considerations as the foundation, the MCA Framework was developed with due attention to:

[16] As was the case in the IBC

- **The completeness of the overall MCA Framework**: Ensuring that the criteria collectively provide full coverage of the Guiding Considerations[17]
- **Avoiding redundancy within the Framework**: Minimising duplication between individual criteria
- **Operationality of each criterion:** Ensuring that each of the criteria would be measurable in practice
- **Enabling differentiation**: Ensuring that MCA criteria were capable of distinguishing between options
- **Size of the MCA Framework**: Identifying a reasonable number of criteria given the scale of tasks

The MCA Framework remained consistent throughout the optioneering process and was applied to all seven MCA assessments. The resulting 17-criteria MCA Framework is shown in the table below and is composed of two Mana Whenua-led criteria, eight ILM-led criteria and seven feasibility and RMA-led criteria. These 17 MCA criteria are aligned with the New Zealand Living Standards Framework[18] (LSF) outcomes. The MCA Framework and the approach to its implementation were reviewed and approved by Tūāpapa and the ALR Board.

[17] See Section 0.2
[18] NZ Treasury Living Standards Framework

Table 0-5 The MCA Framework, including 17 assessment criteria.

ALR MCA Optioneering Framework – Criteria aligned to Guiding Considerations			
Cat		#	Criteria
Mana whenua		A	Ngā Iwi mana whenua ō Tāmaki Makaurau
		B	Cultural Opportunities
Investment Logic Map (ILM)	Objective 1: Unlocking significant urban development potential, supporting a compact urban form and enabling quality integrated communities	1	KPI1.1: Increased residential and employment density
		2	KPI1.2: Increased housing and employment growth
		3	KPI1.3: Improved quality of life
	Objective 2: A transport intervention that reduces Auckland's carbon footprint	4	KPI2.1: Reduced carbon emissions
		5	KPI2.2: Improved health outcomes
	Objective 3: A rapid transit service that: 1. Is attractive, reliable, affordable, frequent, safe and equitable 2. Is integrated with current and future public transport network 3. Improves access to jobs, education, and other opportunities	6	KPI3.1: Improved access to employment, education, and health services across Auckland
		7	KPI3.2: Increased public transport capacity
		8	KPI3.3: Reduced travel times
Feasibility and RMA		9	Deliverability
		10	Affordability
		11	Impact on Cultural Values
		12	Socioeconomic Impacts
		13	Property Impacts
		14	Natural Environment and Hazards
		15	Culture and Heritage

Weighting considerations and sensitivity testing

The core MCA assessments were carried out without weighting. This follows best practice guidance, internationally (including UK[19], Ireland[20]) and from Waka Kotahi, which indicates that MCA assessments are a tool to inform decision-making and are neither expected nor recommended to be used to systematically identify a preferred option. Identification of a preferred option requires due consideration of the evidence presented and the strategic context in which the business case is being developed.[21]

Waka Kotahi does not recommend applying weighting (sometimes known as Multi-Criteria Decision Analysis) to core MCA assessments, and further suggests that any

[19] UK Appraisal Summary Table
[20] Ireland Common Appraisal Framework
[21] Waka Kotahi MCA Guidance

approach to weighting should be included only as a sensitivity to the MCA assessment.

Sensitivity testing can be supported with weighting of MCA assessments in a variety of ways. For example, the Waka Kotahi guidance suggests adopting the weightings identified for the Investment Objectives and Key Performance Indicators included in the ILM[22]. Comparatively, Infrastructure Australia guidance suggests a pairwise process which requires stakeholders to compare each criterion individually against each other criterion to develop weights[23].

Regardless of the approach adopted, both sources of guidance acknowledge that any approach to weighting requires caution and can rapidly become complex and produce inappropriate results.

Weighted sensitivity testing has been reserved for segment corridor options assessments and for the complete integrated solution.[24] This gave confidence that the selection of a preferred corridor was robust, and that the selection of an end-to-end route and stations option within that was also robust.

The approach to sensitivity testing aligns with Waka Kotahi guidance while incorporating international best practice. It involves testing different approaches to weighting the MCA Framework criteria through a series of sensitivity scenarios. These scenarios are summarised in the table below.

A range of scenarios have been identified to provide broad coverage so that the full spectrum of weightings can be used to test the outcomes of the MCA assessments.

[22] Waka Kotahi MCA Guidance
[23] Infrastructure Australia Multi-Criteria Analysis Guidance
[24] See Figure 0-3

Table 0-6 Sensitivity Scenarios for Weighting MCA Framework Criteria

Sensitivity Scenarios for Weighting MCA Framework Criteria		
#	**Sensitivity Scenario Name**	**Description**
1	**50 ILM / 50 Impacts**	**50%** weighting given to the ILM-led criteria, within which ILM criteria are proportionately weighted based on the values included in the ILM. **50%** weighting shared equally across 7 Feasibility & RMA criteria
2	**100 ILM**	**100%** weighting given to the ILM-led criteria, within which ILM criteria are proportionately weighted based on the values included in the ILM. **0%** weighting given to Feasibility & RMA criteria
3	**20 ILM / 70 D&A / 10 Impacts**	**20%** weighting given to the ILM-led criteria, within which ILM criteria are proportionately weighted based on the values included in the ILM. **70%** weighting given to criteria for deliverability and affordability **10%** weighting shared equally across 5 other Feasibility & RMA criteria
4	**20 ILM / 10 D&A / 70 Impacts**	**20%** weighting given to the ILM-led criteria, within which ILM criteria are proportionately weighted based on the values included in the ILM. **10%** weighting given to criteria for deliverability and affordability **70%** weighting shared equally across 5 other Feasibility & RMA criteria
5	**0 ILM / 100 Impacts**	**0%** weighting given to the ILM-led criteria **100%** weighting given to Feasibility & RMA criteria
6	**ILM Urban only**	**100%** weighting given to ILM Urban criteria only **0%** weighting for all other criteria
7	**ILM Carbon only**	**100%** weighting given to ILM Carbon criteria only **0%** weighting for all other criteria
8	**ILM Transport only**	**100%** weighting given to ILM Transport criteria only **0%** weighting for all other criteria

MCA Scoring Matrix

An MCA Scoring Matrix that defined relevant indicators was developed to guide scoring for MCA assessments. The MCA Scoring Matrix is an 11-point scale (Table 1-0-7), selected to ensure that the options could be effectively differentiated from one another.

Rather than comparing options to one another, each was scored relative to the Transport Do Minimum. As a result, MCA scores for some criteria ranged from negative to positive, while others received only positive or only negative scores.

Mana Whenua considerations, as is their preference, were not scored.

The details of how the scale was implemented on individual MCA criteria and measures can be found in Appendices 0.F and 0.G.

Table 0-7 MCA Scoring Scale

MCA Scoring Matrix Score	Indicators for Assessment
-5 Very High Adverse Impacts	National or Greater = May impact on nationally significant resource / or may be experienced by a national scale audience, and/ or May have a substantial/complete impact on the feature/ resource/ community identified. And/or Long Term/Permanent = 20+ years
-4 High Adverse Impact	Regional = May impact on a regionally significant resource or may be experienced by a regional or wider audience; and/or May have a high extent of impact on features/resource/community identified; and/or Long Term/Permanent = 10-20+ years
-3 Moderate Adverse Impact	Local Area Level Impact (1) = May impact on a locally significant resource (e.g. significant within an ecological district or within a catchment) or may impact on local board community/ geographic scale, and/or May have moderate extent of impact on the feature/resource/community identified, And/or Medium Term = 5-10years
-2 Low Adverse Impact	Local Area Impact (2) = May impact on a locally significant resource (e.g. significant within an ecological district or within a catchment) or may impact on a local board community/ geographic scale; and/or May have some extent of impact on the feature/resource/community identified, And/or Short Term = 1-5 Years
-1 Very Low Adverse Impact	Individual level impact = May impact on resources not otherwise identified for their values or with otherwise innominate value or may impact a limited number of households (i.e. 20 households/50people); and/or May have a low extent of impact on the feature/resource/ community identified; And/or Very Short Term = < 1 years
0 Neutral Impact	Negligible Impact or change from current situation/neutral
+1 Very Low Positive Impact	Local Level Benefit = Benefits may be experienced for resources not otherwise identified for their values or with otherwise innominate value. Benefits may be experienced by a limited number of households (i.e. 20 households / 50 people); and/or may have a low or small extent of benefits on the feature/resource/community identified; and/or Very Short Term = < 1 years.
+2 Low Positive Impact	Local Level Benefit (2) = Benefits may be experienced by defined local environment or sub-catchment. Benefits may be on Census Area Unit or experienced by a limited number of households (i.e. 20-50 people); and/or may have a low extent of benefits on the feature/resource/community identified; and/or Short Term = 1-5 years.
+3 Moderate Positive Impact	Local Level Benefits = Benefits may be experienced for values of an ecological district or within a catchment, or at a local board community geographic scale; And/or may have some extent of benefits on the feature/ resource/community identified; and/or Medium Term = 5-10 years.
+4 High Positive Impact	Regional Benefit = Benefits may be experienced for a sub-regionally significant resource/experienced by a sub-regional audience; and/or may have a high extent of benefits on the feature/resource/community identified (and confident benefit being realised); and/or Long Term/Permanent = 10-20+years.

+5 Very High Positive Impact	Regional or Greater Benefit = Benefits may be experienced by a whole region or across regions (including national) or may be to a regionally or nationally significant resource; And/or may have substantial benefits on features/resources/community identified, High Degree of confidence of benefits being realised, And/or Long Term/Permanent = 20+ years.

MCA Assessments

All MCAs assessments took place in a consistent manner for each of the seven MCA processes as shown in Figure 1-0-2 above. For each assessment, the following steps were taken:

1. **Confirmation of the appropriate measures** to assess options against the consistent MCA Framework (17 Criteria shown in Table 1-0-5).
2. **Initial assessment** by workstream Subject Matter Experts (SMEs) using a specified methodology for each measure.
3. An **MCA challenge workshop** where assessors would present initial scoring and rationale, allowing space for discussion and challenge from internal and external parties.
4. A **post-workshop MCA review** where the results of the assessment were considered from a holistic perspective and to generate recommendations for review by Tūāpapa and mana whenua Kaitiaki.
5. **Recommendations considered through ALR governance** was the final step of the assessment process, where recommendations were adopted, or further assessment was requested.

1. Confirmation of appropriate MCA measures

The 17 criteria in the MCA Framework were consistently applied across each MCA framework. However, the measures identified to assess specific criteria were tailored appropriately for individual MCA assessments. This ensured they were suitable and proportionate to the level of analysis being carried out and the options being considered. For example, in identifying a corridor, it was not appropriate to consider the specific property impacts of an as-yet undefined station footprint. Relevant SMEs within ALR defined the appropriate specific measures for each criterion during each MCA assessment. The proposed measures were shared and reviewed through the approved ALR governance structure including Tūāpapa, mana whenua Kaitiaki and the ALR Board.

2. Initial assessment

All MCAs were initially assessed by SMEs from within ALR workstreams who were best qualified to review the defined measures. To ensure consistent and robust, evidence-led scoring, assessors provided specific methodologies for how each measure was scored. Methodologies for all MCA assessments are in Appendix 0.C.

Initial assessments were undertaken by SMEs representing the following ALR workstreams on the measures relating to their workstream:

- Urban regeneration
- Transport
- Planning and consents
- Sustainability
- Design (including operations & maintenance)
- Te Tiriti Partnerships (facilitating inputs from mana whenua kaitiaki and their specialists)
- Property
- Communications & stakeholder engagement

Each assessor was asked to identify and record any key assumptions in relation to their respective scores. Assessors were also instructed to score options on the unmitigated potential impacts of each option. There was provision to identify opportunities for avoiding or mitigating identified effects along with some commentary on how that might affect the unmitigated score.

3. MCA Challenge Workshop

Once initial draft scoring was provided by SMEs, a challenge workshop was convened for each individual MCA assessment. The purpose of the workshop was to review draft MCA scoring and allow for clarification and challenge. The MCA workshops were attended by SME assessors and workstream leads, as well as members of the ALR Senior Leadership Team, partner organisations (including Auckland Transport and Kāinga Ora) as appropriate, and Mana Whenua Kaitiaki. The lead assessor from each workstream was responsible for explaining their initial scoring and rationale.

Mana Whenua and their specialists were invited to attend the MCA workshops to directly hear about and feedback to the options being considered. This was the first opportunity for Mana Whenua to find out about the options and provided an opportunity for asking questions and seeking clarification across the team. Mana Whenua did not have sufficient time to evaluate the options. Their feedback was based on the information presented to them at the workshop and was provided through commentary at the end of each session. Attributing numerical scoring through MCA assessments to convey value is not an adopted practice by Mana Whenua.

4. Post-workshop MCA review

Following each MCA challenge workshop, a holistic review of the analysis and assessment was undertaken by a multi-disciplinary group of SMEs from across ALR, chaired by the Business Case workstream. This review produced a series of recommendations that were initially shared with Tūāpapa and Mana Whenua kaitiaki through a fortnightly engagement hui. This facilitated more detailed discussion on matters of importance to Mana Whenua.

Feedback from Mana Whenua Kaitiaki hui was captured in meeting transcripts, and in the Mana Whenua Kaitiaki Engagement on the Optioneering Process Report.[25]

ALR has made every effort to give effect to Ngā Matapono Principles for Engagement as set out in Te Rautaki. Mana Whenua have identified some challenges with the process and ALR is committed to making improvements in the next phase of the process.

To date, the consistent feedback from Mana Whenua has been the challenging timeframes. There has been no time for information to be considered before workshops and with the process moving at such speed that it has limited their ability to contribute in a meaningful way. ALR acknowledges the challenges and limitations on our ability to consider the Mana Whenua considerations in a robust way through this phase of the process.

ALR is committed to working in partnership with Mana Whenua to continuously improve systems, approach, information and processes through the next phase of the project and in Consent Design.

5. Recommendations considered through ALR governance

The final step of the MCA assessment process was for the recommendations raised at the conclusion of the assessment to be formally reviewed by ALR governance including Tūāpapa and the ALR Board. All optioneering assessment outcomes were reviewed by Tūāpapa and either adopted or direction was provided for additional assessment. The ALR Board reviewed and provided direction on the outcomes of the optioneering assessments by exception.

'Traffic light' initial sift assessment

'Traffic light' assessments which provided an initial red, amber, green (RAG) sift of a longlist of options were employed at a few select points in the process to enable focus and concentration across workstreams on options that were likely to be viable.

The 'traffic light' assessment ensured the options considered through the full MCA process had reasonable capability in meeting the ILM Objectives and did not contain any 'fatal flaws' that would otherwise arise in the MCA assessment.

These assessments were not seen as an alternative to a more detailed MCA but rather as a method for concentrating effort on viable options and remoing redundant analysis from the process to allow for a more practical set of options for assessment.

Where the decision was marginal as to whether an option should be included in the shortlist for MCA assessment or sifted out through the 'traffic light' sift, options were included in the MCA assessment to ensure opportunities were not inappropriately ruled out too early.

'Traffic light' sifts were carried out as part of the following Phase 2a MCA Assessments:

[25] See appendix 0.G

- MCA2 – Station Locations
- MCA3 – Alignments
- MCA4 – End-to-end route

The 'traffic light' sifts used Red, Amber, Green to denote the assessment of options with definitions as shown in the table below.

Table 0-8 'Traffic light' assessment RAG scoring matrix

'Traffic light' initial sift scoring matrix	
Score	Indicators for Assessment
Red	Significant risk or challenge to the delivery of potential opportunity. Major constraint to prevent the feasibility and/or benefits realisation of the intervention. High likelihood of failing to deliver the core ILM Objectives.
Amber	Known risk or challenges to the delivery of potential opportunity. Some constraints may limit the feasibility and/or benefits realisation of the intervention. Potential to impact the delivery of the core ILM Objectives.
Green	Positive or no major known risks to the delivery of potential opportunity. Presence of enablers and/or without significant constraints to the feasibility and/or benefits realisation of the intervention Clear potential to support the delivery of the core ILM Objectives.

All traffic light assessments were undertaken against the same 17-criteria identified in the MCA Framework to ensure consistency across assessments and to best inform shortlisting decision making.

'Traffic light' assessments were undertaken by relevant SMEs across the project. Following each initial draft 'traffic-light' assessment, a challenge workshop was convened. A holistic review of the analysis and assessment was undertaken by a multi-disciplinary group of SMEs from across ALR, chaired by the Business Case workstream.

This review provided direction and recommendations as to which options were to be included in the shortlist and which were to be discounted. 'Traffic light' initial sift recommendations were reviewed and confirmed by Tūāpapa.

0.6 Alternatives backcheck

Prior to commencing the CBC options assessment process, a backcheck of the IBC was carried out. The purpose of this was to evaluate the assessment undertaken to date and to inform selection of the appropriate optioneering process at the outset of the CBC.

The backcheck considered whether new information, such as land use changes, updated growth projections, changes in policy, or new issues and opportunities that had been identified since the completion of the IBC could have had the potential to

influence the selection of the preferred option, had been known when the IBC was produced. While none of these contextual changes was assessed as likely to have altered the conclusions of the IBC, updates to demand forecasts and policy changes were noted as requiring further consideration through the CBC process.
The backcheck also evaluated whether the updates to the Investment Logic Map (ILM) that had been made since the preparation of the IBC could have altered the selection of the preferred option and any other decision-making.

The key gaps identified through the backcheck are summarised below:

- **Connections to Auckland Hospital** – there are large social, economic, environmental and equity benefits to providing a connection to the hospital that require further investigations.
- **Tunnel alignment and station locations** – options should be explored to provide connections to areas in the central Isthmus that range more broadly from Sandringham Road or Dominion Road through a greater focus on integrated urban and transport outcomes.
- **Grade separation** – options should consider the feasibility and costs/benefits of shorter and longer tunnels, as well as other grade separation options.
- **Staging and sequencing** – consideration of interim solutions of potential options will require further investigation, as interim solutions prior to the full implementation of options could strengthen the benefits realisation potential of some options.
- **Manukau Harbour Crossing** – although the consideration of crossing of the Manukau Harbour is consistent across all route options in the IBC, this area of the corridor is considered to be of significant risk due to cultural and environmental impacts. The feasibility of implementing this crossing will affect any route options south of the Manukau Harbour and at Onehunga.

The backcheck identified that while these gaps would not materially change the outcomes or recommendations of the IBC, it was important that they were directly addressed in the CBC options process that this report describes. As such, the CBC corridor and catchment options processes were developed to ensure these issues (along with the direction provided by the Minister) could be fully explored.

Phase 1: Corridor Optioneering

1.1 Corridor Options Development and Assessment Overview

Purpose of Phase 1

Phase 1 sought to confirm the ALR corridor by identifying potential station zones (PSZs) within a 1.4km width running from Waitematā Harbour to the north and Auckland Airport to the south. The preferred option would be identified by considering and assessing alternatives. While a preliminary route was identified in the IBC, Phase 1 validated the IBC corridor by considering changes made to the ILM and relevant policy and forecasting updates.

The Phase 1 option development process identified the number of stations and broad station locations within the corridor. Emerging preferred potential station zone options were then selected to generate a provisional view of the Preferred Corridor, which was taken through to the next phase of optioneering.

Key Assumptions for Phase 1

To guide development and assessment of corridor options, several overarching assumptions were agreed. These assumptions align directly with the outcomes of the ALR IBC and the subsequent direction provided through the Ministerial IMS Letter[26] :

- The ALR would operate as a light rail system
- The route would be tunnelled through the City Centre and Central Isthmus[27]
- The route would be segregated (tunnelled, raised, or otherwise separated) between Mt. Roskill and Ōnehunga [28]
- The route may or may not be segregated between Māngere and the Airport
- The ALR is able to cross the Manukau Harbour in the area near the existing crossing.

[26] See section 0.5
[27] There were no initial assumptions made for the form of connection in the two other segments.
[28] While there was no initial assumption about the form of connection between Mt. Roskill and Ōnehunga, specific form/grade assumptions were made for the section following an initial MCA workshop on the Roskill-Ōnehunga section.

Geographic Segments

For the purposes of Phase 1 corridor option development and assessment, the land between Waitematā Harbour to the north and Auckland Airport to the south was divided into four segments reflecting their distinct characteristics.

The Geographic Segments were:

City Centre – covers the Auckland City Centre, bounded by the Waitematā Harbour to the north and the city motorway junction.

Central Isthmus – spanning from Dominion Junction to Puketāpapa-Mt Roskill.

Puketāpapa-Mt Roskill to Ōnehunga – spans from Puketāpapa-Mt Roskill to Ōnehunga, through to the north side of Māngere Bridge.

Māngere to Airport – covers the area from north of Māngere Bridge up to Landing Drive as well as the area around Auckland Airport.

These areas encompassed, but also ranged substantially beyond, the route corridor identified in the IBC. This ensured that the optionality around potential station locations and corridor could be fully explored, so that achievement of the investment objectives could be maximised. A map of the geographic segments is depicted in Figure 0-.

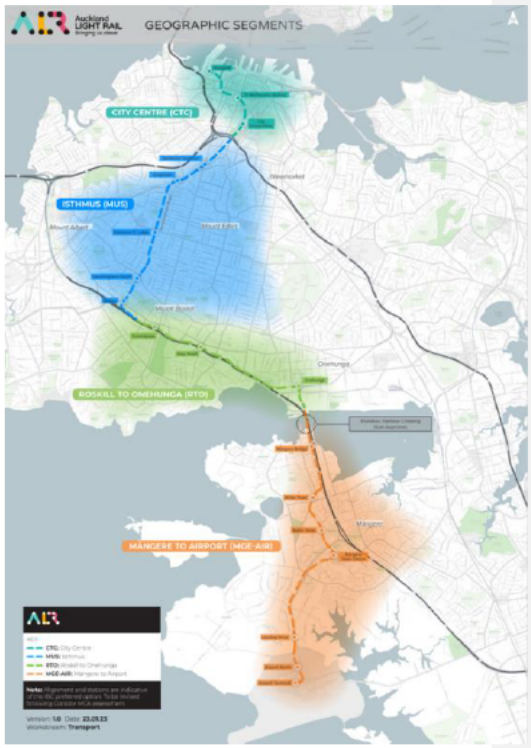


Figure 0-1 Geographic segments along the corridor

Approach

The Phase 1 optioneering process involved three steps:

Segment Corridor Option (SCO) Development (see Section 1.2)

A series of Potential Station Zones (PSZs) were identified within each of the geographic segments based on their ability to deliver urban regeneration and transport opportunities. The PSZ options within each geographic segment were then connected using various combinations to create Segment Corridor Options (SCOs) for assessment.

Segment Corridor Option (SCO) Assessment (see Section 1.3)

The proposed SCOs were subjected to multi-criteria assessment (MCA), incorporating commentary and scoring to support the identification of emerging preferred corridor option(s) for each geographic segment.

Whole Corridor Assembly (see Section 1.4)

Following the MCA assessment for all geographical segments along the corridor, a top-down review of the emerging preferred segment options was undertaken to understand their ability to connect and form an effective Whole Corridor which reflected the guiding considerations.

The following sections of this chapter review each step in detail and signpost to the relevant appendices containing the comprehensive content and documentation developed during each step.

Context Analysis Report evidence base for Phase 1

The Context Analysis Report (CAR) informed development and scoring of options. The CAR integrates relevant policies, plans, background information and data that together provide the context to inform the development of the project, including the required plan change for implementation. It is in constant evolution as plans, policies are revised and more focused information becomes required for specific processes such as optioneering and design.

Context reports were developed for each PSZ to provide baseline data for each potential station zone (800m catchment area) as well as the evidence base for the optioneering process. Each report contains relevant strategies and plans, and context by discipline area including built form, public realm and open space, social & cultural, environment (including planning considerations and climate change risk and resilience), urban infrastructure, economic ecosystems and local movement.

1.2 Segment Corridor Option (SCO) Development

The process for developing corridor options was:

1. **Potential Station Zones** (PSZs) were identified within each of the geographic segments. PSZs themselves were not subjected to an individual MCA at this stage – rather, the PSZs were carried forward as inputs for the Segment Corridor Option development and MCA assessment.

Potential Station Zones
The geographical areas where a station could potentially be located to serve a particular community or capture areas with the greatest level of urban regeneration and transport opportunity. (The precise location of stations and decisions on whether a station would ultimately be contained in each PSZ were explored in the next level of optioneering – during the Catchment Phase.)

2. The PSZs within each geographic segment were combined in various ways into **Segment Corridor Options** (SCOs) for assessment. Approximately 10 SCOs were identified for each Geographic Segment.

Segment Corridor Options
Combinations of PSZs that make up a broad potential corridor option across a geographic segment.

The two stages of the corridor option development process are described in detail below.

Identifying Potential Station Zones

The task of defining corridor options was approached by first identifying the broad potential locations of the stations, i.e., PSZs. This considered various opportunities, enablers and challenges related to the ILM Investment Objectives from both urban and transport perspectives, drawing on the context in the CAR.

Circles were chosen as the appropriate shape to identify a zone of roughly 700m in radius (350m within the city centre) which aligns with Auckland council guidance on a likely realistic walking catchment from a rapid transit station. The centre of the zone was determined by giving consideration to the gravitational pull of initially identified urban and transport opportunities (e.g. an existing town centre or major transport interchange) and centring the PSZ on that location. PSZs were kept broadly mutually exclusive during identification as it was understood that the entire area within a PSZ would be considered through the initial Phase 1 assessment to establish a preferred corridor.

The approach taken to the opportunities, enablers and challenges is consistent with Ministry for the Environment[29] policy advice in that it utilised the best information available at the time of assessment. This included information obtained from modelling, local knowledge and information obtained from other sources.

The approach also follows Section 32 guidance[30] which requires assessment to a level of detail that corresponds with the scale and significance of the environmental, economic, social, and cultural effects anticipated by the proposal. This is important as the assessment and analysis of opportunities and challenges for the optioneering

[29] Ministry of the Environment National Objectives Framework of the NPS
[30] Section 88(2) (which refers to the AEE to be at a level of detail that corresponds with the scale and significance of the effects) contemplates that the material prepared should be proportionate to the potential effects. In Hubbard v Tasman DC W001/95 (PT), the Court found that the wording of s88(2) allows for a subjective assessment of the detail required when estimating the scale and significance of the proposal's actual and potential effects.

process is also the starting point for the ALR Plan Change that is being led by Auckland Council.

The developments considerations that informed the identification of PSZs is described in Table 0-1 below.

Urban and Transport led PSZ Option Development Considerations				
Investment Objective	**KPI**	**Opportunities** Inherent geographic characteristics	**Enablers** Increased likelihood of realisation	**Challenges** Cognisant of potential non-starters
Unlocking significant urban development potential, supporting a compact urban form and enabling quality integrated communities	KPI1.1: Increased residential and employment density KPI1.2: Increased housing and employment growth KPI 1.3: Improved quality of life	• Auckland Unitary Plan (AUP) – employment areas • Community facilities and social infrastructure – marae, schools, hospitals, kura kaupapa, kohanga reo, town/local centres	• Crown Entity Ownership • AUP – residential land • Large scale planned urban regeneration projects	• Significant sized areas (occupying significant proportion of a potential PSZ) of: • Open space (i.e. The Domain) • Volcanic view shafts and height limitations
A transport intervention that reduces Auckland's carbon footprint	KPI 2.1: Reduced carbon emissions KPI 2.2: Improved health outcomes	• Proximity to open space • Existing cycle routes	•	•
A rapid transit service that: • Is attractive, reliable, affordable, frequent, safe and equitable • Is integrated with current and future public transport network • Improves access to jobs, education and other opportunities	KPI 3.1: Improved access to employment, education KPI 3.2 Increased public transport capacity KPI 3.3 Reduced travel times	• Existing cycle routes • Connectivity to key bus interchange • Existing rail stations • Future network integration	•	•

Table 0-1 Urban and transport led PSZ Option Development Considerations

Using GIS as an exploratory tool, the spatial distribution of these factors was defined across each geographic segment. An example of the urban and transport mapping layers used for the Isthmus segment is depicted in Figure 0- to illustrate the process.[31] The exploratory mapping process then guided identification of PSZs which offered the greatest opportunities within each geographic segment[32]. A map of all of the PSZs identified along the corridor can be found in Figure 0-.

[31] The full sets of maps for each geographic segment, and explanations of the relevant factors and measures used to develop them, can be found in Appendices A1-A4.

[32] The full sets of PSZs which resulted from this process are show in in Figure 2-0-3. More detail about these PSZs is recorded in Appendices A1-A4. These volumes provide commentary on the PSZs generated and considerations around broad areas where PSZs were not generated.

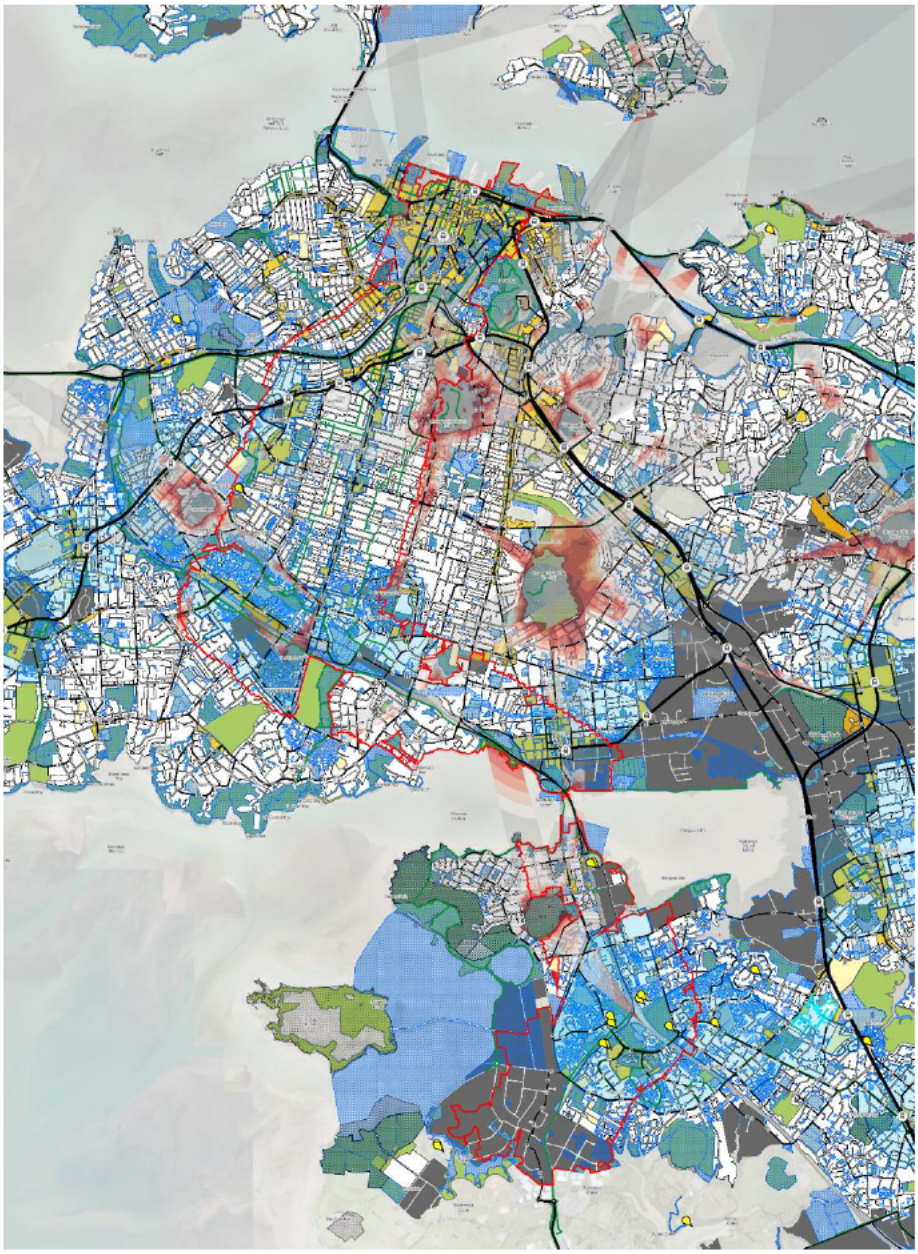


Figure 0-2 Urban and Transport GIS layers

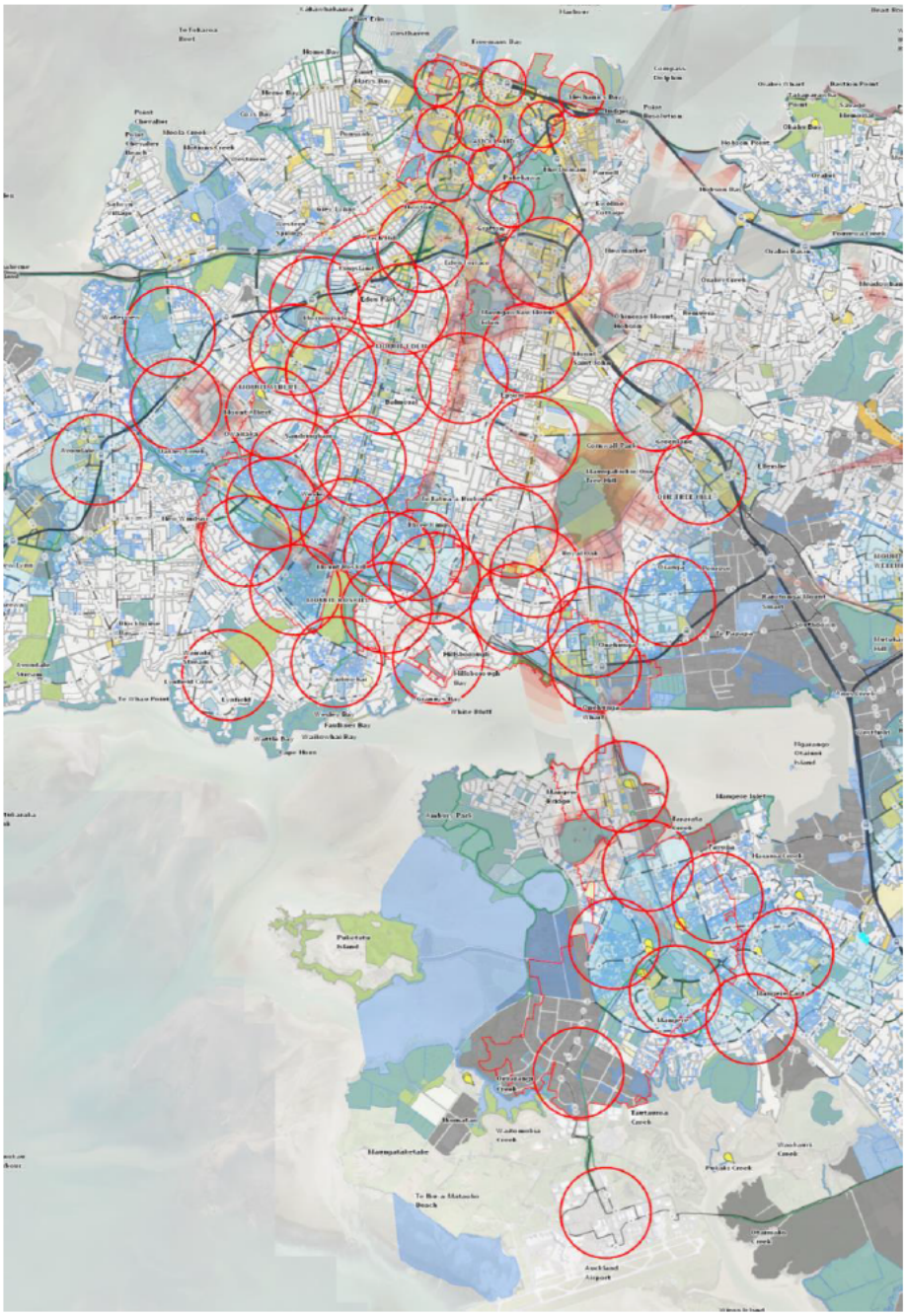


Figure 0-3 Map of all PSZ's identified within the Study Area

Connecting the PSZs into Segment Corridor Options for assessment

Segment Corridor Options (SCOs), defined as potential corridor options, were the focus of the Corridor assessment. The SCOs were defined with the following resolution:

- PSZs had a relatively small radius of approximately **350m in the city centre** geographic segment to differentiate between options where there is high intensity land use activity.
- PSZs had a radius of approximately **700m in the Isthmus, Puketāpapa-Mt Roskill and Māngere-Airport** geographic segments. This ensured that PSZs were large enough to provide possible station location options within them in the Catchment stage, while not being so large that the differences between individual PSZs could not be identified.
- As a result of the above, the SCOs generated from the PSZs were approximately **700m wide in the city centre** geographical segment and **1.4 km wide in the other geographic segments**.

An example of PSZs and an SCO generated for the City Centre geographic segment are depicted below in Figure 0-.

Figure 0-4 Example of PSZs (left) and an SCO (right) for the City Centre geographical segment

Since SCOs were generated from different combinations of identified PSZs, a series of principles was adopted to provide a consistent guide for this process and to ensure that the SCOs generated were likely to support achieving the ILM Investment Objectives. These principles are defined in Table 0-2 below.

Table 0-2 Principles for SCO Generation

ILM Led Principles for SCO Generation*		
Investment Objective	**KPI**	**Principles to guide Segment Corridor Option (SCO) generation**
Unlocking significant urban development potential, supporting a compact urban form and enabling quality integrated communities	KPI1.1: Increased residential and employment density	Each SCO should include PSZs that appear to show the potential to deliver residential and employment densification
	KPI1.2: Increased housing and employment growth	Each SCO should incorporate at least one PSZ where opportunities exist to deliver significant housing and/or employment growth
	KPI 1.3: Improved quality of life	SCOs should favour PSZs where the following currently exist: • Education and social infrastructure • Open space • Existing centres of at least 'local centre' status (from centres hierarchy)
A transport intervention that reduces Auckland's carbon footprint	KPI 2.1: Reduced carbon emissions	SCOs should seek to traverse the geographic segment without creating a requirement for excessive physical infrastructure
	KPI 2.2: Improved health outcomes	Each SCO should increase the active travel catchment to PT coverage across the geographic segment
A rapid transit service that: 4. Is attractive, reliable, affordable, frequent, safe and equitable 5. Is integrated with current and future public transport network 6. Improves access to jobs, education and other opportunities	KPI 3.1: Improved access to employment, education	SCOs should seek to add further diversity to the routes of existing and committed RTN infrastructure (avoid paralleling existing RTN infrastructure)
	KPI 3.2 Increased public transport capacity	SCOs should seek to maximise opportunity for passenger shift and interchange to ALR from other modes of transport
	KPI 3.3 Reduced travel times	SCOs should seek to achieve a good level of travel time competitiveness relative to equivalent car journeys
**ALL SCOs generated seek to reflect as many principles as possible, while appreciating the need to generate options to demonstrate sufficient variety for thorough assessment of the range of possibilities within each geographic segment.*		

SCO generation was focused on connecting PSZs in alignment with the principles outlined. In addition, where possible, SCOs began and ended at overlapping PSZs at each end of the geographic segments, to ensure that options produced could create a consistent overall alignment across all geographic segments[33]. The full list of SCOs for each geographic segment are found in Figure 0- through Figure 0- in Section 1.3

[33] The full list of SCOs for each geographic segment can be found in Figure 0- through Figure 0- in section 1.3. More detail on each SCO generated and how it reflects the principles highlighted in Table 1-2 can be found in Appendices 1.A.A-1DA.

1.3 Segment Corridor Options MCA Assessment (MCA1)

In MCA1, the SCOs generated for each geographic segment were assessed against the Multi-Criteria Assessment (MCA) Framework.

In line with the process outlined in Section 0.5, the MCA method and framework was applied to identify the preferred SCOs for each segment.[34] Table 0-3 below outlines the MCA measures developed for MCA1, aligned against the 17 MCA criteria that form the MCA Framework.[35]

[34] The assessment summaries and MCA scores for each SCO can be found for each geographic segment in Appendices 1A-1D.
[35] See Section 0.5

Category		Criteria		Measure
Mana Whenua		A	Ngā Iwi Mana Whenua ō Tāmaki Makaurau	Mana Whenua values and their cultural landscapes
		B	Cultural Opportunities	Areas where the corridor is likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services.
Investment Logic Map (ILM)	Objective 1: Unlocking significant urban development potential, supporting a compact urban form and enabling quality integrated communities	1	KPI1.1: Increased residential & employment density	Amount of residential and/or Commercial GFA (existing and realisable) within each PSZ
				Assessment of the ability to realise 6 stories (min NPS UD requirement) within PSZ's. Assessment of the ability to realise growth beyond the PSZ's
		2	KPI1.2 Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the defined PSZs
				Amount of private sector large plots (sqm) within the defined PSZs
				Current land value to capital value ratio on identified public/crown land and large private sector plots within PSZs
	Objective 2: A transport intervention that reduces Auckland's carbon footprint	3	KPI1.3 Improved quality of life	Places of economic, recreation, and knowledge importance within each PSZ
		4	KPI2.1: Reduced carbon emissions	Indicative length of linear infrastructure required (tunnel or surface) to connect PSZs
				Number of stations required (tunnelled or surface) to connect PSZs
				Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth
	Objective 3: A rapid transit service that: • Is attractive, reliable, affordable, frequent, safe and equitable • Is integrated with current and future public transport network • Improves access to jobs, education, and other opportunities	5	KPI2.2Improved health outcomes	Population and employment within the PSZ (existing and realisable) *NOTE: This measure was not assessed as it was not able to differentiate between SCOs at the level of granularity required*
		6	KPI3.1: Improved access to employment, education	Population living within 45 minutes of key social and economic opportunity areas by public transport.
		7	KPI3.2 Increased public transport capacity	Anticipated number of boardings (weekday daily)
		8	KPI3.3 Reduced travel times	Indicative travel time of PT Journey compared with car during the AM peak
Feasibility and RMA		9	Deliverability	Major barriers to the ultimate engineering design and operations
		10	Affordability	Anticipated capital costs compared to other options presented
				Anticipated Operational costs compared to other options presented
		11	Impacts on Cultural Values	Anticipated Māori land impacts including areas of significance. Consideration of wider Kaitiakitanga
		12	Socioeconomic Impacts	Potential to impact on community and businesses
		13	Property Impacts	Extent and magnitude of property impacts
		14	Natural Environment	Potential impacts on sensitive natural environments and significant hazard areas
		15	Culture and Heritage	Potential impacts on sites of significance to Mana Whenua, sites and places of archaeological value and built heritage.

Table 0-3 MCA1 Measures and their alignment with the MCA Framework Criteria

Measures 1, 2 and 3 were focused on identifying the conditions necessary to support land use change and urban regeneration opportunity. Whilst the key factors which drive land use change are improved accessibility and regional growth demand, the MCA measures focused on physical characteristics which attract demand from developers and people who may want to live or work in the area. The measures were linked to the Urban Ambition for a metro system, and although quantification of the scale of change was not assessed beyond a desktop study, opportunities where scale could be achieved were identified. For the PSZ analysis, this was focused on:

- Existence of amenities – places of economic, recreation, and knowledge importance
- Density of existing residential and employment areas
- Amount of public/crown owned land, which could serve to catalyse land use change
- Availability of developable land, with a focus on high land-value-to-capital-value (LV/CV) ratio and large land parcels.
-

PSZ's which demonstrated higher prevalence of these conditions typically scored better from an urban opportunity perspective.

Representatives from Mana Whenua Kaitiaki were also present during MCA challenge workshops[36] and invited to offer commentary. Commentary through workshop sessions and Mana Whenua Kaitiaki hui informed the decision making for the emerging preferred SCOs.

The following section sets out the key findings and outcomes from the assessment of each of the geographic segments, along with the emerging SCO preferences identified[37]. Two preferred SCOs were identified in all segments. In each case, the two emerging preferred SCOs significantly overlapped with divergence around one PSZ location (e.g. inclusion or exclusion of a hospital PSZ). These divergences were deemed to require further consideration and analysis to resolve outside of the initial Phase 1 MCA process. The divergences were identified as *outstanding questions* of *Phase 1* (See Section 1.5)

MCA1 Findings and Outcomes:

[36] See MCA Assessment methodology in Section 0.5
[37] Appendices A1.5, A2,.5, A3.5 and A4.5 contain the justification for the preferred segment options and additional opportunities for each geographic segment, incorporating feedback from stakeholders and project partners.

City Centre

This segment covers the Auckland CBD area, bounded by the Waitematā Harbour to the north and the city motorway junction.

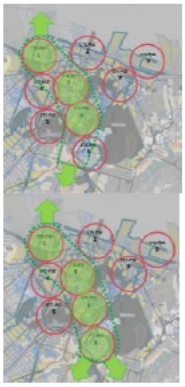
City Centre SCO Assessment Justification and Preferred Options	
Summary Description and Key Factors	**Emerging Preferred Corridor Options**
Overall, potential urban development response in the city centre was not the differentiator between options, though opportunities were noted for options with PSZs at Te Tōangaroa and the Victoria Quarter/City Works Depot. Property did not differentiate between options. Cultural impacts and opportunities of each option were not able to be fully assessed by Mana Whenua due to the timeframes. Most of the options had similar potential impacts on sensitive natural environments and hazard areas since there is an anticipated 2m sea level rise on all the waterfront PSZs. Underground tunnelled stations were expected to have the highest carbon impacts. The key urban and transport trade off's for the City Centre were focussed on the inclusion of PSZ4 (Victoria Quarter/City Works Depot) and PSZ7 (Grafton Gully and Te Tōangaroa). PSZ4 (Victoria Quarter/City Works Depot) presented a good opportunity for urban regeneration due to the area having undeveloped and low-intensity sites. Nevertheless, an interchange function with CRL at Te Waihorotiu (PSZ3) was critical from a transport perspective. PSZ4 is within 350m as a walking catchment of PSZ3, meaning that the opportunity to catalyse land use change remains with a station located at Te Waihorotiu. PSZ4 is also confirmed as being readily accessed from the Wellesley Street bus corridor that provides 12 frequent bus routes that can be accessed through transfer from Te Waihorotiu station. PSZ7 Te Tōangaroa and Grafton Gully represented an opportunity for a station to catalyse development, due to the substantial extent of Crown/public owned land. Auckland Council's City Centre Masterplan acknowledged this opportunity with the Te Tōangaroa Masterplan. Whilst PSZ7 represented a significant opportunity for urban regeneration, the geographic location, sitting east of the projected alignment would add up to an additional 4 minutes of travel time to the corridor and 1.6km of tunnel. Inclusion of the Hospital was considered important for realising, transport, accessibility, and social equity benefits. This was strongly reiterated by Mana Whenua Kaitiaki who emphasised the importance of considering the social benefits for communities who need to access the hospital and cannot afford parking costs. However, it was noted that the IBC did not include for a hospital station and hence additional funding would be needed to secure the long-term future proofing of this as a possible additional location.[38]	 *City Centre Option 1 (left) and Option 2 (right)* **On balance the preferred options taken forward were Option 1 and Option 2.** The only divergence between the two options the potential inclusion of a hospital station. The inclusion of a potential hospital station was identified as a key trade-off that could not be immediately resolved through this process and was identified as an *outstanding question*[39] requiring further analysis. The substantial potential for catalysing urban development through a station at Te Tōangaroa was also considered to be an *outstanding question* emerging from this MCA assessment that required further consideration and analysis as to whether it should be considered for inclusion or its potential was not fully able to be captured without further analysis in the MCA assessment and further engagement with Mana Whenua

Table 0-4 MCA1 City Centre SCO Assessment Justification and Preferred Options

[38] Please Refer to Appendix 2.A.B Hospital Station Analysis
[39] See Section 1.5

City Centre SCO MCA Assessment				Options							
		Criteria	Measure	1	2	3	4	5	6	7	8
Mana Whenua	A	Ngā Iwi Mana Whenua ō Tāmaki Makaurau	Mana Whenua values and their cultural landscapes. *								
	B	Cultural Opportunities	Areas where the corridor is likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services. *								
Investment Logic Map (ILM)	1	KPI1.1 Increased residential & employment density	Amount of residential and/or Commercial GFA (existing) within each PSZ	3	3	3	2	4	2	3	5
			Assessment of the ability to realise 6 stories (min NPS UD requirement) within PSZ's. Assessment of the ability to realise growth beyond the PSZ's	1	1	1	5	1	5	3	3
	2	KPI1.2 Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the defined PSZs	4	4	3	3	1	2	5	3
			Amount of private sector large plots (sqm) within the defined PSZs	3	3	4	4	2	1	4	3
			Current land value to capital value ratio on identified public/crown land and large private sector plots within PSZs	2	3	3	1	5	4	3	2
	3	KPI1.3 Improved quality of life	Places of economic, recreation, and knowledge importance within each PSZ	4	5	5	3	4	4	5	3
	4	KPI2.1 Reduced carbon emissions	Indicative length of linear infrastructure required (tunnel or surface) to connect PSZs	-3	-4	-5	-3	-4	-3	-5	-3
			Number of stations required (tunnelled or surface) to connect PSZs	-4	-5	-5	-4	-4	-4	-5	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	2	2	1	2	1	1	3
	5	KPI2.2 Improved health outcomes	Population and employment within the PSZ (existing and realisable) *NOTE: This measure was not assessed as it was not able to differentiate between SCOs at the level of granularity required*								
	6	KPI3.1 Improved access to employment, education	Population living within 45 minutes of key social and economic opportunity areas by public transport.	2	5	5	1	4	2	2	2
	7	KPI3.2 Increased public transport capacity	Anticipated number of boardings (weekday daily)	5	5	4	1	3	1	4	5
	8	KPI3.3 Reduced travel times	Indicative travel time of PT Journey compared with car during the AM peak	5	3	2	5	4	5	1	1
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design and operations	-1	-2	-4	-3	-4	-3	-4	-3
	10	Affordability	Anticipated capital costs compared to other options presented	-2	-3	-4	-1	-2	-2	-4	-2
			Anticipated Operational costs compared to other options presented	-3	-3	-4	-1	-3	-1	-4	-1
	11	Impacts on Cultural Values	Anticipated Māori land impacts including areas of significance. Consideration of wider Kaitiakitanga *								
	12	Socioeconomic Impacts	Potential to impact on community and businesses	0	0	0	0	0	0	0	0
	13	Property Impacts	Extent and magnitude of property impacts	-1	-1	-1	-1	-1	-1	-1	-1
	14	Natural Environment	Potential impacts on sensitive natural environments and significant hazard areas	-1	-1	-2	-1	-1	-1	-2	-1
	15	Culture and Heritage	Potential impacts on sites of significance and places of archaeological value and built heritage.	-2	-2	-2	-2	-2	-2	-2	-2
* Refer to Summary of Mana Whenua Engagement on the Optioneering Process Report Appendix O-H											

Table 0-5: MCA1 City Centre SCO MCA Assessment

Figure 0-5: MCA outcomes for the City Centre SCOs

Central Isthmus

The Isthmus segment runs north-to-south from the Central Motorway Junction at the southern edge of the City Centre toward Manukau Harbour, ending near Puketāpapa-Mount Roskill. The area includes various residential neighbourhoods, namely Newton, Eden Terrace, Kingsland, Morningside, Mount Eden, Sandringham, Balmoral, Wesley, and part of Mount Roskill.

Central Isthmus SCO Assessment Justification and Preferred Options	
Summary Description and Key Factors	**Emerging Preferred Corridor Options**
Many urban regeneration opportunities were identified in this geographic segment due to availability of large amounts of publicly owned land in many of the PSZs, proximity to commercial areas, the presence of large lots, and the presence of Kāinga Ora involvement in the Wesley area**.** The key urban and transport trade off in the Isthmus section related to the inclusion of PSZ4 (Eden Valley) over PSZ3 (Kingsland). A key consideration for this section of the isthmus is the requirement to interchange with heavy rail western services. Therefore, the trade off was between PSZ1 (Dominion Junction) as an interchange station and (PSZ4) Eden Valley or PSZ3 (Kingsland) as the interchange station without Eden Valley. The 2 options considered were: • Option 1: Interchange at PSZ 1 (Dominion Junction), PSZ4 (Eden Valley), PSZ7 (Balmoral/Sandringham) with the station located to the eastern extent of the PSZ, close • Option 4: PSZ1 (Dominion Junction), PSZ3 (Kingsland), PSZ7 (Balmoral/Sandringham) with the station located to the west of the PSZ PSZ1 (Dominion Junction) presented one of the most significant land use change, urban uplift and regeneration opportunities on the ALR corridor. This is due to presence the of significant amount of large, underutilised land parcels. There is also the opportunity to unlock a large area of land for redevelopment, improve local transport connectivity and create a new urban centre at the heart of future development through removal of redundant motorway infrastructure. The future CRL Maungawhau station due to open in 2024 also presents the opportunity to create a significant interchange between heavy rail, CC2M and a potential future North West Light rail link. The consolidation of all these services would not be possible at Kingsland due to space constraints around the existing heavy rail station. PSZ3 (Kingsland) presented very little opportunity for land use change and urban uplift based on a number of factors. Small land parcel sizes and low extent of public/crown owned land limits urban regeneration potential around Kingsland to immediately around the station precinct on land acquired for construction and maintenance of station assets. The urban opportunity at Kingsland is primarily around public realm and accessibility upgrades for the existing village centre on New North Road. Kingsland is predominantly a transport/interchange opportunity with the existing	 *Isthmus Option 1 (above) and Option 4 (below)* **On balance the preferred options taken forward were Option 1 and Option 4.** With the divergence being the key trade-off between Kingsland and Eden Valley. This trade-off was identified as an *outstanding question*[40] requiring further analysis.

[40] See Section 1.5

Central Isthmus SCO Assessment Justification and Preferred Options	
Summary Description and Key Factors	**Emerging Preferred Corridor Options**
heavy rail station with Western Line services. It also presents the better opportunity for interchange if staging an isthmus Light Rail route (Stage 1). This is driven predominantly by construction due to key sites at Dominion Junction being required for tunnelling Stage 1 (Kingsland to Ōnehunga) and subsequent tunnelling for Stage 2 (Dominion Junction to City Centre). PSZ4 (Eden Valley) Although not as significant as PSZ1 (Dominion Junction) presents a moderate opportunity for land use change and urban uplift due to the presence of large land parcels centred on the existing local centre and commercial spine that is Dominion Road. This would also support the opportunity for public realm and accessibility upgrades for the existing local centre. A station here would also allow a second point of access to Eden Park within acceptable walking distance, which would be an optimal location based on international best practise for stadium access vs consolidating all of the access to Eden Park at Kingsland. PSZ7 (Balmoral Sandringham) presented two different models of urban regeneration with the St Lukes area to the west and Balmoral local centre on Dominion Road in the east. The St Lukes area presents a significant opportunity for urban regeneration with several large lots including Westfield St Lukes shopping centre. There is also a significant opportunity to reduce private vehicle trips to the shopping centre. The Balmoral local centre on Dominion Road in the east benefits from the existing local centre energy and activity for the project to leverage off. There is some aggregated land holdings and large lots, which together with Potters Park brings together an opportunity for land use change. As all the options were assumed to be tunnelled in this geographical segment, it was expected that there would be a significantly higher embodied carbon impact during construction across all options. The differentiation between options depended on length and number of underground stations. There were significant geological constraints in the Central Isthmus area for all options due to the abundance of maunga and lava flows in the area. There are areas along the route where there is a high likelihood of encountering basalt and aquifers.	

Table 0-6: Central Isthmus SCO Assessment Justification and Preferred Options

Central Isthmus SCO MCA Assessment				Options									
		Criteria	Measure	1	2	3	4	5	6	7	8	9	10
Mana	A	Ngā Iwi Mana Whenua ō Tāmaki Makaurau	Mana Whenua values and their cultural landscapes *										
	B	Cultural Opportunities	Areas where the corridor is likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services. *										
Investment Logic Map (ILM)	1	KPI1.1 Increased residential & employment density	Amount of residential and/or Commercial GFA (existing) within each PSZ	2	3	3	2	5	3	3	3	3	2
			Assessment of the ability to realise 6 stories (min NPS UD requirement) within PSZ's. Assessment of the ability to realise growth beyond the PSZ's	4	2	3	5	1	2	3	4	4	3
	2	KPI1.2 Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the defined PSZs	4	2	3	4	1	4	3	4	4	2
			Amount of private sector large plots (sqm) within the defined PSZs	4	1	2	4	2	3	4	4	4	2
			Current land value to capital value ratio on identified public/crown land and large private sector plots within PSZs	4	3	3	4	1	4	2	3	3	4
	3	KPI1.3 Improved quality of life	Places of economic, recreation, and knowledge importance within each PSZ	4	2	3	4	3	3	4	4	5	4
	4	KPI2.1 Reduced carbon emissions	Indicative length of linear infrastructure required (tunnel or surface) to connect PSZs	-4	-3	-4	-4	-4	-5	-4	-4	-4	-3
			Number of stations required (tunnelled or surface) to connect PSZs	-5	-3	-3	-5	-4	-4	-5	-5	-5	-5
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	2	2	2	2	2	2	2	2	2
	5	KPI2.2 Improved health outcomes	Population and employment within the PSZ (existing and realisable) *NOTE: This measure was not assessed as it was not able to differentiate between SCOs at the level of granularity required*										
	6	KPI3.1 Improved access to employment, education	Population living within 45 minutes of key social and economic opportunity areas by public transport.	4	4	3	4	4	3	3	3	3	4
	7	KPI3.2 Increased public transport capacity	Anticipated number of boardings (weekday daily)	4	1	1	4	5	5	4	4	3	4
	8	KPI3.3 Reduced travel times	Indicative travel time of PT Journey compared with car during the AM peak	4	5	5	4	4	3	4	4	3	4
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design and operations	-2	-2	-2	-2	-4	-4	-2	-2	-2	-2
	10	Affordability	Anticipated capital costs compared to other options presented	-2	-1	-2	-2	-2	-4	-3	-3	-3	-3
			Anticipated Operational costs compared to other options presented	-1	-1	-1	-1	-2	-3	-2	-2	-2	-2
	11	Impacts on Cultural Values	Anticipated Māori land impacts including areas of significance. Consideration of wider Kaitiakitanga *										
	12	Socioeconomic Impacts	Potential to impact on community and businesses	0	0	0	0	0	0	0	0	0	0
	13	Property Impacts	Extent and magnitude of property impacts	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	14	Natural Environment	Potential impacts on sensitive natural environments and significant hazard areas	0	0	0	0	0	0	0	0	0	0
	15	Culture and Heritage	Potential impacts on sites of significance and places of archaeological value and built heritage.	0	0	0	0	0	0	0	0	0	0
* Refer to Summary of Mana Whenua Engagement on the Optioneering Process Report Appendix O-H													

Table 0-7: MCA1 Central Isthmus SCO MCA Assessment

Figure 0-6: MCA outcomes for the Central Isthmus Corridor Options

Roskill to Onehunga

This segment spans from Puketāpapa-Mt Roskill to Ōnehunga, through to the north of the Manukau Harbour. The section covers a portion of KiwiRail land, which for the purpose of assessment was assumed to be public land with potential urban regeneration opportunities, in the event the land was released. It was understood that any options that included the existing KiwiRail designation would require close collaboration with KiwiRail to inform route options.

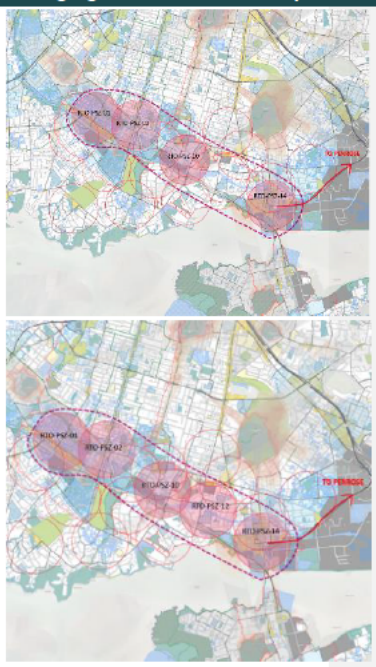
Roskill to Onehunga MCA SCO Assessment Justification and Preferred Options	
Summary Description and Key Factors	**Emerging Preferred Corridor Options**
It was understood that any options that included the existing KiwiRail designation would require close collaboration with KiwiRail to inform route options. Options running through the KiwiRail designation were also expected to have a high impact on local residential properties as the designation does not currently function as railway land. Along the route there is a high likelihood of encountering basalt and aquifers. The key urban and transport trade off in the Roskill to Ōnehunga section related to a 'Ridgeline' alignment (Option 4 and 6) vs a motorway alignment (Option 1/1a). Options 4 and 6 demonstrated the highest prevalence of public/crown owned land, coupled with large privately owned development sites. The Fletcher Living home development in the Three Kings area was identified as an opportunity for further urban growth (provided Fletcher Living were willing to review their plans). All options connect to Ōnehunga, where there is substantial public sector (Eke Panuku) presence to support urban regeneration outcomes. The move away from the strong urban opportunity in options 4 and 6 was not driven by transport requirements. Rather, these options brought with them significant cost, design and consenting risk. • With major utilities running under the Mt Albert Road ridgeline it was expected that options running along this area would have higher construction impacts. • Grade-separated options running at surface which would likely have 2 metre high walls along the length of the corridor, were expected to have visual and severance impacts on communities. • Separated options running along Mt Albert Road were also expected to have significant severance and visual impacts on the local residential environment and wider community, due to the many houses and businesses along the alignment. • Tunnelled options along Mt. Albert Road ridgeline were also considered, however there were significant cost and carbon implications with additional tunnelling. • The other key factor here with separation is the ability to secure a quality urban outcome which supports the projected urban regeneration.	 Roskill to Ōnehunga Option 1 (above) and Option 1A (below). **On balance the preferred options taken forward were Option 1 and Option 1A.** The key divergence between these options was the potential inclusion of an additional station at Queenstown Road. It was deemed that resolving the inclusion of Queenstown Road did not require resolution during the Phase 1 assessment and that it would be subject to further consideration during Phase 2 along with more detailed alignment assessment.

Table 0-8: MCA1 Roskill to Onehunga SCO Assessment Justification and Preferred Options

Roskill to Ōnehunga SCO MCA Assessment				Options											
		Criteria	Measure	1	1A	2	3	4	5	6	7	8	9	10	11
Mana	A	Ngā Iwi Mana Whenua ō Tāmaki Makaurau	Mana Whenua values and their cultural landscapes. *												
	B	Cultural Opportunities	Areas where the corridor is likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services. *												
Investment Logic Map (ILM)	1	KPI1.1: Increased residential & employment density	Amount of residential and/or Commercial GFA (existing) within each PSZ	3	3	4	5	3	4	4	2	3	4	1	2
			Assessment of the ability to realise 6 stories (min NPS UD requirement) within PSZ's. Assessment of the ability to realise growth beyond the PSZ's	1	1	1	1	5	3	5	5	3	5	1	1
	2	KPI1.2 Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the defined PSZs	3	4	2	1	4	3	2	4	3	2	5	4
			Amount of private sector large plots (sqm) within the defined PSZs	2	3	2	2	5	3	3	3	3	3	2	2
			Current land value to capital value ratio on identified public/crown land and large private sector plots within PSZs	4	4	2	1	4	2	2	4	3	3	4	4
	3	KPI1.3 Improved quality of life	Places of economic, recreation, and knowledge importance within each PSZ	3	3	2	2	5	5	4	4	3	2	2	1
	4	KPI2.1: Reduced carbon emissions	Indicative length of linear infrastructure required (tunnel or surface) to connect PSZs	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-3	-3
			Number of stations required (tunnelled or surface) to connect PSZs	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3	3	3	3	5	4	4	3	3	3	3	3
	5	KPI2.2Improved health outcomes	Population and employment within the PSZ (existing and realisable) *NOTE: This measure was not assessed as it was not able to differentiate between SCOs at the level of granularity required*												
	6	KPI3.1: Improved access to employment, education	Population living within 45 minutes of key social and economic opportunity areas by public transport.	4	4	3	3	4	4	4	2	2	3	1	1
	7	KPI3.2 Increased public transport capacity	Anticipated number of boardings (weekday daily)	2	2	1	1	4	4	4	4	2	2	3	3
	8	KPI3.3 Reduced travel times	Indicative travel time of PT Journey compared with car during the AM peak	4	4	4	4	4	4	4	4	4	4	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design and operations	-2	-2	-2	-2	-4	-4	-4	-4	-4	-4	-4	-4
	10	Affordability	Anticipated capital costs compared to other options presented	-2	-2	-1	-1	-2	-2	-1	-3	-2	-1	-3	-2
			Anticipated Operational costs compared to other options presented	-2	-2	-2	-1	-2	-2	-1	-2	-2	-1	-3	-3
	11	Impacts on Cultural Values	Anticipated Māori land impacts including areas of significance. Consideration of wider Kaitiakitanga *												
	12	Socioeconomic Impacts	Potential to impact on community and businesses	0	0	0	0	0	0	0	0	0	0	-1	-1
	13	Property Impacts	Extent and magnitude of property impacts	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
	14	Natural Environment	Potential impacts on sensitive natural environments and significant hazard areas	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2
	15	Culture and Heritage	Potential impacts on sites of significance and places of archaeological value and built heritage.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1

* Refer to Summary of Mana Whenua Engagement on the Optioneering Process Report Appendix 0-H

Table 0-9: MCA1 Roskill to Onehunga SCO MCA Assessment

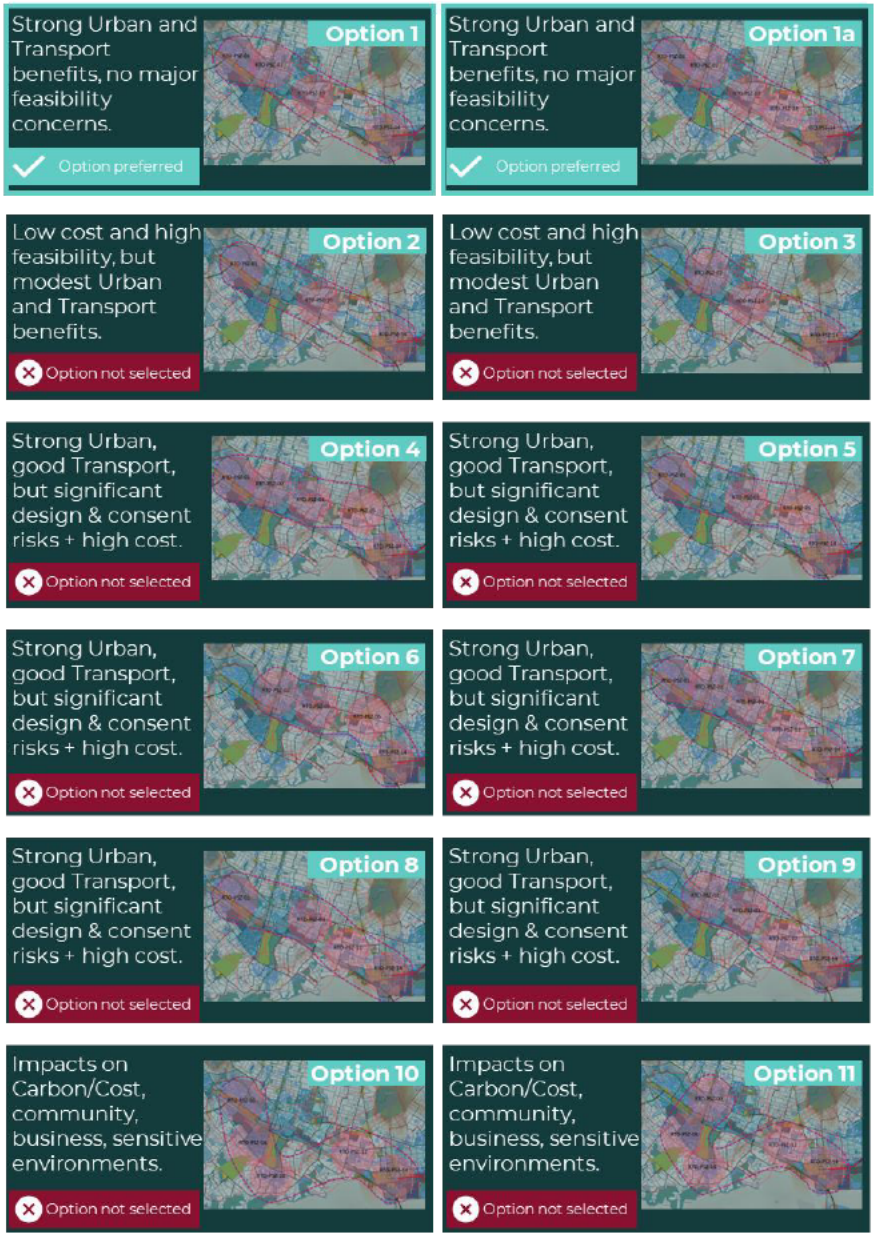


Figure 0-7: MCA Outcomes for the Roskill to Ōnehunga Corridor Options

Māngere to Airport

This segment covers the area from north of Māngere Bridge up to Landing Drive as well as the area around Auckland Airport. Māngere is one of the oldest settlement areas in Aotearoa, so there are many sites of cultural and environmental significance for Mana Whenua including an extensive volcanic landscape and maunga, stone fields, craters, waterways.

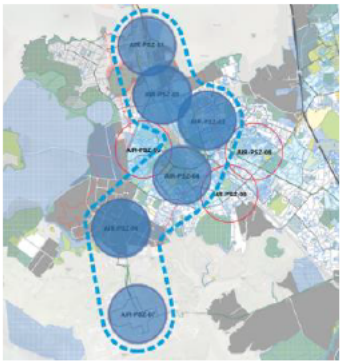
Māngere to Airport SCO Assessment Justification and Preferred Options	
Summary Description and Key Factors	**Emerging preferred corridor options**
The key urban and transport trade off in the Māngere-Airport corridor was the urban desire to capture urban regeneration opportunities in East Māngere, with a good number of large lots, high LV/CV ratio and significant crown/public owned land (Options 6, 7, 8 and 9). However, a balanced approach to delivering urban and transport benefits was taken, in that these options would have seen a significant increase in travel time and travel distance (up to 1.5km longer). The emerging preferred SCO options captured key areas of urban regeneration potential at Favona (Te Ararata) and Māngere Town Centre. Māngere Town Centre was identified as a major opportunity for urban regeneration in this geographic segment. It was noted that Favona offered greater urban regeneration opportunity than the Bader Drive residential area, which is already relatively developed and does not offer significant additional growth opportunity. Mana whenua kaitiaki raised concern about displacement of Māori communities due to urban uplift. As there is a large corridor covered in this geographical segment, it was noted that it is one of the oldest Māori settlements in New Zealand and it is highly significant to mana whenua. Mana whenua highlighted potential employment opportunities at the airport and the importance of access to jobs and higher educational opportunities to connect young people to high performing schools outside of the area to get a quality education. Improving access to the Māngere Town Centre will enable better access to Māori Health providers in the area. All options in this section were determined to be susceptible to flooding and coastal inundation.	  *Māngere to Airport Option 4 (above) and Option 2 (below)* Options 4 and 2 were taken forward as the preferred options for the Mangere to Airport section.

Table 0-10: MCA1 Mangere to Airport SCO Assessment Justification and Preferred Options

Mängere to Airport SCO Assessment Justification and Preferred Options				Options									
		Criteria	Measure	1	2	3	4	5	6	7	8	9	10
Mana	A	Ngā Iwi Mana Whenua ō Tāmaki Makaurau	Mana Whenua values and their cultural landscapes *										
	B	Cultural Opportunities	Areas where the corridor is likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services. *										
Investment Logic Map (ILM)	1	KPI1.1: Increased residential & employment density	Amount of residential and/or Commercial GFA (existing) within each PSZ	4	4	2	4	2	3	2	3	1	4
			Assessment of the ability to realise 6 stories (min NPS UD requirement) within PSZ's. Assessment of the ability to realise growth beyond the PSZ's	1	3	3	5	3	5	5	5	5	3
	2	KPI1.2 Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the defined PSZs	2	3	3	3	3	4	3	4	4	1
			Amount of private sector large plots (sqm) within the defined PSZs	3	4	2	4	2	4	2	4	3	1
			Current land value to capital value ratio on identified public/crown land and large private sector plots within PSZs	4	3	3	2	2	2	3	3	3	5
	3	KPI1.3 Improved quality of life	Places of economic, recreation, and knowledge importance within each PSZ	2	3	3	4	3	5	5	5	5	2
	4	KPI2.1: Reduced carbon emissions	Indicative length of linear infrastructure required (tunnel or surface) to connect PSZs	-2	-2	-2	-2	-2	-3	-3	-3	-3	-2
			Number of stations required (tunnelled or surface) to connect PSZs	-1	-2	-2	-2	-2	-2	-2	-2	-2	-1
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	2	1	2	2	2	2	2	1	1
	5	KPI2.2Improved health outcomes	Population and employment within the PSZ (existing and realisable) *NOTE: This measure was not assessed as it was not able to differentiate between SCOs at the level of granularity required*										
	6	KPI3.1: Improved access to employment, education	Population living within 45 minutes of key social and economic opportunity areas by public transport.	1	3	3	2	2	2	2	2	1	3
	7	KPI3.2 Increased public transport capacity	Anticipated number of boardings (weekday daily)	1	3	3	4	4	5	5	5	5	1
	8	KPI3.3 Reduced travel times	Indicative travel time of PT Journey compared with car during the AM peak	3	2	3	2	3	1	2	1	1	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design and operations	-2	-2	-2	-2	-2	-4	-4	-4	-4	-2
	10	Affordability	Anticipated capital costs compared to other options presented	-2	-3	-2	-3	-2	-4	-3	-4	-4	-2
			Anticipated Operational costs compared to other options presented	-2	-3	-2	-3	-2	-4	-4	-4	-4	-2
	11	Impacts on Cultural Values	Anticipated Māori land impacts including areas of significance. Consideration of wider Kaitiakitanga *										
	12	Socioeconomic Impacts	Potential to impact on community and businesses	0	-1	-1	-2	-2	-2	-2	-1	-1	-1
	13	Property Impacts	Extent and magnitude of property impacts	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
	14	Natural Environment	Potential impacts on sensitive natural environments and significant hazard areas	-1	-1	-2	0	-1	0	-1	0	-1	-1
	15	Culture and Heritage	Potential impacts on sites of significance and places of archaeological value and built heritage.	0	0	-1	0	-1	0	-1	0	-1	-1

* Refer to Summary of Mana Whenua Engagement on the Optioneering Process Report Appendix O-H

Table 0-11: MCA1 Māngere to Airport SCO MCA Assessment

Figure 0-8: MCA Outcomes for the Māngere - Airport Corridor Option

Sensitivity Testing the Segment Corridor Options Assessment (MCA1)

In line with the approach set out in *Section 0.5*, the outputs of MCA1 were subjected to sensitivity testing to understand how sensitive the assessment might be to the application of different weights to individual criteria or groups of criteria.

While MCA scores have not been used systematically to identify an emerging preferred option at any stage in the process, introducing weighted sensitivity tests at this stage gave further confidence in the selection of the preferred option(s) within each corridor segment.

While this exercise was intended to inform, rather than define, the selection of the emerging preferred end-to-end option, this outcome gives substantial confidence that the emerging preferred SCOs represent a strong basis for the further definition of the route through the Catchment Optioneering phase.

The sensitivity testing considered a series of scenarios, as described in *Section 0.5,* in which the 17 MCA criteria were weighted to emphasise or de-emphasise certain considerations.

A summary of the results of this analysis is shown in Figure 0- through Figure 0- below, in which the options are ranked in each scenario according to their overall performance, with 1 being the highest ranked.

	Central City Corridor Options							
	1	2	3	4	5	6	7	8
50% ILM* | 50% Impacts	2	3	7	4	6	5	8	1
100% ILM* | 0% Impacts	3	2	4	8	5	7	6	1
20% ILM* | 70% Deliverability & affordability | 10% Other Impacts	3	5	7	1	6	4	8	1
20% ILM* | 10% Deliverability & affordability | 70% Other Impacts	2	3	7	4	6	5	8	1
0% ILM* | 100% Impacts	2	5	7	1	6	2	7	2
Urban only	7	2	2	6	7	5	1	4
Transport only	2	1	5	7	4	6	8	2
Carbon only	2	6	7	3	3	3	8	1

Figure 0-9: Scenario sensitivity options assessment outcomes for the City Centre Corridor Options

As the outputs above make clear, the emerging preferred corridor options for the City Centre performed well under almost all sensitivity scenarios considered. While Option 8 performed consistently very well, it is important to note that this option did not include (and could not include) a PSZ at Wynyard, which was considered to present a key integration risk with the planned Additional Waitematā Harbour Crossing. It did not present a viable alternative for integration with AWHC, and it was therefore discarded.

	Central Isthmus Corridor Options									
	1	2	3	4	5	6	7	8	9	10
50% ILM* | 50% Impacts	2	8	7	1	10	9	5	3	4	6
100% ILM* | 0% Impacts	2	8	6	1	7	4	5	3	9	10
20% ILM* | 70% Deliverability & affordability | 10% Other Impacts	5	3	6	4	9	10	8	7	1	2
20% ILM* | 10% Deliverability & affordability | 70% Other Impacts	2	5	4	1	7	8	6	3	9	9
0% ILM* | 100% Impacts	4	3	4	4	9	10	7	7	1	2
Urban only	3	7	6	1	7	4	5	2	10	9
Transport only	2	8	9	2	1	5	5	5	9	2
Carbon only	5	1	2	5	3	5	5	5	5	3

Figure 0-10: Scenario sensitivity assessment outcomes for the Central Isthmus Corridor Options

As the outputs above make clear, the emerging preferred corridor options for the Central Isthmus section performed well under all sensitivity scenarios considered, while all other options performed poorly in at least one scenario.

	Roskill-Onehunga Corridor Options											
	1	1a	2	3	4	5	6	7	8	9	10	11
50% ILM* | 50% Impacts	3	1	7	4	2	9	5	6	10	8	12	11
100% ILM* | 0% Impacts	6	5	8	7	1	4	2	3	10	9	11	11
20% ILM* | 70% Deliverability & affordability | 10% Other Impacts	3	2	8	1	10	11	7	12	9	6	4	5
20% ILM* | 10% Deliverability & affordability | 70% Other Impacts	1	4	3	2	6	8	7	5	12	11	9	9
0% ILM* | 100% Impacts	6	8	7	5	11	11	10	9	1	2	3	4
Urban only	6	5	7	8	1	2	4	2	10	9	12	11
Transport only	7	3	9	3	2	3	1	3	10	7	12	11
Carbon only	2	1	2	2	2	7	7	2	7	7	11	11

Figure 0-11: Scenario sensitivity assessment for the Roskill-Onehunga Corridor Options

	Mangere-Airport Corridor Options									
	1	2	3	4	5	6	7	8	9	10
50% ILM* | 50% Impacts	6	3	5	1	8	4	9	2	10	7
100% ILM* | 0% Impacts	8	5	6	3	7	2	4	1	10	9
20% ILM* | 70% Deliverability & affordability | 10% Other Impacts	5	7	3	6	4	10	8	9	2	1
20% ILM* | 10% Deliverability & affordability | 70% Other Impacts	2	4	6	1	7	5	8	3	10	9
0% ILM* | 100% Impacts	3	4	7	4	4	9	10	8	1	2
Urban only	6	4	6	3	8	2	4	1	10	9
Transport only	10	4	2	4	2	4	1	4	9	8
Carbon only	1	1	6	1	1	6	6	6	10	1

Figure 0-12: Scenario sensitivity assessment outcomes for the Mangere-Airport Corridor Options

As demonstrated by the outputs above, the emerging preferred corridor options for the Roskill to Ōnehunga section each performed well in almost all but one of the sensitivity scenarios considered, with the other options scoring poorly in at least two (and in many cases several) scenarios.

As the sensitivity scenario outputs above make clear, the emerging preferred corridor options for the Māngere to Airport section scored well in almost all sensitivity scenarios considered, with many other options performing poorly in several scenarios, or failing to perform well in all but a handful of scenarios.

1.4 Outcome of Phase 1: Emerging Preferred Whole Corridor

Following the completion of MCA1, further analysis was undertaken to summarise and align the assessment findings of each geographic segment to identify a whole corridor. Consideration was given to the potential for an additional MCA requirement at this stage or reiteration of the SCO analysis if the preferred options within each segment did not appropriately stitch together (e.g. start and end PSZs were misaligned). However, this did not prove to be an issue as the preferred options within each segment formed a whole corridor that upon consideration was well integrated from end-to-end.

Emerging Preferred Whole Corridor

From the corridor option assessment process (Phase 1), the shortlisted PSZ options for each geographic segment and subsequent emerging preferred whole-of-corridor option were as follows:

Segment	Potential Station Zones
City Centre	Wynyard, Te Waihorotiu (Aotea), University, Hospital
Isthmus	Dominion Junction, Kingsland / Eden Valley, Balmoral / St Lukes, Sandringham, Wesley
Roskill to Ōnehunga	Puketāpapa-Mt Roskill, Hayr Road, Queenstown Road, Ōnehunga Town Centre
Māngere to Airport	Māngere Bridge Precinct, Te Ararata Creek, Bader Drive Precinct/Favona, Māngere Town Centre, Landing Drive Industrial Employment, Airport Precinct

Table 0-12 Geographic segment and station zones

When combined on a map, the preferred PSZ locations for each geographic segment generated a preliminary view of the station corridor. This corridor, and its associated PSZs, were brought forward to begin the catchment optioneering phase (Phase 2a).

Map of Emerging Preferred Whole Corridor

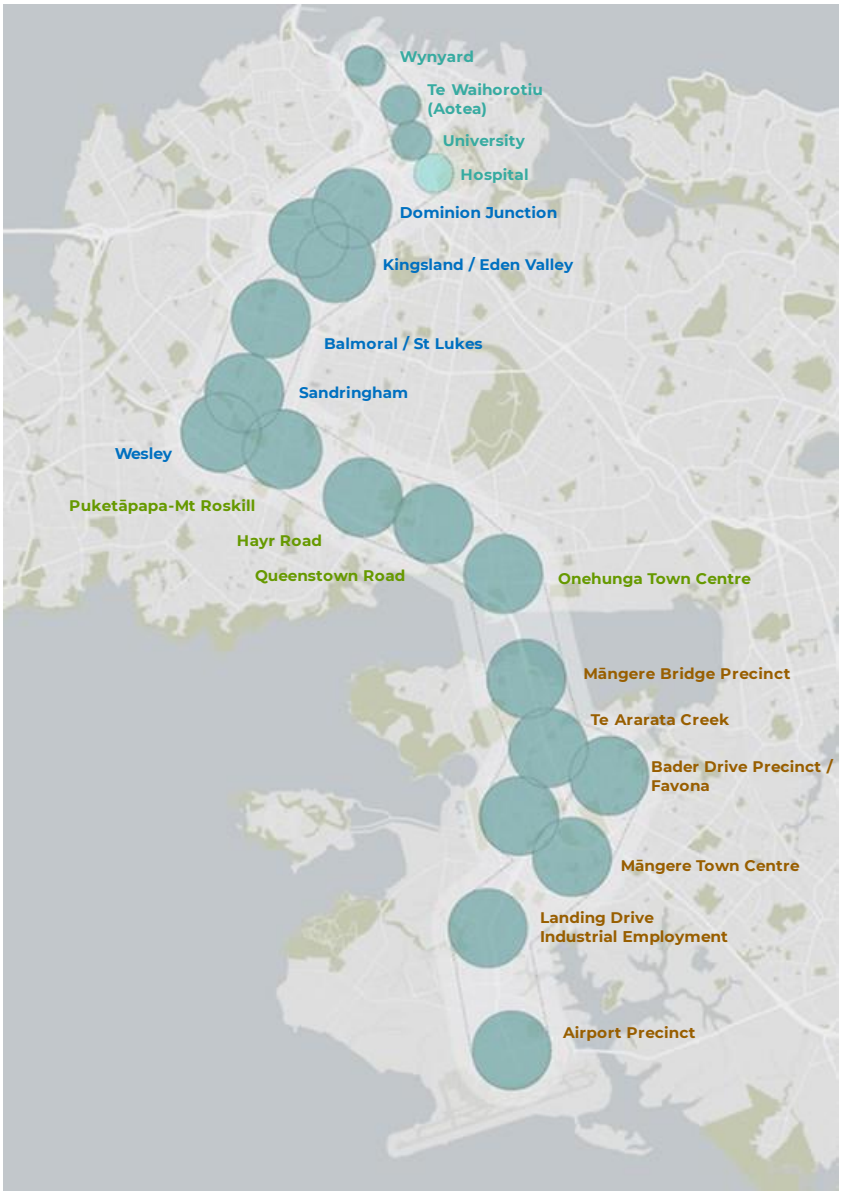


Figure 0-13 Emerging Preferred Whole Corridor established in Phase 1

1.5 Outstanding Questions from Phase 1 (Corridor)

As noted during the presentation of MCA1 assessment findings, several corridor level questions emerged that could not be fully resolved through MCA assessment. The following *outstanding questions* were identified for consideration before progressing to, or through Phase 2. While some questions were deemed appropriate to resolve through the Phase 2 (Catchment) optioneering assessment, others were addressed through focused pieces of analysis carried out by SMEs and subject to review through ALR Governance[41].

Outstanding Questions from Corridor stage			
#	Question	Resolution	Summary of Rationale
1	Inclusion of a Hospital Station	Not included in emerging preferred corridor.	• Technically complex • Delays majority of journeys trying to access City Centre • Significant additional cost • Opportunities to enhance accessibility through University Station
2	Inclusion of a Te Toangaroa Station	Not included in emerging preferred corridor.	• Limits the ability and delays journey time to access CBD where existing employment concentrations exist • Significant additional cost
3	Can ALR activate Victoria Quarter / City Works through Te Waihorotiu (Aotea) or Wynyard Stations	Will be considered through Catchment Optioneering Process (Phase 2a)	• Not required to determine corridor assessed through catchment phase
4	From Dominion Junction, should ALR next connect to Kingsland or to Eden Valley	The emerging preferred corridor should extend from Dominion Junction to Kingsland	• A station at Kingsland is considered essential to protect options for staging the implementation of the ALR route. • While the optimal staging strategy is still under consideration (see Section 2b.6), at a strategic level it is clear that an interchange with Western Rail at Kingsland provides a key means of ensuring that staging options beginning in the southern section of the ALR route have a means of providing access to the city centre.
5	Should we proceed with an alignment between Mt. Roskill and Ōnehunga along SH20, KiwiRail Corridor or Mt Albert Ridgeline Tunnel	Mt Albert Road discounted, assessment of SH20 and KiwiRail options considered through Catchment Optioneering Process (Phase 2a)	• Likelihood of very significant additional cost and carbon impacts of Mount Albert Road tunnel options not deemed to be affordable nor outweighed by potential urban / consenting benefit. • KiwiRail and SH20 options explored in detail through the Catchment Optioneering process (Phase 2a).
6	Should we consider inclusion of a station in Bader or Favona	Will be considered through Phase 2a	• Not required to determine corridor assessed through catchment phase
7	How we will cross the Manukau Harbour	Will be considered through Phase 2a	• Not required to determine corridor assessed through catchment phase

Table 0-13: Outstanding questions from the Corridor stage

[41] See section 2a.1

Phase 2a: Catchment Optioneering

2a.1 Catchment Options Development & Assessment Overview

Purpose of Phase 2

With a provisional view of the preferred ALR whole corridor that emerged from the Phase 1 assessment of potential station zones (PSZs) and segment corridor options (SCOs), the catchment optioneering phase (Phase 2a) sought to define the preferred locations of ALR stations along the corridor and the preferred alignment of the route connecting them.

Key Assumptions for Phase 2

A series of project assumptions and holding assumptions below were developed to guide the catchment optioneering work. These assumptions related to the overall specification of the ALR system and operations, route-wide design considerations, and the status of outstanding 'Corridor Phase' decisions. Assumptions were agreed by the Alliance Management Team.

Holding assumptions were made for assessment purposes only, meaning they were indicative and subject to change, and it was acknowledged that there would be a need to review the assessment and reconfirm that the recommendations remained valid once the technical work to confirm or alter each of the holding assumptions had been completed.

Issue	Assumption
Vertical alignment: Wesley to City Centre	This section of the route would run in a tunnel
Monotunnel vs Twin bore	Tunnel will be constructed as a single bore mono-tunnel
TBM launch site	Dominion Junction
Rolling Stock / Station Platforms	100m trains and platforms
System type	The system would operate fully segregated along the whole route[42]
Power system (catenary / 3rd rail)	Assume overhead catenary on basis this is worst case (effects)
Depot location	To be considered following alignment and station MCA assessments
Station Spacing	Minimum spacing: approximately 600m in CBD and 900m elsewhere
KiwiRail 4-tracking	Consideration of 4-tracking and 2-tracking alignment within MCA process
AWHC integration point (Future proofing)	Wynyard
North West integration point (Future proofing)	Dominion Junction
Airport interface	Alignment extends to the airport

Table 2.a.1- 1 Catchment Optioneering Assumptions

These assumptions were communicated to the integrated cross-workstream teams carrying out the development and assessment of PSL and Alignment options to ensure consistency. All assumptions were reviewed and approved through ALR governance.

Approach

Taking the preferred corridor as a starting point (Output of Phase 1), the catchment optioneering phase sought to identify, to a resolution of a circle around 200m in diameter, the preferred locations of ALR stations, and the preferred alignment of the route connecting them. All steps of the process were guided by the Guiding Considerations[43].

Potential Station Locations (PSLs) within PSZ's and alignment options were developed and assessed separately, before being brought together to generate a first-pass view of the end-to-end route. The station and alignment combination options were then developed and assessed to determine the Emerging Preferred Option for Finalisation, which was brought forward to the next phase of optioneering.

[42] See Appendix 2A..A
[43] See Section 0.2

In outline, the Phase 2a option development and assessment was approached as follows:

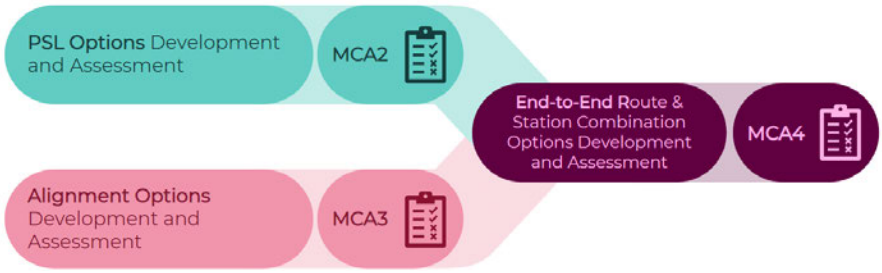


Figure 2.a.1- 1 Combined PSL and Alignment Option Development and Assessment Process

Potential Station Location Options Development and Assessment (Section 2a.2)

Using the Guiding Considerations, each of the PSZs identified in the corridor phase was reviewed to explore the issues and opportunities that would influence the location of a station within it. After generating a longlist of Potential Station Locations (PSLs) within a given PSZ, a 'Traffic Light' assessment was performed to identify a shortlist. Through MCA2, the pros and cons of the PSLs within each PSZ were identified. In the first instance, this process was conducted without being constrained by particular alignments.

Alignment Options Development and Assessment (Section 2a.3)

Again using the Guiding Considerations, the range of potential alignments through the surface sections of the route was examined through MCA3, to identify their issues and opportunities, without (in the first instance) being constrained by particular station locations along the route.

End-to-end Route and Station Combination Options Development and Assessment (Section 2a.4)

The alignments and station locations examined above were brought together to derive an overall view of the combinations which would best address the Guiding Considerations, again subject to MCA (MCA4).

2a.2 Potential Station Location Options Development and Assessment

In total, the Corridor Phase had confirmed 18 Potential Station Zones (PSZs) within which a station could potentially be located, with the preferred locations to be identified through the Catchment Phase 2a. In addition, an assumption was made that up to three stations would be developed within the boundary of Auckland International Airport, which were dealt with outside the Catchment Phase as part of the Airport's master planning process.

The six steps in the process of developing and accessing Potential Station Locations (PSLs) in the Catchment Phase were:

- PSZ context analysis
- PSL longlist option generation
- Traffic light assessment of longlist PSL options to identify a potential shortlist
- Confirmation of PSL shortlist
- Development of shortlisted PSL options for assessment purposes
- Assessment of shortlisted options

Taking each of these steps in turn, ALR worked through the assessment of PSL options as set out below.

PSZ context analysis

For each of the PSZs identified in the corridor phase, a series of GIS layers were assembled identifying the spatial distribution of matters of significance from urban, transport and Mana Whenua perspectives. These layers collectively provided insight into the areas within the PSZ where there was greater opportunity to deliver the ILM Investment Objectives by locating a station.

Below is an example of the Urban focused GIS layers that were developed during the context analysis to inform the PSL longlist generation in Ōnehunga[44]. It is important to note that different layers and contextual analysis was developed by each workstream to support the assessment (including Transport Planning, Te Tiriti Partnerships, Sustainability etc.)

[44] The full set of layers for each PSZ can be found in Appendix 1A-D.

Ōnehunga Urban Context

- Established Town Centre with Street-Based Retail and a shopping mall
- One of Tāmaki Makaurau's earliest settlements for both Māori and Pakeha
- Historic heritage overlay applies to main street/ Onehunga Mall
- Fencibles block and grid pattern
- Extensive reclaimed foreshore that is highly modified from its original form (1940's shoreline is shown as the original is not available on AC GIS)
- Volcanic Viewshafts to Maungakiekie apply over the town centre
- High voltage transmission lines running east to west along Neilson Street and south of Neilson Street
- Relatively mixed/diverse resident demographic
- Volcanic landscape underlying area with springs, aquifers, lava tunnels
- High number of >1200sqm lots to the west of town centre
- Transform location for Eke Panuku – their focus is on the town centre and wharf
- Town Centre 'blocks' extend from Grey Street to Neilson Street, between Selwyn and Galway Streets

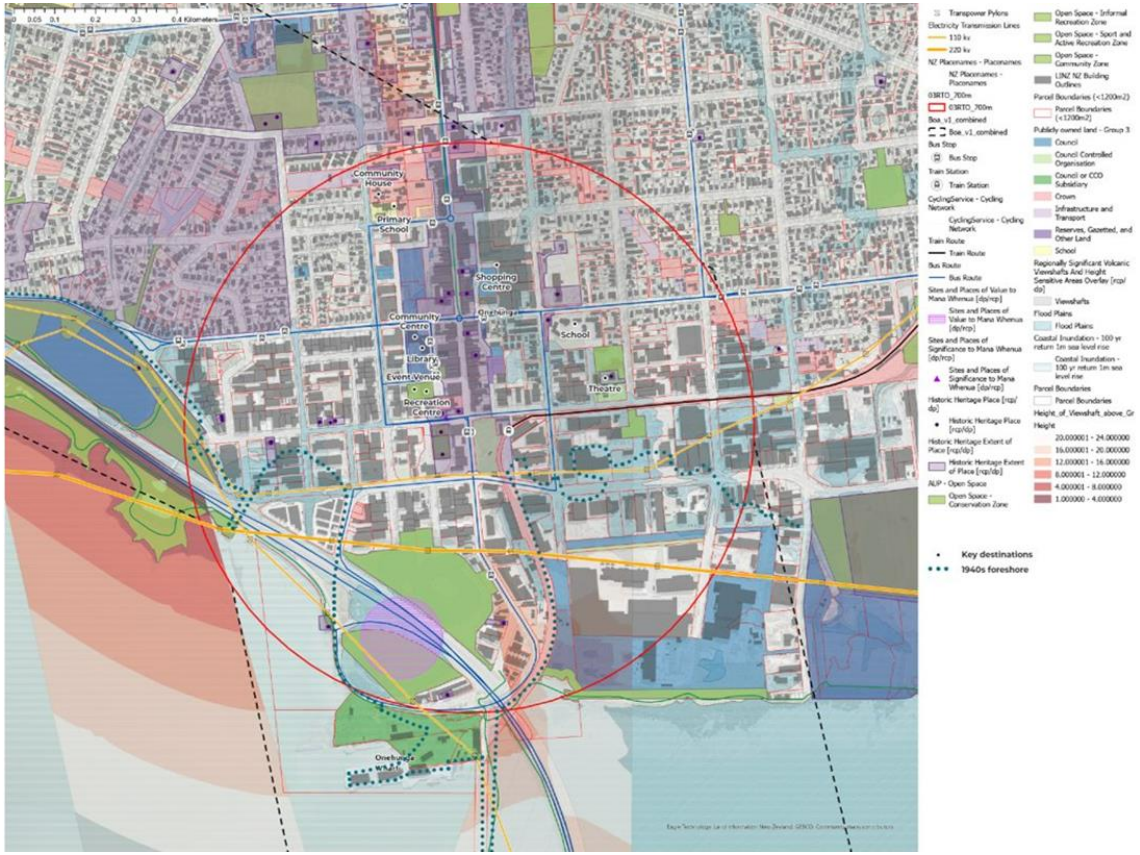


Figure 2.a.2- 1 Ōnehunga Urban Context Analysis Layer

Onehunga Transport Context

- Neilson Street is a busy & heavy freight route and severs the town centre from the south/waterfront
- SH20 has a severance legacy, cutting resident access to earlier beaches/bays along the foreshore
- East-West Expressway (4-lane) along the foreshore was consented in 2018
- Emerging active mode/cycling network, design for active mode access between town centre and wharf/Ngā Hau bridge
- Bus station located within town centre at Upper & Lower Municipal Place, approximately 200m from the heavy rail station
- 6x Potential ALR alignments being explored. Transport team have also suggested a possible Onehunga Mall street running option (black dash)

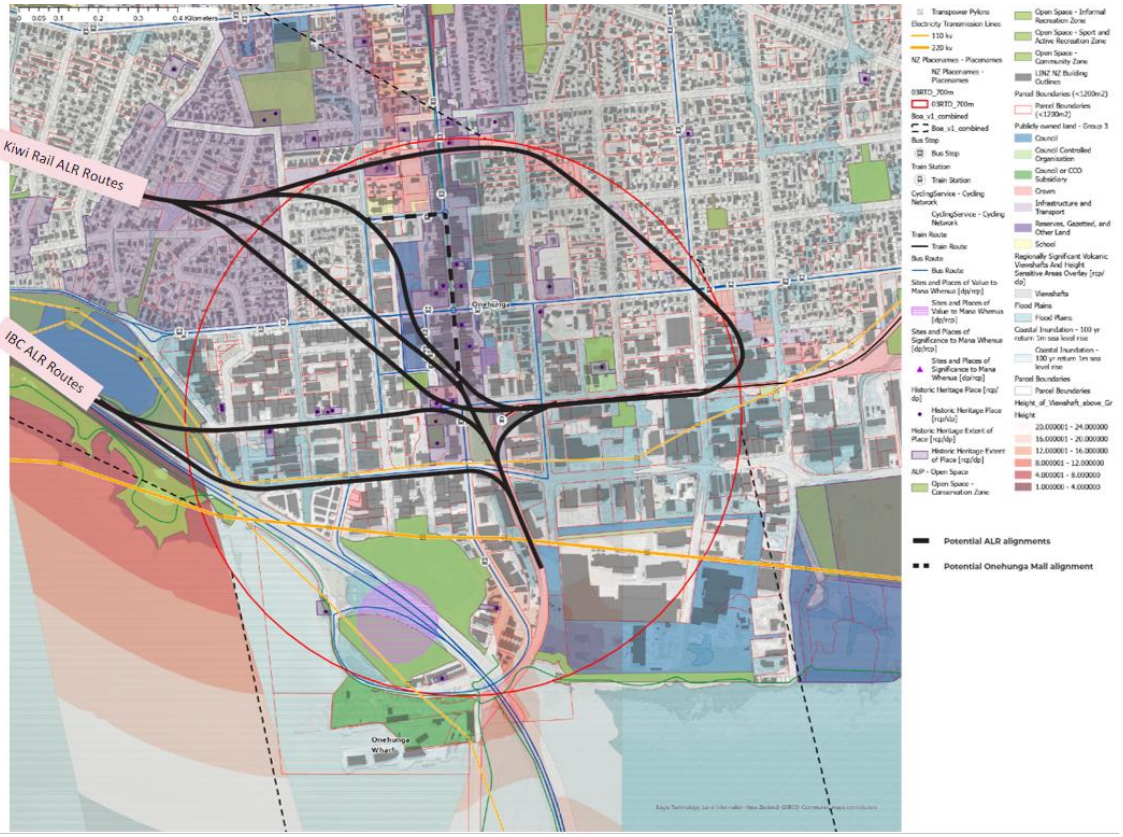


Figure 2.a.2- 2 Ōnehunga Transport Context Analysis Layer

PSL longlist option generation

Based on the context analysis, SMEs in the urban and transport workstreams developed longlists of Potential Station Locations (PSLs) for each PSZ. The longlist options were identified using the following set of principles that were established based on the ILM investment objectives:

Principles for PSL longlist traffic options identification		
Investment objective	**ILM KPI**	**Principles to guide generation of PSL longlist**
Unlocking significant urban development potential, supporting a compact urban form and enabling quality integrated communities	KPI1.1: Increased residential & employment density	Locations which show the potential to deliver residential and employment densification should be favoured, especially where sites are unconstrained by existing property
	KPI1.2 Increased housing and employment growth	Locations which show the potential to deliver significant housing and/or employment growth should be favoured
	KPI1.3 Improved quality of life	Locations which have access to the following should be favoured: • Education and social infrastructure • Open space • Existing centres of at least 'local centre' status (from centres hierarchy)
A transport intervention that reduces Auckland's Carbon footprint	KPI2.1: Reduced carbon emissions	PSLs should not create a requirement for excessive physical infrastructure (e.g. tunnel length) in relation to the stations located adjacent along the alignment
	KPI2.2 Improved health outcomes	Locations which would increase the active travel catchment to PT coverage across the geographic segment should be favoured
A rapid transit service that: **Is attractive, reliable, affordable, frequent, safe and equitable** **Is integrated with current and future public transport network** **Improves access to jobs, education and other opportunities**	KPI3.1: Improved access to employment, education	Locations which diversify the range of places that are connected to existing and committed RTN infrastructure (avoid paralleling existing RTN infrastructure) should be favoured
	KPI3.2 Increased public transport capacity	Locations which maximise opportunity for passenger shift and interchange to ALR from other modes of transport should be favoured
	KPI3.3 Reduced travel times	Locations where stations would achieve a good level of travel time competitiveness relative to equivalent car journeys to places connected by the rest of the ALR alignment should be favoured. When selecting PSL locations should consider the influence on neighbouring PSZs and reflect transport planning principles of appropriate station spacing. Route and alignment should also be considered.
All PSLs generated should seek to reflect as many principles as possible, while appreciating the need to generate options to demonstrate sufficient variety for thorough assessment of the range of possibilities within each PSZ.		

Table 2.a.2- 1 Principles for PSL longlist traffic options identification

Longlist options were mapped as 200m diameter circles around areas were indicated as having the highest potential to deliver on the Investment Objectives[45] based on the analysis outlined above.

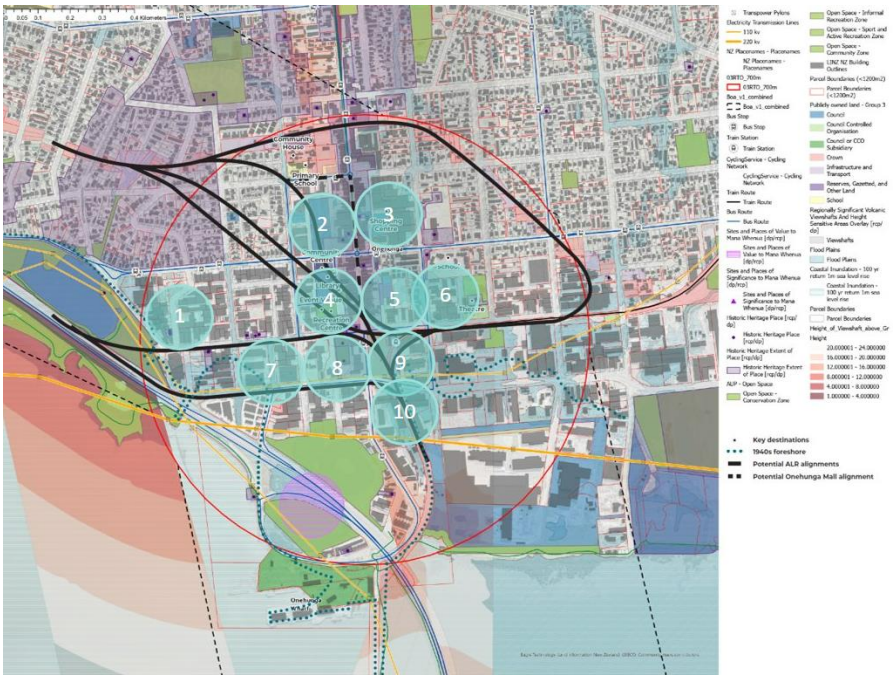


Figure 2.a.2- 3 Ōnehunga PSL Longlist

Traffic light assessment of PSL longlist to identify a potential shortlist

To generate a practicable shortlist of robust options for full MCA assessment, the PSL longlist options were subjected to an initial 'traffic light' assessment[46] against the MCA Framework Criteria.

In some cases, this assessment led to the development of additional longlist options, typically centred on the midpoint between two adjacent PSLs, where the assessment team identified that there could be potential to increase the opportunity while minimising disadvantages.

Confirmation of PSL shortlist

The 'traffic light' assessment process[47] confirmed the shortlist of PSLs within each PSZ that would be taken forward for MCA assessment.

[45] The full set of PSL longlist options for each of the 18 PSZs can be found in Appendix 2A.D
[46] See description of 'traffic light' assessment in Section 0.5
[47] Ibid

Below is an example of the shortlist confirmation and identification for Ōnehunga. The full shortlist of PSLs for each PSZ can be found in Appendix 2A.D.

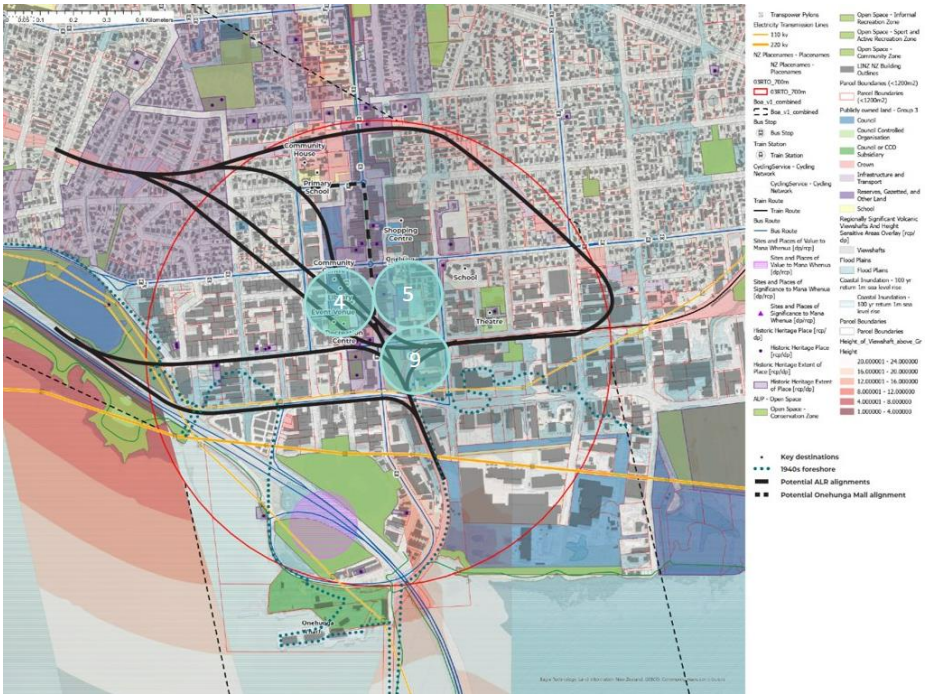


Figure 2.a.2- 4 Ōnehunga PSL Shortlist

Potential Station Location ID	**Location plan**	**Notes and comments**
1. Ōnehunga Library		• Church Street, Pearce St, Upper Municipal Road and Lower Municipal Road • Centred around social infrastructure / public land at the centre of the block • Potential for interchange opportunities with surrounding bus stops
2. Waller Street		• Waller Street (between Church Street and Princes Street) • Centred around existing car park – opportunity to acquire land • Direct interface with large, medium density residential development • Access to town centre area via street or laneway

3. Heavy Rail Station		• Existing heavy rail station block, between Princes Street and Neilson Street • Direct interface with Ōnehunga mall with bus interchange opportunity

Table 2.a.2- 2 Onehunga PSL Location Recommended Shortlist Options

Development of shortlisted PSL options for assessment purposes

With the shortlist of 200m diameter PSLs identified, the urban, transport and design teams collaborated on each option to identify an approximate location of the station within it and provide a provisional indication of the route alignment that would connect them to the neighbouring PSLs. While not definitive and with the precise location of the core transport infrastructure within the PSL subject to further consideration during subsequent steps, these approximate locations provided a consistent basis to enable assessment[48].

Additional work developed illustrative implementations of:

- Station layouts
- Local pedestrian and cycle access interventions
- Urban uplift interventions

While each of these would also be subject to further consideration beyond the Catchment Phase and were not definitive, they enabled assessors to reach a view of the issues and opportunities with each PSL.

Assessment of shortlisted options (MCA2)

The shortlisted PSLs for each PSZ were assessed using the MCA Framework. The following MCA measures were applied to the framework to undertake an MCA assessment of the shortlisted PSL options[49].

[48] The shortlist option development evidence for each shortlist PSL is in Appendix 2A.E.
[49] The rationale and assessment method behind each measure is explained in Appendix 0.C.

The specific measures for PSL shortlist assessment aligned to the MCA Framework			
Cat	#	Criteria	Measure
Mana Whenua	A	A: Nga Iwi Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment
			Ability to realise residential and/or commercial GFA growth within the walkable catchment
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL
			Current land value to capital ratio within the walkable catchment of the PSL
			Māori Business Identification and Growth Potential within PSL
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas
			Station User Experience
			Opportunity to support and enhance existing neighbourhoods within the station catchment
			Level of intervention required to deliver a well-functioning urban environment
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth

The specific measures for PSL shortlist assessment aligned to the MCA Framework			
Cat	#	Criteria	Measure
			Whole of life carbon impact of surrounding urban development
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.
			Level of network integration
			Station spacing
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL
	7	KPI 3.2: Increased public transport capacity	Operational capacity
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities
			Vulnerability to the impacts of climate change
			Ability for the infrastructure to adapt to the impacts of climate change
	10	Affordability	Anticipated capital costs compared to other station options presented
			Anticipated operational costs compared to other station options presented
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment
	12	Socioeconomic Impacts	Character and Amenity
			Social Cohesion
			Transport network
			Human Health and Wellbeing
	13	Property Impacts	Property implications
			Value of property
	14	Natural Environment and Hazards	Landscape
			Visual
			Water quality and Wetlands
			Groundwater and settlement
			Ecology
			Natural Hazards
	15	Culture and Heritage	Effects on Māori Cultural values and Te Taiao
			Potential impacts on sites and places of archaeological value and built heritage

Table 2.a.2- 3 The specific measures for PSL shortlist assessment aligned to the MCA Framework

Aligned with the MCA assessment methodology,[50] assessors provided a scored commentary against each measure for each PSL option within the identified PSZ[51]. To do so, assessors were supplied a PSL option development pack, containing all information for the specific PSZ that had been developed during PSL shortlist development.

Highlighting key urban considerations within PSL Assessment (MCA2)

Whilst the key factors which enable urban regeneration are improved accessibility and redistribution of regional growth demand, the PSL MCA criteria focused on physical characteristics which attract demand from developers and people who may want to live or work there. The measures were linked to the Urban Ambition for a metro system, delivering fewer stations and concentrating development in key areas along the corridor. Although quantification of the scale of change was not assessed beyond a desktop study, opportunities where scale could be achieved were identified. Several measures were focussed on to identify the conditions necessary to support these opportunities. A mix of quantitative and qualitative measures provided a broad foundation for urban analysis, understanding and overlaying indicators including:

- Existence of amenities – places of economic, recreation, and knowledge importance
- Density of existing residential and employment areas
- Amount of public/crown owned land, which could serve to catalyse land use change.
- Availability of developable land, with a focus on high land-value-to-capital-value (LV/CV) ratio and large land parcels.
- Ability to realise GFA growth which was determined using the City Algorithmic Tool (CAT) which is parametric modelling tool that provides an approximation of future density based on a series of pre-set parameters and constraints. This does not include market feasibility or parcel amalgamation.
- Qualitative assessment of housing and employment growth potential, when considering limiting factors such as AUP overlays – viewshafts, climate resilience, heritage protection, fragmentation
- Halo opportunities – urban regeneration opportunities beyond an 800m walkable catchment
- Ability to create, enhance and support local businesses and diversity of employment opportunities.

MCA2 Findings and Outcomes

Regardless of the initial outcomes of this assessment, it was a principle of this process that the preferred PSL for any PSZ would not be considered to have been confirmed until sufficient deliberation on relevant alignment issues (See Section

[50] See Section 0.5
[51] The full scored commentary for each PSL shortlist option can be found in Appendix 2A.F.

2a.3), occurred. The following section sets out the key outcomes from the MCA2 assessment and the emerging preferences identified for each PSL option.

Wynyard

Summary Description
There were 6 shortlisted PSLs for Wynyard, with 4 of the options located within Wynyard Quarter and a further 2 located in Victoria Park. The alignment is underground at this location, so all station locations are assumed to be below ground 
Key Factors
• Wynyard is the proposed integration point with the future Additional Waitemata Harbour Connections project, which is still to be confirmed. • PSL 1a/b are preferred by urban team due to it being more centrally located between key urban regeneration opportunities at Wynyard Quarter to the north and City Works Depot to the south. • PSL 3a/b/c/ab are likely to be costly from a property perspective and require significant engineering due being subject to coastal inundation. • PSL1a/b – Victoria Park is identified as a scheduled site of significance to mana whenua in the Auckland Unitary Plan and was identified in close proximity to the PSL and alignment. Ngāti Paoa based on information available at the MCA workshop, opposed any impact on the scheduled site.
Emerging Preference
No preference recorded, noting the need for further work to test the station locations with mana whenua, more detailed engagement with Eke Panuku and Waka Kotahi on their respective plans, and more detailed engineering work on constructability aspects of stations within Victoria Park

Table 2.a.2- 4 MCA2 Wynyard Assessment Justification and Preferred Options

PSZ Wynyard MCA Assessment										
Cat	#	Criteria	Measure	1a	1b	3a	3b	3c	3ab	
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes							
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services							
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	5	4	1	2	2	2	
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	5	3	2	2	2	2	
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	3	3	3	3	3	
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL							
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	5	5	5	5	5	5	
			Current land value to capital ratio within the walkable catchment of the PSL	1	1	1	1	1	1	
			Māori Business Identification and Growth Potential within PSL							
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	5	3	2	2	2	2	
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	5	3	1	1	1	2	
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	5	2	2	2	2	2	
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	5	0	3	3	2	3	
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	5	2	4	4	4	4	
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL							
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	1	1	1	1	1	1	
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	5	3	2	2	2	2	
			Station User Experience	1	1	2	2	2	3	
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	4	3	2	2	1	2	
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4	-4	-4	-4	-4	-4	
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3	2	2	2	2	2	
			Whole of life carbon impact of surrounding urban development	3	3	2	2	2	2	
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	4	2	3	3	3	3	
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	4	3	2	2	2	2	
			Level of network integration	3	1	2	2	2	2	
			Station spacing	3	3	3	3	3	3	
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL							
	7	KPI 3.2: Increased public transport capacity	Operational capacity	3	2	3	3	3	3	
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	2	3	3	3	3	
F. d	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-2	-3	-2	-2	-2	-2	

PSZ Wynyard MCA Assessment									
			Vulnerability to the impacts of climate change	-3	-3	-5	-5	-5	-5
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-4	-3	-2	-3	-4	-3
			Anticipated operational costs compared to other station options presented	-3	-2	-1	-1	-1	-1
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment						
	12	Socioeconomic Impacts	Character and Amenity	-3	-1	0	0	0	0
			Social Cohesion	-4	-3	-2	-2	-2	-2
			Transport network	-4	-2	-1	-1	-2	-1
			Human Health and Wellbeing	-4	-3	-3	-3	-3	-3
	13	Property Impacts	Property implications	-4	-4	-2	-2	-3	-3
			Value of property	-3	-3	-2	-2	-3	-3
	14	Natural Environment and Hazards	Landscape	0	0	0	0	0	0
			Visual	0	0	0	0	0	0
			Water quality and Wetlands	0	0	0	0	0	0
			Groundwater and settlement	0	0	0	0	0	0
			Ecology	0	0	0	0	0	0
			Natural Hazards	-4	-4	-5	-5	-5	-5
			Effects on Māori Cultural values and Te Taiao						
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-4	-2	0	0	0	0

Table 2.a.2- 5 MCA Wynyard PSL MCA Assessment

Te Waihorotiu (Aotea)

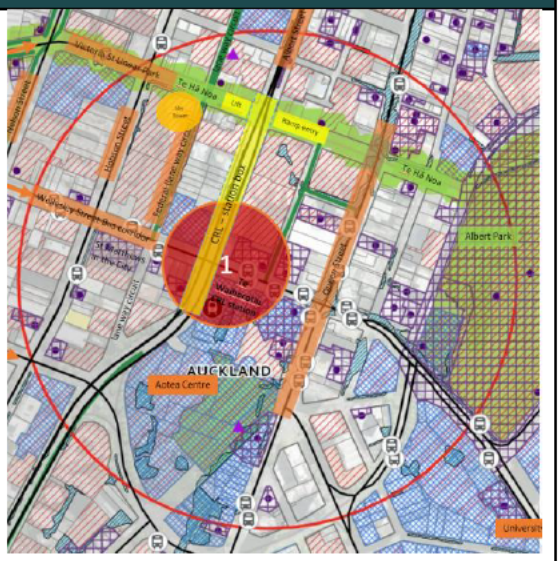
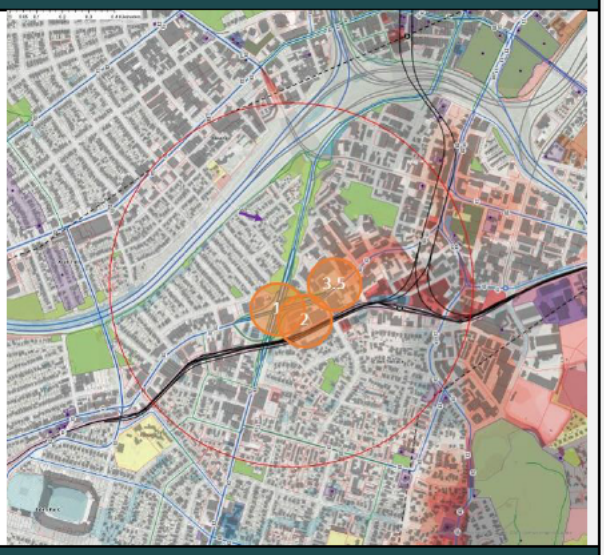
Summary Description
Only a single PSL was identified at Te Waihorotiu (Aotea) due to the project requirement to have this station integrate with the existing City Rail Link station Te Waihorotiu. As part of the original design of the Te Waihorotiu station, a future provision has been provided for future tunnels to connect under and integrate with the heavy rail network at this location. As such, there was only a single shortlisted location for this station. 
Key Factors
• Design and engineering considerations regarding ground conditions and working under existing buildings, including heritage buildings. • Further work will be required during the next stage to identify potential heritage issues and connectivity to the urban regeneration opportunity at City Works Depot. • A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.
Emerging Preference
PSL 1 on the basis that it was the only viable option to provide an integrated station with the Te Waihorotiu Station.

Table 2.a.2- 6 MCA2 Aotea Assessment Justification and Preferred Options

PSZ Aotea MCA Assessment				
Cat	#	Criteria	Measure	1
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes	
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services	
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	4
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL	
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	2
			Current land value to capital ratio within the walkable catchment of the PSL	0
			Māori Business Identification and Growth Potential within PSL	
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	5
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	5
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL	
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	4
			Station User Experience	5
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	0
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3
			Whole of life carbon impact of surrounding urban development	
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	4
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	5
			Level of network integration	4
			Station spacing	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL	
	7	KPI 3.2: Increased public transport capacity	Operational capacity	0
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	5
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3
			Vulnerability to the impacts of climate change	-1
			Ability for the infrastructure to adapt to the impacts of climate change	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-3
			Anticipated operational costs compared to other station options presented	-1
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment	
	12	Socioeconomic Impacts	Character and Amenity	0
			Social Cohesion	0
			Transport network	4
			Human Health and Wellbeing	-1
	13	Property Impacts	Property implications	
			Value of property	
	14	Natural Environment and Hazards	Landscape	0
			Visual	0
			Water quality and Wetlands	0
			Groundwater and settlement	0
			Ecology	0
			Natural Hazards	0
			Effects on Māori Cultural values and Te Taiao	
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-4

Table 2.a.2- 7 MCA Aotea PSL MCA Assessment

University

Summary Description	
There were 3 shortlisted PSLs for the University station, all of which were located along Symonds St. This is considered to likely be a high demand destination station due to the station serving multiple universities.	

Key Factors
• Close proximity to Te Waihorotiu (Aotea) presents challenge for tunnel gradient and alignment. • Built-up urban environment with tall buildings will increase complexity of fitting a station in, including locating station entrances.

Emerging Preference
PSL 3.5 as it is the most centrally located to the universities, offers the greatest accessibility to surrounding catchment, including Auckland Hospital, and presents the best opportunity for wider development, including opportunity to work with the universities to deliver an integrated station in partnership with the University of Auckland.

Table 2.a.2- 8 MCA2 University Assessment Justification and Preferred Options

PSZ University MCA Assessment						
Cat	#	Criteria	Measure	1	2	3.5
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	2	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	0	0	0
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	1	0	0
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	0	0	0
			Current land value to capital ratio within the walkable catchment of the PSL	0	0	0
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3	1	0
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3	1	0
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	4	3	1
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	5	4	2
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	5	2	2
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	1	1	1
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	0	0	0
			Station User Experience	4	4	1
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	-1	-1	-1
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4	-3	-3
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3	2	1
			Whole of life carbon impact of surrounding urban development	0	0	0
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	4	3	2
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	4	3	3
			Level of network integration	3	2	1
			Station spacing	3	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	4	3	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	4	4	4
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3	-2	-3
			Vulnerability to the impacts of climate change	-2	-2	-1
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-2	-2	-3
			Anticipated operational costs compared to other station options presented	-2	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	0	0	-3
			Social Cohesion	0	0	-1
			Transport network	-3	-2	-1
			Human Health and Wellbeing	-2	-1	-1
	13	Property Impacts	Property implications	-4	-4	-4
			Value of property	-4	-4	-4
	14	Natural Environment and Hazards	Landscape	-1	0	-3
			Visual	-1	0	-3
			Water quality and Wetlands	-1	-1	-2
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	0	0	0
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-1	-2	-3

Table 2.a.2- 9 MCA2 University PSL MCA Assessment

Dominion Junction

Summary Description
There were 3 PSLs located at Dominion Junction, all in close proximity to the existing intersection of Dominion Rd and New North Rd. Dominion Junction has been identified as a key urban regeneration opportunity due its proximity to City Rail Link's Maungawhau Station to the east and the opportunity associated with the removal of the Dominion Rd flyover ramps and intersection upgrade, which opens up the potential for up to 3 hectares of land available for urban regeneration. It has been assumed that the NW RTN corridor will connect with this line at Dominion Junction. 
Key Factors
• Within close proximity to Maungawhau Station and proposed Kingsland Station. • Transport preference for PSL 3 due to potential integration with Maungawhau Station and overall accessibility improvements. • Urban preference for PSL 1 as the location offers the greatest urban regeneration opportunity, being located centrally on the junction of Dominion and New North Roads. • Mana Whenua are aware of areas along the route where there is a high likelihood of encountering basalt and aquifers
Emerging Preference
PSL 1 and PSL 3 required further analysis to better understand the trade-offs associated with each of the stations. With further analysis opportunities were identified by the Transport Planning workstream to improve the transport integration and connectivity of PSL1. Recognising the scale and importance of enabling urban potential at this location, it was confirmed that PSL1 was the preferred option to be taken forward.

Table 2.a.2- 10 MCA2 Dominion Junction Assessment Justification and Preferred Options

PSZ Dominion Junction MCA Assessment						
Cat	#	Criteria	Measure	1	2	3
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Incre-lased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	3	4
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	3	3	2
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	5	5	3
			Amount of Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL.			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	2	2	3
			Current land value to capital ratio within the walkable catchment of the PSL	4	3	1
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	5	4	2
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	5	4	2
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	5	4	2
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	5	5	2
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	5	1	2
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	3	2
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	5	3	3
			Station User Experience	2	2	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	-1	-1	0
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4	-4	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	2	3
			Whole of life carbon impact of surrounding urban development	1	2	3
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	3	4
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	2	2	4
			Level of network integration	1	3	5
			Station spacing	0	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	1	2	3
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-2	-5	-2
			Vulnerability to the impacts of climate change	-1	-1	-1
			Ability for the infrastructure to adapt to the impacts of climate change			
	10	Affordability	Anticipated capital costs compared to other station options presented	-1	-5	-1
			Anticipated operational costs compared to other station options presented	-2	-2	-1
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	0	0	0
			Social Cohesion	-1	0	2
			Transport network	3	2	4
			Human Health and Wellbeing	-3	-3	-3
	13	Property Impacts	Property implications	-2	-4	-4
			Value of property	-2	-3	-4
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	0	0	0
			Water quality and Wetlands	0	0	0
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	-1	-1	-1
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-4	-2	0

Table 2.a.2- 11 MCA2 Dominion Junction PSL MCA Assessment

Kingsland

Table 2.a.2- 12 Kingsland Assessment Justification and Preferred Options

Summary Description	
There were 4 PSLs located at Kingsland, all within close proximity to the existing Kingsland train station along the Western Rail Line. Kingsland was identified as a preferred PSZ on the basis that this station offers a key opportunity to provide an interchange between ALR and the existing heavy rail network. As such, the ability to provide the transport interchange function is seen as critical for the overall success of the station line at Dominion Junction.	
Key Factors	
• Options along New North Rd were likely to result in significant disruption to the bus network. • Redevelopment opportunities will be limited due to heritage and character areas; greatest urban regeneration opportunity associated with PSL 2 and potential coordinated development of land surrounding Eden Park. • Potential to offer a second public transport access point for Eden Park.	
Emerging Preference	
PSL 1 on balance provides best access to Eden Park and localised urban regeneration opportunity while also being the preferred location for property and design.	

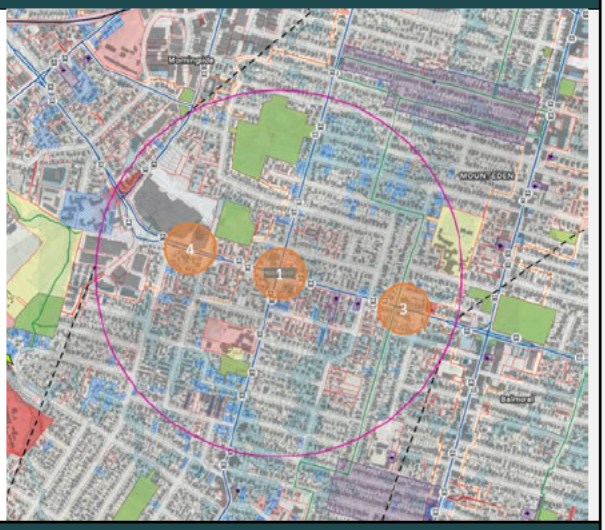
PSZ Kingsland MCA Assessment							
Cat	#	Criteria	Measure	1	2	3	6
Mana Whenua	A	A: Nga Iw-Si Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes				
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services				
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	2	1	2
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	3	2	1	2
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	0	0	0	0
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL				
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	3	1	2	2
			Current land value to capital ratio within the walkable catchment of the PSL	2	2	2	2
			Māori Business Identification and Growth Potential within PSL				
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	1	2	3	1
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	1	2	3	1
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	3	3	3	3
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	1	1	1	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	1	1	1	1
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL				
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	2	2	2	2
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	3	4	2	2
			Station User Experience	4	3	2	2
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment?	-2	-2	-3	-3
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-2	-2	-3	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3	2	1	2
			Whole of life carbon impact of surrounding urban development	3	2	2	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	2	1	1
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	4	3	2	3
			Level of network integration	4	3	1	3
			Station spacing	2	3	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL				
	7	KPI 3.2: Increased public transport capacity	Operational capacity	2	1	1	1
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-2	-2	-3	-4
			Vulnerability to the impacts of climate change	-2	-2	-1	-2
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-2	-2	-3	-4
			Anticipated operational costs compared to other station options presented	-2	-1	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment				
	12	Socioeconomic Impacts	Character and Amenity	-1	-1	-2	-3
			Social Cohesion	-1	-1	0	0
			Transport network	-1	-1	-2	-2
			Human Health and Wellbeing	-1	-1	-2	-2
	13	Property Impacts	Property implications	-2	-2	-2	-4
			Value of property	-2	-2	-3	-3
	14	Natural Environment and Hazards	Landscape	0	0	0	0
			Visual	0	0	0	0
			Water quality and Wetlands	-1	-1	-1	-1
			Groundwater and settlement	0	0	0	0
			Ecology	0	0	0	0
			Natural Hazards	0	0	0	0
			Effects on Māori Cultural values and Te Taiao				

PSZ Kingsland MCA Assessment							
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0	-4

Table 2.a.2- 13 MCA2 Kingsland PSL MCA Assessment

Balmoral/St Lukes

Table 2.a.2- 14 MCA2 Balmoral/St Luke's Assessment Justification and Preferred Options

Summary Description	
Three shortlisted stations were identified at Balmoral, all along Balmoral Rd. All stations are underground at this location.	
Key Factors	
• This area of the Isthmus has substantial lava flows from Maungawhau which may impact on ability to deliver the preferred station location due to the design and cultural challenges it poses. Mana Whenua are aware of areas along the route where there is a high likelihood of encountering basalt and aquifers. • PSL 1 offers a highly accessible location which enables the best opportunity for the greatest urban regeneration potential, given its proximity to opportunities at both Westfield St Lukes and the intersection of Balmoral Road and Dominion Road. • PSL 4 to the west offers substantial urban regeneration potential associated with Westfield St Lukes and other large land-holdings, but this could also result in a longer route, with greater carbon footprint	
Emerging Preference	
PSL 1 is the emerging preferred location from both urban and transport, however this may be subject to engineering and design considerations given the extent and nature of basalt in the area.	

PSZ Balmoral/St Lukes MCA Assessment						
Cat	#	Criteria	Measure	1	3	4
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	4	2	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	3	1	2
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	2	3
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	3	2	4
			Current land value to capital ratio within the walkable catchment of the PSL	2	3	2
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3	3	2
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3	3	3
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	4	3	3
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	3	1	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	4	3	3
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	2	3	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	3	2	3
			Station User Experience	3	2	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	4	2	2
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4	-4	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3	2	3
			Whole of life carbon impact of surrounding urban development	2	2	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	3	3
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	3	3	3
			Level of network integration	4	2	3
			Station spacing	3	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	2	2	3
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	2	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3	-2	-3
			Vulnerability to the impacts of climate change	-2	-2	-2
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-3	-2	-4
			Anticipated operational costs compared to other station options presented	-1	-3	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	-1	-1	-1
			Social Cohesion	-1	-1	-1
			Transport network	-2	-1	-1
			Human Health and Wellbeing	-3	-3	-3
	13	Property Impacts	Property implications	-2	-1	-1
			Value of property	-2	0	0
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	-1	-1	-1
			Water quality and Wetlands	0	0	0
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	-1	-1	-1
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0

Table 2.a.2- 15 MCA2 Balmoral/St Luke's PSL MCA Assessment

Sandringham

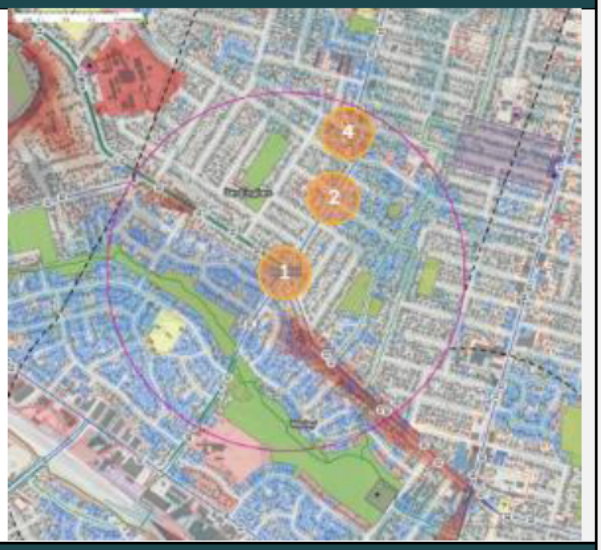
Summary Description
There were 3 stations shortlisted at Sandringham. All 3 were located underground, generally following the Sandringham Rd corridor. 
Key Factors
• PSL 1 is preferred from a transport perspective as Mt Albert Rd is a high frequency bus corridor. PSL 1 offers greater interchange potential, but it is noted that this is very close to the Wesley station. • PSL 2 is marginally preferred from an urban perspective due to the slightly greater urban regeneration potential around this location, with the opportunity to extend the local centre south. • Mana Whenua are aware of areas along the route where there is a high likelihood of encountering basalt and aquifers • A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage. • There are several heritage buildings in the village centre which may be impacted by a station at PSL 4, but this is the best located, being roughly equidistant between Balmoral and Wesley • Public feedback indicates a strong preference for a station within close proximity of the village centre.
Emerging Preference
PSL 4 was preferred due to the improved connectivity offered to the local centre, noting that a location between PSL 4 and PSL 2 may be more desirable from an urban perspective.

Table 2.a.2- 16 MCA2 Sandringham Assessment Justification and Preferred Options

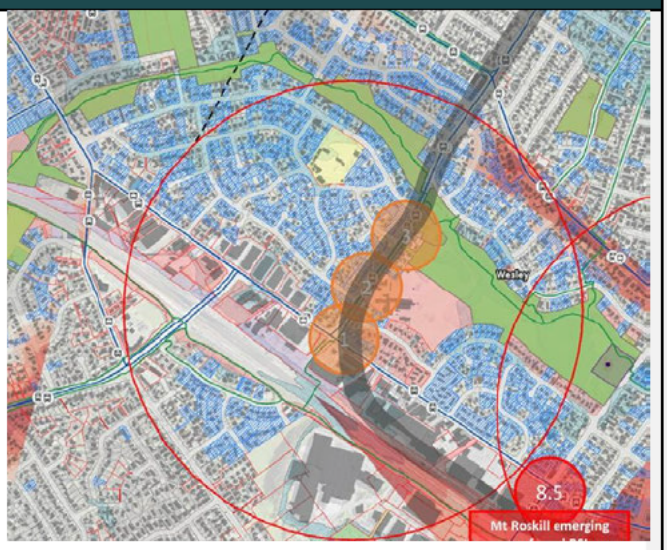
PSZ Sandringham MCA Assessment						
Cat	#	Criteria	Measure	1	2	4
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Incre-lased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	2	2	2
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	2	2	3
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	2	2
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	2	2	3
			Current land value to capital ratio within the walkable catchment of the PSL	4	4	3
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	4	3	3
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3	3	3
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	3	3	2
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	2	2	2
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	3	4	2
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	2	3	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	2	4	3
			Station User Experience	3	2	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	2	3	3
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4	-4	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	1	1
			Whole of life carbon impact of surrounding urban development	2	2	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	2	1	1
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	3	3	3
			Level of network integration	2	1	1
			Station spacing	1	2	1
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	2	2	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	2	2	2
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-2	-2	-2
			Vulnerability to the impacts of climate change	-1	-2	-2
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-2	-2	-2
			Anticipated operational costs compared to other station options presented	-2	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	-1	-1	-1
			Social Cohesion	-1	-1	-1
			Transport network	-2	-1	-1
			Human Health and Wellbeing	-3	-3	-3
	13	Property Impacts	Property implications	-1	-1	-2
			Value of property	0	0	-2
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	-1	-1	-1
			Water quality and Wetlands	0	0	0
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	0	0	-3
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0

Table 2.a.2- 17 MCA2 Sandringham PSL MCA Assessment

Wesley

Summary Description

There were 3 shortlisted PSLs at this location, with all of them located along Sandringham Rd. While a precise location has yet to be confirmed, the tunnelled portion of the corridor is assumed to end at Wesley given that an underground station would require extending the tunnel by ~600m, adding significant capital costs to the project. This station is also at the heart of one of Kāinga Ora's large scale redevelopment sites. Two sub-options (A - trench) and (B - viaduct) were developed for each shortlisted PSL. Was an at surface option explored and if not, why- cant create surface option at Wesley because need to get past the junction of Sandringham and Stoddard Road?



s 9(2)(g)(i)

Key Factors

- This location will be an important bus interchange location, with a considerable volume of buses connecting in from areas to the west and southwest; this is likely to require a substantial footprint to accommodate a high-quality bus-train interchange.
- Development at Wesley is already committed through Kāinga Ora, with plans for a light rail station currently being masterplanned at the proposed PSL 2 location.
- Te Auaunga Oakley Creek to be avoided as much as practicable given potential to impact on mana whenua values.
- A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.
-

Emerging Preference

s 9(2)(g)(i)

The emerging preference is for a blend of PSL 1 and PSL 2 due to their close proximity, the need to incorporate a bus interchange facility with access to Stoddard Rd, and the ability integrate with a new future town centre. Further work will be required, including careful coordination and more detailed masterplanning with Kāinga Ora on the precise location, including form and alignment of the station.

Table 2.a.2- 18 MCA2 Wesley Assessment Justification and Preferred Options

PSZ Wesley MCA Assessment									
Cat	#	Criteria	Measure	1a	1b	2a	2b	3a	3b
Mana Wh	A	A: Nga Iw-Si Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes						
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services						
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	2	2	2	2	3	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	1	1	2	2	1	1
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	3	3	3	2	2
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL						
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL.	2	2	2	2	2	2
			Current land value to capital ratio within the walkable catchment of the PSL	4	4	4	4	4	4
			Māori Business Identification and Growth Potential within PSL						
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	-1	-2	1	0	-2	-3
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	-1	-2	1	0	-2	-3
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	2	3	2	2	2	2
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	-1	2	-1	2	-2	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	3	3	3	3	3	3
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL						
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	3	3	3	3	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	z	3	2	2	1	1
			Station User Experience	1	1	1	3	2	1
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	-5	-5	-5	-5	-5	-5
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-3	-4	-3	-4	-3	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	3	2	3	2	2	1
			Whole of life carbon impact of surrounding urban development	2	2	2	2	2	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	4	3	3	2	3	2
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	1	1	2	2	3	3
			Level of network integration	4	4	3	3	2	2
			Station spacing	2	2	3	3	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL						
	7	KPI 3.2: Increased public transport capacity	Operational capacity	2	2	2	2	2	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	2	2	2	2	2	2
asibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-1	-3	-1	-3	-1	-3
			Vulnerability to the impacts of climate change	-2	-2	-2	-2	-2	-2
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-1	-2	-1	-3	-1	-4
			Anticipated operational costs compared to other station options presented	-1	-1	-1	-1	-1	-1

PSZ Wesley MCA Assessment									
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment						
	12	Socioeconomic Impacts	Character and Amenity	-3	-3	-3	-3	-3	-3
			Social Cohesion	-3	-4	-3	-4	-3	-4
			Transport network	-2	-2	-1	-1	-1	-1
			Human Health and Wellbeing	-4	-4	-4	-4	-4	-4
	13	Property Impacts	Property implications	-2	-2	-1	-1	-1	-1
			Value of property	-2	-2	-1	-1	-1	-1
	14	Natural Environment and Hazards	Landscape	-2	-2	-2	-2	-2	-2
			Visual	-3	-1	-3	-1	-3	-1
			Water quality and Wetlands	0	0	0	0	0	0
			Groundwater and settlement	0	0	0	0	0	0
			Ecology	0	0	0	0	0	0
			Natural Hazards	0	-1	0	0	0	0
			Effects on Māori Cultural values and Te Taiao						
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0	0	0	0

Table 2.a.2- 19 Wesley PSL MCA Assessment

Puketāpapa-Mt Roskill

Summary Description	
There were 2 PSLs identified at Puketāpapa-Mt Roskill, which is in close proximity to Wesley. The alignment is out of the tunnel at this point and is adjacent to the northern edge of the SH20 motorway corridor.	

Key Factors

- There is constrained urban regeneration potential due to proximity to the motorway and volcanic viewshafts.
- Both options offer good transport opportunities for integrating with existing bus networks.
- Flooding, utilities, and property requirements are likely to present design risks for either option.
- Overall question of whether a station is necessary or appropriate in this location.
- A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.

Emerging Preference

PSL 8.5 was identified as preferred as it offered slightly greater urban regeneration potential and marginally better integration with the existing bus network, but the location is very close to Wesley.

Table 2.a.2- 20 Puketāpapa -Mt Roskill Assessment Justification and Preferred Options

PSZ Puketapapa-Mt Roskill MCA Assessment					
Cat	#	Criteria	Measure	4/6	8.5
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes		
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services		
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	2	2
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	2	4
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	2	3
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL		
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	3	2
			Current land value to capital ratio within the walkable catchment of the PSL	4	4
			Māori Business Identification and Growth Potential within PSL		
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	0	1
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	0	1
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	2	2
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	0	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	0	1
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL		
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	4
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	0	1
			Station User Experience	3	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	-3	-4
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-2	-2
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	2
			Whole of life carbon impact of surrounding urban development	1	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	2	3
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	4	4
			Level of network integration	2	3
			Station spacing	3	2
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL		
	7	KPI 3.2: Increased public transport capacity	Operational capacity	3	3
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-2	-3
			Vulnerability to the impacts of climate change	-2	-1
			Ability for the infrastructure to adapt to the impacts of climate change	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-3	-3
			Anticipated operational costs compared to other station options presented	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment		
	12	Socioeconomic Impacts	Character and Amenity	-1	0
			Social Cohesion	0	0
			Transport network	-3	-1
			Human Health and Wellbeing	-1	-1
	13	Property Impacts	Property implications	-4	0
			Value of property	-5	-1
	14	Natural Environment and Hazards	Landscape	0	0
			Visual	0	0
			Water quality and Wetlands	-1	-1
			Groundwater and settlement	0	0
			Ecology	0	0

PSZ Puketapapa-Mt Roskill MCA Assessment				
		Natural Hazards	0	-1
		Effects on Māori Cultural values and Te Taiao		
	15 Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0

Hayr Road

Summary Description

There were 2 PSLs shortlisted at Hayr Rd. The alignment is generally above ground and adjacent to the northern edge of the SH20 motorway.

Key Factors

- Option 2.5 could be integrated with the depot, subject to Carr Rd being confirmed as the preferred depot site.
- There was very little difference in terms of preferences for either option with discussion again around whether a station is necessary here.
- Limited development potential for either due to proximity to the motorway; view shaft may impact PSL 4.5
- A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.

Emerging Preference

Table 2.a.2- 21 PSZ Puketapapa-Mt Roskill MCA Assessment

Initially PSL 4.5 was identified as preferred as it would likely pose fewer feasibility concerns. However, as post MCA assessment of the PSL, the implications of key constraints became evident: • The large footprint of the SH20/Hillsborough Interchange limited the ability to create an effective bus to light rail connection • Property constraints, including a church, within the PSL limited the viable space for station access and infrastructure Consequently, PSL 2.5 was confirmed as the preferred location for further investigation.

Table 2.a.2- 22 MCA2 Hayr Road Assessment Justification and Preferred Options

PSZ Hayr Road MCA Assessment					
Cat	#	Criteria	Measure	2.5	4.5
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes		
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services		
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	2	2
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	0	0
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL		
			Current land value to capital ratio within the walkable catchment of the PSL	4	3
			Māori Business Identification and Growth Potential within PSL	3	3
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	1	1
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	2	0
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	1	1
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	1	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	1	1
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL		
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	2	1
			Station User Experience	3	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment	-3	-4
			Level of intervention required to deliver a well-functioning urban environment		
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-3	-2
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	2
			Whole of life carbon impact of surrounding urban development	2	1
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	2
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	3	4
			Level of network integration	3	3
			Station spacing	3	2
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL		
	7	KPI 3.2: Increased public transport capacity	Operational capacity	3	3
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-2	-1
			Vulnerability to the impacts of climate change	-2	-1
			Ability for the infrastructure to adapt to the impacts of climate change	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-2	-2
			Anticipated operational costs compared to other station options presented	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment		
	12	Socioeconomic Impacts	Character and Amenity	0	-1
			Social Cohesion	0	0
			Transport network	-1	-3
			Human Health and Wellbeing	-1	-1
	13	Property Impacts	Property implications	-3	-1
			Value of property	-3	-1
	14	Natural Environment and Hazards	Landscape	0	0
			Visual	0	0
			Water quality and Wetlands	-1	-1
			Groundwater and settlement	0	0
			Ecology	0	0
			Natural Hazards	-3	0
			Effects on Māori Cultural values and Te Taiao		
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0

Table 2.a.2- 23 MCA2 Hayr Road PSL MCA Assessment

Queenstown Road

Summary Description
There were 2 PSLs shortlisted at Queenstown Rd, with one station located where Queenstown Rd intersects with the KiwiRail Avondale-Southdown designation and the second located just off Queenstown Rd along Beachcroft Ave. Each station is associated with the 2 general alignment options, being an alignment adjacent the SH20 motorway corridor or an alignment which utilises the KiwiRail designation. 
Key Factors
• The preferred station location is likely to be better informed by the alignment decision (ie following the motorway corridor or KiwiRail corridor). • Either station is relatively straightforward to deliver from a design, planning, and property perspective. • Neither PSL represented a particularly strong urban regeneration opportunity.
Emerging Preference
No preference was identified, noting that the preferred station would be informed by the alignment decision.

Table 2.a.2- 24 MCA2 Queenstown Road Assessment Justification and Preferred Options

PSZ Queenstown Road MCA Assessment					
Cat	#	Criteria	Measure	2	5.5
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes		
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services		
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	2	1
			Ability to realise residential and/or commercial GFA growth within the walkable catchment		
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	1	1
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL		
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	2	2
			Current land value to capital ratio within the walkable catchment of the PSL	4	4
			Māori Business Identification and Growth Potential within PSL		
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	1	0
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	1	0
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	1	1
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	1	0
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	1	0
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL		
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	2	2
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	1	0
			Station User Experience	3	1
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	-4	-4
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-2	-3
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	1
			Whole of life carbon impact of surrounding urban development	2	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	2	2
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	3	2
			Level of network integration	2	2
			Station spacing	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL		
	7	KPI 3.2: Increased public transport capacity	Operational capacity	2	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	0	-2
			Vulnerability to the impacts of climate change	-1	-4
			Ability for the infrastructure to adapt to the impacts of climate change	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-1	-2
			Anticipated operational costs compared to other station options presented	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment		
	12	Socioeconomic Impacts	Character and Amenity	-2	0
			Social Cohesion	-2	0
			Transport network	-2	-1
			Human Health and Wellbeing	-3	-1
	13	Property Impacts	Property implications	0	-1
			Value of property	-1	-1
	14	Natural Environment and Hazards	Landscape	0	-1
			Visual	0	0
			Water quality and Wetlands	0	-1
			Groundwater and settlement	0	0
			Ecology	0	0
			Natural Hazards	0	-2
			Effects on Māori Cultural values and Te Taiao		
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0

Table 2.a.2- 25 MCA1 Queenstown Road PSL MCA Assessment

Ōnehunga

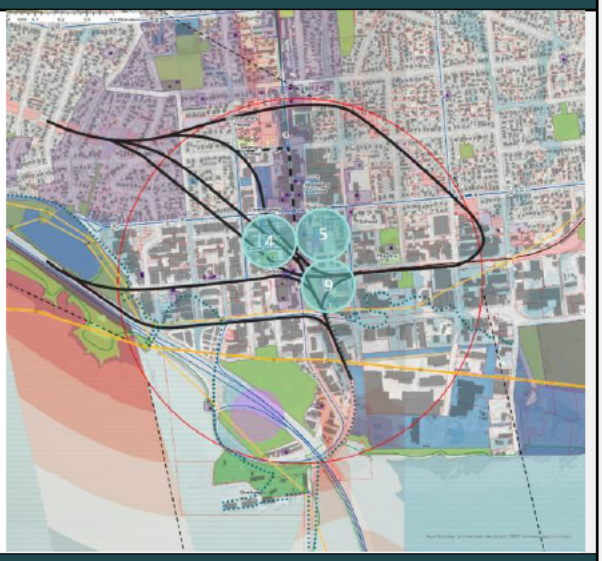
Summary Description
There were 3 PSLs short listed for Ōnehunga, with all options assuming the need to integrate with or connect with the existing Ōnehunga heavy rail station. This is considered to be a high priority station for interchanging due to the potential connection to the heavy rail station and a number of frequent bus services running through Ōnehunga. 
Key Factors
• Need to work in with and coordinate with Eke Panuku masterplanning for any option. • The potential alignment options may influence the station location. • Transport and Urban both prefer PSL 9 due to it having the best opportunity for reintegration with the surrounding urban fabric and the direct connection with the Ōnehunga heavy rail station • A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.
Emerging Preference
Significant engineering constraints were identified with PSL 9 when these were combined with possible alignment options. As a result, only two PSL's (4 and 5) were considered viable, with PSL 4 being preferred for its connectivity with Onehunga train station and as the least disruptive option from an urban perspective.

Table 2.a.2- 26 MCA2 Ōnehunga Assessment Justification and Preferred Options

PSZ Ōnehunga MCA Assessment						
Cat	#	Criteria	Measure	4	5	9
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	3	2
			Ability to realise residential and/or commercial GFA growth within the walkable catchment			
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	3	3
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL			
			Current land value to capital ratio within the walkable catchment of the PSL	2	2	2
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3	3	4
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3	3	4
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	4	4	4
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	4	3	3
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	4	3	3
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	2	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	3	3	3
			Station User Experience	1	2	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment?	-5	-5	-3
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-5	-3	-3
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	2	1
			Whole of life carbon impact of surrounding urban development			
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	3	3
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	5	4	3
			Level of network integration	3	2	3
			Station spacing	3	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	3	2	3
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-4	-4	-2
			Vulnerability to the impacts of climate change	-1	-2	-2
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	1
	10	Affordability	Anticipated capital costs compared to other station options presented	-4	-3	-1
			Anticipated operational costs compared to other station options presented	-2	-2	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			

PSZ Ōnehunga MCA Assessment						
	12	Socioeconomic Impacts	Character and Amenity	0	-3	-1
			Social Cohesion	-2	-2	2
			Transport network	4	3	3
			Human Health and Wellbeing	-1	-2	-1
	13	Property Impacts	Property implications			
			Value of property			
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	0	0	0
			Water quality and Wetlands	-2	-1	-1
			Groundwater and settlement	-2	-1	-1
			Ecology	0	0	0
			Natural Hazards	0	0	-1
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-2	0	0

Table 2.a.2- 27 MCA1 Ōnehunga MCA Assessment

Māngere Bridge

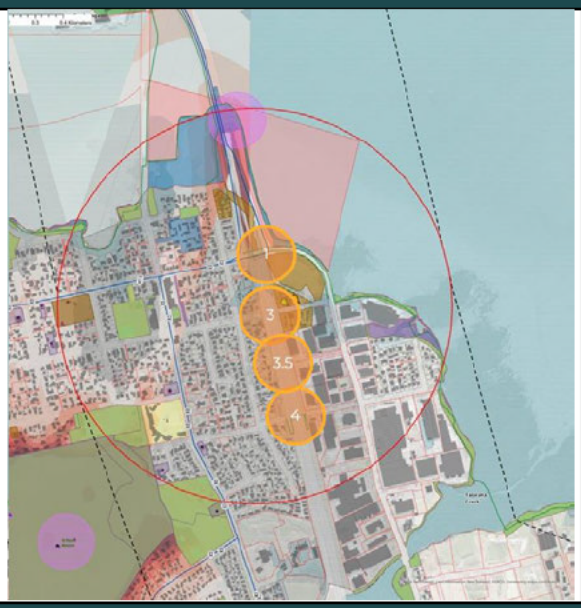
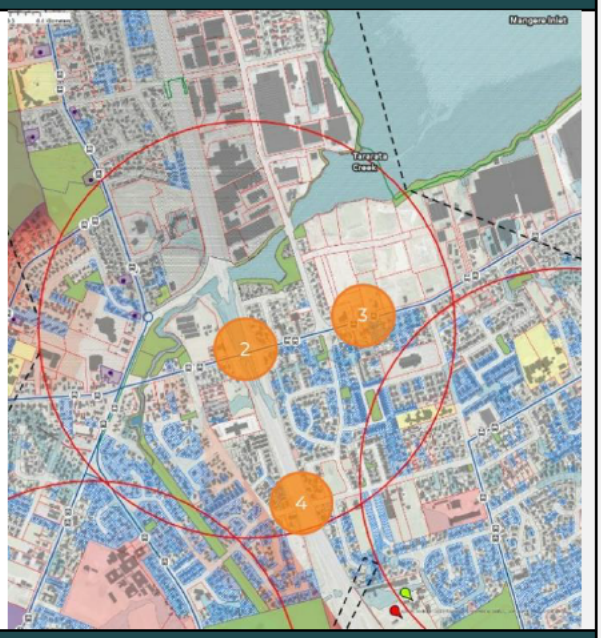
Summary Description
Three sites were shortlisted, with all generally assumed to be adjacent the SH20 motorway along the eastern edge. These options assume the Manukau Harbour Crossing will generally land in this location, with the alignment continuing adjacent the motorway corridor to the south. 
Key Factors
• All options likely to impact on Te Puea Marae in some manner due to the need for widening of the motorway corridor and Rimu Rd bridge. Māori Land to be avoided. • PSL 3 preferred for urban due to opportunity to coordinate urban regeneration with the marae as well as being closest to the existing town centre • PSL 4 likely to be easiest to construct with least property and planning issues • PSL 3 and 4 assume opportunities to provide improved east-west connectivity over motorway • A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.
Emerging Preference
While PSL 3 was preferred from both urban and transport perspectives, PSL 4 was initially selected as the emerging preferred option on the basis that it is likely to be the least disruptive among the shortlisted stations. However, in response to the desire for an option located closer to Te Puea and Mangere Bridge town centre, a new PSL (PSL 3.5) was developed and progressed as the preferred option. This decision was subject to engagement with Te Puea Marae on property impacts and the need to avoid Māori land and potential opportunities for coordinated urban regeneration.

Table 2.a.2- 28 MCA2 Māngere Bridge Assessment Justification and Preferred Options

PSZ Māngere Bridge MCA Assessment						
Cat	#	Criteria	Measure	1	3	4
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Incre-lased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	3	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment			
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	3	3
			Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL			
			Current land value to capital ratio within the walkable catchment of the PSL	4	4	4
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3	4	3
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3	4	4
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	3	3	3
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	3	4	4
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	3	4	4
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	4	4
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	3	4	4
			Station User Experience	1	3	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	-3	-1	-1
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-2	-1	-1
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	1	1
			Whole of life carbon impact of surrounding urban development			
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	3	3
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	4	3	3
			Level of network integration	1	2	3
			Station spacing	4	4	4
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	4	2	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	4	3	2
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3	-1	-2
			Vulnerability to the impacts of climate change	-1	-1	0
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-1	-3	-3
			Anticipated operational costs compared to other station options presented	-1	-2	-3
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	-1	-1	-1
			Social Cohesion	-1	2	2
			Transport network	3	1	2
			Human Health and Wellbeing	-1	-1	-1
	13	Property Impacts	Property implications			
			Value of property			
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	0	0	0
			Water quality and Wetlands	-1	0	0
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	-1	-1	0
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0

Table 2.a.2- 29 MCA2 Māngere Bridge PSL MCA Assessment

Te Ararata

Summary Description	
There were 3 stations shortlisted with 2 along the motorway corridor and the third along Walmsley Rd. A station in this location would be subject to the alignment decision for Māngere, with the shortlisted options associated with one or more alignment options.	

Key Factors

- Options along the motorway offer the opportunity to address historic east-west severance created by the SH20 motorway
- There is a large scale private residential site to the east of SH20 which would be accessible from PSL 3
- Options along Walmsley Rd are likely to be more difficult due to the strategic nature of the transport corridor as a key freight and bus route
- PSL 4 was marginally preferred from an Urban perspective, due to the potential to catalyse urban regeneration on aggregated public land holdings.
- Te Ararata Stream identified as an important location for Mana Whenua

Emerging Preference

PSL 4 was preferred among most of the disciplines as it provides the best balance between transport and urban regeneration opportunities. This location would offer the opportunity to improve east-west connectivity, thereby improving accessibility to ALR from both sides of the motorway via a new east-west bridge.

Table 2.a.2- 30 Te Ararata Assessment Justification and Preferred Options

PSZ Te Ararata MCA Assessment						
Cat	#	Criteria	Measure	2	3	4
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	2	2	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment			
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	2	1	4
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	3	2	4
			Current land value to capital ratio within the walkable catchment of the PSL	1	1	3
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	1	3	2
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	1	4	1
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	4	4	4
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment			
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	2	2	2
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	3	5
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	0	2	2
			Station User Experience	2	2	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	-2	-2	-4
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-3	-1	-2
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	1	2
			Whole of life carbon impact of surrounding urban development	2	3	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	2	2
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	2	2	3
			Level of network integration	1	1	0
			Station spacing	4	4	4
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	0	0	0
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	4	3	4
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-4	-2	-3
			Vulnerability to the impacts of climate change	-4	-2	-1
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-4	-2	-3
			Anticipated operational costs compared to other station options presented	-3	-2	-4
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	0	-2	0
			Social Cohesion	0	-3	0
			Transport network	-3	-2	-1
			Human Health and Wellbeing	-1	-3	-1
	13	Property Impacts	Property implications	0	-3	0
			Value of property	0	-3	0
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	0	-1	0
			Water quality and Wetlands	0	0	0
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	-3	0	0
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0

Table 2.a.2- 31 MCA1 Te Ararata PSL MCA Assessment

Bader Dr

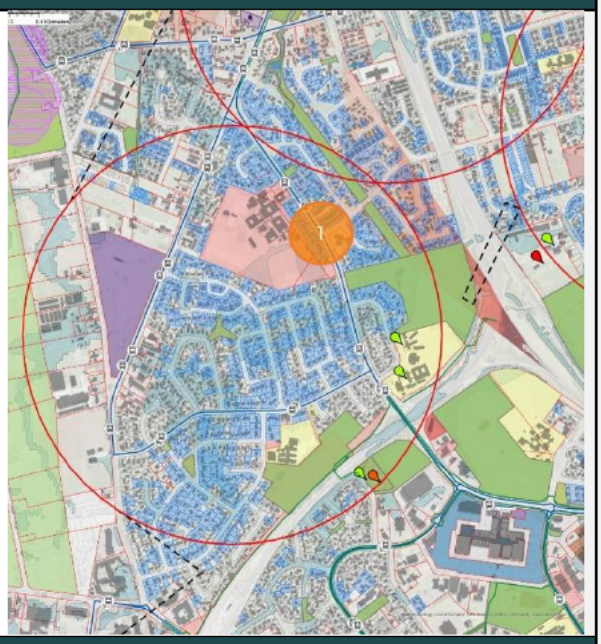
Summary Description	
Most of this area is located in a flood plain and is highly susceptible to flooding as witnessed by the Auckland flooding events of January 2023. Only a single location was identified at Bader and this was generally in the location of the previous IBC option. This area is part of the Kāinga Ora large scale redevelopment site. *The assessment of the Favona PSZ was carried out in combination with the Bader Dr MCA, with an understanding that there would be a single station identified covering both PSZs.	
Key Factors	
• Much of the Kāinga Ora development has either occurred or is already underway, thereby limiting the potential to realise greater density of urban regeneration. • A station at Bader is likely to be subject to the preferred alignment decision. • The area is well served by buses along both Bader Dr and McKenzie Ave. Māngere College is a key destination in the area and is centrally located along Bader Dr • PSL 1 is the only site that was identified as being credible for a station due to its central location and its limited impact on existing properties, including the new development sites.	
Emerging Preference	
PSL 1 was the only option brought forward and is therefore the preferred option.	

Table 2.a.2- 32 MCA2 Bader Dr Assessment Justification and Preferred Options

PSZ Bader Drive MCA Assessment				
Cat	#	Criteria	Measure	1
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes	
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services	
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	1
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL	1
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL	1
			Current land value to capital ratio within the walkable catchment of the PSL	3
			Māori Business Identification and Growth Potential within PSL	
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	1
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	1
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	3
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	3
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	3
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL	
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	1
			Station User Experience	2
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment	-2
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-3
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1
			Whole of life carbon impact of surrounding urban development	1
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	1
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	2
			Level of network integration	0
			Station spacing	2
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL	
	7	KPI 3.2: Increased public transport capacity	Operational capacity	0
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	4
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3
			Vulnerability to the impacts of climate change	-3
			Ability for the infrastructure to adapt to the impacts of climate change	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-3
			Anticipated operational costs compared to other station options presented	-3
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment	
	12	Socioeconomic Impacts	Character and Amenity	-2
			Social Cohesion	-2
			Transport network	-2
			Human Health and Wellbeing	-3
	13	Property Impacts	Property implications	-3
			Value of property	-1
	14	Natural Environment and Hazards	Landscape	0
			Visual	-1
			Water quality and Wetlands	0
			Groundwater and settlement	0
			Ecology	0
			Natural Hazards	-2
			Effects on Māori Cultural values and Te Taiao	
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0

Table 2.a.2- 33 MCA1 Bader Drive PSL MCA Assessment

Favona

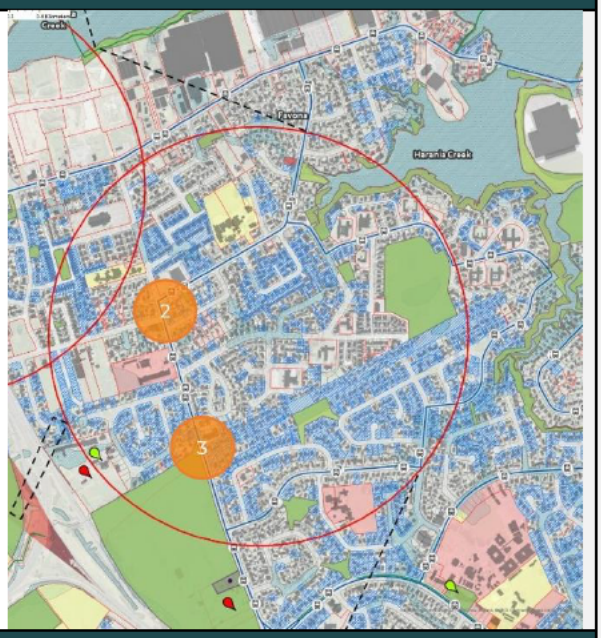
Summary Description	
There were 2 shortlisted options brought forward at this location, with both located along Robertson Rd. One option is located at the intersection of Robertson and Hall Ave while the other is further to the south along Robertson Ave where it meets with Māngere Centre Park. *The assessment of the Favona PSZ was carried out in combination with the Bader Dr MCA, with an understanding that there would be a single station identified covering both PSZs.	
Key Factors	
• There is generally poor public transport service through this area currently, with few services and low frequencies. • PSL 3 is located in close proximity to a prevalence of contiguous of public/crown owned land, making this an attractive location from an urban regeneration perspective. • Any station within this area would need to be carefully planned to manage impacts on the fabric of the existing communities , due to grade separation. • A Favona station is likely to be subject to the preferred alignment decision.	
Emerging Preference	
Emerging preference: PSL 3 on the basis that it provides the greatest opportunity for urban regeneration with the large amalgamation of public/crown owned land to the east	

Table 2.a.2- 34 MCA2 Favona Assessment Justification and Preferred Options

PSZ Favona MCA Assessment					
Cat	#	Criteria	Measure	2	3
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes		
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services		
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	2
			Ability to realise residential and/or commercial GFA growth within the walkable catchment		
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	4	4
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL		
			Amount of private sector large plots (sqm) within walkable catchment of the PSL	5	4
			Current land value to capital ratio within the walkable catchment of the PSL	2	3
			Māori Business Identification and Growth Potential within PSL		
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3	4
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	4	4
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	4	4
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	4	4
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	3	3
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL		
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	2	4
			Station User Experience	2	2
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	-2	-3
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-3	-1
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	1
			Whole of life carbon impact of surrounding urban development	2	2
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	2	1
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	3	3
			Level of network integration	2	1
			Station spacing	3	3
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL		
	7	KPI 3.2: Increased public transport capacity	Operational capacity	0	0
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3	-3
			Vulnerability to the impacts of climate change	-2	-2
			Ability for the infrastructure to adapt to the impacts of climate change	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-3	-1
			Anticipated operational costs compared to other station options presented	-3	-3
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment		
	12	Socioeconomic Impacts	Character and Amenity	-2	-2
			Social Cohesion	-3	-3
			Transport network	-2	-2
			Human Health and Wellbeing	-3	-3
	13	Property Impacts	Property implications	-3	0
			Value of property	-3	0
	14	Natural Environment and Hazards	Landscape	0	0
			Visual	-1	-1
			Water quality and Wetlands	0	0
			Groundwater and settlement	0	0
			Ecology	0	0
			Natural Hazards	0	-1
			Effects on Māori Cultural values and Te Taiao		
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0

Table 2.a.2- 35 Favona PSL MCA Assessment

Māngere Town Centre

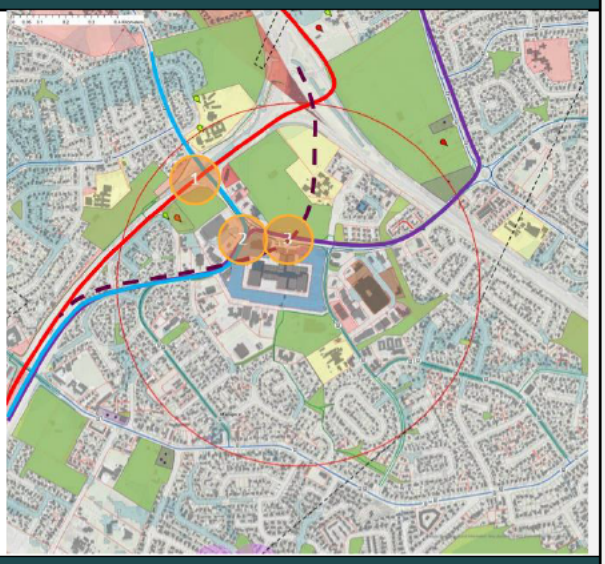
Summary Description
There were 3 PSLs shortlisted for Māngere Town Centre, with each being relatively sensitive to the multiple alignment options being considered. PSL 1 is in the SH20A corridor, while PSL 2 and PSL 3 are located at the town centre. PSL 1 assumes a new Bader Dr bridge will be required and the replacement bridge will have a placemaking function. PSL 2 and PSL 3 assume the alignment enters in the town centre, stimulating a full masterplanned urban regeneration of the existing town centre. 
Key Factors
• Options accessing the town centre are likely to be relatively disruptive due to the need for grade separation • PSL 1 is preferred from a transport perspective due to the motorway location offering the most efficient corridor for the light rail • Urban preference for PSL 2 or 3 due to the greater accessibility and urban regeneration potential associated with these locations, but the challenges associated with grade separation require a fully integrated urban response • Further work required to understand the property requirements for PSL 1
Emerging Preference
PSL 1 was identified as the emerging preferred location, subject to further work being completed to test alignment options that might be able to bring the station closer to the town centre with minimal impact.

Table 2.a.2- 36 MCA2 Māngere Town Centre Assessment Justification and Preferred Options

PSZ Māngere Town Centre MCA Assessment						
Cat	#	Criteria	Measure	1	2	3
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	3	3	3
			Ability to realise residential and/or commercial GFA growth within the walkable catchment			
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	3	3
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Amount of private sector large plots (sqm) within the walkable catchment of the PSL			
			Current land value to capital ratio within the walkable catchment of the PSL	4	4	4
			Māori Business Identification and Growth Potential within PSL			
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.	3	4	3
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	3	4	4
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	3	3	3
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	3	4	4
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	3	4	4
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL			
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment	3	3	3
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	3	4	4
			Station User Experience	1	3	3
			Opportunity to support and enhance existing neighbourhoods within the station catchment. Level of intervention required to deliver a well-functioning urban environment.	-3	-1	-1
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-2	-1	-1
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	1	1
			Whole of life carbon impact of surrounding urban development			
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	3	3
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	4	3	3
			Level of network integration	1	2	3
			Station spacing	4	4	4
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	4	2	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	4	3	2
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-3	-1	-2
			Vulnerability to the impacts of climate change	-1	-1	0
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-1	-3	-3
			Anticipated operational costs compared to other station options presented	-1	-2	-3
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	-1	-1	-1
			Social Cohesion	-1	2	2
			Transport network	3	1	2
			Human Health and Wellbeing	-1	-1	-1
	13	Property Impacts	Property implications			
			Value of property			
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	0	0	0
			Water quality and Wetlands	-1	0	0
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	-1	-1	0
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0

Table 2.a.2- 37 Mangere Town Centre PSL MCA Assessment

Landing Drive

Summary Description
There were 3 stations shortlisted at Landing Dr, with 2 along the SH20A corridor and a third to the east of SH20A along Westney Dr. 
Key Factors
• Motorway based locations were generally preferred due to lower impact on existing communities, plus the opportunity to re-connect severed communities across the motorway. • This station is generally seen as being driven by ability to connect to a strategic employment zone, rather than urban regeneration, albeit there is an opportunity for longer term land use change. • The size and scale of properties in the study area are of such significance that they should be avoided if possible due to the anticipated scale of cost (including business relocation costs) of property acquisitions. • A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.
Emerging Preference
PSL 1 was preferred among all disciplines as it is likely to be least disruptive, offers the best opportunity to connect with potential growth areas both east and west of the motorway, and is likely to be the easiest to construct.

Table 2.a.2- 38 MCA2 Landing Drive Assessment Justification and Preferred Options

PSZ Landing Drive MCA Assessment						
Cat	#	Criteria	Measure	1	3	4
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes			
	B	B: Cultural Opportunities	Areas where the PSL is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services			
Investment Logic Map	1	KPI 1.1: Incre-lased residential & employment density	Ability to connect with areas of higher density i.e. existing residential and/or commercial space within the walkable catchment	2	1	2
			Ability to realise residential and/or commercial GFA growth within the walkable catchment	0	0	0
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the PSL's walkable catchment including ability to leverage off publicly/ crown owned land	3	2	2
			Amount of private sector large plots (sqm), Mana Whenua holdings and Māori community (including housing provider developments) within the walkable catchment of the PSL			
			Current land value to capital ratio within the walkable catchment of the PSL	4	2	2
			Māori Business Identification and Growth Potential within PSL	1	4	3
			Growth potential (housing) land use change free of overlays, view shafts, environmental considerations etc.			
			Growth potential (employment) land use change free of overlays, view shafts, environmental considerations etc.	0	1	1
			Application of Halo Study Principles to identify realisable urban opportunities beyond the 800m walkable catchment area	1	1	1
			Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	1	1	1
	3	KPI 1.3: Improved quality of life	Ability to connect to/create a network of places of cultural and economic importance, recreation and knowledge within the station catchment	0	0	0
			Ability for Mana Whenua to incorporate ngā kōrero tuku iho and connect to sites of significance and value as cultural anchors in the PSL	1	1	1
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment			
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	4	5	4
			Station User Experience	3	1	1
			Opportunity to support and enhance existing neighbourhoods within the station catchment	3	0	2
			Level of intervention required to deliver a well-functioning urban environment	-1	-1	-1
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-2	-1	-2
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	1	1
			Whole of life carbon impact of surrounding urban development	0	1	1
	5	KPI 2.2: Improved health outcomes	Ability for PSL to connect into existing and planned active travel networks (i.e. cycleway, walking trail).	3	2	1
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Station multi-modal catchment - 10 /20 min walk, cycle and bus.	1	2	2
			Level of network integration	4	3	2
			Station spacing	4	4	4
			Access to /potential to create network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers) around the PSL			
	7	KPI 3.2: Increased public transport capacity	Operational capacity	4	2	4
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	4	2	4
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including consideration of utilities	-1	-3	-2
			Vulnerability to the impacts of climate change	-2	-2	-1
			Ability for the infrastructure to adapt to the impacts of climate change	0	0	0
	10	Affordability	Anticipated capital costs compared to other station options presented	-1	-3	-2
			Anticipated operational costs compared to other station options presented	-2	-1	-2
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance within the station catchment			
	12	Socioeconomic Impacts	Character and Amenity	0	-1	0
			Social Cohesion	0	-2	0
			Transport network	-1	-2	-1
			Human Health and Wellbeing	-1	-2	-1
	13	Property Impacts	Property implications	-1	-4	-4
			Value of property	-2	-4	-4

PSZ Landing Drive MCA Assessment						
	14	Natural Environment and Hazards	Landscape	0	0	0
			Visual	0	0	0
			Water quality and Wetlands	-1	-1	-1
			Groundwater and settlement	0	0	0
			Ecology	0	0	0
			Natural Hazards	-3	-1	0
			Effects on Māori Cultural values and Te Taiao			
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	0	0

Table 2.a.2- 39 Landing Drive PSL MCA Assessment

Emerging Preferred Outcome of Phase 2a.2

An emerging preferred potential station location was identified for each of the 18 PSZs. The 17 preferred PSLs were confirmed by the AMT sub-group and taken forward to the next phase of optioneering.

Engaging with the Community

At this stage, a series of community engagement initiatives took place to gather feedback on several topics, including the potential for two new stations at Dominion Junction and Kingsland.

Respondents were asked about their aspirations for the potential stations which will connect to the heavy rail network and what facilities and services they thought would be essential for turning them into thriving hubs of activity. A range of ideas were shared about making light rail travel a convenient and enjoyable part of everyday life. A small proportion (1.7%, or 26 people) thought the hubs were unwarranted and that no facilities were needed at any stations.

Key Themes included:

- Shopping, retail and dining to make hubs desirable and busy destinations
- Good amenities to make public transport a more attractive travel choice
- Making walking or cycling to light rail stations easy
- The need for good public transport connections to the station
- Station hubs must be safe and secure
- Enabling more housing and development around stations

2a.3 Alignment Options Development and Assessment

The broad implications of the linear infrastructure required to connect PSZs was considered at a high level in the generation and assessment of Segment Corridor Options for the Corridor Phase. This was to ensure that the corridor would not lead to excessive journey times or embodied carbon impacts.

During the Catchment Phase, the implications of the different potential forms and horizontal/vertical alignments of the transport infrastructure connecting the eventual stations needed to be assessed. This was a particular issue for the sections of the route which were not assumed to run in a tunnel and where alternative alignment options were available.

In the tunnelled section of the route, ALR considered that the alignment would be largely led by the selection of PSLs (though in doing this ALR was cognisant of the implications for tunnel length, minimum radii, and underground conditions that could affect the feasibility of tunnelling). In the non-tunnelled section of the route between Māngere Town Centre and the Airport only one alignment option was identified in the shortlisted options.

In parallel with the work to identify the preferred locations for stations within the PSZs, ALR also worked to ensure that issues and opportunities related to the Alignments to connect PSLs were fully explored, again taking account the Guiding Considerations.

The Alignments process involved the following steps (set out in detail below):

- Alignment option longlist generation and traffic light assessment
- Alignment shortlist option confirmation and development
- Shortlist alignment option MCA assessment

Three sections of the overall ALR corridor were relevant for alignment assessment listed and shown on a map below:

7. The section between Wesley and Ōnehunga[52]
8. The crossing of the Manukau Harbour
9. The section between the Manukau Harbour and Māngere Town Centre

[52] The investigation for the ALR alignment between Wesley and Ōnehunga underwent several iterations following discussions for infrastructure sharing between ALR and KiwiRail's future planned infrastructure delivery. A summary of this process can be found in Appendix 2A.I.

Map of sections of the ALR corridor relevant for alignment assessment

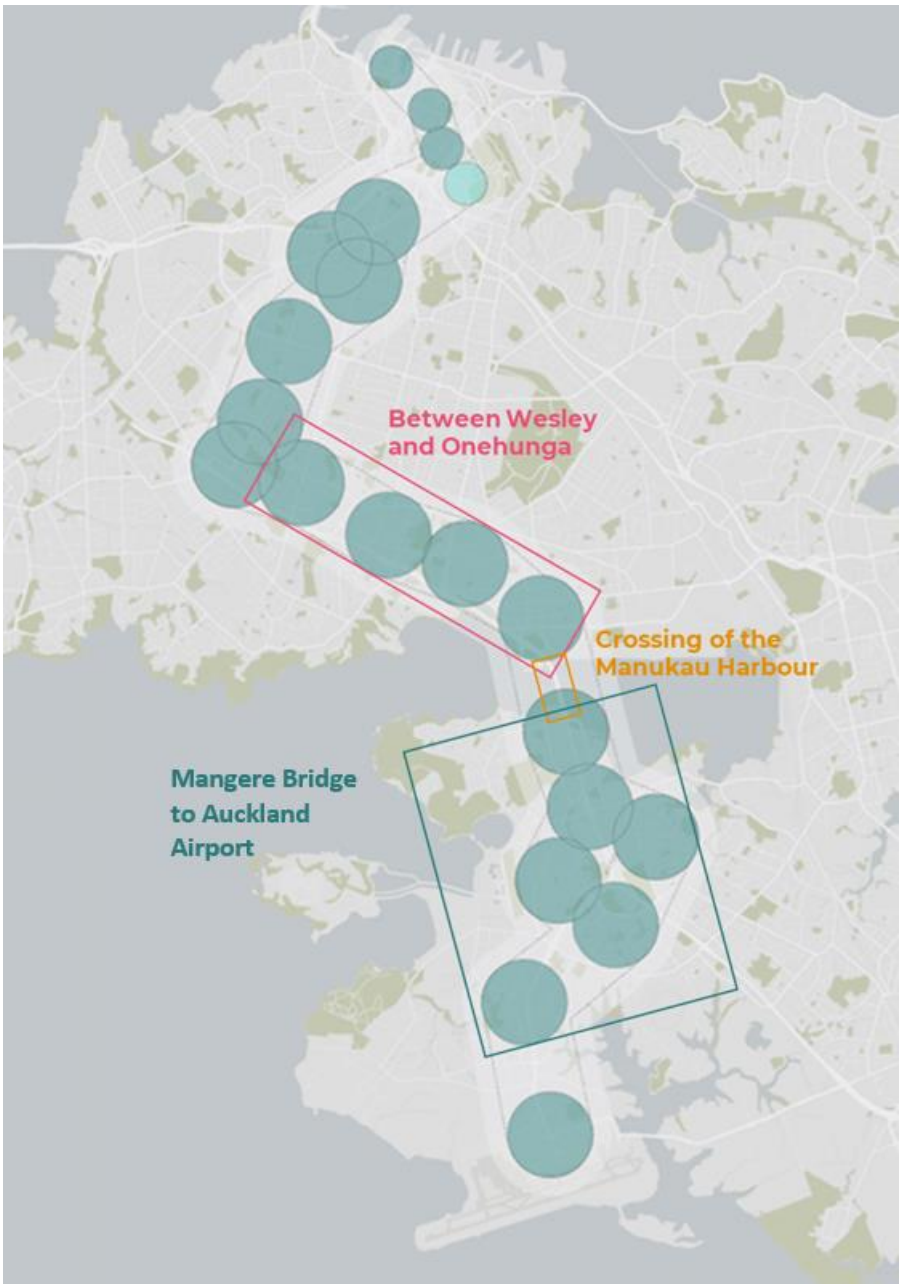


Figure 2.a.3- 1 Map of sections of the ALR corridor relevant for alignment assessment

Alignment longlist generation and traffic light assessment

For each of the three route-sections identified as relevant for alignment assessment, the design team developed a longlist of potential options for alignment, based primarily on engineering considerations.

To generate a shortlist of robust options for full MCA assessment in MCA3, the Alignment options longlist was subject to a 'traffic light' initial sift[53] outlining the anticipated performance of each alignment against the Guiding Considerations[54]

Alignment shortlist option confirmation and development

Following the 'traffic light' assessment, a shortlist of alignment options was confirmed by ALR governance.

The shortlisted options were developed and refined by integrated cross-workstream teams to enable an appreciation of the potential risks and impacts of each alignment in relation to the Guiding Considerations, as assessed through the Alignment MCA, MCA3, (described below)[55].

While each of these would also be subject to further consideration beyond the Catchment Phase and were not definitive, they enabled assessors to reach a view of the issues and opportunities for each alignment.

Alignment MCA Assessment (MCA3)

After being developed and confirmed by the AMT Sub-Group, the shortlist alignment options were subjected to their own MCA assessment (MCA3). The measures adopted for MCA3 to illustrate the performance of the options against the 17 MCA criteria were based on those used for the PSL MCA Assessment (MCA2). Since the alignments in themselves were considered unlikely to trigger improvements in access or urban uplift, the measures were tailored to reflect the greater focus on potential adverse impacts and design deliverability, and the lower prominence of urban and transport opportunity in decision-making for alignment options.

The urban assessment measures were qualitative, focused on the degree to which the vertical alignment supported the delivery of quality urban regeneration outcomes. This assessment considered both the existing receiving urban environment, and the level of intervention required to support a well-functioning future urban environment.

- Assessment of the enduring urban environment, and opportunity to deliver quality integrated neighbourhoods, considering the local movement network, vertical alignment and potential future land use change.

[53] See description of 'traffic light' assessment in section 0.5
[54] The longlist of alignment options and 'traffic light' assessment for each alignment option can be found in Appendix 2A.G, 2A.H and 2A.I
[55] The option development evidence for each shortlist alignment option can be found in Appendix 2A.G, 2A.H and 2A.I

- Assessment of the alignment to create, enhance and support local businesses and diversity of employment. This assessment was focussed on vertical alignment
- Impact on existing neighbourhoods and ability to create quality neighbourhoods. This assessment focussed on the level of intervention required to deliver a well-functioning urban environment

The MCA3 measures used for the assessment of alignment options are presented in the table below.[56] These measures were taken to Tūāpapa and the ALR Limited Board for sign-off before the MCA workshops. Assessors provided a scored commentary against each measure for each alignment option[57].

[56] The rationale and assessment method behind each criterion is explained in Appendix B2.4.
[57] MCA3 scoresheets for each alignment option can be found in Appendix 2A.G, 2A.H and 2A.I

Specific measures for alignment shortlist assessment aligned to the MCA Framework			
Cat	**#**	**Criteria**	**Measure**
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes
	B	B: Cultural Opportunities	Areas where the alignment is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Not applicable at this stage of optioneering
	2	KPI 1.2: Increased housing and employment growth	Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment
	3	KPI 1.3: Improved quality of life	Potential impact on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value
			Impact on accessibility and introduction of severance to known areas of deprivation
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas
			Impact on existing neighbourhoods and ability to create quality neighbourhoods
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth
			Whole of life carbon impact of surrounding urban development
	5	KPI 2.2: Improved health outcomes	Impact on existing and planned active travel networks (i.e. cycleway, walking trail).
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration
			Impact on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)
	7	KPI 3.2: Increased public transport capacity	Operational capacity
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak
Feasibility and RMA	9	Deliverability	Constructability
			Extent of impacts on utilities and below ground structures
			Extent and complexity of structures
			Geotech and hydrogeology
			Maintenance
			Roading and access
	10	Affordability	Anticipated capital costs
			Anticipated operational and maintenance costs
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance around the alignment
	12	Socioeconomic Impacts	Character and Amenity
			Social Cohesion
			Transport network
			Human Health and Wellbeing
	13	Property Impacts	Property implications
			Property implications – impact on at-risk communities
			Value of property
	14	Natural Environment and Hazards	Landscape
			Visual
			Water quality and wetlands
			Groundwater and settlement
			Ecology
			Natural Hazards
			Effects on Māori Cultural values and Te Taiao
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage

Table 2.a.3- 1 MCA measures for alignment shortlist assessment

MCA3 Findings and Outcomes

As with the PSL process, scores for the options for each alignment were validated and collectively considered at an MCA workshop which included representatives from all relevant Alliance disciplines and Mana Whenua representatives and specialists. This gave an opportunity to identify and correct any misalignment on assumptions, and to arrive at a collective understanding of the issues, and opportunities of each option.

Also reflecting the approach taken to the PSL process, regardless of the initial outcomes of this assessment, it was a principle of this process that the preferred alignment would not be considered to have been confirmed until sufficient consideration had been given to PSLs in affected PSZs.

The following section sets out the key outcomes from each of the discussions on each of the alignments along with the emerging preferences identified at the workshop.

Wesley to Ōnehunga

Summary Description

The investigation for the ALR alignment between Wesley and Ōnehunga underwent several iterations following discussions for infrastructure sharing between ALR and KiwiRail's future planned infrastructure delivery. A summary of this process can be found in Appendix 2A.I.

5 shortlist options were brought forward for MC:

- SH20 + viaduct adjacent to Princes Street
- SH20 + viaduct north of Nielson Street
- SH20 lagoon + mid-block Princes St/Nielson St
- SH20 Beachcroft + mid-block Princes St/Nielson St
- SH20 along ALR crossing motorway twice and along Orpheus Drive

KiwiRail have an existing designation along SH20 which has been set aside for the future purpose of constructing a heavy rail corridor. It was agreed that ALR would look at options that provided 2 tracks for ALR and 2 tracks for KiwiRail – i.e. 4 tracks in total.

Initial option development considered vertical arrangements, acknowledging the complexities of the existing context and the need to provide a fully segregated corridor.

Key Factors

- Initial assessments highlighted serious concerns with the width and corresponding impacts of the 4-track corridor. The 4-track options were also flagged for additional risks associated with delivering a separated corridor within an existing residential neighbourhood.
- The motorway-based alignments were flagged for having significant impacts on the existing environment, including the coastal marine environment, associated with the width of the corridor.
- Several additional alternative alignments were developed in response to the initial feedback and were put forth for further assessment. A hybrid solution (Option 8), which uses part of the KiwiRail designation before the ALR corridor splits off to the south (as a 2-track corridor) through a mid-block section of Ōnehunga was seen as potentially preferable to a 4-track corridor due to the ability to masterplan urban regeneration in coordination with the delivery of the transport infrastructure.

Emerging Preference

Two options were recommended for taking forward:

- ALR 2-track only along SH20/Princes St
- ALR 2-track through Ōnehunga (west of town centre) and connecting to KiwiRail designation north-west of Ōnehunga (with four tracks provided within the designation).

It was concluded that a 2-track corridor would have no direct impacts on the coastal environment and as such, this was seen as the preferred alignment due to its ability to best manage environmental impacts while minimising property requirements.

Table 2.a.3- 2 MCA3 Wesley to Ōnehunga Alignment Assessment Justification and Preferred Options

Wesley to Ōnehunga Alignment MCA Assessment 1														
Cat	#	Criteria	Measure	Kiwirail	4b	4c	9a	9b	4c2	5a2	11a	11b	16
	A	A: Nga Iwi Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes										
	B	B: Cultural Opportunities	Areas where the alignment is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services										
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Not applicable at this stage of optioneering										
	2	KPI 1.2: Increased housing and employment growth	Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	-3	-2	-1	-3	-3	-3	-2	2	-3	-3
	3	KPI 1.3: Improved quality of life	Potential impact on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value										
			Impact on accessibility and introduction of severance to known areas of deprivation	-2	-1	-1	-1	-3	-1	-1	-1	-1	-1
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	-1	-2	-1	-4	-4	-3	-3	2	-3	-2
			Impact on existing neighbourhoods and ability to create quality neighbourhoods	-2	-3	-3	-4	-4	-3	2	-3	-3	-4
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-3	-2	-2	-4	-4	-2	-2	-2	-2	-3
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	2	2	2	2	2	2	2	2	2
			Whole of life carbon impact of surrounding urban development	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
	5	KPI 2.2: Improved health outcomes	Impact on existing and planned active travel networks (i.e. cycleway, walking trail).	3	0	0	0	0	0	0	0	0	0
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration	2	2	2	2	2	2	2	2	2	2
			Impact on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)										
	7	KPI 3.2: Increased public transport capacity	Operational capacity	2	2	2	2	2	2	2	2	2	2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	1	3	3	3	3	3	3	3	3	2
-3	9	Deliverability	Constructability	1	-1	1	-2	-3	-1	-1	-1	-2	-3
			Extent of impacts on utilities and below ground structures	-1	-2	-2	-2	-2	-1	-1	-2	0	-2
			Extent and complexity of structures	2	-2	0	-1	-1	-1	-1	-2	-2	-3
			Geotech and hydrogeology	-1	0	0	0	0	-1	-1	-1	-1	-1
			Maintenance	-2	-3	-3	-2	-2	1	1	1	2	1
			Roading and access	-1	-2	-2	-1	0	-1	-1	0	-1	-1

Wesley to Ōnehunga Alignment MCA Assessment 1												
10	Affordability	Anticipated capital costs	-5	-1	-1	-3	-3	-1	-1	-2	-2	-3
		Anticipated operational and maintenance costs	-2	-2	-2	-2	-2	-2	-2	-2	-2-	-2
11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance around the alignment										
12	Socioeconomic Impacts	Character and Amenity	-4	-4	-4	-4	-4	-2	-2	-2	-4	-2
		Social Cohesion	-1	-1	-1	-3	-3	-1	-1	-1	-4	-2
		Transport network	-2	-3	-3	-4	-4	-1	-1	-1	-1	-2
		Human Health and Wellbeing	-4	-2	-2	-2	-4	-2	-2	-2	-2	-2
13	Property Impacts	Property implications	-3	-1	-4	-3	-3	0	-3	-4	-4	-3
		Property implications – impact on at-risk communities										
		Value of property	-2	-1	-4	-3	-3	0	-3	-4	-4	-3
14	Natural Environment and Hazards	Landscape	-4	-2	-2	-3	-4	-2	-2	-2	-4	-3
		Visual	-4	-2	-2	-3	-4	-2	-2	-2	-4	-2
		Water quality and wetlands	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
		Groundwater and settlement	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
		Ecology	-1	-4	-4	-1	-4	-1	-1	-1	-2	-1
		Natural Hazards	-1	-2	-2	-2	-1	-2	-2	-2	-3	-2
		Effects on Māori Cultural values and Te Taiao										
15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-1	-3	-3	-3	-3	-3	-2	-3	-4	-1

Manukau Harbour Crossing

Summary Description

6 shortlisted options were identified for assessment, including 2 options that utilised the existing southbound bridge, 2 options that would require a new bridge, and two options that would require a new tunnel.

East and West options were both considered for the new tunnel and new bridge scenarios.

Southbound Reuse Option 2c – Widened

New Eastern Bridge

Key Factors

- Consideration made for the Manukau Harbour's cultural and environmental significance to mana whenua and impact on their values. Experts were asked to address concerns, acknowledging mana whenua connections and those of the Manukau harbour claimants. Opportunity for remediation and environmental enhancement.
- A number of locations of cultural significance to Mana Whenua have been identified in close proximity to the emerging route. These are priority location for Mana Whenua input into location, design and mitigation as part of the next phase of work in relation to cultural heritage.
- Several experts referred to the physical impact of building a tunnel versus building a bridge. Bridges introduce new structures to the natural and built environment, which has a greater physical and aesthetic impact compared to tunnels which have no visual effect. However, tunnels are more difficult to construct from a feasibility perspective and score poorly on the operational and maintenance costs. Concerns were also raised about the potential effect of tunnels on underground aquifers, basalt, and other physical and natural features.

Table 2.a.3- 3 Wesley to Ōnehunga Alignment MCA Assessment

• Concerns were raised with regards to encroachment of Te Hopua ā Rangi (the tuff crater).. • The new East bridge was preferred to the new West option. While the new West bridge would bring the route closer to Māngere Town Centre, it would require crossing over to access opportunities to the East. The new East bridge naturally connects to Māngere Town Centre, enabling more potential for urban regeneration.
Emerging Preference
Two shortlist options were identified for taking forward: • Southbound Reuse Option 2c – Widened • New Eastern Bridge The Southbound Reuse option reuses the existing Southbound bridge through removal of the shoulder running bus lane and widening to accommodate 2 ALR tracks and maintain SH20 operational capacity of 4 no traffic lanes with reduced shoulders. The option provides for the future East-West Link Road and has no significant utility constraints/impacts. The New East Bridge option involves the construction of a new bridge crossing from Ōnehunga over Neilson Street and the East West Link along the KiwiRail designation, connecting on to existing SH20 abutment on the south side. Ultimately, the New East bridge option was taken forward as the preferred option. The option scored particularly well in terms of its feasibility and ecological impact and provided opportunities for improving access to employment and education through its connection to Māngere Town Centre.

Table 2.a.3- 4 MCA3 Manukau Harbour Crossing Alignment Assessment Justification and Preferred Options

MHX Alignment MCA Assessment

Cat	#	Criteria	Measure	3	4	5	6	7	8
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes						
	B	B: Cultural Opportunities	Areas where the alignment is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services						
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Not applicable at this stage of optioneering						
	2	KPI 1.2: Increased housing and employment growth	Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	-2	-2	-2	1	-2	-3
	3	KPI 1.3: Improved quality of life	Potential impact on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value						
			Impact on accessibility and introduction of severance to known areas of deprivation	-2	-1	0	-1	0	0
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	0	0	1	1	-3	-3
			Impact on existing neighbourhoods and ability to create quality neighbourhoods	-3	-3	-2	1	-3	-3
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-1	-1	-2	-2	-5	-5
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	1	0	0	0	0	0
			Whole of life carbon impact of surrounding urban development	0	0	0	0	0	0
	5	KPI 2.2: Improved health outcomes	Impact on existing and planned active travel networks (i.e. cycleway, walking trail).	-2	-2	0	-1	0	0
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration	-4	-2	0	0	0	0
			Impact on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)						
	7	KPI 3.2: Increased public transport capacity	Operational capacity	-3	-1	0	0	0	0
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	3	-1	-2	0	1	1
Feasibility and RMA	9	Deliverability	Constructability	-2	-4	-3	-1	-1	-1
			Extent of impacts on utilities and below ground structures	-2	-2	-3	-2	0	0
			Extent and complexity of structures	-3	-5	-2	-1	-3	-3
			Geotech and hydrogeology	-3	-4	-2	-2	-3	-3
			Maintenance	1	1	1	1	0	0
			Roading and access	-5	-3	-5	-1	-1	-1
	10	Affordability	Anticipated capital costs	-1	-2	-2	-2	-5	-5
			Anticipated operational and maintenance costs	-1	-1	-2	-2	-4	-4
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance around the alignment						
	12	Socioeconomic Impacts	Character and Amenity	-3	-3	-2	0	-1	0
			Social Cohesion	-2	-2	-1	-1	-1	-1
			Transport network	-5	-2	-1	-1	-2	-1
			Human Health and Wellbeing	-3	-3	-3	-3	-2	-2

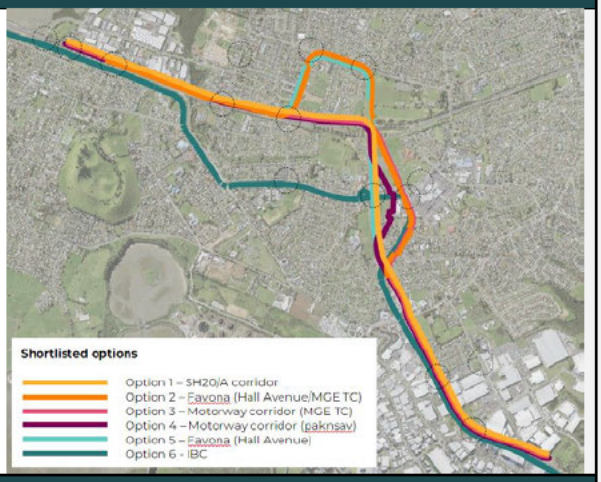
MHX Alignment MCA Assessment								
13	Property Impacts	Property implications						
		Property implications – impact on at-risk communities						
		Value of property						
14	Natural Environment and Hazards	Landscape	-2	-3	-5	-4	-1	0
		Visual	-2	-3	-5	-4	-1	0
		Water quality and wetlands	-1	-1	-1	-1	-1	-1
		Groundwater and settlement	-1	-1	-2	-1	-2	-2
		Ecology	-2	-2	-4	-2	0	-1
		Natural Hazards	-2	-2	-4	-2	-2	-2
		Effects on Māori Cultural values and Te Taiao						
15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-1	-1	-2	-2	-1	-1

Māngere Bridge to Auckland Airport

Table 2.a.3- 5 MCA3 Mangere Bridge to Auckland Airport Alignment Assessment Justification and Preferred Options

Summary Description

6 shortlisted alignments were identified, including options which were adjacent the motorway (both SH20 and SH20A) as well as alignments which were more urban based. All shortlisted options follow SH20 between the Manukau Harbour crossing and Te Ararata Creek and follow SH20A south of Kirkbride Rd up to the Airport boundary.



Key Factors

- A key trade-off was the desire to bring the alignments closer to where people live and work, and the potential impacts of introducing a grade separated, significant new transport infrastructure within existing residential communities, including potential severance.
- The motorway-based alignment options were preferred from a transport perspective due to their ability to provide a more direct and efficient corridor. These alignments were also seen as favourable from a planning, design, and property perspective, due to being less complex to deliver. These alignments also presented an opportunity to address the historic severance introduced by the construction of SH20 and SH20A, providing improved east-west connectivity at station locations.
- From and urban perspective, horizontal alignments which deviated closer to existing and future communities in Favona and Māngere Town Centre were preferred due to the urban regeneration opportunity they enable. However, the opportunity in Favona was somewhat tempered by the delivery of a separated vertical alignment, and the associated challenges in delivering a quality urban outcome. Securing a quality outcome for an elevated alignment requires substantial urban

intervention to deliver an integrated urban and transport response. This is more challenging in the low density residential context of Favona than it is in centres, like Māngere and Ōnehunga. • Feedback from the local community in Māngere was overwhelmingly positive in support of a potential station at Māngere Town Centre. This was largely on the basis of the potential to acquire and redevelop the existing town centre with the Local Board and community. Options that supported a potential station location closer to the town centre were therefore likely to be seen more favourably by the community.
Emerging Preference
Three options (alignment A, C and G) were recommended for further consideration, two following the SH20 route towards Māngere Town Centre (differing in how close to the Town Centre they pass), and a separate alignment running through Favona to the east. The Favona option was taken forward to test the merits and trade-offs of delivering an alignment connecting to a future urban based station location as opposed to being located within the motorway corridor. These options were all compatible with different PSLs and were subject to a decision based on the outcome of the End-to-end Route & Station Combination MCA.

Table 2.a.3- 6 Manukau Harbour Crossing Alignment MCA Assessment

Mangere Bridge to Auckland Airport Alignment MCA Assessment									
Cat	**#**	**Criteria**	**Measure**	**1**	**2**	**3**	**4**	**5**	**6**
Mana Whenua	A	A: Nga Iw-5i Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes	1	2	3	3	1	1
	B	B: Cultural Opportunities	Areas where the alignment is likely to benefit Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services						
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Not applicable at this stage of optioneering	0	-3	-1	-1	-2	-3
	2	KPI 1.2: Increased housing and employment growth	Ability to deliver quality integrated neighbourhoods in alignment within the station and catchment function assessment	1	3	3	3	1	3
	3	KPI 1.3: Improved quality of life	Potential impact on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value	-4	-4	-2	-1	-4	-5
			Impact on accessibility and introduction of severance to known areas of deprivation	-1	-4	-3	-3	-2	-4
			Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres; 2. existing business areas; 3. existing industrial areas	2	1	2	2	1	1
			Impact on existing neighbourhoods and ability to create quality neighbourhoods	0	1	1	2	1	0
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	0	-3	-2	0	-2	-3
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	0	-1	2	1	-1	2
			Whole of life carbon impact of surrounding urban development						
	5	KPI 2.2: Improved health outcomes	Impact on existing and planned active travel networks (i.e. cycleway, walking trail).	-1	-3	-2	-2	-3	-3
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration	5	2	5	5	3	4
			Impact on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)	-1	-2	-2	-1	-2	-2
	7	KPI 3.2: Increased public transport capacity	Operational capacity	-1	-3	-3	-2	-2	-2
	8	KPI 3.3: Reduced travel times	Indicative travel time of PT journey compared with car during the AM peak	-1	-2	-2	-2	-2	-1
Feasibility and RMA	9	Deliverability	Constructability	-1	-1	-1	-1	-1	-1
			Extent of impacts on utilities and below ground structures	-1	-2	-1	-1	-1	-2
			Extent and complexity of structures	-1	-3	-2	-1	-2	-3
			Geotech and hydrogeology	-1	-2	-2	-2	-2	-1
			Maintenance	-1	-4	-3	-2	-3	-3
			Roading and access						
	10	Affordability	Anticipated capital costs	-1	-4	-3	-3	-4	-4
			Anticipated operational and maintenance costs	0	-4	-3	-3	-4	-4
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance around the alignment						
	12	Socioeconomic Impacts	Character and Amenity	-2	-4	-3	-3	-3	-4
			Social Cohesion	-4	-4	-4	-4	-4	-2
			Transport network						

Mangere Bridge to Auckland Airport Alignment MCA Assessment								
		Human Health and Wellbeing	-4	-4	-4	-4	-4	-2
13	Property Impacts	Property implications	0	-3	0	0	-3	-3
		Property implications – impact on at-risk communities	-1	-3	-1	-1	-3	-3
		Value of property	0	0	0	0	0	0
14	Natural Environment and Hazards	Landscape	0	0	0	0	0	0
		Visual	0					
		Water quality and wetlands	-2	-2	-2	-2	-2	-3
		Groundwater and settlement						
		Ecology	0	0	0	0	0	0
		Natural Hazards	1	2	3	3	1	1
		Effects on Māori Cultural values and Te Taiao						
15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	0	-3	-1	-1	-2	-3

Table 2.a.3- 7 Mangere Bridge to Auckland Airport Alignment MCA Assessment

Emerging Preferred Outcome of Phase 2a.3

Emerging preferred alignment options were identified for each of the 3 sections of the ALR corridor that were relevant for alignment assessment. Two preferred options were selected for the Hillsborough Road to Ōnehunga section, one preferred option was identified for the Manukau Harbour Crossing and three preferred options were taken forward for the Māngere Bridge to Auckland Airport Section.

Engaging with the Community

At this stage, a series of community engagement initiatives took place to gather feedback on several topics including the preferred route. Feedback was sought on the following themes:

- Two options for a shared light rail and heavy rail route in the Onehunga area.
- Two options for light rail to connect into Māngere.

Onehunga

Over 50% of respondents were from the Onehunga community or provided feedback about the Onehunga options.

There was surprise and concern about offering shared heavy rail/light rail options and particularly freight trains in the area.

There was a strong preference to not pursue heavy rail as part of a shared KiwiRail corridor option.

SH20 Onehunga Bay Lagoon option as light rail only was preferred, as it was seen to be simpler and more direct (alongside the motorway).

Some individuals expressed concern about the options that were being considered, but sentiment for the project remained high at 70% support.

Māngere.

There was strong support for light rail, especially for those travelling to work at the airport precinct and for shift workers.

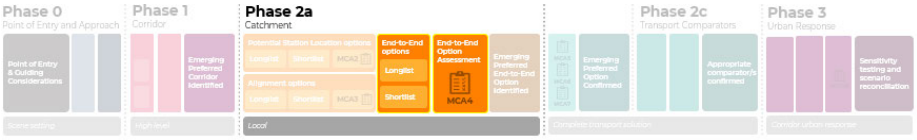
Almost 80% of respondents strongly supported the route connecting to the town centre – the cultural hub of the area.

The motorway option was least preferred as it was seen to be too hard to get to by all.

Support was shown for a separated system as it would be more reliable, but respondents expressed the need to understand impacts more closely (key stakeholders).

Access for all community groups was important, including for the elderly, and those with mobility and health issues.

2a.4 End-to-end Option Development and Assessment



To confirm the preferred end-to-end route and stations, ALR drew on the outputs of the PSL process and alignment process described in the preceding two sections.

These had generated:

- **A clear view** of the pros and cons of the PSLs in the sections of the route between Wynyard and Wesley and south of Māngere Town Centre, where PSL selection was the overriding determinant of the route, and
- **A provisional view** of the alignment options and station location options between Wesley and Ōnehunga and between the Manukau Harbour and Māngere Town Centre, pending consideration of trade-offs between the two.

In relation to the latter, since not all alignment options were compatible with all station options, there were trade-offs to be considered. The next step was to bring together the various combinations of the two component parts to derive a rounded view of the full route and station options which would best address the Guiding Considerations.

The process for identifying a preferred end-to-end Station and Alignment combination involved three steps:

- Longlist option generation
- Longlist option review and shortlist confirmation
- Shortlist MCA assessment

Longlist option generation

Although the eventual assessment of options would be carried out on an end-to-end route basis, the option development process for this stage followed two steps:

1) An initial focus on the route-sections between Wesley and Ōnehunga and between the Manukau Harbour and Māngere Town Centre.

In these sections, alternative alignment options were brought together with PSL options that they were compatible.

Combinations of alignments and PSLs were created where different alignments that had been individually assessed through MCA3 could allow different PSLs (that had been individually assessed through MCA2) to be reached.

The key objective of this process was to fully explore the potential trade-offs between alignment options and the PSLs they would serve to create close integration between components and outcomes. If looked at in isolation, the two components might perform differently from one another relative to the Guiding Considerations,

with (for example) an alignment option appearing undesirable in and of itself, while the PSL options it would facilitate might have been individually assessed as having significant potential merit.

In creating combinations, assessments performed on the PSL and alignment options separately was duly considered, with combinations created only where either the alignment option or the PSLs it would connect to (or both) were regarded as being capable of effectively addressing the Guiding Considerations. As a result, where a given alignment option and the PSLs to which it could connect were not preferred, no combination was created, as there was no reason to consider that the result would perform any better than its component parts.

In some instances, a single alignment option could connect to more than one of the assessed PSLs within the relevant PSZ. To create the combination options, each preferred alignment option was brought together only with the preferred of the PSLs which it could access. This means that each preferred alignment option was only combined with one set of PSLs, as there was no need/benefit in assessing that alignment with alternative compatible PSLs which were less preferred, even if in principle that combination was possible.

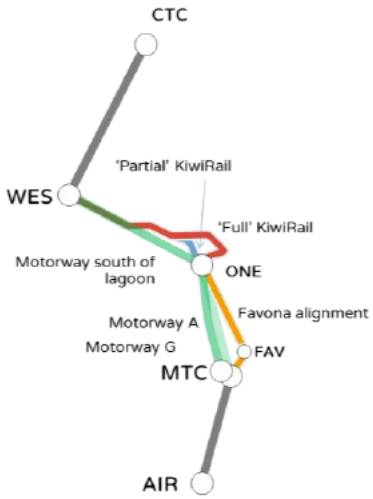


Figure 2.a.4- 1 Areas of optionality in the end-to-end options

2) Complete end-to-end options

Having created the combinations of alignments and PSLs in the route-sections between Wesley and Ōnehunga and between the Manukau Harbour and Māngere Town Centre

The final step in creating end-to-end options was to integrate these into an overall route incorporating the sections between Wynyard and Wesley and from Māngere Town Centre to the Airport (these latter sections were consistent across all end-to-end options assessed).

The diagram to the right summarises the areas of optionality in the end-to-end options which were then explored in the long and shortlist options.

The end-to-end longlist options that were developed based on the above areas of optionality are set out diagrammatically below, with the details of the PSLs being assumed in each case set out in

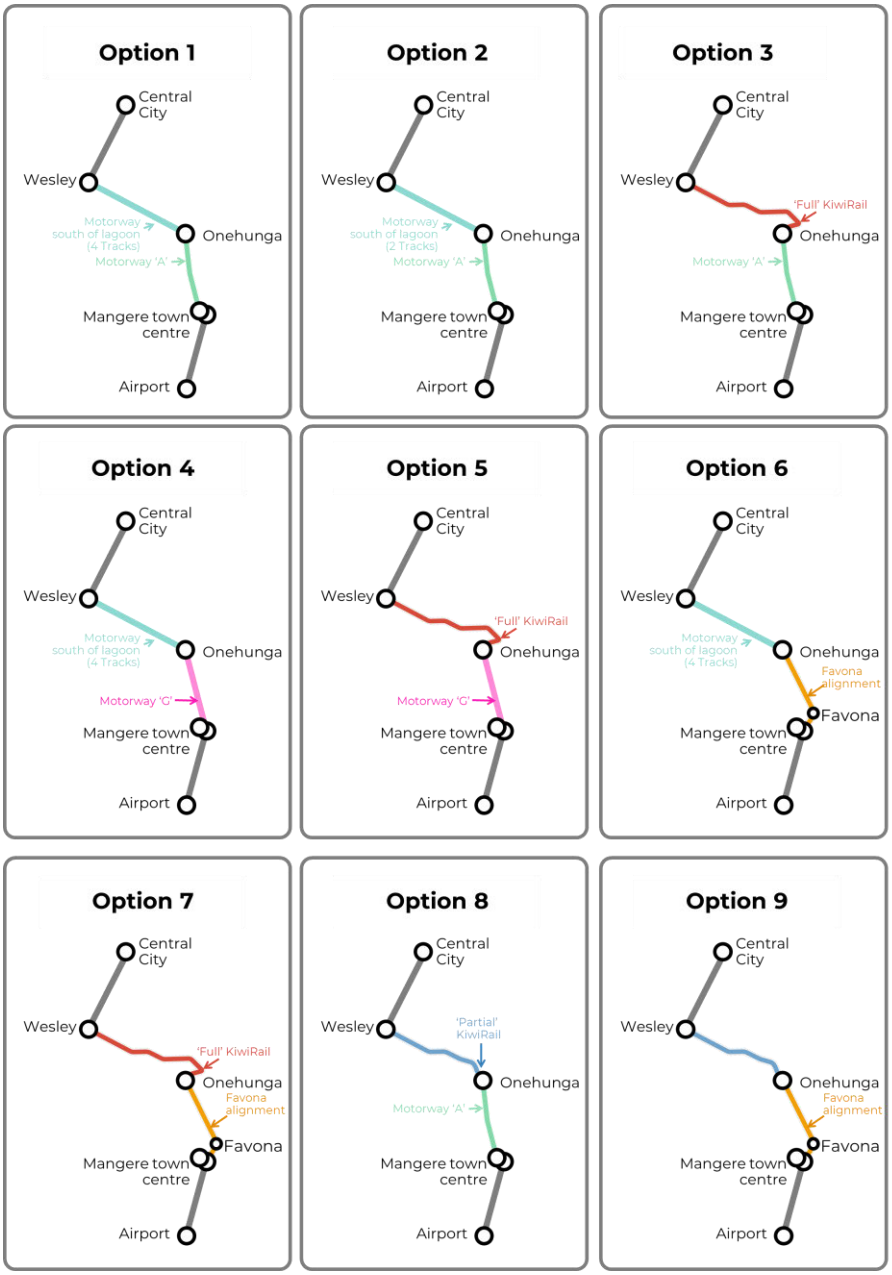


Figure 2.a.4- 2 Longlist of end-to-end options

PSL/Alignment	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Wynyard	PSL 3AB	PSL 3AB	PSL 3AB	PSL 3AB	PSL 3AB	PSL 3AB	PSL 3AB	PSL 3AB	PSL 3AB
Te Waihorotiu (Aotea)	PSL1	PSL1	PSL1	PSL1	PSL1	PSL1	PSL1	PSL1	PSL1
University	PSL 3	PSL 3	PSL 3	PSL 3	PSL 3	PSL 3	PSL 3	PSL 3	PSL 3
Dominion Junction	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1
Kingsland	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1
Balmoral	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1
Sandringham	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4
Wesley	PSL 2	PSL 2	PSL 2	PSL 2	PSL 2	PSL 2	PSL 2	PSL 2	PSL 2
Puketāpapa-Mt Roskill	PSL 8.5	PSL 8.5	PSL 8.5	PSL 8.5	PSL 8.5	PSL 8.5	PSL 8.5	PSL 8.5	PSL 8.5
Hayr Road	PSL 4.5	PSL 4.5	PSL 4.5	PSL 4.5	PSL 4.5	PSL 4.5	PSL 4.5	PSL 4.5	PSL 4.5
Queenstown Road	PSL 5.5	PSL 5.5	PSL 2	PSL 5.5	PSL 2	PSL 5.5	PSL 2	PSL 2	PSL 2
Ōnehunga Alignment	Motorway (2 ALR + 2 KR tracks)	Motorway (2 ALR tracks)	Full KiwiRail (7)	Motorway (2 ALR + 2 KR tracks)	Full KiwiRail (7)	Motorway (2 ALR + 2 KR tracks)	Full KiwiRail (7)	Part KiwiRail (8)	Part KiwiRail (8)
Ōnehunga	PSL 9	PSL 9	PSL 9	PSL 9	PSL 9	PSL 9	PSL 9	New PSL	New PSL
Māngere Bridge	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4
Te Ararata	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4	PSL 4
Māngere Alignment	Motorway A	Motorway A	Motorway A	Motorway G	Motorway G	Favona C	Favona C	Motorway A	Favona C
Favona	N/A	N/A	N/A	N/A	N/A	PSL 3	PSL 3	N/A	N/A
Māngere Town Centre	PSL 1	PSL 1	PSL 1	PSL 1.5	PSL 1.5	PSL 3	PSL 3	PSL 1	PSL 3
Landing Dr	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1	PSL 1
Airport	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 2.a.4- 1 PSL/Alignment longlist options

Confirmation of shortlist

Following an initial 'traffic light' assessment a shortlist of five end-to-end options was confirmed through ALR governance:

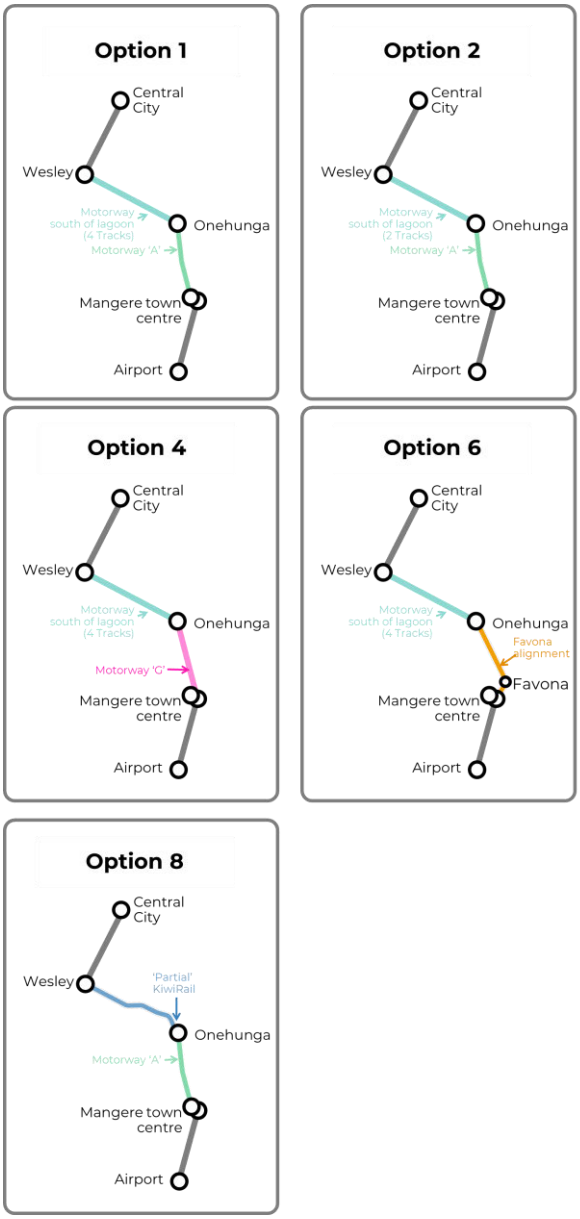


Figure 2.a.4- 3 End-to-end shortlist options

The shortlist incorporated each component of the longlist options in at least one shortlist option, with the exception of the 'Full KiwiRail' option between Wesley and Ōnehunga, which was regarded as being excessively expensive and disruptive for little additional benefit.

The shortlist was selected such that the incremental impact of the component parts could be understood during assessment, such that (if necessary) a 'hybrid' option could be created following MCA assessment.

Shortlist End-to-End MCA Assessment (MCA4)

The shortlisted combinations were assessed using the MCA framework. Again, workstream leads were asked to provide measures that would help assess each end-to-end option against the MCA framework. These measures were taken to Tūāpapa and the ALR board for sign-off before the MCA workshops. The measures used to assess the performance of the shortlist end-to-end options against the 17 MCA criteria are presented in Table 3-0-49 below[58]. These measures were taken to Tūāpapa and the ALR Board for sign-off before the MCA workshops.

[58] The rationale and assessment method behind each measure is explained in Appendix 0.C.

Specific measures for the end-to-end station and alignment shortlist assessment			
Cat	#	Criteria	Assessment Measure
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes
	B	Cultural Opportunities	Areas where the alignment and PSL are likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services.
ILM	1	KPI 1.1: Increased residential & employment density	Amount of residential and/or commercial GFA (existing) for total combined PSL walkable catchment
	2	KPI 1.2P Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the total combined PSL walkable catchment, including ability to leverage off publicly/crowned owned land
			Amount of private sector large plots (sqm) for the total combined PSL walkable catchment
			Amount of Mana Whenua holdings and Māori community (including housing provider developments) within the total combined walkable catchment of the PSLs
			Current land value to capital value for the total combined PSL walkable catchment
			Realisation of growth potential (employment and housing) land use change - free of overlays, viewshafts, environmental considerations, etc.
			Ability to deliver quality integrated neighbourhoods
	3	KPI 1.3: Improved quality of life	Places of social and economic importance, recreation and knowledge, existing centres of at least 'local centre' status (from centres hierarchy) within PSL's
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment, and introduction of severance to known areas of deprivation
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth
			Whole of life carbon impact of surrounding urban development
	5	KPI 2.2: Improved health outcomes	Opportunities to connect to and potential impact on existing and planned active travel networks
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Population and employment within the station multi-modal catchment
			Population living within 45 minutes of key social and economic opportunity areas by public transport.
	7	KPI 3.2: Increased public transport capacity	Ability of route and stations to support desired operating specifications, including impact on capacity of other public transport modes
	8	KPI 3.3: Reduced travel times	Indicative travel time of ALR journey compared with car during the AM peak.
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including considerations of utilities
			Constructability
			Extent of impacts on utilities and below ground structures
			Extent and complexity of structures
			Geotech and hydrogeology
			Maintenance

Specific measures for the end-to-end station and alignment shortlist assessment			
Cat	#	Criteria	Assessment Measure
			Roading and Access
			Vulnerability to the impacts of climate change
	10	Affordability	Anticipated capital costs compared to other options presented ($m)
			Anticipated operational costs compared to other options presented
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance
	12	Socioeconomic Impacts	Character and Amenity
			Social Cohesion
			Transport Network
			Human Health and Wellbeing
	13	Property Impacts	Extent and magnitude of property impacts
	14	Natural Environment	Landscape
			Visual
			Water quality and Wetlands
			Groundwater and settlement
			Ecology
			Natural Hazards
			Effects on Māori Cultural values and Te Taiao
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage

Table 2.a.4- 2 MCA measures for end-to-end station and alignment optioneering

The measures were very similar to those which had been used to assess the PSL and Alignment options, and in many cases the assessment analysis for those assessments was simply consolidated for the PSL and Alignment option assessment, on the basis that the impact of the combined options for the whole route was likely to reflect the sum of its parts.

The urban assessment measures drew on the analysis from the previous MCA's, with a mixture of quantitative and qualitative measures to capture physical characteristics which are indicative of urban regeneration opportunity.

- Density of existing residential and employment areas
- Amount of public/crown owned land, which could serve to catalyse land use change
- Availability of developable land, with a focus on high land-value-to-capital-value (LV/CV) ratio and large land parcels.
- Qualitative assessment of housing and employment growth potential, when considering limiting factors such as AUP overlays – viewshafts, climate resilience, heritage protection, fragmentation
- Halo opportunities – urban regeneration opportunities beyond an 800m walkable catchment
- Connecting places of social and economic importance, recreation and knowledge, and centres
- Impact on existing neighbourhoods and ability to create quality neighbourhoods. This assessment focussed on the level of intervention required to deliver a well-functioning urban environment.

Additional considerations were however made for the following subset of issues where either the result of the end-to-end assessment was not expected to be equal to the sum of its parts, or where an issue simply could not have been assessed until viewed at the overall route level:

- Journey time
- Station spacing
- Accessibility
- Cost
- Whole of life carbon
- Key risks to delivery
- Social, environmental, cultural impacts

Findings from the end-to-end Assessment (MCA4)

The findings of MCA4 are summarised in Table 2.a.4.3 below. The findings and feedback from the workshop resulted in a 'first-pass' view of a preferred end-to-end ALR route with stations as shown in the table above (Option 2).

End-to-end MCA Assessment (MCA4)				Shortlist Options				
Cat	#	Criteria	Assessment Measure	Opt 1	Opt 2	Opt 4	Opt 6	Opt 8
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Mana Whenua values and their cultural landscapes *					
	B	Cultural Opportunities	Areas where the alignment and PSL are likely to benefit Mana Whenua along the route through commercial opportunities, opportunities for environmental enhancement and connections to Māori cultural facilities and services. *					
Investment Logic Map (ILM)	1	KPI 1.1: Increased residential & employment density	Amount of residential and/or commercial GFA (existing) for total combined PSL walkable catchment	3	3	3	3	3
	2	KPI 1.2: Increased housing and employment growth	Amount of public/crown owned land (sqm) including RfR land within the total combined PSL walkable catchment, including ability to leverage off publicly/crowned owned land	2	2	2	2	2
			Amount of private sector large plots (sqm) for the total combined PSL walkable catchment	2	2	2	2	2
			Amount of Mana Whenua holdings and Māori community (including housing provider developments) within the total combined walkable catchment of the PSLs *					
			Current land value to capital value for the total combined PSL walkable catchment	1	1	1	1	1
			Realisation of growth potential (employment and housing) land use change - free of overlays, viewshafts, environmental considerations, etc.	2	2	3	4	2
			Ability to deliver quality integrated neighbourhoods	-3	2	0	-3	-1
	3	KPI 1.3: Improved quality of life	Places of social and economic importance, recreation and knowledge, existing centres of at least 'local centre' status (from centres hierarchy) within PSL's	2	2	4	4	2
			Ability to connect and provide accessibility to known areas of deprivation within the station catchment, and introduction of severance to known areas of deprivation	2	2	1	2	1
	4	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure)	-4	-4	-4	-4	-4
			Likely ability to enable carbon reduction through mode shift, trip reduction and active travel growth	2	2	2	1	1
			Whole of life carbon impact of surrounding urban development	1	1	1	1	1
	5	KPI 2.2: Improved health outcomes	Opportunities to connect to and potential impact on existing and planned active travel networks	3	3	3	1	2
	6	KPI 3.1: Improved access to employment, education & health services	Population and employment within the station multi-modal catchment	3	3	3	4	3
			Population living within 45 minutes of key social and economic opportunity areas by public transport.	3	3	4	3	2
	7	KPI 3.2: Increased public transport capacity	Ability of route and stations to support desired operating specifications, including impact on capacity of other public transport modes	2	2	1	0	2

End-to-end MCA Assessment (MCA4)				Shortlist Options				
Cat	#	Criteria	Assessment Measure	Opt 1	Opt 2	Opt 4	Opt 6	Opt 8
	8	KPI 3.3: Reduced travel times	Indicative travel time of ALR journey compared with car during AM peak.	4	4	4	2	3
Feasibility and RMA	9	Deliverability	Major barriers to the ultimate engineering design including considerations of utilities	-2	-2	-2	-2	-1
			Constructability	-1	-1	-2	-2	-1
			Extent of impacts on utilities and below ground structures	-1	-1	-2	-3	-1
			Extent and complexity of structures	-1	-1	-2	-2	-1
			Geotech and hydrogeology	-1	-1	-1	-1	-1
			Maintenance	-1	-1	-1	-2	-1
			Roading and Access	-1	-1	-1	-1	-1
			Vulnerability to the impacts of climate change	-4	-4	-4	-4	-4
	10	Affordability	Anticipated capital costs compared to other options presented ($m)	-2	-2	-3	-3	-2
			Anticipated operational costs compared to other options presented	0	0	-1	-3	0
	11	Impacts on Cultural Values	Potential impacts on areas of known cultural significance *					
	12	Socioeconomic Impacts	Character and Amenity	-4	-2	-4	-4	-4
			Social Cohesion	-3	-2	-3	-4	-4
			Transport Network	-1	-1	-1	-2	-2
			Human Health and Wellbeing	-2	-2	-2	-4	-4
	13	Property Impacts	Extent and magnitude of property impacts	-3	-1	-4	-3	-3
	14	Natural Environment	Landscape	-3	-1	-3	-3	-4
			Visual	-3	-1	-3	-3	-4
			Water quality and Wetlands	-2	-2	-2	-2	-2
			Groundwater and settlement	-1	-1	-1	-1	-1
			Ecology	-1	-1	-1	-1	-1
			Natural Hazards	-2	-2	-2	-2	-1
			Effects on Māori Cultural values and Te Taiao *					
	15	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage	-3	-1	-3	-3	-1

* Refer to Summary of Mana Whenua Engagement on the Optioneering Process *Appendix O.H*

Table 2.a.4- 3 First pass' view of the preferred end-to-end route with stations, based on MCA4 assessment. Note: Coloured segments only illustrate components. No indication of performance or function.

Option 1	Option 2	Option 4	Option 6	Option 8
				
Key Findings from MCA Assessment (MCA4)				
4-track Ōnehunga section, presents significant consent risks, additional carbon impact, and risk to delivering quality urban regeneration outcomes. Living Bridge concept in Māngere Town Centre is expected to deliver a lower-cost and carbon outcome; however significant social license issues need to be worked through. Significant urban intervention required to support expansion of the town centre west to the station.	ALR tracks only to Ōnehunga reduces consenting, social license, cost risks, and lowers carbon. Best opportunity for an integrated urban regeneration outcome, assuming 2-track mid-block running. Living Bridge concept in Māngere Town Centre is expected to deliver a lower-cost and carbon outcome; however significant social license issues need to be worked through. Significant urban intervention required to support expansion of the town centre west to the station.	4-track section between Mt Roskill and Ōnehunga presents significant consent risks, additional carbon impact, and risk to delivering quality urban regeneration outcomes. Māngere Town Centre option (100m off the motorway), increases the opportunity to secure urban regeneration benefits but significantly higher costs and carbon.	Alignment to Ōnehunga presents major deliverability and cost challenges as well as consent and urban regeneration risks, carbon impact. Least preferred option for most disciplines. Favona alignment presents and opportunity to catalyse urban regeneration, however this has impacts on deliverability, and increase costs and carbon. Whilst there are opportunities to capture urban benefits in Favona by deviating east, the added separation complexity offset this, given the lower density residential context of the area. The PSL at Te Ararata has the potential to enable this opportunity still, through strong multi-modal connections within the walkable catchment.	Impact on Ōnehunga town centre, high costs of urban integration to secure a quality urban regeneration outcome. Lowest cost Ōnehunga alignment excluding property costs. Major consenting and social license risks. Living Bridge concept in Māngere Town Centre is expected to deliver a lower-cost and carbon outcome; however significant social license issues need to be worked through. Significant urban intervention required to support expansion of the town centre west to the station.
Option not selected to proceed	Option selected as preferred	Option not preferred but possible alternative	Option not selected to proceed	Option not preferred but possible alternative

Table 2.a.4- 4 : 'First pass' view of the preferred end-to-end route with stations, based on MCA4 assessment. Note: Coloured segments only illustrate components. No indication of performance or function.

Sensitivity Testing the end-to-end Assessment (MCA4)

In line with the approach set out in *Section 0.5*, the outputs of MCA4 were subjected to sensitivity testing to understand how sensitive the overall score might be to the application of different weights to individual criteria or groups of criteria.

While MCA scores had not been used to programmatically identify an emerging preferred option at any stage in the process, introducing weighted sensitivity tests at this stage gave further confidence in the selection of the emerging preferred overall end-to-end route option relative to the alternative end-to-end shortlist options.

The sensitivity testing considered a series of scenarios, as described in *Section 0.5*, in which the 17 MCA criteria were weighted to emphasise or de-emphasise certain considerations.

A summary of the results of this analysis is shown in Table 3-0-52, below, in which the options are ranked in each scenario according to their overall performance.

	End-to-End option				
	1	2	4	6	8
50% ILM* | 50% Impacts	2	1	3	5	4
100% ILM* | 0% Impacts	3	1=	1=	4	5
20% ILM* | 70% Deliverability & affordability | 10% Other Impacts	3	2	4	5	1
20% ILM* | 10% Deliverability & affordability | 70% Other Impacts	2	1	3	5	4
0% ILM* | 100% Impacts	2	1	4	5	3
Urban only	5	1=	1=	3	4
Carbon only	1=	1=	1=	5	4
Transport only	1=	1=	1=	5	4

* Individual ILM criteria weighted proportionately based on the values included in the ILM

Table 2.a.4- 5 End-to-End station and alignment sensitivity test outcomes (Ranked)

As the above outputs demonstrate, in all but one of the sensitivity scenarios considered, end-to-end Option 2 secured the most positive score of all options assessed.

Emerging Preferred Outcome of Phase 2a.4

At the completion of Phase 2a.4, emerging preferred alignment options had been identified for each of the 3 sections of the ALR corridor that were relevant for alignment assessment. Two preferred options were selected for the Hillsborough Road to Ōnehunga section, one preferred option was identified for the Manukau Harbour Crossing and three preferred options were taken forward for the Māngere Bridge to Auckland Airport Section. These options were all compatible with different PSLs and were subject to a decision based on the outcome of the End-to-end Route & Station Combination MCA.

While this exercise is intended to inform, rather than define, the selection of the emerging preferred end-to-end option, this outcome gives substantial confidence that Option 2 represents the best means of taking the project forward.

2a.5 Emerging Preferred end-to-end Option for Finalisation

The AMT Sub-Group reviewed the outputs of the MCA and recommended Option 2 as the preferred end-to-end option. This option was preferred due to the significantly reduced likelihood of environmental and social license impacts resulting from the 2-Track assumption for the route-section between Wesley and Ōnehunga, and the optimal balance of likely costs and benefits in the 'Motorway A' alignment to Māngere Town Centre.

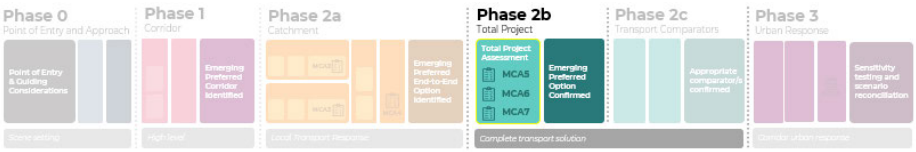
The resulting end-to-end route and stations are indicated geographically in the map below:

Emerging Preferred End-to-End Option for Finalisation

Figure 2.a.5- 1 End-to-end route and stations geographic overview

Phase 2b: Total Project Components

2b.1 Total Project Components & Assessment Overview



With an emerging preferred end-to-end route and station alignment identified, Part B of the Phase 2 catchment optioneering process focused on a series of route and station finalisation tasks were completed to confirm the complete emerging preferred option. These tasks comprised:

1. Confirmation of Holding Assumptions used during Optioneering Process
2. Consideration of AWHC and Airport Integration
3. Location of the Depot (MCA5)
4. Station Optimisation
5. Staging Considerations (MCA6)

The process and outcomes of these tasks are described in the subsections below and the Complete Emerging Preferred Option is identified.

2b.2 Confirmation of Assumptions from Optioneering Process

In parallel with the Phase 2 optioneering process, technical analysis was performed to establish key assumptions that guided the optioneering and which are implicit to the confirmation of the emerging preferred option for assessment through the CBC economic appraisal.

Two areas of technical analysis were critical to confirming holding assumptions that could not otherwise be resolved through the Catchment optioneering process (Phase 2a) or the Total Project optioneering process (Phase 2b):

Grade-separation Summary[59] **–** This document summarises the reasoning guiding our understanding of the appropriate transport service provision to meet the existing and expected future requirements. It covers:

a) Expected demand requirements in the corridor including with and without AWHC and NW (and Congestion Pricing)
b) Capacity and interlining requirements (vehicle length and frequency)
c) Implications for level of separation
d) Implications and opportunities for mode of operation

[59] See appendix 2A.A

The Tunnel Typology Report[60] - This report provided a comparative assessment of the relative strengths, weaknesses, opportunities, and threats associated with a monotunnel versus a twin bore approach to tunnel engineering design.

Emerging Preferred Outcome of Phase 2b.2

A summary of the holding assumptions confirmed through technical analysis are included in the table below.

Title	Assumption	Status
Emerging Preferred System type	The system would operate fully segregated along the whole route	Confirmed through grade separation summary.
Rolling Stock / Station Platforms	100m trains and platforms	
Monotunnel vs Twin bore	Tunnel will be constructed as a single bore mono-tunnel	Confirmed through the Tunnel Typology Report

Table 2.b.2- 1 Emerging Preferred Outcome of Phase 2b.2

2b.3 AWHC & Airport Integration

Consideration was given to how ALR would integrate with the Auckland Waitematā Harbour Crossing (AWHC) and the Airport at the Northern and Southern extents of the alignment respectively.

Integration of the alignment with AWHC

The Cabinet Paper and IMS letter (see appendices B-B and B-C) indicate the importance of considering how the City Centre to Māngere (CC2M) project can integrate with a future AWHC project as part of the optioneering process. The IBC scheme identified that this integration would happen between the existing Harbour Bridge and the Eastern Edge of Wynyard Quarter and had included a potential Wynyard Station as part of the preferred IBC option.

Various options were considered as part of the station and alignment optioneering process for a potential Wynyard station, with consideration of the importance of integration with AWHC and the potential activation of Victoria Quarter (as noted in the outcomes of the Phase 1 Corridor assessment). However, due to the uncertainty of the vertical and horizontal alignment of a future connection across the harbour and the range of options currently under consideration by the AWHC project team, evidence was reviewed using the existing transport modelling, indicative Land Use and Transport Interaction[61] modelling and potential delivery implications to assess the inclusion or exclusion of Wynyard station as part of this CC2M phase of ALR.

Based on the evidence reviewed, two considerations were highlighted in particular:

- Significant delivery risks and likely additional costs of constructing an alignment and station through Wynyard in advance of a future harbour connection with an as-yet undetermined alignment

[60] See Appendix 2B.A
[61] Using the Dynamic City Model (See Appendix 2B.C)

- Limited impact on the overall patronage and land use outcomes of ALR by not including a Wynyard station during the initial CC2M phase

The AMT-Subgroup recommended that a future Wynyard station and its precise location should be considered in a future phase of the ALR programme in conjunction with AWHC. It was also suggested that drawing the project boundary further south would ensure compatibility with AWHC crossing options under consideration, noting a strong preference to avoid multiple periods of construction at this location. This recommendation was confirmed and adopted by Tūāpapa.

Integration of the alignment with Auckland Airport

At the southern end of the CC2M alignment, the route and station optioneering process assumed the alignment would need to reach the boundary of the Auckland Airport. No further consideration was given as part of the optioneering process was given to the specific location of stations within the airport precinct. It is anticipated this process will be undertaken as part of a separate Auckland Airport masterplanning exercise.

Emerging Preferred Outcome of Phase 2b.3

Wynyard station is considered for inclusion as part of a future AWHC phase of ALR and is not included within the emerging preferred option. With the CC2M phase of ALR terminating at Te Waihorotiu (Aotea) station.

2b.4 Depot Location

A depot site is required to support operations and maintenance activities. Depending on the complexity of the network and the associated operations, the type and form (including size) of depot required. With larger operations accommodating an operations control centre, light maintenance, heavy maintenance, crash repair, overhaul and refurbishment activities are added in addition to stabling. A large parcel of contiguous land meeting specific depot requirements will be required.

This section sets out the approach to arriving at a preferred depot location for the project.

Overview of Depot optioneering

The identification and assessment of a preferred depot location has built on previous analysis on potential depot locations completed by Auckland Transport in 2017. Taking a staged approach, the process set out below in this section is as follows:

Step 1: Review and update of assumptions from previous depot assessments

Step 2: Completion of an accelerated activities assessment (2022)

Step 3: Longlist generation and assessment.

Step 4: Consideration of a depot's functional requirements based upon the above longlist.

Step 5: Confirmation of shortlist and assessment of depot locations using an MCA assessment.

Step 1: Previous Depot Assessments

Auckland Transport 2017 Assessment

In 2017, Auckland Transport completed a depot site selection process for a surface light rail scheme between Wynyard Quarter and Mt Roskill[62].

A total of 17 sites[63] were evaluated through the long list assessment that identified and eliminated options based on meeting a series of operational requirements.

The remaining options then went through a short list evaluation which involved assessing against a Multi-Criteria Analysis (MCA) based on a range of quantitative and qualitative criteria.

The outcome of this evaluation process was a preferred depot location at Carr Road, Mt Roskill (Option 6). This option which was subsequently fed into the work for the 2021 ALR CC2M IBC.

Figure 2.b.4- 1 Extract from 2017 Depot Assessment (Auckland Transport)

[62] Appendix 2B.E

[63] Stoddard Road, War Memorial park, Kainga Ora site north-east of Stoddard Road, May Road Industrial Site, Keith Hay Park, Site between South-Western Motorway and Carr Rd, Akarana Golf Course, Wynard Headlands, Auckland Ports land, Victoria Park, Ian Mckinnon Drive, Bribblehirst Park, Maungakiekie Golf Course, site between Mt Roskill Rd, Dominion Rd, Coleman Ave, Memorial Ave, Site between SH20 and Carr Rd, Site adjacent to SW Motorway East of Hillsborough Rd, Dominion Junction Area

Refined Depot Assumptions

Significant technical work has been undertaken since the depot sites were first considered in 2017 including the development of the ALR Indicative Business Case (IBC).

Additional technical work identified three key changes that impact the depot size requirements for this assessment as follows:

- The Concept of Operations for the Tunnelled Light Rail option (Final version, issued March 2022, developed 2021) identified **75 x 33m** LRVs for the services WYN-AAP and WYN-HAY.
- This is 25% greater than previously considered for a depot site as LRT-SYS-PJC-TATMP-000003] identified **60 x 33m** LRVs.
- At very least any new depot sites around Rarotonga (Penrose) should consider the **25%** uplift to include the COO number but the additional sets for the Rarotonga (Penrose) service itself would make it more prudent to find a site for **a 33%** uplift compared to the original depot paper consideration or around 8ha.

These revised assumptions result in the requirement of a site of at least 80,000m^2 is appropriate and would be of benefit if a site could offer up to 100,000m^2.

Accelerated Activities Depot Assessment 2022

In 2022, an Accelerated Works Programme was investigated for early activities that could be delivered for ALR between City Centre and the Auckland International Airport. One of the accelerated works considered was the conversion of the existing single heavy rail line between Onehunga and Rarotonga (Penrose) to two tracks of light rail. In addition to the alignment considerations, a supplementary analysis was undertaken to assess if there were any suitable depot sites between Onehunga and Rarotonga (Penrose).

A long list of seven potential depot sites was identified between Ōnehunga and Rarotonga (Penrose) to service the accelerated programme. This was beyond the spatial extent that was investigated in 2017. Refer to Appendix 2B.F for the full assessment report. The early conversion of existing single track heavy rail between Onehunga and Penrose heavy rail station to two track light rail is no longer part of the project scope, but this exercise offered a longlist generation for depot sites to be considered as part of the current proposed project scope.

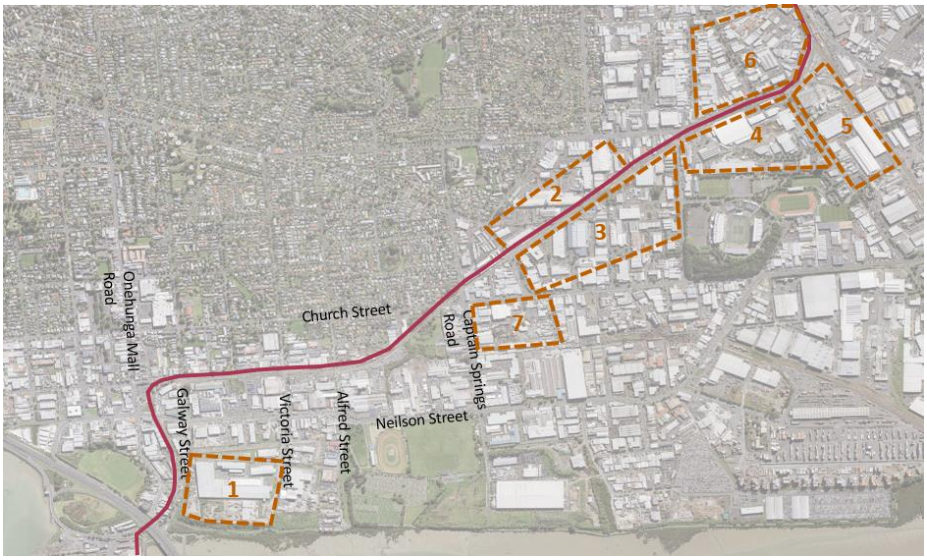


Figure 2.b.4- 2 Onehunga to Rarotonga accelerated programme - depot long list sites

The long list was reduced to four sites following an initial access and operational review based on the following set of minimum requirements. The short-listed depot sites then underwent a full MCA using the same criteria as the ALR Indicative Business Case 2021.

The results of the MCA showed that Site 1: Ōnehunga Harbour Road is feasible and compared with the options assessed and is preferred from an operational perspective as it is the closest to the main City Centre to Mangere alignment and does not require grade separation to secure rail access to the depot.

None of the other options investigated connect directly on to the City Centre to Mangere alignment.

Consideration of functional depot requirements

Following on from the above, further assessment of the depot locations was completed against a series of key functional requirements. These functional requirements are set out in the Depot Options Report[64].

All 17 sites in the 2017 Depot Options Assessment[65] and the Onehunga Harbour Road site have been reassessed against the functional requirements detailed. No other sites from the 2022 Accelerate Programme were included as they do not connect to the City Centre to Mangere line.

The key findings of this assessment showed that:

[64] Appendix 2B.F
[65] Appendix 2B.E

Option 6 – Carrs Road (whole site) - remained a preferred option out of the 17 sites from the 2017 Depot Options Assessment. This site has good road and rail access for the depot. The additional depot space requirements can generally be accommodated on site; however, this would likely remove the opportunity for sleeving development.

Option 18 – Onehunga Harbour Road – also remained a good option following on from the 2022 assessment.

These two shortlisted options were put forward for further assessment and review.

Identification of potential depot locations

The first shortlist option was located at a site on Carr Rd in Puketāpapa-Mt Roskill – the site previously identified as the preferred location at the IBC phase. The second location was south of Neilson St in Ōnehunga.

The depot is a critical component of any light rail operation, with trains being maintained and stabled at the site. A set of functional requirements was defined for the depot[66]. Both shortlisted depot options can meet the functional requirements for the depot and as such, both have been confirmed as viable options. It was further assumed that future spatial requirements can be met by future projects (i.e. future extension of ALR to north shore will require stabling on the north shore).

Confirmation of Shortlist

Following the outcome of the longlist assessment and workshop, a shortlist of two depot location options were presented to ALR governance. These are shown in the figures below.

[66] These are set out in more detail in Appendix 2B.F

Carr Road

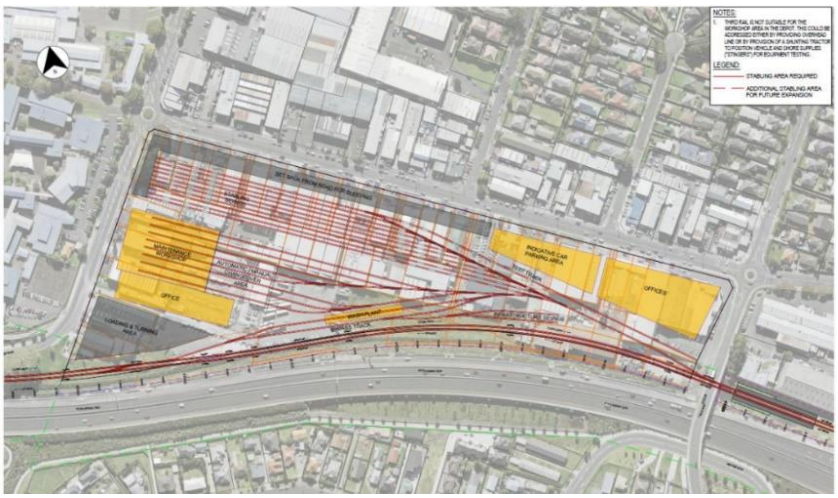


Figure 2.b.4- 3 Carr Road Depot Location Option

Ōnehunga

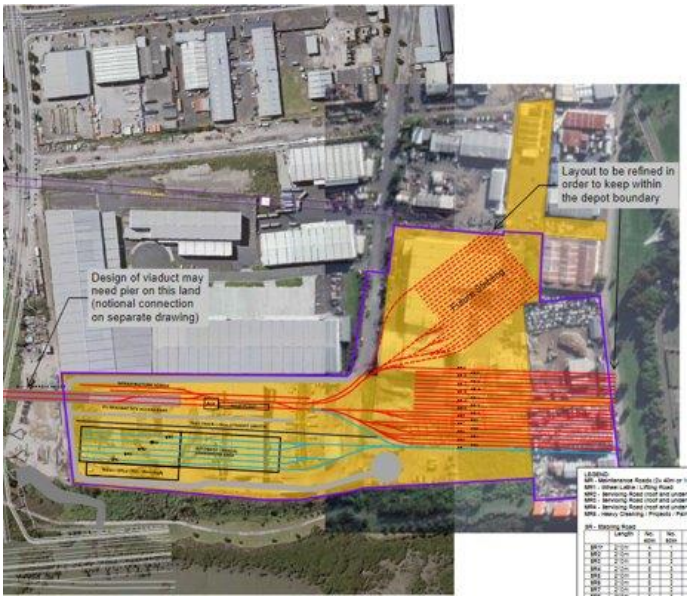


Figure 2.b.4- 4 Ōnehunga Depot Location Option

Shortlist assessment of depot options (MCA5)

The shortlist of depot options were assessed using the MCA framework. Workstream leads were asked to provide measures that would help assess each depot option against the MCA framework. These measures were taken to Tūāpapa and the ALR board for sign-off before the MCA workshops. The measures used to assess the performance of the shortlist depot options are presented in the table below:

The specific measures for the Depot location shortlist assessment aligned to the MCA Framework			
Cat	#	Criteria	Assessment Measure
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Nga Iwi Mana Whenua o Tamaki Makaurau
	B	Cultural Opportunities	Areas where the depot is likely to affect Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Maori cultural facilities and services
Investment Logic Map	1	KPI 1.2: Increased housing and employment growth	Amount of private sector large plots (sqm), Mana Whenua holdings and Maori community (including housing provider developments) within the walkable catchment of the PSL impacted by the depot
	2		Māori Business Identification and Growth Potential enabled by the depot
	3		Ability to deliver quality integrated neighbourhoods
	3a		Ability of the depot to deliver quality integrated development
	4	KPI 1.3: Improved quality of life	Potential impact of the depot on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value
	5		Impact of the depot on accessibility and introduction of severance to known areas of deprivation
	6		Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres 2. existing business areas 3. existing industrial areas
	7		Impact of the depot on existing neighbourhoods and ability to create quality neighbourhoods
	8	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure) for the depot
	9		Likely ability of the depot to enable carbon reduction through mode shift, trip reduction and active travel growth
	10		Whole of life carbon impact of surrounding urban development
	12	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration
	13		Impact of the depot on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)
	14	KPI 3.2: Increased public transport capacity	Operational capacity of the depot
Feasibility and RMA	16	Deliverability	Constructability
	17		Extent of impacts on utilities and below ground structures.
	18		Extent and complexity of structures
	19		Geotechnical and hydrogeology
	20		Maintenance
	21		Roading and Access
	22		Vulnerability to the impacts of climate change
	23	Operations and maintenance	The extent to which the site can provide for key operational and functional depot requirements
	24		Proximity of the depot site to mainline for efficient launch/retrieval of rail vehicles
	25		Site can expand to accommodate future depot requirements taking in to account whole network
	26	Affordability	Anticipated capital costs of the depot
	27		Anticipated operational and maintenance costs of the depot
	28	Impacts on Cultural Values	Potential impacts on areas of known cultural significance along the alignment
	29	Socioeconomic Impacts	Character and Amenity
	30		Social Cohesion
	31		Transport network
	32		Human Health and Wellbeing
	33	Property Impacts	Property Implications
	34		Property implications impacts on at risk communities
	35		Value of property
	36	Natural Environment	Landscape
	37		Visual
	38		Water quality and Wetlands
	39		Groundwater and settlement
	40		Ecology
	41		Natural Hazards
	42		Effects on Māori Cultural values and Te Taiao
	43	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage.

Findings and Outcomes from Assessment (MCA5)

The specific measures for the Depot location shortlist assessment aligned to the MCA Framework					
Cat	#	Criteria	Assessment Measure	Option 1 – Carr Road	Option 2 – Onehunga
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Nga Iwi Mana Whenua o Tamaki Makaurau		
	B	Cultural Opportunities	Areas where the depot is likely to affect Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Maori cultural facilities and services		
Investment Logic Map	1	KPI 1.2: Increased housing and employment growth	Amount of private sector large plots (sqm), Mana Whenua holdings and Maori community (including housing provider developments) within the walkable catchment of the PSL impacted by the depot		
	2		Māori Business Identification and Growth Potential enabled by the depot		
	3		Ability to deliver quality integrated neighbourhoods	2	1
	3a		Ability of the depot to deliver quality integrated development	2	1
	4	KPI 1.3: Improved quality of life	Potential impact of the depot on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value		
	5		Impact of the depot on accessibility and introduction of severance to known areas of deprivation	1	2
	6		Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres 2. existing business areas 3. existing industrial areas	-1	0
	7		Impact of the depot on existing neighbourhoods and ability to create quality neighbourhoods	0	-2
	8	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure) for the depot	-3	-3
	9		Likely ability of the depot to enable carbon reduction through mode shift, trip reduction and active travel growth	0	0
	10		Whole of life carbon impact of surrounding urban development	0	0
	12	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration	2	1
	13		Impact of the depot on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)		
	14	KPI 3.2: Increased public transport capacity	Operational capacity of the depot	0	1
Feasibility and RMA	16	Deliverability	Constructability	2	0
	17		Extent of impacts on utilities and below ground structures.	-3	0
	18		Extent and complexity of structures	0	-2
	19		Geotechnical and hydrogeology	-1	-3
	20		Maintenance	2	3
	21		Roading and Access	-1	-3
	22		Vulnerability to the impacts of climate change	-2	-2
	23	Operations and maintenance	The extent to which the site can provide for key operational and functional depot requirements	1	2
	24		Proximity of the depot site to mainline for efficient launch/retrieval of rail vehicles	1	-1
	25		Site can expand to accommodate future depot requirements taking in to account whole network	-1	2
	26	Affordability	Anticipated capital costs of the depot	-1	-3
	27		Anticipated operational and maintenance costs of the depot	1	-1

The specific measures for the Depot location shortlist assessment aligned to the MCA Framework					
Cat	#	Criteria	Assessment Measure	Option 1 – Carr Road	Option 2 – Ōnehunga
	28	Impacts on Cultural Values	Potential impacts on areas of known cultural significance along the alignment		
	29	Socioeconomic Impacts	Character and Amenity	-1	-2
	30		Social Cohesion	0	0
	31		Transport network	-1	-1
	32		Human Health and Wellbeing	-3	-2
	33	Property Impacts	Property Implications	-3	-1
	34		Property implications impacts on at risk communities		
	35		Value of property	-3	-1
	36	Natural Environment	Landscape	0	-1
	37		Visual	-1	-2
	38		Water quality and Wetlands	-1	-1
	39		Groundwater and settlement	0	0
	40		Ecology	0	0
	41		Natural Hazards	-2	-1
	42		Effects on Māori Cultural values and Te Taiao		
	43	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage.	0	0

Table 2.b.4- 1 MCA Depot location assessment

Option 1 – Carr Road

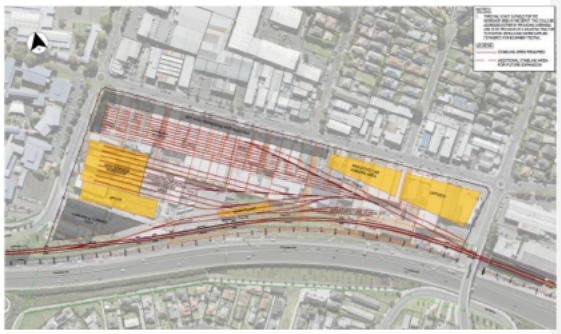
Summary Description
This option is located on land at the intersection of Frost Road and Carr Road, Mount Roskill. The land is a mixture of Business - Light Industry, Open Space – Informal Recreation and Strategic Transport Corridor zoned land, with current land use including commercial, light industry and a pocket park. The surrounding area includes light industry, Mount Roskill Grammar and State Highway 20. The site is fully bound by adjacent land uses, resulting in minimal opportunities for future site expansion as and when required. In land ownership terms, the site is also home to a number of site owners and businesses. The site itself includes an infrastructure maintenance facility and would be in close proximity to tunnels for maintenance purposes. The site is located adjacent to the mainline, suiting a light metro arrangement. This site was defined as the preferred depot location at IBC stage.   
Key Factors
• The site benefits from direct access to the mainline. • The site is located closer to potential workforce, has a sleeving opportunity, no viewshaft restrictions and opportunities for OSD. • In transport and sustainability terms, there is no clear differentiation between either the Carr Road or Onehunga option. • In planning terms, Carr Road is relatively straight forward to obtain consent. • The construction costs is estimated to be approximately $23 million. • In regards to property, the approximate capital value is $110 million, the approximate business relocation/purchase: $40 million. **Total: $150 million**. • In regards to property acquisition, there is the potential for an extended programme to deliver the site when considering the number of small/medium business relocations to take place. • For operations, the site meets depot operational requirements for CC2M 2051. Aditional stabling to be provided elsewhere post 2051. An additional depot would be required for a future North Shore line. In sustainability terms, there is no clear differentiation between either the Carr Road or Onehunga option
Emerging Preference
Based upon the above, it was concluded that Carr Road is the preferred option.

Table 2.b.4- 2 Carr Road Depot MCA Justification and Key Factors

Option 2 - Ōnehunga

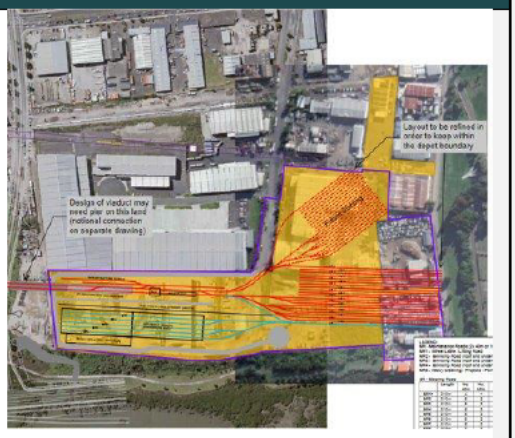
Summary Description
This option is located on land next to Onehunga Harbour Road and is accessible by Victoria Road. The current land use is heavy industrial. It is located on the coastal foreshore. The site at Onehunga has the possibility of future expansion, and comprises relatively few site owners and businesses currently located there. Initial draft layouts use Auckland Council owned land, which can suit a light metro arrangement. Connection to the mainline is in a less convenient location when compared to Carr Road. The site topography will require careful design consideration. The site includes an infrastructure maintenance facility and is less close to tunnels for future maintenance in comparison to Carr Road. In the earlier stages, the site is closer to the staged terminus and will be more beneficial to service launch.      
Key Factors
• The site has challenging design of viaduct access/egress considerations. Significant time will be required to work through remediating the site. • The site's viewshaft restrictions limits any integrated development. • In transport and sustainability terms, there is no clear differentiation between either the Carr Road or Onehunga option. • In planning terms, Onehunga is relatively straight forward to obtain consent however it becomes high risk if remediation takes place and landfill material is required to be located elsewhere. • The construction costs is estimated to be approximately $140 million. This cost includes site preparation works onlu and not clean up of uncontrolled landfill. • In regards to property, the approximate capital value is $67 million, the approximate business relocation/purchase: $40 million. **Total: $107 million**. • In regards to property acquisition, there is an existing business (Green Gorilla) which will need to be relocated which could be challenging due to scarity of Heavy Industrial zoned land elsewhere. • For operations, the site is big enough for future stabling, albeit with complex access and egress. An additional depot would be required for the future North Shore line. • The local community doesn't want additional infrastructure and views development on the coastline as unfavourable.
Emerging Preference
Based upon the above, this option was not recommended to proceed.

Table 2.b.4- 3 Ōnehunga Depot MCA Justification and Key Factors

Emerging Preferred Outcome of Depot location

Following the MCA Assessment process, a depot at Carr Road was recommended to proceed for the following reasons:

- Carr Road has opportunities of over site developments, closer access to workforce, and potential for development of an education quarter.
- Design and cost preference due to more direct access from mainline. Ōnehunga being a closed uncontrolled landfill has added complexities and cost.
- It was noted that property acquisition of a large number of businesses (in the order 70) was seen as a high risk to delivery programme. .

Request for further investigation

Following the recommendation, further investigations in to costs and property acquisition was explored. The following further information were investigated:

- Property acquisition timeline and risk for Carr Road and Ōnehunga options;
- For the Ōnehunga site, the consenting feasibility and programme for relocating two recycling centres;
- For the Ōnehunga site, refinement of the viaduct length for access, re-use of tunnel spoil, and develop sub-options for connecting to the emerging Manukau Harbour Crossing (MHX) options (Option 1 connecting to a New Eastern Bridge, and Option 2 connecting to a widened SH20 bridge); and
- For the Carr Road site, include the additional cost associated a cross-over with KiwiRail tracks at Hillsborough Road.

The two sub-options for the Ōnehunga site were subsequently presented as follows:

Ōnehunga Option 1

This option connects to a New Eastern Bridge.

Figure 2.b.4- 5 Ōnehunga Option 1

Ōnehunga Option 2

This option connects to a widened SH20 bridge.

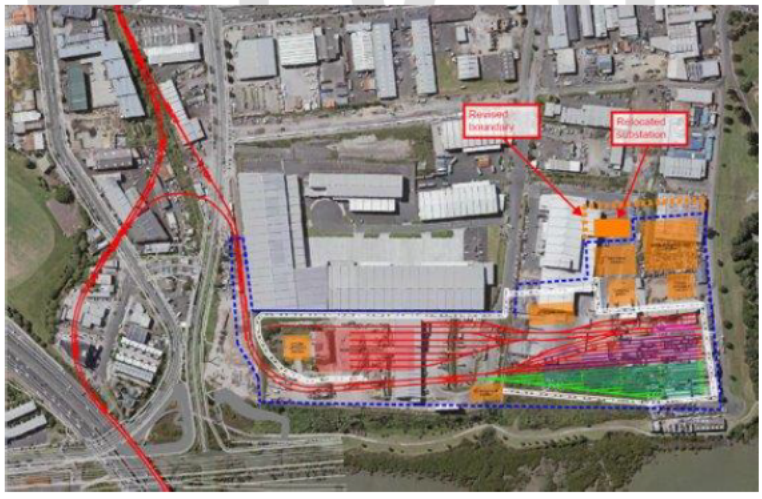


Figure 2.b.4- 6 Ōnehunga Option 2

Outcomes of further investigations

Following the further investigations which took place, as series of further outcomes were obtained:

- An additional existing business was identified at Ōnehunga (Visy Recycling) which would require relocating. The programme associated with consenting for the relocation of the recycling centre was estimated to be around 24 months.
- For Ōnehunga Option 1 – MHX is a new eastern bridge, then impacts of the viaducts connecting to the depot are minimised.
- For Ōnehunga Option 2 – MHX is widening of the existing SH20 bridge, then impacts of the viaducts are more adverse for urban development potential and sterilises the lower area of Ōnehunga.
- Construction costs were re-visited and reviewed. At Ōnehunga, on the assumption that fill from tunnelling works could be used, the site preparation cost was significantly reduced (noting that this has the potential to increase as design increases). The outcome of the costs exercise identified the greatest cost savings at Ōnehunga.
- The costs relating to the Trench Box KiwiRail alignment at Carr Road may not be as expensive as originally forecast (subject to scheme design).

Revised shortlist assessment of depot options (MCA5a)

The specific measures for the Depot location shortlist assessment aligned to the MCA Framework					
Cat	#	Criteria	Assessment Measure	Option 1 – Carr Road	Option 2 – Onehunga
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Nga Iwi Mana Whenua o Tamaki Makaurau		
	B	Cultural Opportunities	Areas where the depot is likely to affect Mana Whenua within the station catchment through commercial and partnering opportunities, opportunities for environmental enhancement and connections to Maori cultural facilities and services		
Investment Logic Map	1	KPI 1.2: Increased housing and employment growth	Amount of private sector large plots (sqm), Mana Whenua holdings and Maori community (including housing provider developments) within the walkable catchment of the PSL impacted by the depot		
	2		Māori Business Identification and Growth Potential enabled by the depot		
	3		Ability to deliver quality integrated neighbourhoods	2	1
	3a		Ability of the depot to deliver quality integrated development	2	1
	4	KPI 1.3: Improved quality of life	Potential impact of the depot on Mana Whenua ability to incorporate ngā kōrero tuku iho and connect to sites of significance and value		
	5		Impact of the depot on accessibility and introduction of severance to known areas of deprivation	1	2
	6		Ability to create, enhance and support local business (and businesses owned by locals) and diversity of employment opportunities in: 1. existing centres 2. existing business areas 3. existing industrial areas	-1	0
	7		Impact of the depot on existing neighbourhoods and ability to create quality neighbourhoods	0	-2
	8	KPI 2.1: Reduced carbon emissions	Indicative upfront carbon total for infrastructure (stations, tunnel, linear infrastructure) for the depot	-3	-3
	9		Likely ability of the depot to enable carbon reduction through mode shift, trip reduction and active travel growth	0	0
	10		Whole of life carbon impact of surrounding urban development	0	0
	12	KPI 3.1: Improved access to employment, education & health services across Auckland	Impact on network integration	2	1
	13		Impact of the depot on network of places of cultural importance and knowledge to Mana Whenua and Māori (marae, kōhanga reo, kura kaupapa Māori & wānanga-marae & schools and hau ora (Māori health providers)		
	14	KPI 3.2: Increased public transport capacity	Operational capacity of the depot	0	1
Feasibility and RMA	16	Deliverability	Constructability	2	0
	17		Extent of impacts on utilities and below ground structures.	-3	0
	18		Extent and complexity of structures	0	-2
	19		Geotechnical and hydrogeology	-1	-3
	20		Maintenance	2	3

The specific measures for the Depot location shortlist assessment aligned to the MCA Framework					
Cat	#	Criteria	Assessment Measure	Option 1 – Carr Road	Option 2 – Onehunga
	21		Roading and Access	-1	-3
	22		Vulnerability to the impacts of climate change	-2	-2
	23	Operations and maintenance	The extent to which the site can provide for key operational and functional depot requirements	1	2
	24		Proximity of the depot site to mainline for efficient launch/retrieval of rail vehicles	1	-1
	25		Site can expand to accommodate future depot requirements taking in to account whole network	-1	2
	26	Affordability	Anticipated capital costs of the depot	-1	-3
	27		Anticipated operational and maintenance costs of the depot	1	-1
	28	Impacts on Cultural Values	Potential impacts on areas of known cultural significance along the alignment		
	29	Socioeconomic Impacts	Character and Amenity	-1	-2
	30		Social Cohesion	0	0
	31		Transport network	-1	-1
	32		Human Health and Wellbeing	-3	-2
	33	Property Impacts	Property Implications	-3	-1
	34		Property implications impacts on at risk communities		
	35		Value of property	-3	-1
	36	Natural Environment	Landscape	0	-1
	37		Visual	-1	-2
	38		Water quality and Wetlands	-1	-1
	39		Groundwater and settlement	0	0
	40		Ecology	0	0
	41		Natural Hazards	-2	-1
	42		Effects on Māori Cultural values and Te Taiao		
	43	Culture and Heritage	Potential impacts on sites and places of archaeological value and built heritage.	0	0

Emerging Preferred Outcome of Phase 2b.4

Following the full MCA Assessment process, and as a result of further investigations which took place, a depot at Ōnehunga (Option 1) was recommended to proceed for the following reasons:

1. Construction savings can be made at Ōnehunga, with greater opportunity for savings for Option 1;
2. Property capital costs remain cheaper for Ōnehunga;

2b.5 Station Optimisation

With an initial view of the preferred end-to-end option, a route-wide station optimisation process was undertaken to consider the potential exclusion of identified stations. This assessment provides the opportunity to review affordability and value-for-money of the end-to-end route, and the contribution that individual stations made to the urban and transport potential of the whole corridor.

The station optimisation process considered several trade-offs of route-wide significance, such as the implications of individual stations on likely end-to-end journey time and the contribution of individual stations to the urban change potential of the whole ALR corridor.

The station optimisation process involved two steps:

1. Shortlist station identification
2. Individual station optimisation review

Each step of the station optimisation process is described in detail below.

Shortlist station identification

An initial assessment identified a shortlist of stations for potential optimisation based on their anticipated performance across key system-wide factors and in the context of relative station costs and carbon impacts. Each station was reviewed for potential optimisation on the basis of presenting one of both of the following characteristics:

1. Expected low patronage
2. Limited anticipated urban development potential

Based on the initial assessment, the following shortlist of stations was identified for optimisation review:

Stations Identified for Optimisation Review
Balmoral
Sandringham South
Mount Roskill Puketapapa
Hayr Road
Queenstown Road
Māngere Bridge
Te Ararata Creek
Landing Drive

Table 2.b.5- 1 Stations identified for optimisation review

Individual station optimisation review

After an initial assessment, individual key station characteristics were reviewed for each shortlist option to identify candidates for optimisation. The analysis included in this review can be found in Appendix 2B.C. The outcome of the initial individual station review is presented in the table below:

Outcome of Initial Individual Station Review	
Stations Identified for Optimisation Review	**Initial Individual Review Outcome**
Balmoral	Included as a station in all optimised scenarios
Sandringham South	Included as a station in all optimised scenarios
Mount Roskill Puketapapa	Included as a station in all optimised scenarios
Hayr Road	Included as a station in all optimised scenarios
Queenstown Road	Not included in all optimised scenarios
Māngere Bridge	Included as a station in all optimised scenarios
Te Ararata Creek	Included as a station in all optimised scenarios
Landing Drive	Included as a station in all optimised scenarios

Table 2.b.5- 2 Outcome of initial individual station review

Station optimisation outcome

Emerging Preferred Outcome of Phase 2b.5

It was determined that Queenstown Road would not be included under any optimised scenario. Given the catchment's significant overlap with Hayr Road and Onehunga, low patronage and limited urban development potential were anticipated.

The remaining 7 shortlisted stations (Balmoral, Sandringham South, Mount Roskill, Hayr Road, Māngere Bridge, Te Ararata Creek and Landing Drive) were retained across all optimised scenarios. These stations were retained on the basis of fulfilling one or several of the following priorities:

- Major demand destinations
- Interchange points and transfer nodes
- Residential coverage and local coverage

2b.6 Staging

As part of the Phase 2 catchment optioneering, initial PSL and Alignment assessments have not been substantially informed by whole of route staging considerations, with the ambition of Phase 2 to identify the preferred long-term outcome delivered through ALR investment. However, as part of the route and stations finalisation process within phase an initial review of potential staging options was undertaken to identify a shortlist of potential staging options to ensure there were feasible pathways available to deliver the end-to-end scheme.

The overall Rapid Transit Network is already thought of as a series of projects that grow over time to meet demand. The phasing of these, and of ALR as a part, deliver incrementally improved transport and community outcomes over time, within the capacity and constraints of the government to fund, and industry to deliver.

Overview of Staging optioneering

The assessment for section 2b.6 of the optioneering process has been completed as follows:

- Step 1: Consideration of key staging assumptions
- Step 2: Staging longlist generation
- Step 3: Longlist to shortlist assessments
- Step 4: Confirmation of shortlist
- Step 5: Assessment of staging options using MCA assessments and workshop reviews.
- Step 6: Recommendations to ALR governance.

The goal of staging the project was to do this in a way which balanced the deliverability and affordability of the project, whilst maximising the benefits along the way. The maps below present each of the options initially identified.

Key Assumptions for Phase 2b.6 Staging

Several key assumptions were considered as part of the staging process which informed each of the options. Key assumptions were as follows:

Issue	Assumption
Final Investment Decision	The Final Investment Decision will be made in June 2024 and will include funding for all stages between Aotea and the Airport.
Pre-implementation timing	Reference design – 12 months; starting upon Final Investment Decision Procurement of the contractor for Stage 1 – 12 months; follows Reference Design Design, manufacturing and assembly of TBM and dive structure etc. – 18 months to TBM launch; follows Procurement Early works: No allowance for early works at this stage for service diversions
Construction Timing	All stage timelines are approximate based on industry knowledge and subject matter expertise and are indicative only
Testing & Commissioning	The first section of the route open would require time for overall Systems Testing & Commissioning prior to operations – 12 months has been assumed between end of works and potential opening
Tunnelled sections	Tunnelled sections would require additional time for testing additional safety requirements (fire-life etc.) – 12 months has been allowed between construction completion and stage finish
Time requirements	Each additional stage of opening results in incremental time requirements. Fewer stages results in a tighter schedule
Funding cashflow	This is considered across both ALR and WHC and includes the potential continuation / sequential delivery of tunnelling as an industry-capacity optimisation to prevent loss or overlap of critical skills and resources

Table 2.b.6- 1 Key components of Phase 2b.6 Staging

Staging longlist generation

To generate a series of staging options, the longlist options were identified using the following set of principles that were established based on the Guiding Considerations:

Principles for longlist staging options identification Category		Criteria	Principles to guide generation of staging option longlist
Feasibility and RMA		Affordability	**Affordable** – fit in funding capacity envelopes -Should provide even cash flow where possible -Should not increase overall costs within reason
		Deliverability	**Deliverable** – fit in industry capacity envelopes Recognises the inherent limitations of local construction industry capacity and prevents Staging must be designed to avoid/minimise significant/expensive rebuild for subsequent phases
Investment Logic Map (ILM)	Objective 3: A rapid transit service that: - Is attractive, reliable, affordable, frequent, safe and equitable - Is integrated with current and future public transport network - Improves access to jobs, education and other opportunities.	KPI3.2: Increased public transport capacity	**Effective** – each phase must deliver on core outcomes for transport, community, and growth Form a successful project from day one – make a meaningful contribution to net transport outcomes for Auckland – net patronage increase, and strategically enable and accelerate urban uplift. Be a logical part of regional transport network – main regional links, busways, frequent bus, ferry, rail – to enable journeys for people that matter Any construction staging within phases should each be efficiently operable Phases should optimise whole of network timing and outcomes

Table 2.b.6- 2 Principles for longlist staging option generation

Maps of Staging options of the ALR corridor relevant for staging assessment

Figure 2.b.6- 1 Overview of staging option maps

MCA assessment of staging options longlist to identify a potential shortlist

To identify a practicable shortlist of robust options, an assessment was completed against the MCA7 criteria defined in the table below:

The specific measures for the staging options longlist assessment aligned to the MCA Framework			
Cat	**#**	**Criteria**	**Assessment Measure**
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Nga Iwi Mana Whenua o Tamaki Makaurau
	B	Cultural Opportunities	Cultural Opportunities
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Indicative Whole Corridor Land Use Change Potential – Population
			Indicative Land Use Change Potential – Employment
	2	KPI 1.2: Increased housing and employment growth	Indicative Whole Corridor Land Use Change Potential – Population
			Indicative Land Use Change Potential – Employment
	3	KPI 1.3: Improved quality of life	Impact of staging profile on Quality of Life
	4	KPI 2.1: Reduced carbon emissions	Indicative impact of staging profile on Whole of Life Carbon
	5	KPI 2.2: Improved health outcomes	Indicative impact of the staging profile on encouraging active travel benefits
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Indicative impact of the staging profile on patronage and daily boardings
			Indicative impact of the staging profile on level of network integration across modes
	7	KPI 3.2: Increased public transport capacity	Operational capacity profile (how quickly is additional capacity online)
	8	KPI 3.3: Reduced travel times	Impact on travel time savings of staging profile
OFeasibility and RMA	9	Deliverability	Indicative impact of optimised corridor on overall deliverability (effort and efficiency)
	10	Affordability	Indicative costs profile and ability to improve affordability through staging option
	11	Impacts on Cultural Values	Potential Impacts of proposed phasing to significantly change the overall impact of the ALR Scheme
	12	Socioeconomic Impacts	
	13	Property Impacts	
	14	Natural Environment	
	15	Culture and Heritage	

Table 2.b.6- 3 MCA7 Measures for staging options longlist assessment

This assessment resulted in three of the eight staging options taken forward to the next stage Option B, Option C and Option D.

Shortlist assessment of staging options (MCA7)

Following the completion of the longlist assessment of staging options, a shortlist was developed to assess against the MCA criteria.

As part of this earlier stage, it became clear within the initial feedback that the principles underpinning the options should also focus on matters relating to targeted improvements for those with the highest level of transport poverty, and the projects alignment to planned urban development and intensification. As such, additional principles were added as follows:

Principles for shortlist staging options identification Category		Criteria	Principles to guide generation of staging option longlist
Feasibility and RMA		Affordability	**Enabling** – align with planned urban development and intensification
		Deliverability	
Investment Logic Map (ILM)	Objective 1: Unlocking significant urban development potential, supporting a compact urban form and enabling quality integrated communities	KPI 1.1: Increased residential and employment density	Ability to unlock and/or coordinate with large scale urban redevelopment
		KPI 1.2: Increased housing and employment growth	Support early adoption and behaviour change by providing public transport in line with urban growth.
		KPI 1.3: Improved quality of life	
	Objective 3: A rapid transit service that: 20. Is attractive, reliable, affordable, frequent, safe and equitable 21. Is integrated with current and future public transport network 22. Improves access to jobs, education and other opportunities.	KPI 3.1: Improved access to employment, education and health services across Auckland	**Equitable** – help those that need it most first Target improvements towards those areas with highest level of transport poverty first
		KPI3.2: Increased public transport capacity	

Table 2.b.6- 4 Additional principles for shortlist staging options identification.

As a result, two additional options were presented as part of the shortlisting assessment to provide greater focus on the additional principles:

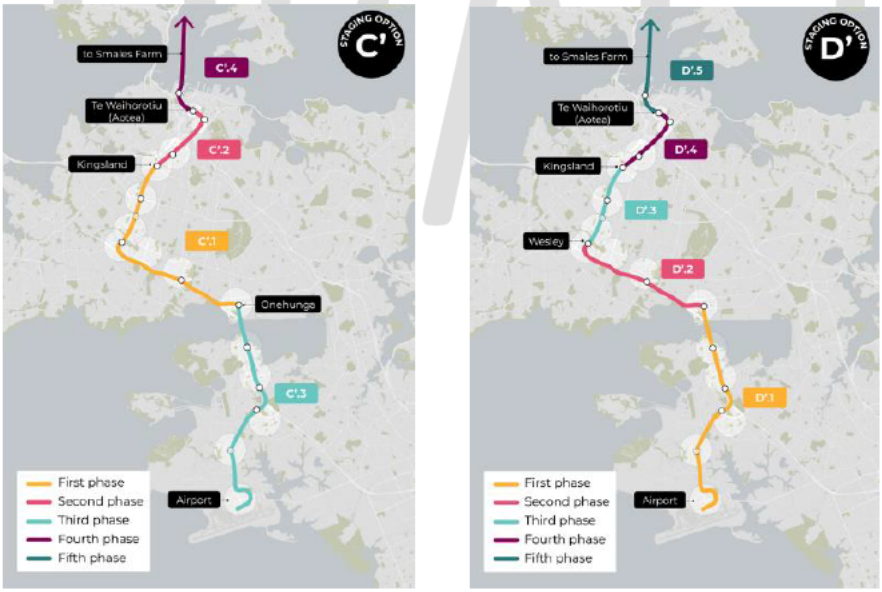


Figure 2.b.6- 2 Additional staging options following shortlist assessment

These two options were subsequently incorporated into the assessment of shortlisted options.

Confirmation of shortlist

Following the outcome of the longlist assessment and workshop, a shortlist of five staging options was confirmed through ALR governance. This included Staging Options C' and D':

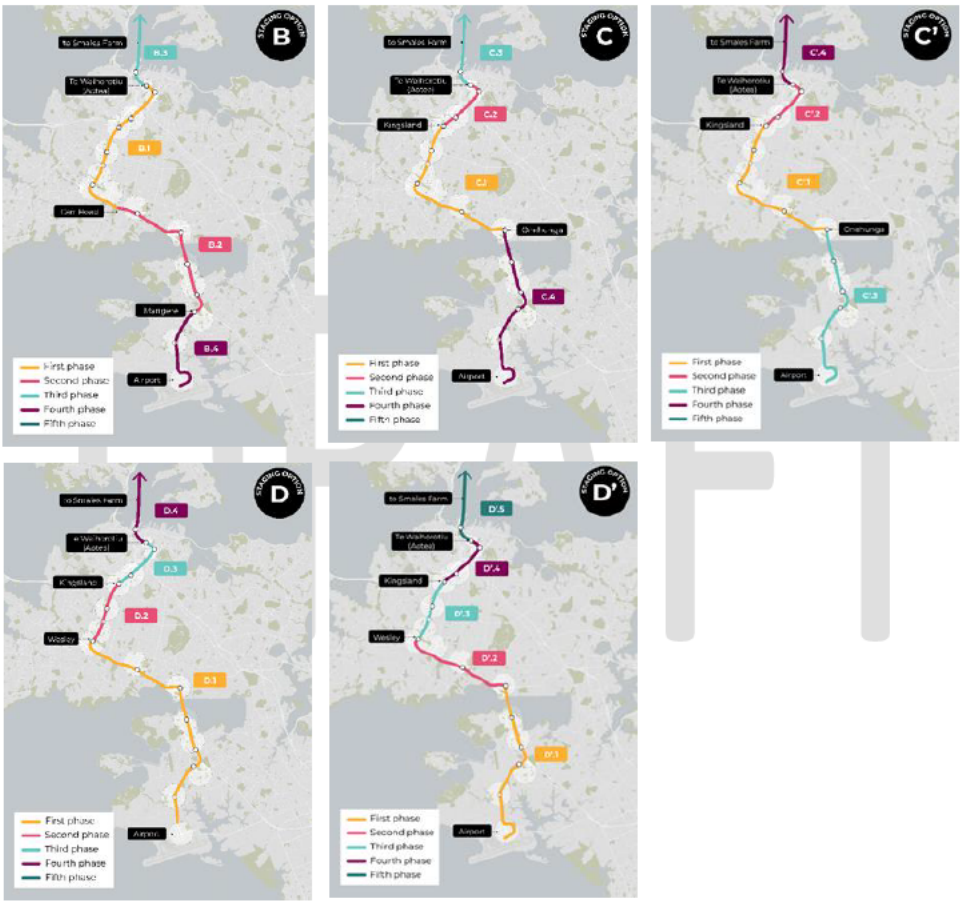


Figure 2.b.6- 3 Shortlist staging options

Assessment of shortlisted options (MCA7)

The shortlisted staging options were assessed using the MCA Framework. The following MCA measures were applied to the framework to undertake an MCA assessment of the shortlist options using the ALR MCA Framework. The specific measures used for this assessment are contained in the MCA7 findings and outcomes (Table 4-0-9) shown below.

The specific measures for the staging options shortlist assessment aligned to the MCA Framework			
Cat	#	Criteria	Assessment Measure
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Nga Iwi Mana Whenua o Tamaki Makaurau
	B	Cultural Opportunities	Cultural Opportunities
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Indicative Whole Corridor Land Use Change Potential – Population
			Indicative Land Use Change Potential – Employment
	2	KPI 1.2: Increased housing and employment growth	Indicative Whole Corridor Land Use Change Potential – Population
			Indicative Land Use Change Potential – Employment
			Market/ property readiness to develop (assessment of the extent to which surrounding land use is ready to redevelop in the desired manner and in alignment with the timing of the staging.
	3	KPI 1.3: Improved quality of life	Impact of staging profile on Quality of Life
	4	KPI 2.1: Reduced carbon emissions	Indicative impact of staging profile on Whole of Life Carbon
	5	KPI 2.2: Improved health outcomes	Indicative impact of the staging profile on encouraging active travel benefits
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Indicative impact of the staging profile on patronage and daily boardings
			Indicative impact of the staging profile on level of network integration across modes
			Ability to improve public transport access for those who need it most, first
	7	KPI 3.2: Increased public transport capacity	Operational capacity profile (how quickly is additional capacity online)
	8	KPI 3.3: Reduced travel times	Impact on travel time savings of staging profile
Feasibility and RMA	9	Deliverability	Indicative impact of optimised corridor on overall deliverability (effort and efficiency)
			Complexity of procurement / contracting arrangements and market capacity to respond
	10	Affordability	Indicative costs profile and ability to improve affordability through staging option
			Property risks and opportunity for coordinating with broader redevelopment initiatives.
	11	Impacts on Cultural Values	Potential Impacts of proposed phasing to significantly change the overall impact of the ALR Scheme
	12	Socioeconomic Impacts	
	13	Property Impacts	
	14	Natural Environment	
	15	Culture and Heritage	

Table 2b.6- 5 MCA measures for the staging options shortlist assessment

MCA7 Findings and Outcomes

Scores for each of the staging options were validated and collectively considered at an MCA workshop which included representatives from all relevant Alliance disciplines and Mana Whenua representatives and specialists. This gave an opportunity to identify and correct any misalignment on assumptions, and to arrive at a collective understanding of the issues, and opportunities of each option.

The following section sets out the key outcomes from each of the discussions on each of the staging options, along with the emerging preferences identified at the workshop.

Staging Option B

Option Description

This staging option comprises of four phases with a total programme period of 16 years. The strategic intent of this option is to: ***Maximise early benefits in order to minimise discrete phases.***

The first phase focuses on providing access to the highest passenger demand origins and destination stations (**Phase B.1**) – reaching the City Centre and key development areas, it utilises the previously planned location for the depot. This option would require continuous construction of the tunnelled section between Te Waihorotiu (Aotea) and Wesley, leaving flexibility on which stations are opened. Surface infrastructure would be utilised beyond Wesley to the Carr Road depot site.

The second phase (**B.2**) follows immediately with an ongoing extension to Mangere. This would result in, and enable, greater community benefit at an earlier stage in the construction process.

The third phase (**B.3**) links Smales Farm via the Harbour crossing and follows as a continuation of tunnelling activity.

The connection from Mangere to the Airport would then comprise the final phase (**B.4**).

The proposed staging timeline is summarised as follows:

Option B				
	Stage Description		**Construction Period**	
Stage	**Start**	**End**	**Start Year**	**End Year**
B.1	Te Waihorotiu (Aotea)	Carr Road	1	9
B.2	Carr Road	Mangere	8	14
B.3	Te Waihorotiu (Aotea)	Smales Farm	7	13
B.4	Mangere	Airport	12	16

Key Factors

- Low uplift in economic benefits associated with this option, with the majority of the uplift dependent on delivery the North Shore extension (Stage 3)
- In terms of the the market's readiness to develop (including housing, employment, infrastructure etc.) this option is joint second most preferred due to late opening date of the first stage.
- In terms of quality of life measures, this option is considered to be the third preferred option – noting the development uplift potential in the city centre, but not benefitting areas such as Mangere until later in the construction process.
- In transport terms, with delivery focused on completing the segments serving the highest population and highest demand area, this option acheives the highest patronage earliest. However, this option was second preferred on the basis that it does not deliver the same level of travel time savings as D.
- From an Operations perspective, this would be the most preferred option as it provides the most logical and legible service from day one, connecting the city centre to the Isthmus.
- When considering sustainability, due to the contruction of carbon intensive activities in the earlier stage (i.e tunnelling) and the resultant carbon emissions triggered, this option is equal to options C and C'.
- Relating to design deliverability this is the least preferred option due to the extent of concurrent tunnelling to take place at any one time.
- With the majority of the tunnelling works in Stage 1, this is likely to have the greatest cost up from of all the options as well as greatest cost risk, particularly with multiple parallel tunnelling works.
- There were no defined preferences between the staging options from a planning perspective and there

Table 2.b.6- 5 Staging Option 'B' description and emerging preference.

Staging Option C

Option Description

This option comprises of four phases, with a total programme of 15 years. The overall strategic intent of this option is: ***Constructability is key to bring the project forward.***

This option incorporates the construction of a train depot at Onehunga (Phase **C.1**). As part of this phase, the interchanges at Kingsland and Onehunga would comprise two distinct construction zones - one tunnelled from Wesley to Dominion Junction and one at surface level from Wesley to Onehunga.

The approach allows for Phases C.1 to become operational whilst Phase **C.2** (Kingsland to Te Waihorotiu (Aotea)) is being completed. This approach is considered to be pragmatic in terms of bedding-in the operations necessary to run a light rail network.

The third phase (**C.3**) links the AWHC over to Smales Farm.

The final phase (**C.4**) comprises the link from Onehunga to Airport.

The proposed staging timeline is summarised as follows:

Option C				
	Stage Description		**Programme**	
Stage	**Start**	**End**	**Start Year**	**End Year**
C.1	Kingsland	Onehunga	1	7
C.2	Kingsland	Te Waihorotiu (Aotea)	5	10
C.3	Te Waihorotiu (Aotea)	Smales Farm	7	13
C.4	Onehunga	Airport	10	15

Key Factors

- In terms of economic benefits, this option is preferred, due to significant early stage benefits, gradual employment growth across each stage and an overall moderate positive impact.
- In terms of the market's readiness to develop (including housing, employment, infrastructure etc.) this option is preferred.
- In terms of quality of life measures, this option is considered to be the fourth preferred option – noting the development uplift potential in the city centre, but not benefitting areas such as Mangere until later in the construction process.
- In transport terms, the patronage is high for this staging approach, but is not the least or most preferred option.
- Regarding sustainability, due to the contruction of carbon intensive activities in the earlier stage (i.e tunnelling) and the resultant carbon emissions triggered, this option is equal to options B, C and C'.
- Relating to design deliverability, this is the joint preferred option due to the continuity of tunnelling proposed.
- Relating to procurement strategy considerations, this option is 'neutral' with no defined preference between any of the options. At this stage, market capacity has not yet been tested.
- In operational terms, this is equal to C' as the least preferred option.
- There were no defined preferences between the staging options from a planning perspective.

Table 2.b.6- 6 Staging Option 'C' description and emerging preference.

Staging Option C'

Summary Description

This option comprises of four stages, over a 19-year programme period. The overall strategic intent of this option is to: **Complete CC2M before commencement of the North Shore phases, noting slower delivery timescales.**

This option incorporates the construction of a train depot at Onehunga (Phase **C'.1**). As part of this phase, the interchanges at Kingsland and Onehunga would comprise two distinct construction zones - one tunnelled from Wesley to Dominion Junction and one at surface level from Wesley to Onehunga.

The approach allows for Phases C.1 to become operational whilst Phase **C'.2** (Kingsland to Te Waihorotiu (Aotea)) is being completed. This approach is pragmatic in terms of bedding-in the operations necessary to run a light rail network.

The third phase (**C'.3**) links Onehunga to the Airport.

The final phase (**C'.4**) comprises the link from Onehunga to Airport. In comparison to Option C, this option assumes that all of CC2M is completed before works commence on North Shore connections (Phase C'.4).

The proposed staging timeline is summarised as follows:

Option C'				
	Stage Description		Programme	
Stage	Start	End	Start Year	End Year
C'.1	Kingsland	Onehunga	1	8
C'.2	Kingsland	Te Waihorotiu (Aotea)	6	11
C'.3	Onehunga	Airport	10	14
C'.4	Te Waihorotiu (Aotea)	Smales Farm	13	19

Key Factors

- In terms of economic benefits, this is the least preferred option, due to slightly delayed early benefits and the second longest maximum realization time (2044). This results in a very low positive impact.
- In terms of the market's readiness to develop (including housing, employment, infrastructure etc.) this option is joint second most preferred.
- In terms of quality of life measures, this option is considered to be the least preferred option – noting the development uplift potential in the city centre, but offering slightly less benefits along the route as a whole.
- Due to the extended construction programme proposed, the benefits relating to transport (i.e capacity, patronage, travel time, transport) become less as a result of longer project lead in times. As such, this option is not preferred.
- In sustainability terms, due to construction of carbon intensive activities in the earlier stage (i.e tunnelling) and the resultant carbon emissions triggered, this option is equal to options B, C and C'.
- Relating to design deliverability, this is the joint second preferred option due to the gap in tunnelling proposed and resultant market availability.
- Relating to procurement strategy considerations, this option is 'neutral' with no defined preference between any of the options. At this stage, market capacity has not yet been tested.
- In operational terms, this is equal to C as the least preferred option.
- There were no defined preferences between the staging options from a planning perspective.

Table 2.b.6- 7 Staging Option 'C'' description and emerging preference

Staging Option D

Summary Description

This option comprises of fourth phases, with a total programme of 17 years. The strategic intent of this option is to: ***Connect communities in greatest need – lowering complexity at the initial stages***

The first phase is Airport to Wesley (**D.1**). This first phase offers earlier benefit realisation to the South Auckland area and reduces annual cashflows due to an extended programme period. This phase also allows onward travel via bus services from Onehunga and other stations to create further connectivity.

This option links directly to Auckland Airport's development works and Kainga Ora's Mangere and Wesley development sites.

Phase **D.2** connects Wesley to Kingsland.

Phase **D.3** links Kingsland to Te Waihorotiu (Aotea). Through developing the northern sections at a later stage within the construction period, a co-ordinated delivery timeframe with AWHC may be improved – allowing for the potential of a single stage of delivery for services across the harbour. The timing of the tunnelled section can be varied accordingly, relative to funding streams and timescales.

The final phase (**D.4**) links Smales Farm via the Harbour Crossing.

The proposed staging timeline is summarised as follows:

Option D				
	Stage Description		Programme	
Stage	Start	End	Start Year	End Year
D.1	Airport	Wesley	1	8
D.2	Wesley	Kingsland	4	9
D.3	Kingsland	Te Waihorotiu (Aotea)	8	13
D.4	Te Waihorotiu (Aotea)	Smales Farm	11	17

Key Factors

- In terms of economic benefits, this is the third preferred option, due to slightly delayed early-stage benefits and an overall low positive impact.
- In terms of the market's readiness to develop (including housing, employment, infrastructure etc.) this option is joint third most preferred.
- In relation to quality of life measures, this is the second preferred option, providing the second greatest priority group benefits, due to its early programme linkages to Mangere, an area with a high level of deprivation.
- In transport terms, whilst there are fewer stations in the southern section (resulting in overall less catchment potential), this option was preferred due to the benefits it offered in terms of improved travel time. This option also offered the most improvements when considered against population, employment and education accessibility (within 45 minutes).
- In relation to sustainability, due to carbon intensive construction (i.e tunnelling) and its resultant carbon emissions being triggered in the later stages, this is the joint preferred option. This option also offered greatest transport modal shift, resulting in moderate carbon benefit as a result of early southern opening.
- Relating to design deliverability, this is the joint second preferred option due to construction access considerations in the Wesley area.
- Relating to procurement strategy considerations, this option is 'neutral' with no defined preference between any of the options. At this stage, market capacity has not yet been tested.
- In operational terms, this option is joint second in terms of staging preference.
- There were no defined preferences between the staging options from a planning perspective

Table 2.b.6- 8 Staging Option 'D' description and emerging preference

Staging Option D'

Summary Description

The option comprises a total of five phases, over a 20- year period. The strategic intent of this option is: **Fastest opening but slowest overall delivery, a lower complexity initial stage, and connecting communities in greatest need.**

The option focuses upon opening the southern sections of the route between Airport and Wesley within the first and second phase (**D'.1** and **D'.2**). This would reduce cashflow in the first phase, and offer earlier benefit realisation to South Auckland.

Phase **D'.3** connects Wesley to Kingsland and enable Dominion Junction to be used as a construction support location for the next phase of works.

Phase **D'.4** connects Kingsland to Te Waihorotiu (Aotea).

Similar to option D, option D' pushes the northern sections to later in the timeframe, allowing the opportunity to develop a coordinated delivery timeframe with AWHC. As such, the final phase (**D'.5**) would connect across AWHC to Smales Farm.

The proposed staging timeline is summarised as follows:

Option D'				
	Stage Description		**Programme**	
Phase	**Start**	**End**	**Start Year**	**End Year**
D'.1	Airport	Onehunga	1	6
D'.2	Onehunga	Wesley	5	6
D'.3	Wesley	Kingsland	6	11
D'.4	Kingsland	Te Waihorotiu (Aotea)	10	15
D'.5	Te Waihorotiu (Aotea)	Smales Farm	14	20

Key Factors

- In terms of economic benefits, this is the fourth preferred option, due to the greatest early-stage employment uplift, but relatively lower middle and late stage benefits, and the longest maximum realization time (2045). This results in a low positive impact.
- In terms of the market's readiness to develop (including housing, employment, infrastructure etc.) this option is joint third preferred.
- In relation to quality of life measures, this is the preferred option, providing the greatest priority group benefits due to its early programme linkages to Mangere, an area with a high level of deprivation.
- Due to the extended construction programme proposed, the benefits relating to transport (i.e capacity, patronage, travel time, transport) become less as a result of longer project lead in times. As such, the option is not preferred.
- Due to carbon intensive construction (i.e tunnelling) and its resultant carbon emissions being triggered in the later stages, this is the joint preferred option in sustainability terms. This option also offered greatest transport modal shift, resulting in moderate carbon benefit as a result of early southern opening.
- Relating to design deliverability, this is the joint preferred option due to the continuity of tunnelling proposed.
- Relating to procurement strategy considerations, this option is 'neutral' with no defined preference between any of the options. At this stage, market capacity has not yet been tested.
- In operational terms, this option is joint second in terms of staging preference.
- There were no defined preferences between the staging options from a planning perspective.

Table 2.b.6- 9 Staging Option 'D" description and emerging preference

Staging Options MCA (MCA7)

Comparison Summary MCA7 Assessment				Staging Options				
Cat	#	Criteria	Assessment Measure	Option B	Option C	Option C'	Option D	Option D'
Mana Whenua	A	Nga Iwi Mana Whenua o Tamaki Makaurau	Nga Iwi Mana Whenua o Tamaki Makaurau					
	B	Cultural Opportunities	Cultural Opportunities					
Investment Logic Map	1	KPI 1.1: Increased residential & employment density	Indicative Whole Corridor Land Use Change Potential – Population					
			Indicative Land Use Change Potential – Employment	3	4	2	2	1
	2	KPI 1.2: Increased housing and employment growth	Indicative Whole Corridor Land Use Change Potential – Population					
			Indicative Land Use Change Potential – Employment	3	4	2	2	1
			Market/ property readiness to develop (assessment of the extent to which surrounding land use is ready to redevelop in the desired manner and in alignment with the timing of the staging.	3	4	3	1	1
	3	KPI 1.3: Improved quality of life	Impact of staging profile on Quality of Life	2	1	1	4	4
	4	KPI 2.1: Reduced carbon emissions	Indicative impact of staging profile on Whole of Life Carbon	-3	-3	-3	-2	-2
	5	KPI 2.2: Improved health outcomes	Indicative impact of the staging profile on encouraging active travel benefits	4	3	2	2	2
	6	KPI 3.1: Improved access to employment, education & health services across Auckland	Indicative impact of the staging profile on patronage and daily boardings	4	4	3	3	2
			Indicative impact of the staging profile on level of network integration across modes	4	4	3	3	2
			Ability to improve public transport access for those who need it most, first	2	2	2	4	4
	7	KPI 3.2: Increased public transport capacity	Operational capacity profile (how quickly is additional capacity online)	3	4	4	2	3
	8	KPI 3.3: Reduced travel times	Impact on travel time savings of staging profile	3	3	3	5	5
Feasibility and RMA	9	Deliverability	Indicative impact of optimised corridor on overall deliverability (effort and efficiency)	2	5	5	4	5
			Complexity of procurement / contracting arrangements and market capacity to respond	1	2	2	2	
	10	Affordability	Indicative costs profile and ability to improve affordability through staging option	2	5	4	4	5
			Property risks and opportunity for coordinating with broader redevelopment initiatives.					
	11	Impacts on Cultural Values	Potential Impacts of proposed phasing to significantly change the overall impact of the ALR Scheme	0	0	0	0	0
	12	Socioeconomic Impacts						
	13	Property Impacts						
	14	Natural Environment						
	15	Culture and Heritage						

Table 2b.6- 7 Comparison summary MCA7 Assessment

Summary of Workshop feedback

				
Staging Option B	**Staging Option C**	**Staging Option C'**	**Staging Option D**	**Staging Option D'**
Key Findings from MCA Assessment (MCA7)				
Whilst delivering what would be the busiest section of the route as the first stage, the benefits are primarily accrued by those who currently have good public transport already. Due to the scale of the first stage, this option has a later first stage opening than the other options, delaying the benefit realization. The first stage is the highest cost of all the options, with a higher degree of complexity and risk associated with more overlapping works. The benefits to the areas in the south take longer to achieve than other options and there is potential reputation risk that these stages are deferred or never delivered as a result of funding constraints.	This option provides an opportunity to manage sequencing of construction and extent of concurrent tunneling works by breaking the tunneling sections into 2. This option offers significant early-stage benefits, gradual employment growth across each stage and an overall moderate positive impact. In terms of the market's readiness to develop (including housing, employment, infrastructure etc.) this option is preferred. Note: This option is not supported by Mana Whenua as the benefits to the areas in the south take longer to achieve.	This option matches the initial delivery of C, but assumes a later phasing of North Shore connectivity. This potentially impacts on the availability and productivity of tunnelling contracts and would not be preferred to option C.	Opening in the south first and provides significant connectivity and journey time improvements compared to today, with benefits starting earlier than other options. This option also offered the most improvements when considered against population, employment and education accessibility (within 45 minutes). This option defers the most carbon intensive construction (i.e tunnelling), allowing time for advances in industry best practice and technological innovations. The urban market readiness is less developed in the South and as such, is likely to require a greater degree of public intervention in delivering the desired urban form. Note: This option is supported by Mana Whenua as benefits for the south can be achieved sooner.	Like Option D, this enables opportunities in the southern areas first, with a shorter and quicker to open first section. This option provides the greatest benefit for communities most in need, including early programme linkages to Mangere. This option defers the most carbon intensive construction (i.e tunnelling), allowing time for advances in industry best practice and technological innovations. The delivery timeframes can be further optimized to accelerate project timelines similar to C, but with benefits accruing more quickly and significant social equity improvements earlier. Note: This option is supported by Mana Whenua as benefits for the south can be achieved sooner.
Option not selected to proceed	Option selected as preferred	Option not selected to proceed	Option not selected to proceed	Option selected as preferred

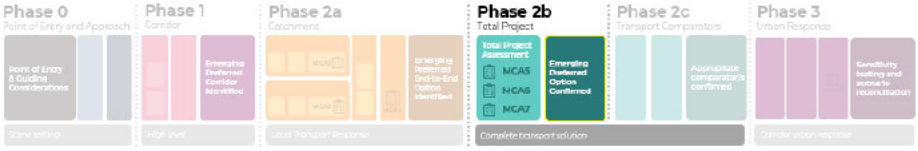
Emerging Preferred Outcome of Phase 2b.6

Following the MCA Assessment process, it was recommended to the ALR group board that Options C and D' were the preferred staging options as per the summaries provided in the table above. Option D was also selected as a staging option alternative.

Given the time between individual stages is relatively short, any difference in impacts between each staging option are expected to be small. Based on an assessment of strategic and quantitative factors, Staging Option C was taken forward as the basis of the indicative assessment of the scheme. The final staging option will be informed by the findings of the Commercial, Financial, and Management cases, which may result in an updated staging option.

Table 2.b.6- 8 Summary of Workshop Feedback and emerging preferences

2b.7 Complete Emerging Preferred Option



After route and station finalisation, the complete emerging preferred option was identified. This option is shown on the map overleaf.

Emerging Preferred Option – Separated Light Metro

Figure 2.b.7- 1 Emerging preferred option

Phase 2c: Emerging Preferred Option and Intermediate Comparator(s) for CBC

While the Route and Station Finalisation process culminated in a complete emerging Preferred Option for the project, as outlined in our approach[67] and in line with Better Business Case, Waka Kotahi, and NZ Treasury guidance, the second objective of the optioneering process was to: *Review the options shortlisted by the IBC, to identify the appropriate comparator(s) for DBC economic appraisal, mindful of the need to ensure that there is sufficient variation between comparators to warrant appraisal.*

Phase 2C of the optioneering process focuses on addressing this objective through two steps:

1. Reviewing the shortlisted IBC schemes relative to the emerging preferred option to identify which option(s) present sufficient divergence (in either costs or potential benefits) to be considered reasonable comparators for economic appraisal.
2. Optimising the identified reasonable comparator(s) in line with the updates to the investment objectives and strategic context to allow for a robust shortlist economic appraisal.

These two steps are discussed in turn in the sections below with the confirmed shortlist of options for economic assessment the output of the Phase of analysis.

2c.1 Reviewing short-listed IBC schemes relative to emerging preferred option

As a starting point for reviewing the short-listed IBC schemes for potential inclusion as intermediate comparator options within the CBC economic appraisal it is important to reflect on the purpose of intermediate comparators and the economic appraisal within what will be a DBC-level transport appraisal.

[67] See section 0.4

The shortlist economic appraisal as part of a DBC is not intended to relitigate the MCA assessments carried out through the optioneering process undertaken to review, refine, and optimise the emerging preferred option. Instead, shortlist comparators are intended to provide a realistic and achievable option that meets the core needs and essential requirements for the investment but may not be the PWF. These options need to show significant divergence in the costs and/or benefits from the PWF while continuing to deliver the core elements of the investment objectives.

The table below summarises how (and if) the three shortlisted IBC schemes are significantly divergent in their ability to deliver anticipated benefits in line with the Investment Objectives and their relative feasibility (including costs).

IBC Shortlist to Emerging Preferred Comparison			Indicative Business Case Options		
Cat		**Criteria**	**Light Metro**	**Tunnelled Light Rail (IBC PWF)**	**Light Rail**
Key Divergence from Emerging Preferred Option			• Similar operations, speed, & capacity compared to emerging preferred. • Does not benefit from optimisations implemented into the emerging preferred which maximise benefit and reduce cost	• Lower speed & capacity compared to emerging preferred • Incorporates street running operation for parts of the alignment (Onehunga and Māngere)	• Significantly lower speed & capacity compared to emerging preferred • Operates primarily at surface and street-running. No major tunnelling • Lower costs and upfront carbon
MW	A	Ngā Iwi Mana Whenua ō Tāmaki Makaurau			
	B	Cultural Opportunities			
Investment Logic Map	1	KPI1.1: Increased residential & employment density	No significant divergence from the emerging preferred. Emerging preferred expected to deliver better outcomes than either scheme following optimisation	Potentially divergent residential and employment density and growth outcomes due to altered alignment and end-to-end journey times	No significant divergence from the emerging preferred.
	2	KPI1.2 Increased housing & employment growth			
	3	KPI1.3 Improved quality of life			
	4	KPI2.1: Reduced carbon emissions	Significantly greater embodied carbon due to additional tunnelling	No significant divergence from the emerging preferred.	lower upfront carbon emissions and lower enabled carbon reduction
	5	KPI2.2Improved health outcomes	No significant divergence from the emerging preferred.		
	6	KPI3.1: Improved access to employment, education		Potentially divergent access to employment and education due to end-to-end journey times	Significantly different ability to provide access to opportunities due to slower operations
	7	KPI3.2 Increased public transport capacity	No significant divergence from the emerging preferred option	Reduced operational capacity compared to emerging preferred due to mixed operations. Reduced ability to support RTN integration (AWHC & NW)	Significantly reduced operational capacity compared to emerging preferred due to mixed operations. Significantly reduced ability to support RTN integration (AWHC & NW)
	8	KPI3.3 Reduced travel times	No significant divergence from the emerging preferred option	Slower end-to-end travel time	Significantly longer journey times due to street running operations
Feasibility & RMA	9	Deliverability	Significantly more disruption in the additional cut and cover tunnelled sections through Māngere and Onehunga	Significantly more disruption in the street-running sections through Māngere	Significantly greater deliverability challenges due to surface operations
	10	Affordability	Significantly more expensive given additional tunnelled sections through Māngere and Onehunga	Similar or more expensive given higher cost of Māngere and higher OpEx	Significantly lower upfront costs compared to emerging preferred but higher OpEx
	11	Impacts on Cultural Values	No significant divergence from the emerging preferred. Emerging preferred expected to deliver better outcomes following optimisation	Divergent and likely greater potential RMA impacts in street running sections compared to emerging preferred	Significantly different RMA Impacts across criteria relative to emerging preferred option
	12	Socioeconomic Impacts			
	13	Property Impacts			
	14	Natural Environment			
	15	Culture and Heritage			
Outcome of comparison			Only diverges form the emerging preferred option in ways that negatively impact appraisal	Only diverges form the emerging preferred option in ways that negatively impact appraisal	Significantly divergent from emerging preferred and a realistic comparator

Table 2.c.1- 1 IBC Shortlist to Emerging Preferred Option Comparison

Outcome of the review of shortlisted IBC schemes for inclusion as the intermediate comparator

Based on the outcome of the comparative assessment, one of the three IBC shortlisted schemes provides a realistic and divergent comparator for inclusion in the CBC economic appraisal. The intermediate comparator (IC) is a critical component of the CBC, given it will be appraised alongside the Emerging Preferred Option ('EPO') and the 'Urban Minimal Investment' growth option. In relation to street-running light rail, Initial significantly divergent topics from the EPO are as follows:

- This option offers a lower cost solution, with lower upfront carbon emissions.
- This option has lower speed and capacity potential compared to the EPO.
- No major tunnelling is required for this option, given it would primarily run at street level.
- Significantly lower upfront costs, but higher upfront OpEX.
- Significantly different ability to provide access to opportunities due to slower operations.
- Significantly reduced operational capacity compared to EPO due to mixed operations. Significantly reduced ability to support RTN integration (AWHC & NW).
- Significantly longer journey times due to street running operations.
- Significantly greater deliverability challenges due to surface operations.

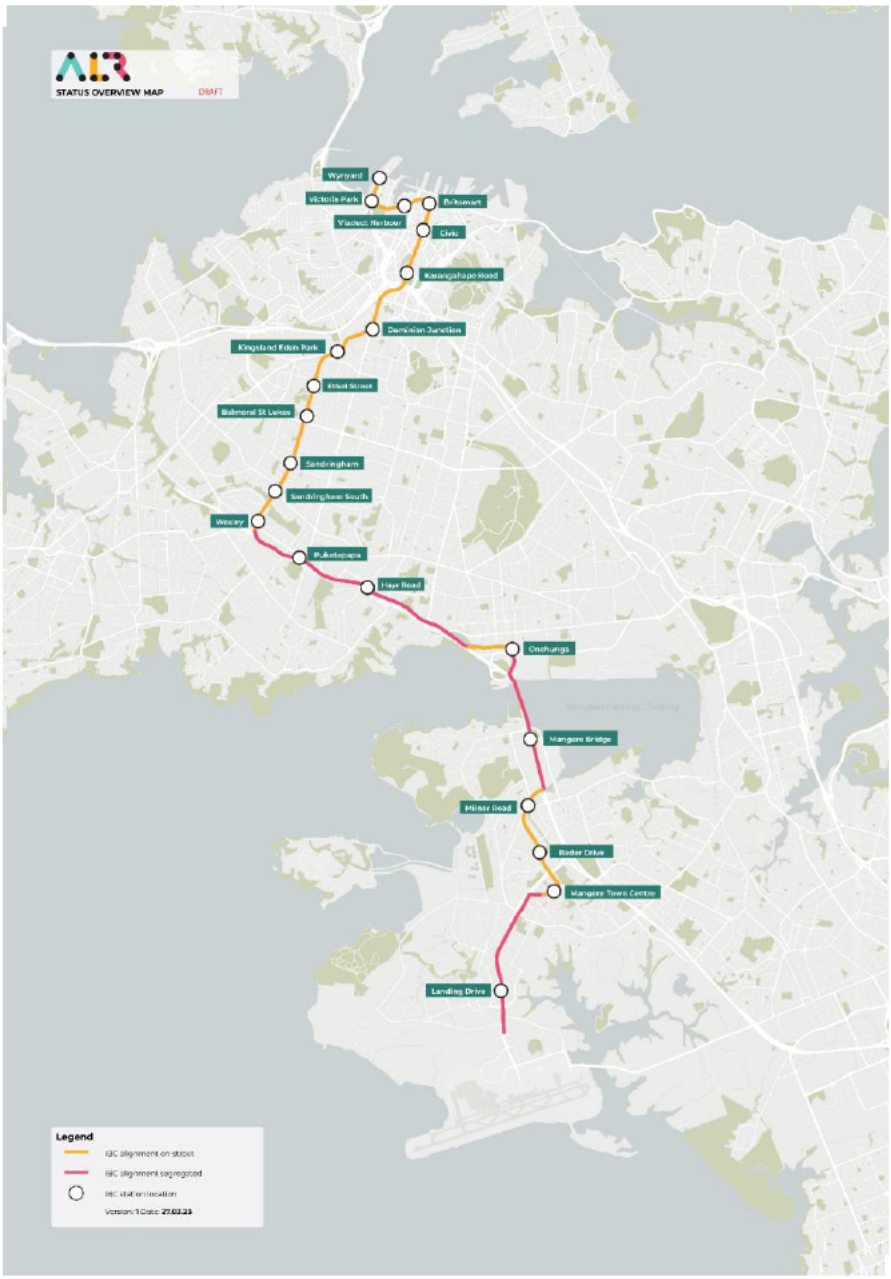


Figure 2.c.1- 1 IBC Intermediate Comparator

2c.2 Optimising the identified intermediate comparator

Optimisation of the intermediate comparator

In order to align to the guidance defined within Better Business Case, Waka Kotahi, and NZ Treasury guidance, the assessment for section 2c.2 of the optioneering process has been assessed as follows:

- Step 1: Confirmation and refinement of the existing baseline.
- Step 2: Completion of technical assessment updates.
- Step 3: Confirmation of the emerging IC.
- Step 4: MCA assessments of IC.

Confirming the baseline

Following the publication of the IBC and the shortlist of options presented, the street running rail option provided the most realistic comparator to the EPO. This approach is necessary for input into the CBC to define clear differing outcomes between the EPO and IC as opposed to providing a choice of equals.

Like other components of the business case, the EPO has been subject to an optioneering process. Through this process, a series of key assumptions and requirements have been defined. The IC should also be aligned to this baseline as much as is possible. This approach has been taken in order to ensure that the IC is an accurate divergent comparator of the EPO.

A summary of the agreed key requirements for the IC are set out in the table below, with accompanying justification. These have been developed through this optioneering process, or were previously defined through the IBC. They have also been subject to further refinement, as set out throughout the remainder of this section.

Summary of Key Requirements for Scheme Definition

Topic	Requirement	Justification and Approach
Southern Terminus	The route will terminate at the Airport.	An airport terminus was defined within the CC2M corridor as set out with the IBC's strategic case and to match the EPO alignment. This decision reflects major employment opportunities around the airport business precinct.
Depot	The depot is to be located at Onehunga, resized for fleet and review of access arrangements.	The selection of the Onehunga depot location was based on extensive MCA assessment for the EPO. The primary reasons for selection were not rail mode specific and so for comparison, the same location will be assumed for the IC, requirement for facilities have been reviewed.
Land use assumptions	LUTI modelling as per the EPO.	The different alignment, station locations and overall slower journey time will affect the accessibility impacts of ALR and

Topic	Requirement	Justification and Approach
		subsequent land use response, which is central to future patronage demand. For these reasons land use modelling has been undertaken for the IC.
Network (Demand) modelling	Demand modelling has been repeated for IC specification, calculated with alignment, stops (20/30/40s dwell times based on forecast patronage), journey time and vehicle specification inputs (Slot 24B).	Population figures, land-use assumptions and forecast years have changed since the IBC. The IC uses station locations and alignment that differ from previously modelled ALR schemes. As a result, the journey time and demand response will differ.
Staging	Construction of the route will be in a single stage.	Review considered that while feasible, there is little driver to deliberate staging from either an industry capacity or affordability/cashflow perspective. Opening of a complete scheme will result in significantly higher accessibility and benefits particularly for southern areas of the route without major delay in comparison to a staged opening.
North Shore connection	Passive provision at Wynyard is included to ensure future connectivity opportunities.	The route and northern terminus at Wynyard provides potential for extension of the CC2M route. It is assumed any North Shore route would operate as the new northern terminus, i.e., there would be no increase in the assumed operational limit of 15 trains per hour (element 4).
Northwest connection	No provision for Northwest Rapid Transit Network.	A connection to the northwest corridor would require a mid-route connection to the ALR CC2M route with shared running for the portion of the route. Due to assumed operational limit of 15 trains per hour (element 4) it would not be possible to provide sufficient capacity for two RTN corridors to share infrastructure. It is noted that as of November 2023 the emerging preferred option for the northwestern corridor is a bus-based provision.
Vertical alignment	The vertical alignment will follow the IBC and EPO. The IBC alignment will be followed on Queen Street and Dominion Road. For the section of the route from Puketāpapa to Onehunga vertical alignment will be reconsidered to take advantage of the greater gradient capability of Light Rail Vehicles using a desirable maximum gradient of 7% and an absolute maximum gradient of 8.5%. For the section of the route from Onehunga to Airport vertical alignment has been reconsidered only for IC specific sections of design, notably around Mangere Town Centre.	The increased gradient capability of Light Rail Vehicles enables different design solutions to be considered for sections of the route where there are significant natural topographical features or the need to cross other infrastructure. IBC Option 1B previously considered vertical alignment for LRV operation on the section of route from Wynyard to Puketāpapa but LRV operation has not been considered for the section of the route adopted from the EPO from Puketāpapa to Airport.
Microsimulation Modelling	No microsimulation modelling for the IC.	Operation of on-street sections is consistent with IBC microsimulation modelling, namely service frequency and approximate vehicle specification, therefore findings will be assumed to be consistent with that work.

Table 2.c.2- 1 Summary of Key requirements taken from IBC and EPO

Option Refinement

Following confirmation of agreed key requirements developed during the IBC and optioneering process, a series of additional topics were identified for further option refinement. These topics became apparent as a result of new knowledge and issues identified in the process to date and to therefore ensure a fair comparison of the IC. These topics were discussed at a series of workshops which included representatives from relevant disciplines.

Topic	Requirement	Justification and Approach
Northern Terminus	The location of the Northern Terminus would be located at Wynyard.	This approach aligns to the overall project limits and the scoped defined within the EPO.
Train Fleet	66m LRT vehicle comprised of two coupled 33m units. For capacity and operational assessment, the assumed specification is equivalent to the Citadis X05 class (currently operating on Sydney's L2/L3 Light Rail) with a maximum capacity of 48 seated and 185 standing (@ 4ppm^2) totalling 466 pax per 66m vehicle. 750 VDC traction power with full route overhead electrification (excluding any consideration at this stage of the airport designation and any AIAL requirements).	The IBC considered trade offs of meeting urban outcomes with transport capacity needs. A 66m long vehicle is considered to balance impacts on property, operations and traffic. 750 VDC overhead electrification can facilitate on-street operation and is a proven technology with lower costs than proprietary or battery powered catenary-free solutions.
Operations	- 15 trains per hour as a maximum feasible frequency with full signal priority at all intersections. - Maximum speed in operation of 63km/h (based on alignment limitations). - Stop dwell time of 20/30/40 seconds (related to forecast patronage).	Previous modelling demonstrates difficulties in managing the overall road network at headways below 4 minutes – due to changes to standard cycle times and disruption to cross-street traffic. An increase in frequency to 20 trains per hour / 3 minute headway without priority is not compatible with cycle times, given it introduces variability, increasing journey times and potential bunching.
Horizontal Alignment	The horizontal alignment of the IC is as follows: • Wynyard to Puketāpapa – As per the IBC, with on-street running • Puketāpapa to Te Ararata – As per the EPO, with the exception of short linking sections and the approach to Onehunga where the IC route runs on-	From Wynard to Puketāpapa the IBC alignment represents a direct route between stop locations that can be achieved largely within existing highway land, minimising property impact. For the remainder of the route the EPO alignment has been the subject of development both in terms of identifying preferred station locations and the design of a preferred alignment between them. It has therefore been adopted for the IC, however opportunity for vertical alignment variation using the gradient ability of LRVs has been considered (see section 16). The IC route is therefore a combination of both the IBC and EPO alignments.

Topic	Requirement	Justification and Approach
	street to an alternative station location. • Te Ararata to Māngere Town Centre – As per the EPO, with the exception of a diversion to serve an alternative Māngere Town Centre station location. • Māngere Town Centre to Airport – As per the EPO, with the exception of a diversion to serve an alternative Māngere Town Centre station location.	This response also considers consultation feedback and wider factors including property impact, interaction with other transport modes and major utilities routes. The resulting alignment offers improved accessibility to Māngere Town Centre in comparison to the EPO (but with impact on overall journey time).
Stop Locations	21 stops locations based on whether the alignment section is IBC, EPO or IC specific (see Figure 4-1). Additional stop count (above the EPO) are in the Wynyard to Puketāpapa section.	From Wynyard to Puketāpapa stop locations are consistent with the IBC option. Review considered proximity of stops in Wynyard/Victoria Park/Viaduct Harbour/Britomart section and also Milton Road/Lambeth Road section in terms of journey time impact but as a result of improved accessibility, low operating speeds and no impact on alignment all stations were retained. From Hayr Road to the Airport stop locations are as for the EPO option with the exceptions of Onehunga and Māngere Town Centre which are in IBC locations.
Stop Design/size	70m platforms are assumed to serve 66m low-floor vehicle. On-street stops to be accessed from street including at grade-track crossings. Access to stops on sections of separated running to match EPO access arrangements with grade-separated track crossings. Assumption of no Platform Screen Doors (PSD's).	The length of the platforms will match the LRV – plus the inclusion of access ramps at each end of the platform. For on-street stops where vehicle speeds are typically low, at-grade access provides ease of access/egress and can be more readily accommodated in the streetscape. For separated sections where vehicle speeds are higher, grade-separated access arrangements will provide improved safety and access/egress from either side of the SH20/SH20A motorways for both passengers and other active mode trips. As defined within the IBC – the stations will not incorporate any gate lines or PSDs.
Cross Section – LRT	IBC cross section for on-street, EPO cross section for separated sections. Assume that for on-street sections LRT would operate on raised, dedicated area of roadway with kerbs to improve traffic separation.	The space required for LRT operation is mainly determined by the kinetic envelope of vehicles. To ensure priority and reliability it is intended that this space would be dedicated except for intersections or stations where access to shared sections would be controlled with traffic signals. Where the IC operates on separated sections, the route corridor width used for the EPO has been assumed, as these sections are typically adopted from the EPO alignment (see element 5). The cross section for both on-street and separated sections will enable overhead electrification masts to be provided within it.
Cross Section –	Two cross-sections for on-street running have been considered:	Where the IC alignment operates on-street it will follow existing public road corridors, bounded to either side by private ownership (often buildings).

Topic	Requirement	Justification and Approach
LRT on-street	- Desirable minimum width of 25.0m, requiring intermitting land/property take with the renewal of all utilities, retained traffic lanes, cycle lanes and footpath widths of 2.5m. - Minimal width of 20.0m where 25.0m would have an overall negative impact. This would include the renewal of all utilities retained traffic lanes, footpath widths of 3.5m but no cycle lanes, street trees or furniture.	Design work undertaken at the IBC stage considered the trade-off between the AT Transport Design Manual standards and the space available along the IC alignment and proposed a range of cross sections with differing widths to understand the trade-offs between space and the facilities which could be accommodated. The property impact has been investigated for both (1) a consistent 25m corridor and (2) a 25m corridor which pinches to 20m where there would otherwise be extensive sections of significant impact on existing buildings – specifically in town centre locations along the corridor.

Table 2.c.2- 2 Summary of additional requirements through option refinement

Final IC requirements and assumptions

Following the outcome of the reviews and workshop, the following assumptions therefore form the recommended way forward for the IC:

Topic	Requirement/Assumption
Southern Terminus	The route's southern terminus is at the Airport.
Northern Terminus	The route's northern terminus will be at Wynyard.
Fleet	66m long LRT trains, comprising 2x coupled 33m units with a maximum capacity of 48 people seated and 185 standing, totalling 466 people per 66m train.
Operations	Adoption of a full signal priority to maximise capacity (15 trains per hour / 4 minute headway) with maximum speed in operation of 63km/h.
Horizontal Alignment	Street running from Wynyard to Puketāpapa via the IBC alignment, primarily off-street from Puketāpapa to the Airport via the EPO alignment with on-street diversions in Onehunga and Māngere Town Centre.
Stop Locations	21 stops – consistent with the IBC alignment from Wynyard to Puketāpapa, and consistent with the EPO from Puketāpapa to the Airport with the exception of Onehunga and Māngere Town Centre.
Stop design/size	70m platforms to serve 66m long LRT trains, accessed from street including at-grade track crossings.
Depot	The depot will be located at Onehunga, resized for fleet and review of access arrangements.
Land use assumptions	LUTI modelling repeated for the IC specification.
Network (demand) modelling	Demand modelling repeated for the IC specification.
Staging	Construction of the route will be in a single stage.
Cross Section - LRT	EPO cross-section for grade separated route sections. Street-running sections would operate on raised, dedicated areas of roadway with kerbs.

Cross Section – LRT on-street	Street-running sections would operate on raised, dedicated areas of roadway with kerbs, and two possible widths depending on context – a desirable minimum of 25.0m and minimal of 20.0m.
North Shore connection	Passive provision at Wynyard is included to ensure future connectivity opportunities.
Northwest connection	No provision is made as it would not be possible to provide sufficient capacity for two Rapid Transit Network corridors to share the same infrastructure. It is also noted that as of November 2023 the emerging preferred option for the Northwestern Corridor is a bus-based option.
Vertical alignment	The vertical alignment will follow the IBC and EPO.
Microsimulation modelling	No microsimulation modelling for the IC.

Table 2.c.2- 3 : Final IC requirements and assumptions

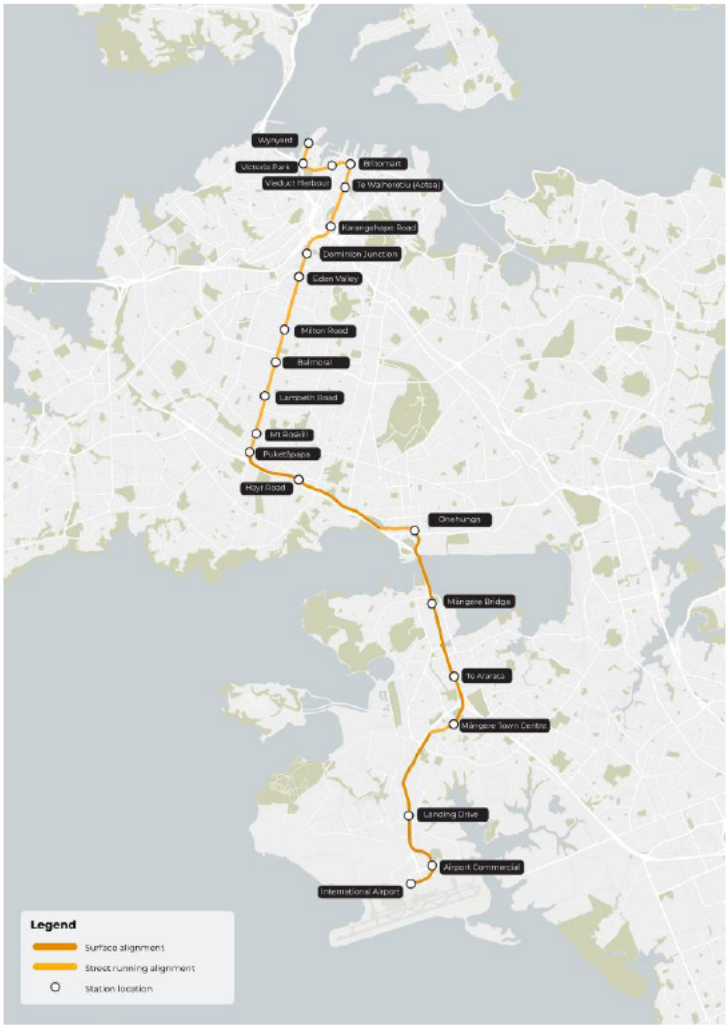
These requirements and assumptions allow for the relevant technical assessments and models to be updated accordingly. This signifies an evolution of the IC from its original inception defined in the IBC and to reflect the optioneering process of the Emerging Preferred Option.

Further details of the IC's technical specification and the rationale for this is set out in the Intermediate Comparator Technical Note, Appendix 2C.A.

2c.3 Complete Intermediate Comparator Option

After the review of key assumptions and requirements the updated complete Intermediate Comparator Option was identified. This option is shown below.

Intermediate Comparator – Street-Running Light Rail



Phase 3: Urban Response Optioneering

9.1Introduction

ALR CC2M is a combined Transport and Urban investment intended to address an interlinked set of Transport, Urban and Carbon problems.

Phases 1 and 2 of this report have set out the process of establishing the optimal Transport Investment (defined as the 'Emerging Preferred Option'[68]' 'EPO') to meet the ILM Objectives for the project. This third phase sets out the urban development implications that could occur as a result of the Transport Investment, and considers different choices that can be made to select growth options.

The Transport investment alone can be expected to trigger a degree of urban uplift, in response to the improved accessibility it delivers. However, this investment in the ALR CC2M corridor also has the potential to be linked to commensurate urban investment, with the opportunity to deliver improved urban outcomes to the benefit of Auckland and its residents. This could deliver even more growth.

As such, it was agreed to develop a range of urban growth options for the economic case assessment, and complete a shortlisting process of these. This is referred to as the 'Urban Response' of the project[69].

The methodology followed throughout the urban optioneering process is set out in Section 3 below, with the outputs forming the remainder of Phase 3. In summary, the following main steps have been followed:

- The development of different options for the quantum of growth and the spatial distribution of growth throughout the CC2M Corridor – informed by wider work understanding the urban context of the Corridor.
- An analysis of requirements for urban enabling infrastructure arising from the different potential growth options, and hence the scale of investment required.
- Consideration of what intervention measures might be necessary to achieve the higher quantums of growth, in addition to the Transport Investment.

[68] The IC was not considered as a part of the urban response because the urban optioneering uses the EPO as its starting point.
[69] **Disclaimer:** Mana Whenua have not reviewed this Chapter of the Optioneering report due to time constraints. The Te Tiriti Partnerships team have reviewed and provided some placeholder text to support future engagement with Iwi leaders. In terms of costings for the Te Tiriti Partnerships inputs, these can be developed in partnership with the ALR Te Tiriti Partnerships team.

- A process of refinement of the urban enabling infrastructure and intervention requirements, as well as modelling of urban capacity to ensure that the growth options could be delivered in practice.
- Shortlisted options have fed into the assessment in the Economic Case.

Urban interventions are inherently different to transport investment interventions. They are centred around being able to realise wider urban benefits, including realising the benefits of the transport investment sooner by accelerating growth. Outcomes from urban interventions are typically cumulative and the use of interventions happens via an iterative process – potentially comprising large interventions and/or a series of small interventions over a longer period of time. As a result, any interventions can become more adaptable as the parallel transport investment takes place and the needs of the CC2M corridor evolve over time.

The infrastructure interventions considered in Phase 3 are a part of ALR's overall urban response, alongside the wider urban measures which will be set out further in the Corridor Strategies and Provisional Catchment Development Frameworks (PCDFs) in due course.

Please note: Mana Whenua content developed in partnership with the ALR Mana Whenua Kaitiaki Working Group is yet to be integrated into this report. When the project proceeds, ALR will need to review this information to ensure it is up to date and aligned with current mana whenua considerations. Mana Whenua have not provided feedback on this deliverable. Further engagement is required.

Te Tiriti o Waitangi

The ALR CC2M investment is governed by expectations and principles that reflect Te Tiriti o Waitangi, and bring an expectation for partnership with Māori. For all growth options and potential urban interventions, there will be a range of opportunity to partner with Māori in various ways, and at varying scales.

For this report, the focus on options and interventions is at a level that does not contemplate how they would be implemented, but rather, what the potential options and interventions could be. It is assumed that in all cases, any approach to pursue growth options and interventions would be in the spirit of partnership, and reflective of the expectations and principles of Te Tiriti.

The Principles of Te Tiriti o Waitangi relevant to this proposal include:

(a) **Rangatiratanga** – the duty to recognise Māori rights of independence, autonomy and self-determination. This principle empowers Māori to determine and manage matters of significance to them.

(b) **Partnership** – the duty to interact in good faith and in the nature of a partnership. This includes a sense of shared enterprise and mutual benefits; where each partner must take into account the needs and interests of the other.

(c) **Active protection** – the duty of the Crown to proactively protect the rights and interests of Māori, including the need to build Māori capacity and capability.

(d) **Mutual benefit** – the need to recognise that benefits should accrue to both Māori and non-Māori, and that both must participate in the prosperity of Aotearoa.

(e) **The Right of Development** – recognising that Treaty rights are not confined to customary uses or the state of knowledge as at 1840, but include an active duty to assist Māori in the development of their properties and taonga.

Background

As part of the Investment Management System (IMS) scope and expectations in June 2022, it was recommended that further work and investigation be carried out to understand how transport improvements can be integrated with urban development to create conditions which would fully realise the urban outcomes sought by the project (i.e. wider urban benefits). This included '*presenting different options around zoning densities and housing along the corridor, as well as local bulk infrastructure investment*'.

As a result, the Corridor Business Case (CBC) has sought to understand and identify a suite of complementary integrated urban response investments which can be delivered alongside transport investments to increase the achievable benefits, including acceleration of growth and the delivery of urban enabling infrastructure. The urban response is accompanied by the Corridor Strategic Framework (CSF) in providing the strategic direction for the urban outcomes sought by the project, an analysis of areas with the greater potential for large-scale urban change, and a general background to the urban context of the ALR corridor. However, any investment decisions that are made will sit within the CBC.

Taking the above into consideration, the rationale and approach to develop the best way forward for an urban response necessarily differs when compared to transport interventions.

Overview of approach

Taking the EPO as a starting point (output of Phase 2), the urban response [optioneering] phase has identified two shortlisted options for urban intervention which have been fed through to the economic assessment of the CBC. The two options also guided the emerging catchment brief requirements for the Provisional Catchment Development Frameworks (PCDFs) for each of the stations in the corridor.

In order to determine two shortlisted options, five potential growth options (Urban Minimal Investment, together with four additional options) were developed and assessed. As part of this exercise an assessment of monetary costs has been developed, relating to defined:

- Urban enabling infrastructure categories; and
- Anticipated urban intervention categories – physical, financial, planning and coordination.

Theoretical capacity modelling (both 2D and 3D) was also undertaken to assess the theoretical supply of development capacity within each station catchment, and

therefore the ability for these growth options to be achieved. The final options, and their associated costs, are presented in section 5.7. The approach can be broadly defined as follows, but a more detailed overview to the methodology is available at Section 4.

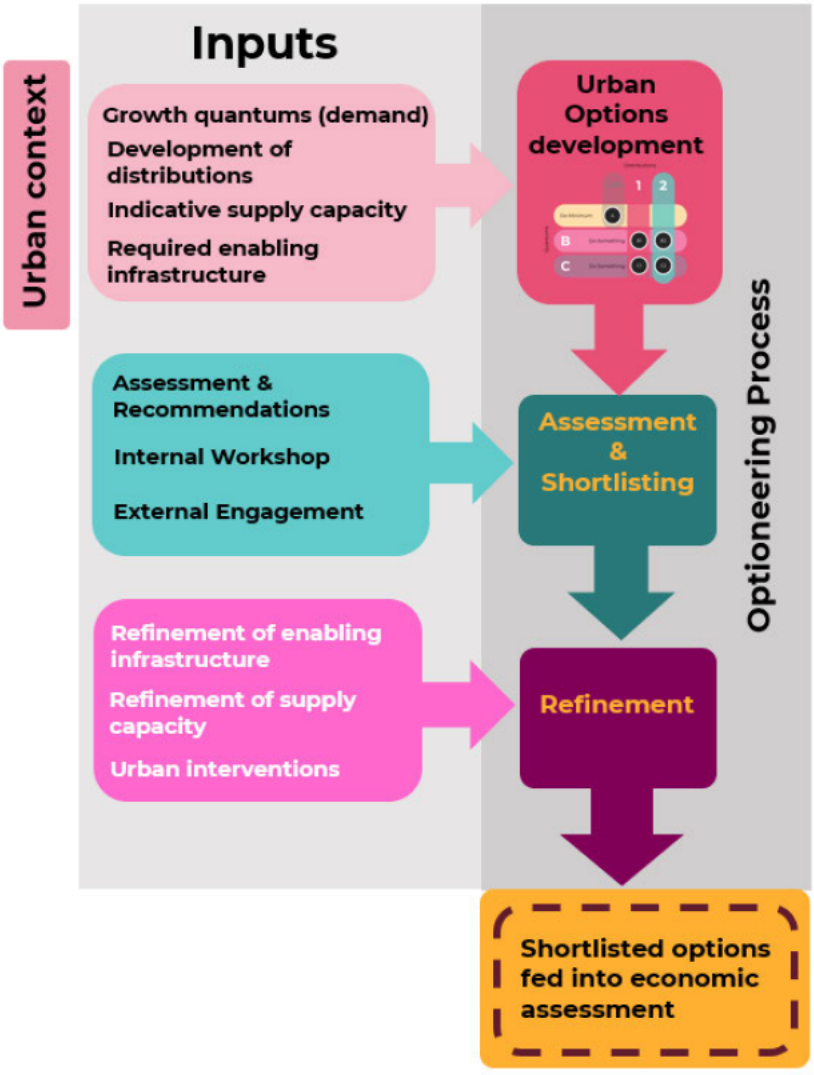


Figure 3-0-1-1 Summary of urban response optioneering

Following the identification of the two shortlisted options and their economic assessment modelling, the Urban Minimal Investment Option will be modelled to steer the outcomes of the financial and commercial case – which sit in the wider suite of documents of the CBC. This approach would be undertaken given any other options would be subject to future investment decisions (e.g Urban DBCs).

Framework and Context

As referenced in Section 0.3 of this report, the optioneering process has aligned to an extensive urban and transport evidence base. For the urban response in particular, much of this detail sits within the Corridor Strategic Framework ('CSF'), set out below.

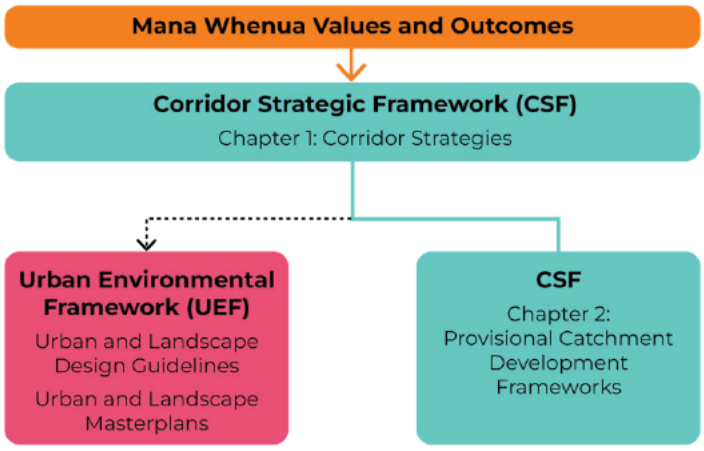
The Mana Whenua Outcomes Report outlines the mana whenua context in Tāmaki Makaurau at a corridor wide level, setting the overarching values and outcomes sought by Mana Whenua in Tāmaki Makaurau as part of the delivery of ALR.

Mana Whenua Urban Outcomes Report

The Mana Whenua Urban Outcomes Report is intended to sit above the CSF informing the seven Corridor Strategies and PCDFs.

The Mana Whenua Outcomes Report outlines the mana whenua context in Tāmaki Makaurau at a corridor wide level, setting the overarching values and outcomes sought by Mana Whenua in Tāmaki Makarau as part of the delivery of ALR.

It has also been prepared to inform the Urban Environmental Framework (UEF) and Cultural Urban and Landscape Design Guidelines (CULDG) developed as part of the Notices of Requirement.



Corridor Strategic Framework

The Corridor Strategic Framework (CSF)[70] (version 1) sets out the future vision and aspiration for the transformation of the ALR Corridor.

The CSF outlines how ALR can contribute to a thriving Auckland by delivering better community outcomes, creating jobs and employment opportunities, driving economic growth and creating improved environmental outcomes across the corridor.

The CSF will guide the realisation of ALR's desired urban outcomes over a 20-30 year timeframe.

Version 1 of the CSF is made up of three parts including:

- The Vision Statement;
- The Corridor Strategies;
- The Provisional Catchment Development Frameworks (PCDFs); and
- The Context Analysis Report.

Subsequent versions will also include an Implementation Plan.

The outputs of the urban response process will subsequently guide the catchment brief requirements and the further development of the PCDFs.

Corridor Strategies

Each of the Corridor Strategies[71] work together to form a holistic and multi-disciplinary framework for the ALR corridor. Each strategy is discipline specific, but must be understood as an integrated group which works together to drive ALRs urban outcomes as a whole. The purpose of each Strategy is outlined below:

Strategy	Purpose
Environmental Sustainability	To protect and restore the ecosystem of the corridor, improving the quality of nature and human life, create climate positive and low carbon outcomes and encourage a regenerative and circular approach to development.
People and Communities	To illustrate and optimise the benefits and access to opportunities that ALR can enable for mana whenua, Māori and all communities and contribute to a more liveable, equitable, socially cohesive, and resilient communities.
Economic Ecosystems	To set a clear and transformational economic development vision that will identify implementable actions to enable inclusive and sustainable economic growth.
Built Form	To ensure a compact built form that enhances the unique landscapes of Tāmakai Makaurau and creates high quality urban environments
Public Realm and Open Space	To provide strategic direction for linewide excellence in public realm and open space outcomes with the unique cultural, urban and landscape context of Te Terewhiti ki Tāmaki Makaurau – Auckland.
Local Movement Network	To enable low carbon urban mobility by optimising multimodal access to ALR stations for the highest number of people.
Urban Infrastructure	To support urban regeneration opportunities through the efficient and sustainable staging of urban infrastructure investment and delivery.

Table 0-1-1: Overview of corridor strategies and their purpose

[70] Appendix 3.A.A – Corridor Strategic Framework (v1)
[71] Appendix 3.A.B – Corridor Strategies

As part of the background to these strategies, the Context Analysis Report (CAR) also defined the evidence base which steered the direction of travel for each of the Corridor Strategies.

Context Analysis Report (CAR)

The evidence base compiled and accessible through the CAR[72][73] covered and extended beyond all three investment objectives identified in the ILM, and provided a huge breadth of background information and analysis for the ALR project. The CAR is a living document and GIS portal which was updated over time as and when new evidence and information came to light. The spatial structuring of the CAR ensured the evidence and information is considered at city, corridor and catchment levels.

Developing this content informed the understanding of the spatial distribution of ALR's urban opportunity and realisable urban benefit through all phases of the optioneering process.

Interaction with the wider Business Case

The urban response has informed the economic assessment within the CBC. It also assisted in defining anticipated population, household and employment growth growth options in order to inform catchment requirements for each of the PCDFs.

In the context of the above, the urban response discussed in this chapter takes note of, aligns and integrates an urban led method which provides direction in developing the approach of Phase 3 of the optioneering methodology as a whole.

3.2 Methodology

Overview

The main objective of Phase 3 of the optioneering process was to identify two urban response options, and for these to then be inputted into the economic assessment. It was recognised that an uplift in population along the corridor would result in an increase to the level of investment necessary in enabling infrastructure (services such as water, power and other assets) to facilitate any future urban uplift and improve urban outcomes along the corridor. In this regard, the urban response methodology was developed with the key aim of understanding what additional investment (if any) is needed to achieve the outcomes of the ILM, and what additional intervention could be required to accelerate growth.

The options presented define a series of population, jobs and household assumptions for growth and spatial distributions within the ALR corridor. These options were subsequently articulated into a range of enabling infrastructure

[72] Please note: Mana Whenua were not engaged on the development of the CAR, due to it predominantly being a desktop analysis of publicly available information. Further engagement is needed with Mana Whenua to reflect the feedback ALR have received through engagement, Cultural Values Assessments, relevant Treaty Settlement legislation and other Iwi Planning Documents.
[73] Appendix 3.A.C -Context Analysis Report

category investments which would best enhance outcomes from the transport investment.

It was also recognised that physical, financial, planning policy and governance settings would also be necessary to review in order for sites to be unlocked in anticipation for development within the corridor to realise the full urban uplift potential. The EPO (output of Phase 2) was taken as a starting point.

In outline, the urban response optioneering process was as follows:

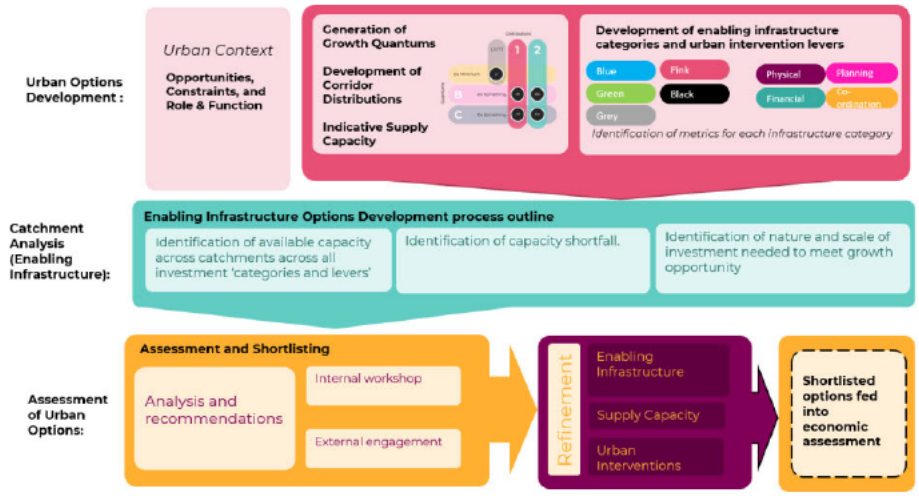


Figure 0-2-1 - Urban Response Optioneering methodology diagram

The following sub-headings define the overarching methodology taken, with full detail being found in Appendix 3.A.H of this report.

Generating the Growth Options

Opportunities, Constraints, Role & Function

As set out in section 3.2, understanding the wider urban context of ALR set the foundation for anticipating the need for improved urban outcomes within the corridor and more broadly for Auckland. In particular, an urban led understanding of the existing baseline information of ALR allowed for the urban optioneering methodology to be further developed.

In referring back to the CSF, an analysis of opportunities, constraints, role and function of each of the stations and their catchments were completed. These are defined within the context analysis report, developed on a station-by-station basis. Through developing this understanding of place characteristics, there was a process of highlighting focus areas of urban intervention for enabling infrastructure – such as improvements to public open space, water services and others. These overarching

requirements were then turned to metrics for urban enabling infrastructure categories, forming part of the methodology of the urban response (see Section 4.2).

In order to further develop and focus upon specific areas within the corridor, six key regeneration focus areas were identified:

- City Centre (Wynyard, Te Wai Horotiu, Universities)
- New North Road Corridor (Dominion Junction and Kingsland)
- The Balmoral Mile (Balmoral and Sandringham South)
- Te Auaunga Awa (Wesley, Puketāpapa and Hayr Road)
- Onehunga (Onehunga and Depot)
- Māngere (Māngere Town Centre and Te Ararata)

The identification of these areas were further guided by the issues and opportunities which emerged through feedback by mana whenua including constraints relating to Sites of Significance, Viewshafts and Height Sensitive Areas).

These areas were identified as priority locations by the urban team, and form part of the wider urban context of the ALR corridor. These are spatially represented on the map below:

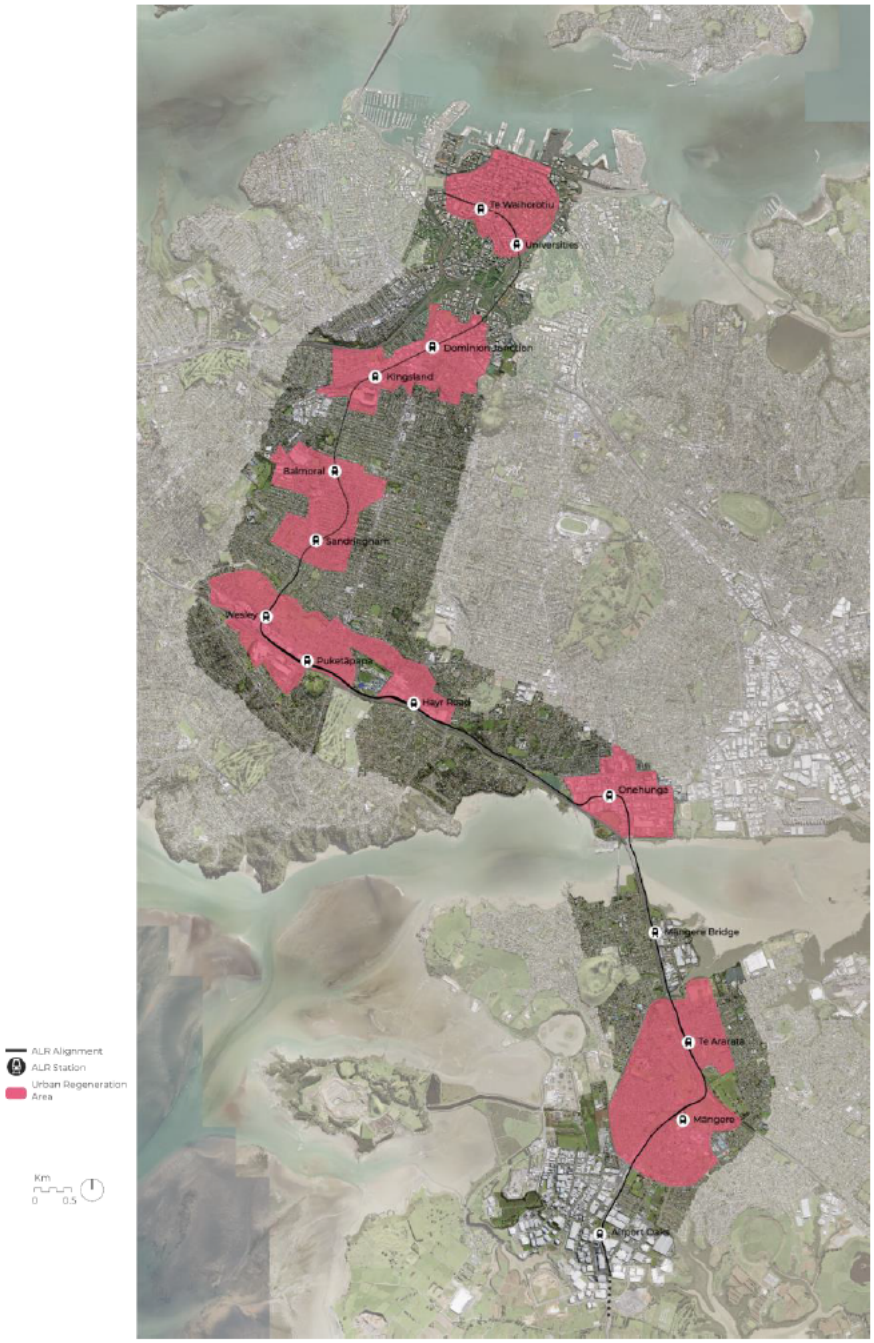


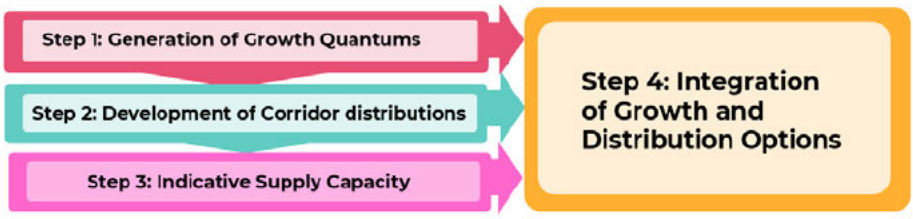
Figure 0-3-2 CC2M Corridor Regeneration Focus Areas

The six priority areas are formed around the 800m walkable catchments of station locations. The areas identified represent significant public, mana whenua, and private sector urban regeneration opportunities, and opportunities for mana whenua involvement in urban delivery across the corridor. The areas have been grouped based on a number of factors including:

- Proximity, including overlapping catchments,
- Identification of mana whenua opportunities and/or constraints,
- Underlying urban structures, such as existing centres, waterbodies and infrastructure, and
- Urban activity including economic, residential, commercial and retail opportunities.

Development of Growth/Distribution options

The ALR urban response optioneering considered a series of different population, household and employment options for the future growth and corresponding spatial distribution along the corridor. This resulted in a total of five options. The steps taken to develop these can be broadly defined as follows:



Step 1: Generation of Growth Quantums

The quantum and distribution of growth for the 'Urban Minimal Investment Option[74]' in 2051 was taken directly from the Land Use Transport Interaction (LUTI) modelling of the EPO in 2051. This identified a likely urban response to the accessibility improvements delivered by the scheme, without accounting for any further intervention directly designed to support urban uplift.

The growth quantums for the 'Incremental Investment' and 'Active Investment' growth options were established by bringing forward either some or all of the additional growth identified in the 2065 LUTI outputs. This is shown in the figures below:

[74] Please note: The 'Urban Minimal Investment Option' should not be compared to the 'Do Minimum' associated with the transport investment ('Transport Do Minimum'). These refer to two different outcomes ('Urban Minimal Investment Option' = with ALR built, 'Transport Do Minimum' = No ALR built)

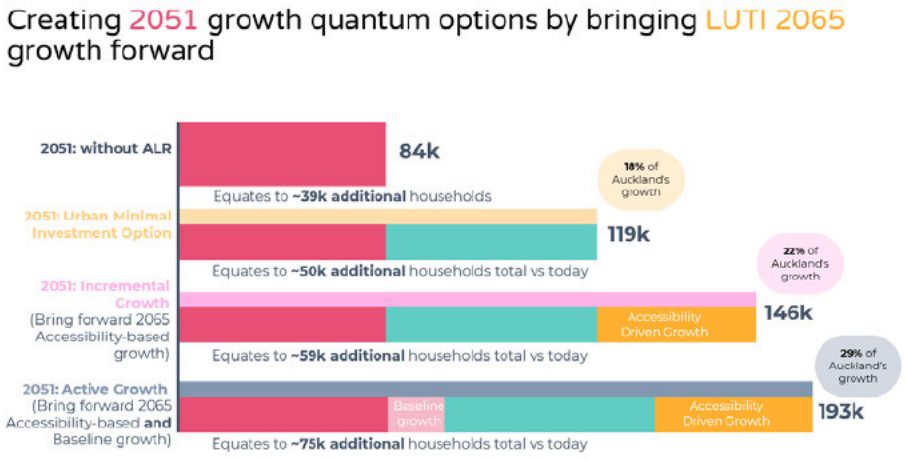


Figure 0-4-3 Approach to growth quantums

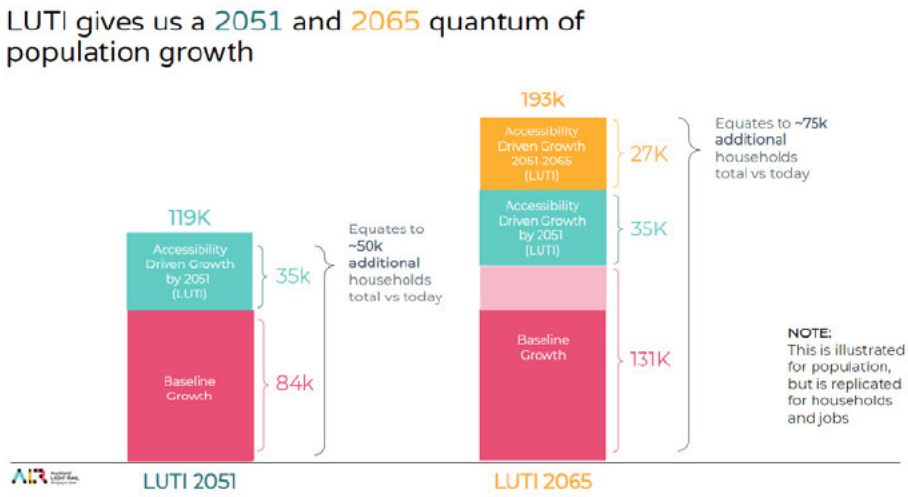


Figure 0-5-4: Breakdown of growth quantums

Step 2: Development of Corridor distributions

Two potential distribution approaches were then applied for the 'Incremental Investment' and 'Active Investment' growth options, to allow for the consideration of variation in the future urban growth pattern.

Distribution 1[75] focussed on growth which would incur as a result of improved accessibility from ALR (as modelled by LUTI[76]). LUTI modelling followed the

[75] See Economic Case appendix CBC E-F
[76] Appendix 3.A.D – LUTI-derived growth quantum explanatory note

traditional method of analysing how much additional population, household and employment growth could be realised solely by investing in rapid transit. Although transport distributions of growth are valid and reasonable, they often don't reflect all planned investment in urban development projects.

In contrast, Distribution 2[77] was developed to take account of known opportunities identified in strategic growth plans, such as the Auckland Plan 2050 Future Development Strategy, as well as areas where the project has high urban development ambitions along the corridor. By aligning with existing strategies and plans and focusing on greatest urban opportunity, Distribution 2 supports the implementation of key urban policy in Auckland and provides greater opportunity to achieve broader urban outcomes.

The map on the following page shows the urban development areas or, spatial priority areas, in Auckland Council's draft Future Development Strategy. The areas identified are commensurate with known Kainga Ora and Eke Panuku development plans and priority areas.

Distribution 2 used this map to manually amend the transport distribution of growth across the corridor. As the draft Future Development Strategy does not comment on the quantum of growth anticipated in the spatial priority areas, the amount of growth allocated has been informed by using information provided by Kainga Ora on the Large-Scale Projects in Mangere and Onehunga as well as information from the City Centre Masterplan and Eke Panuku's plans for Onehunga. Additional to this is ALR's and Auckland Council's aspiration for large scale urban regeneration at Dominion Junction.

This modelling approach to Distribution 2 was agreed at a workshop with workstream leads[78], where it was concluded that the two distributions offered a sufficient difference in population, household and employment distribution approaches to feed into and develop 'valid' options for urban response shortlisting. For the purposes of this work, a 'catchment' or 'station catchment' is defined as a walkable catchment of a c.800m walking radius (or 10 minute walk) from each of the station NOR boundaries. These catchments were provided by Auckland Council.

[77] Please see Appendix 3.A.D for Distribution 2 background evidence
[78] Appendix 3-A-E – Workshop Meeting Minutes 3.08.2023

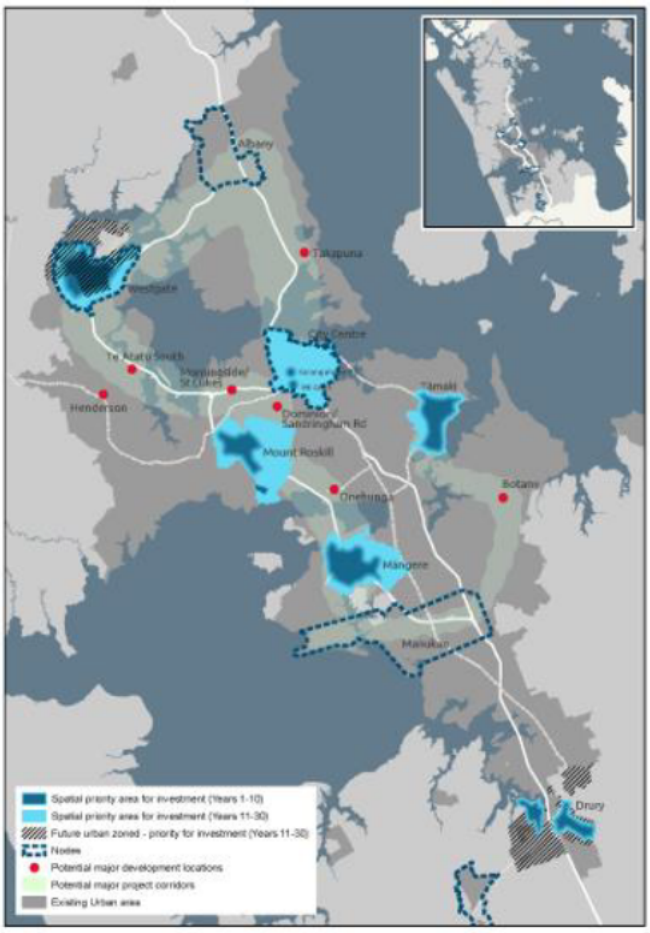


Figure 18: Spatial priority areas

Step 3: Indicative Development Supply Capacity

In addition to understanding the urban environment of the CC2M corridor, its constraints, opportunities and characteristics defined within the Corridor Strategic Framework, a 2 dimensional[79] lens was initially applied which focussed upon developing evidence of potential development land supply and its corresponding urban form. These details were developed through Catchment Capacity Analysis, prepared by PwC (taking a 2 dimensional approach to calculating capacity).

Later uplift modelling also took place (please see section 5.5) following the initial shortlisting process to further verify that capacity exists, and this utilised a 3

[79] A 2-dimensional lens means that capacity was calculated based on set parameters and are a function of parcel size, zoning, etc, in order to determine a potential GFA. This differs from a 3-dimensional approach, which calculates a hypothetical building envelope to determine potential GFA.

dimensional approach. This modelling was more targeted, focusing on key catchments.

Catchment Capacity Analysis

An analysis of potential development capacity[80], prepared by PwC, was completed as part of the urban response process to understand likely development capacity (potential supply) for anticipated growth around station catchments within the ALR corridor to meet anticipated growth options. This 2-dimensional approach focused on residential and business development capacity, testing the sufficiency of capacity (as at 2023) to accommodate future urban growth (demand).

The data informing this analysis was based upon and provided by Auckland Council's Rating Valuations Database and Auckland Council's assessment of Residential and Business development capacity.

This analysis provided an initial understanding of likely development capacity along the corridor, based upon the options presented.

Step 4: Integration of the Growth and Distribution Options

Following the above steps, the five growth options were built up as indicated on the figure below:

- **Option A:** Urban Minimal Investment Option
- **Option B1:** Incremental Investment (Distribution 1 – LUTI-driven growth)
- **Option B2:** Incremental Investment (Distribution 2 – Maximising urban potential)
- **Option C1:** Active Investment (Distribution 1 – LUTI-driven growth)
- **Option C2**: Active Investment (Distribution 2 – Maximising urban potential)[81]

[80] Appendix 3.A.F – ALR CC2M catchment capacity analysis v3 (dated 22nd August 2023)

[81] In early stages of the Urban Optioneering Process, the Urban Minimal Investment Option was referred to as 'Urban Do Minimum', the Incremental Investment Option was referred to as 'Do Something' and the Active Investment Option was referred to as 'Do Something Plus'. These previous names appear in any appendices which are records of discussions taking place at that time (such as workshop slides), but have otherwise been superseded.

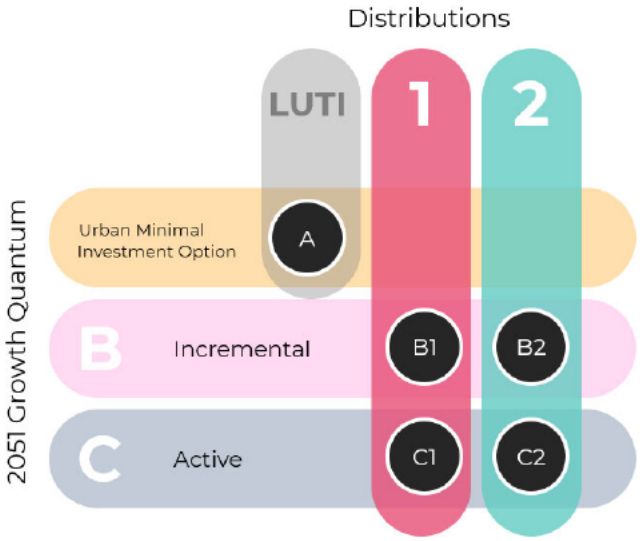


Figure 0-6-5 Urban response options matrix

All five options operate within a closed city context. This means that overall growth within Auckland by 2051 is assumed to be the same under each option, with a larger share of the overall total growth being assumed to be accommodated within the ALR corridor under the higher-growth options.

Please note, whilst not considered to be an actual 'option', the baseline case Transport Do Minimum 'Without ALR' (i.e the corridor without ALR being built within it) is also referenced throughout Phase 3 of this report. This acted as the baseline position for understanding the status of existing infrastructure capacity within a station catchment.

This comprised baseline levels of growth forecast within each catchment by LUTI, which would arise from current development trends and existing plans and strategies.

The five options are described as follows. Their corresponding growth quantums, presented numerically,[82] are expanded upon within the appendices to this report.

Option A – Urban Minimal Investment Option

This option comprises baseline growth forecast for each catchment forecast by LUTI, plus additional growth that will be driven by the increase in accessibility that results from ALR. This would comprise 18% of Auckland's growth to 2051. It is assumed that

[82] Appendix 3.A.G – Growth and Distribution Options - Spreadsheet

the delivery of development will otherwise be left to market forces – with no investment beyond ALR transport infrastructure.

[83]Station Catchment	2051 Population	2051 Households	2051 Employment
Wynyard, Te Waihorotiu and Universities	71,000	31,700	158,000
Dominion Junction and Kingsland	33,800	12,500	18,500
Balmoral and Sandringham	36,200	12,200	6,700
Wesley and Puketāpapa	33,900	9,900	5,000
Hayr Road	13,600	4,400	3,300
Onehunga	14,300	5,400	4,700
Māngere Bridge	7,600	3,000	2,700
Te Ararata and Māngere Town Centre	20,900	6,100	2,200
Airport Industrial	800	300	14,000
Airport Stations	2,300	700	29,000
Elsewhere in CC2M corridor	105,000	31,400	16,300
CC2M corridor total	339,500	117,600	260,400
Rest of Auckland	1,991,700	726,000	700,100
Auckland total	**2,331,200**	**843,600**	**960,500**

Table 0-2-1 Option A - Population, Household and Employment forecast

Option B1 – Incremental Investment, Distribution 1

The 'Incremental Investment' options assume that the 'Urban Minimal Investment Option' component of growth resulting from ALR's increased accessibility could be brought forward from 2051-2065, and occur prior to 2051. They would comprise 22% of Auckland's growth to 2051.

Distribution 1 would maintain the same pattern of growth forecast within each catchment by LUTI that informs the Urban Minimal Investment Option.

Station Catchment	2051 Population	2051 Households	2051 Employment
Wynyard, Te Waihorotiu and Universities	74,400	33,000	161,300
Dominion Junction and Kingsland	35,800	13,200	18,900
Balmoral and Sandringham	41,200	13,800	6,900
Wesley and Puketāpapa	39,600	11,600	5,300
Hayr Road	15,400	5,000	3,400
Onehunga	15,100	5,700	5,000
Māngere Bridge	8,400	3,300	2,900
Te Ararata and Māngere Town Centre	25,200	7,300	2,400
Airport Industrial	900	400	15,100
Airport Stations	2,600	800	34,400
Elsewhere in CC2M corridor	107,100	32,000	16,600
CC2M corridor total	365,700	126,400	272,400
Rest of Auckland	1,965,500	717,400	688,100
Auckland total	**2,331,200**	**843,800**	**960,500**

Table 0-3-2 Option B1: Population, Household and Employment Forecast

Option B2 – Incremental Investment, Distribution 2

The 'Incremental Investment' options assume that the 'Urban Minimal Investment Option' component of growth resulting from ALR's increased accessibility could be brought forward from 2051-2065, and occur prior to 2051. They would comprise 22% of Auckland's growth to 2051.

[83] Please note – previous growth numbers for each of the options were used during the original assessment of the optioneering process. These tables comprise the latest figures.

Distribution 2 would differ from Distribution 1 by focussing on growth in catchments considered to have the greatest potential to grow and achieve aspirational urban outcomes.

Station Catchment	2051 Population	2051 Households	2051 Employment
Wynyard, Te Waihorotiu and Universities	73,400	32,900	158,100
Dominion Junction and Kingsland	35,600	14,200	22,900
Balmoral and Sandringham	40,300	13,600	9,300
Wesley and Puketāpapa	35,000	10,300	6,300
Hayr Road	14,000	4,500	3,400
Onehunga	14,100	5,300	6,300
Māngere Bridge	7,000	2,800	2,900
Te Ararata and Māngere Town Centre	30,700	8,900	4,200
Airport Industrial	1,600	700	13,400
Airport Stations	2,100	700	29,700
Elsewhere in CC2M corridor	108,800	32,500	15,900
CC2M corridor total	365,700	126,200	272,400
Rest of Auckland	1,965,500	717,400	688,100
Auckland total	**2,331,200**	**843,600**	**960,500**

Table 0-4-3 Option B2 - Population, Household and Employment forecast

Option C1 – Active Investment, Distribution 1

The 'Active Investment' options assume that the 'Urban Minimal Investment Option' components of growth resulting from both ALR's increased accessibility and baseline population change could be brought forward from 2051-2065, and occur prior to 2051. They would comprise 29% of Auckland's growth to 2051.

Distribution 1 would maintain the same pattern of growth forecast within each catchment by LUTI that informs the Urban Minimal Investment Option.

Station Catchment	2051 Population	2051 Households	2051 Employment
Wynyard, Te Waihorotiu and Universities	89,200	40,000	170,000
Dominion Junction and Kingsland	43,900	16,200	23,000
Balmoral and Sandringham	44,000	14,800	7,400
Wesley and Puketāpapa	44,000	12,900	5,900
Hayr Road	16,600	5,400	3,700
Onehunga	17,000	6,400	5,300
Māngere Bridge	8,500	3,300	3,000
Te Ararata and Māngere Town Centre	30,000	8,700	3,000
Airport Industrial	1,000	400	16,000
Airport Stations	2,600	800	41,500
Elsewhere in CC2M corridor	116,000	34,400	18,300
CC2M corridor total	412,700	143,400	297,200
Rest of Auckland	1,918,500	699,800	663,300
Auckland total	**2,331,200**	**843,200**	**960,500**

Table 0-5-4 Option C1 - Population, Household and Employment forecast

Option C2 – Active Investment, Distribution 2

The 'Active Investment' options assume that the 'Urban Minimal Investment Option' components of growth resulting from both ALR's increased accessibility and baseline population change could be brought forward from 2051-2065, and occur prior to 2051. They would comprise 29% of Auckland's growth to 2051.

Distribution 2 would differ from Distribution 1 by focussing on growth in catchments considered to have the greatest potential to grow and achieve aspirational urban outcomes.

Station Catchment	2051 Population	2051 Households	2051 Employment
Wynyard, Te Waihorotiu and Universities	83,600	37,500	171,800
Dominion Junction and Kingsland	45,500	16,800	25,400
Balmoral and Sandringham	45,200	15,200	9,900
Wesley and Puketāpapa	40,800	12,000	6,800
Hayr Road	15,600	5,000	3,600
Onehunga	16,700	6,200	6,800
Māngere Bridge	7,500	2,900	3,100
Te Ararata and Māngere Town Centre	36,900	10,800	4,700
Airport Industrial	2,000	800	14,100
Airport Stations	2,700	800	34,600
Elsewhere in CC2M corridor	30,700	34,600	16,400
CC2M corridor total	192,500	142,600	297,200
Rest of Auckland	472,100	699,800	663,300
Auckland total	**664,600**	**842,400**	**960,500**

Table 0-6-5: Option C2 - Population, Households and Employment forecast

Identification of metrics for assessment of capacity and investment

In order to assess the capacity and investment requirements of each catchment, a set of metrics were developed, related to infrastructure categories and urban intervention levers. The infrastructure categories and urban intervention levers are presented in the table below.

Infrastructure Category	**Blue**	Three waters infrastructure (Potable, Storm, Waste)
	Green	Public realm, open space, environment
	Grey	Transport
	Black	Energy utilities
	Pink	School places and community infrastructure
Urban Intervention Levers	**Planning & Policy**	Strategy, systems and development controls
	Physical	Catalysing development, improving the physical environment
	Co-ordination	Powers and mechanisms
	Financial	De-risking and direct funding

Table 0-7-6 Urban Infrastructure Category and Urban Intervention Lever metrics

The purpose of the infrastructure categories is to understand the potential urban enabling infrastructure needs in the corridor in response to the different growth options. The focus is on capacity and the need for investment. The urban intervention levers serve a different purpose, as they describe how the project could intervene in the urban environment in order to achieve the investment objectives and urban outcomes associated with the option. Interventions are focused on addressing either supply or demand. In this regard, interventions are able to either boost the demand for new homes or employment locations (i.e make the area an attractive place to build, live or work) - or address supply issues (such as where developable land is constrained) in order to boost supply in that location to meet that demand.

Metrics were developed for each infrastructure category to determine the total development which could be supported in each catchment, its corresponding capacity shortfall, and what level of investment would be required by each infrastructure category to support each option. Individual urban Intervention levers were identified on the basis of determining what intervention strategies might be required for each growth option, depending upon the need to intervene to address supply or demand. These Infrastructure metrics and headline details are defined on the following figure:

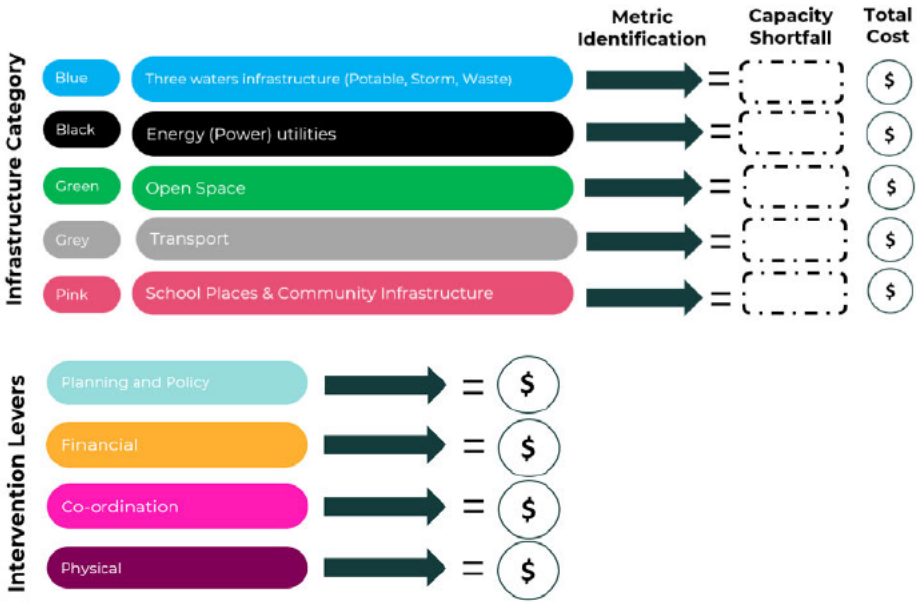


Figure 0-7-6: Infrastructure Categories and Levers

The full methodologies and assumptions relating to the above infrastructure categories are referred to in the appendices[84][85].

The identification of Growth/Distribution options, as well as infrastructure categories and urban intervention levers, allowed for the next step of the methodology (the growth option catchment analysis) to be completed.

3.3 Growth Option Catchment Analysis

With confirmation of the five growth options for assessment, a catchment analysis process was undertaken to understand what it would take to deliver each growth option outcome at station catchment level from an urban enabling infrastructure and urban intervention perspective.

3.3.1 Identification of available capacity and capacity shortfall across the infrastructure categories and urban intervention levers

Initially, an assessment of the current available capacity of each infrastructure category in each station catchment was completed. These related to the baseline conditions within the corridor area, which is the option defined as 'Without ALR' (Transport Do Minimum).

[84] Appendix 3.A.H – Urban Enabling Infrastructure Methodology
[85] Appendix 3.A.I – Urban Enabling Infrastructure Three Waters Preliminary Report

This allowed the current capacity in any of the infrastructure categories within the station catchments to be identified.

In order to understand any potential capacity shortfall, the baseline position was subsequently compared to the anticipated growth and distribution options under each category. The process highlighted the extent of any capacity shortfall, and set the basis for calculating the anticipated level of investment in monetary terms (see section 4.3.2).

A summary of the individual infrastructure methods are as follows. The full methodology of capacity identification can be found within the appendices[86].

Infrastructure Category and Levers	Description of capacity and capacity shortfall identification
Blue (Potable Water)	In order to define the baseline capacity for potable water, the capacity of trunk and transmission potable water pipes within each station catchment were assessed. This was done via analysis with Watercare Services Limited (WSL) models, and the results were agreed with WSL. The capacity for each catchment was then compared to anticipated population increases under each growth/distribution option, to identify the threshold point where growth exceeds capacity.
Blue (Wastewater)	In a similar approach to potable water, the capacity of trunk and transmission wastewater pipes within each station were assessed using WSL's models, with the results agreed with WSL. In order to define current capacity and anticipated shortfall, the capacity for each catchment was then compared to anticipated population increases under each growth/distribution option, and the threshold point where growth exceeds capacity identified for each catchment.
Blue (Storm Water)	To define baseline capacity, a high-level capacity check of existing stormwater pipelines discharging from within station catchments were considered under each catchment's current level of imperviousness. Three further scenarios were run. An imperviousness percentage of 90%, and two equally spaces impervious scenarios between the current and 90%. For catchments that had been previously assessed as having no capacity constraints at an imperviousness percentage of 90%, no further scenarios were run.
Black (Power)	The current capacity of relevant N-1 zone substations in proximity to catchments were attained via Vector's Electricity Asset Management Plan (AMP) 2023-2033[87]. The future N-1 capacity[88] (megavolt-amperes (MVA)[89]) of relevant power zone substations were calculated for a base case, moderate case and very high case MVA scenarios. Any constraints identified within station catchments were compared against Vector's AMP to define anticipated solutions to capacity constraints. The capacity for each catchment was then compared to anticipated population increases under each growth/distribution option.

[86] Appendix 3.A.H Urban Enabling Infrastructure Methodology
[87] Vector's Electricity Asset Management Plan 2023-2033 [Accessed 8/09/2023 https://blob-static.vector.co.nz/blob/vector/media/vector-2023/vec246-vector-amp-2023-2033_120523_1.pdf]
[88] N-1 denotes the Subtransmission security class rating
[89] A volt-ampere is defined as a unit of measurement for apparent power in an electrical circuit

Infrastructure Category and Levers	Description of capacity and capacity shortfall identification
Green (Open Space)	Baseline provision and identification of existing capacity for open space was established by summing all types of open space zoned by Auckland Council's Auckland Unitary Plan[90] within the station catchments, and comparing this provision to existing (2021) population within those catchments. Consideration was given to what future open space standards per capita should be – considering international comparators, existing baseline provision and balancing the benefits of dense urban form. Stations were broadly categorised into the following metrics[91]: • Central Auckland – 15sqm/person • Isthmus – 12.5sqm/person • Motorway to Māngere – 25sqm/person This subsequently identified the ability for catchments to absorb additional population before open space requirements were factored in as a shortfall. Therefore, a cost rate per household of population change was used to reflect the need to invest in these spaces, and in some cases expand open space provision in some catchments. The current Auckland Council Development Contributions Policy rates were used to identify open space cost per additional household.
Grey (Transport)	Transport related infrastructure assets include walking & cycling infrastructure, vehicle access facilities, bus interchanges and other network improvements. The anticipated level of spend by station type was derived from existing planned expenditure and Waka Kotahi guidance. Following this assessment specific walking and cycling interventions were analysed and costed for key catchments, with similar results to the higher level approach used here. The higher level approach was retained as it covered all stations and broader transport interventions.
Pink (School Places and community infrastructure)	The Ministry of Education previously published the National Education Growth Plan 2030 (NEGP)[92], which has been developed from the New Zealand Catchment Planning Model (NZCPM). This forecasts student place demand and distribution for education infrastructure across New Zealand. In recognition of this resource being available, no capacity modelling was completed at the first stage in the urban response process. Instead, engagement with the Ministry took place on identification of the two options which proceeded into the CBC. This process, and its outputs are discussed at section 5.7 of this chapter, and in summary the time ranges and uncertainties are too great to enable the Ministry to estimate costs. Therefore, the ALR project has made a series of simplified assumptions for the need for school investment based on increased quantum of school age children in the corridor, as set out in Appendix 3.A.H. Estimation of community infrastructure needs uses the Auckland Council Development Contribution Policy rates for community infrastructure. This rate is used only as a proxy, as the community infrastructure needs following ALR investment would require significant consideration and agreement with mana whenua partners and other stakeholders. In particular, any required investment in cultural infrastructure assets for Māori, e.g. Marae, kura kaupapa, Whare Wananga, urupa, etc.
Urban Intervention Levers	
It was anticipated that any option chosen above the Urban Minimal Investment Option would require a degree of urban intervention. At the growth option catchment analysis stage, it was concluded that any such option would not differentiate substantially from another, and therefore not impact upon initial shortlisting. As such, a series of urban intervention levers were assessed during the 'refinement' stage of the urban response methodology, which focused on the two shortlisted options and the below four levers. This is discussed at Section 3.7 The urban intervention lever categories are described as follows:	

[90] Auckland Unitary Plan [Accessed 8/09/2023 - https://unitaryplan.aucklandcouncil.govt.nz/pages/plan/Book.aspx?exhibit=AucklandUnitaryPlan_Print]
[91] **Central Auckland**: Wynard Quarter, Te Waihorotiu, Universities **Isthmus**: Dominion Junction, Kingsland, Balmoral, St Lukes, Sandringham **Motorway to Māngere**: Wesley, Mount Roskill, Hayr Road, Onehunga **Māngere/Airport Stations**: Māngere Bridge, Te Ararata Creek, Māngere Town Centre, Landing Drive
[92] National Education Growth Plan [Accessed 8/09/2023 - https://www.education.govt.nz/school/new-zealands-network-of-schools/about/national-education-growth-plan/]

Infrastructure Category and Levers	Description of capacity and capacity shortfall identification
Planning and Policy	Interventions that remove, amend or (outside the ALR corridor) create planning controls to facilitate alternative outcomes.
Co-ordination	Interventions that provide new or enhanced public sector powers and mechanisms to achieve spatial outcomes.
Financial	Interventions that reduce the cost and risk of development
Physical	Interventions that provide would involve works or on-the-ground actions by ALRL or other partner entities

Table 0-8-7 Capacity and capacity shortfall identification

Any eventual interventions in urban infrastructure need to consider mana whenua aspirations and constraints. The capacity and intervention analysis undertaken for this study was at a high level. Further detailed work is required to understand specific infrastructure solutions, and this detailed work must also account for mana whenua concerns with the impacts of infrastructure on the moana and whenua, as well as opportunities to delivery broader outcomes for Māori as a part of any intervention.

3.3.2 Identification of the level of investment required

Following confirmation of the baseline case for each station catchment, relative to each infrastructure category and urban intervention lever, a process was undertaken to define the likely levels of investment required for each growth/distribution option. The approach to each infrastructure category is as follows, but is available to read in full detail at Appendix 3.A.H.

Infrastructure Category and Levers	Approach to identify the level of investment required
Blue (Potable Water)	WSL was engaged to agree high-level rates for Potable Water infrastructure. A per linear meter rate was multiplied by the length of pipe that needed upgrading.
Blue (Waste Water)	WSL was engaged to agree high-level rates for Wastewater infrastructure. A per linear meter rate was multiplied by the length of pipe that needed upgrading.
Blue (Storm Water)	In seeking to understand stormwater infrastructure requirements, cost estimations were calculated via QV Cost builder 2023[93]. The additional pipe capacity was determined by the stormwater modelling, and cost determined by calculating pipe length by the relevant QV cost builder rate for that pipe size.
Black (Power)	For solutions analysed for identified constraints in the catchments, costs were derived using similar costs for similar solutions in Vector's 2023-2033 AMP.
Green (Open Space)	The basis for calculating the cost of green infrastructure provision has been derived from Auckland Council's Development Contributions Policy (DCP) 2022[94]. This uses a principle of proportional contributions by developers to the anticipated capital costs of green infrastructure provision planned by Auckland Council over a ten-year period from 2021 to 2031, across two categories – reserve acquisition and reserve development.[95]
Grey (Transport)	Transport costs are allocated based on station type, with pre-determined reference rates. These costs are considered to be fixed in all growth options (other than the Transport Do Minimum without ALR) as the need for transport integration in the wider environmental does not change.

[93] https://costbuilder.qv.co.nz/

[94] Auckland Council's Development Contributions Policy (DCP) 2022 – [Accessed 8.09.2023 https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-policies/development-contributions-policy/Documents/development-contributions-policy-2022-variation-a.pdf]

[95] Reserve acquisition can be defined as the acquisition of land to provide public open space of all types, from small local parks to large regional parks. Reserve development can be defined as the development and improvements of parks, sports pitches and related facilities including playgrounds and public toilets.

Social (School Places and Community Infrastructure)	As no capacity assessments were completed at this stage in the process, identification of the level of investment required for school places was not completed. Engagement with the Ministry of Education was maintained in anticipation for their input at refinement stage of the methodology process to allow them to feed into anticipated investment costs once two shortlisted options had been indicatively chosen. As the Ministry were unable to estimate costs given the long time frames and uncertainties, ALRL generated an estimated cost per additional student. This cost is based on the cost to build higher density classrooms, and also made provision for the need to replace existing school assets (i.e. build over the top of existing buildings, rather than expand, due to limited land availability). Like with open space calculation, Auckland Councils Development Contributions Policy was used to determine Community Infrastructure costs.
Urban Intervention Levers	
The identification of the level of investment required for the urban intervention levers developed was fully scoped at the refinement stage with a focus on the two shortlisted options. Please see section 3.7 for full details.	

Table 0-9-8 Identification of the level of investment required

The approach to the urban intervention levers were fully developed following the refinement of the two shortlisted options. This is set out at section 3.7.

Summary

In summary, the section has set out the overarching methodology for the growth optioneering process. In completing this process, the distribution/growth options were further developed, with their findings and outcomes being presented in the following section.

3.4 Assessment of Growth Options

Findings and Outcomes

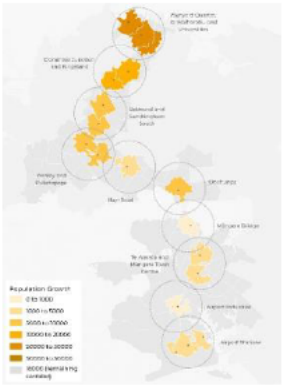
The following section sets out the key details of each of the options, along with their indicative urban enabling infrastructure requirement. These options were presented as part of a workshop[96], in which the outcomes of this session are defined in the next section. For completeness, the baseline position (i.e, the Transport Do Minimum Option without ALR) has been included as a comparison.

[96] Appendix 3.A.J – Growth/Distribution Options overview pack, noting the workshop was prior to finalisation of some costs, and excluded the social cost category

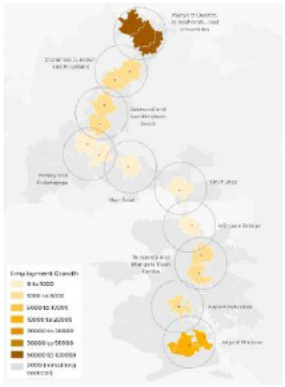
Baseline: Without ALR (Transport Do Minimum)

Summary Description

This position is the 'true' do minimum (Transport Do Minimum) in which ALR is not built. It solely comprises the baseline levels of growth forecast within each catchment by LUTI, which would arise from current development trends and existing plans and strategies.



Total Growth Figures – Without ALR: Population



Total Growth Figures – Without ALR:

The total growth figures for the Baseline position ('without ALR') are as follows:

[97]	2051 Population	2051 Population Growth	2051 Households	2051 Household Growth	2051 Employment	2051 Employment growth
CC2M corridor total	303,900	83,700	105,800	38,500	245,200	71,100
Rest of Auckland	2,027,300	580,900	740,600	245,400	715,300	184,900
Auckland total	**2,331,200**	**664,600**	**846,400**	**283,900**	**960,500**	**255,500**

The following urban enabling infrastructure category costs* have been identified for the baseline assumption to this exercise, i.e the corridor without ALR: [98]

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social[99]	Transport	**Total**
$38m	$123m	$123m	$75m	$70m	Not calculated at this stage in optioneering process	$446m	$874m

*Present value costs ($m) to June 2022, discounted at 4% real.

Key Factors

- The baseline position highlights that investment would be required in any case, whether ALR would come forward or not.
- The highest anticipated levels of population growth would be located in the city centre catchments, followed by Balmoral and Sandringham catchments.
- The lowest levels of population growth would be at the Airport Industrial and Māngere Bridge.

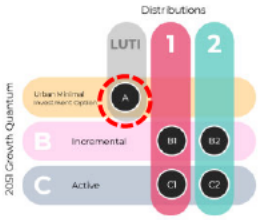
Table 0-10-1: Baseline: Without ALR (Transport Do Minimum) option Summary

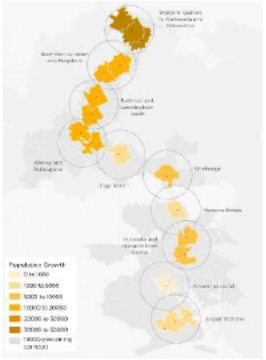
[97] At the time of this stage of the optioneering process, this option had a 87k population growth and 36k household growth (now superseded but referenced for completeness). The most recent figures are provided above.
[98] Note, the costs presented comprise the refined figures. Please note, previous figures were provided at the time of optioneering which have now been superseded. The refined figures do not fundamentally change the outcome of the overall optioneering process.
[99] At this stage in the process, the MoE had not yet reviewed the indicative growth/distribution options. As such the 'Social' category is represented as $0 in this stage of the optioneering process.

Option A: Urban Minimal Investment Option

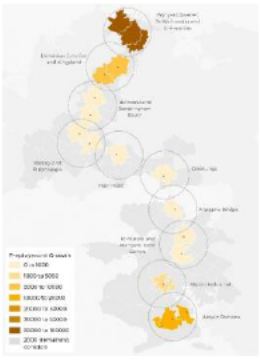
Summary Description

This option comprises the baseline growth forecast for each catchment forecast by LUTI, plus additional growth that will be driven by the increase in accessibility that results from ALR. This would comprise 19% of Auckland's growth to 2051. It is assumed that the delivery of development will otherwise be left to market forces – with no urban investment beyond ALR's transport infrastructure.





Total Growth Figures – Urban Minimal Investment: Population



Total Growth Figures – Urban Minimal Investment: Employment

The total growth figures for this Option can be summarised as follows:

[100]	2051 Population	2051 Population Growth	2051 Households	2051 Household Growth	2051 Employment	2051 Employment growth
CC2M corridor total	339,500	119,300	117,600	50,300	260,400	85,300
Rest of Auckland	1,991,700	535,300	726,000	230,800	700,100	169,700
Auckland total	**2,331,200**	**664,600**	**843,600**	**281,100**	**960,500**	**255,000**

The following urban enabling infrastructure category costs* have been identified for the Urban Minimal Investment Option relating to this exercise, i.e. the growth modelled through LUTI, as the basis for the EPO: [101]

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social[102]	Transport	**Total**
$90m	$182m	$168m	$75m	$91m	Not calculated at this stage in the optioneering process	$719m	$1,324m

*Present value costs ($m) to June 2022, discounted at 4% real.

Key Factors

- This option focuses upon anticipated accessibility improvements as a result of ALR.
- Population growth is focused at the north end of the corridor.
- Employment growth is focused at each end of the corridor (City Centre and Airport), with additional opportunities at Dominion Junction and Kingsland.

Table 0-11-2 Option A - Summary description

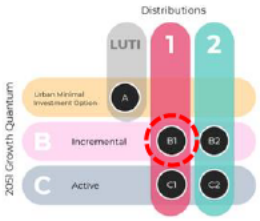
[100] At the time of this stage of the optioneering process, this option had a 120k population growth and 46k household growth (now superseded but referenced here for completeness). The most recent population, household and employment figures are set out above.
[101] Note, the costs presented comprise the refined figures. Please note, previous figures were provided at the time of optioneering which have now been superseded. The refined figures do not fundamentally change the outcome of the overall optioneering process.
[102] At this stage in the process, the MoE had not yet reviewed the indicative growth/distribution options. As such the 'Social' category is represented as $0 in this stage of the optioneering process.

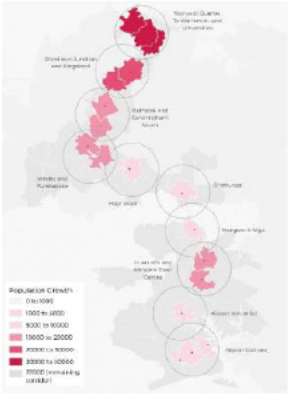
Option B1: Incremental Investment (Distribution 1)

Summary Description

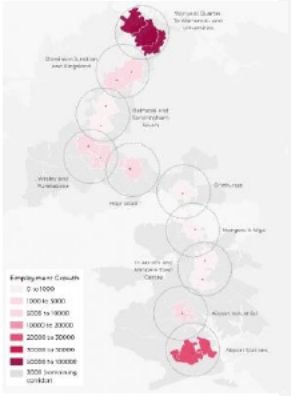
This option assumes that the component of growth in the Urban Minimal Investment Option resulting from ALR's increased accessibility could be brought forward from 2051-2065, and occur prior to 2051.

Distribution 1 would maintain the same pattern of growth forecast within each catchment by LUTI that informs the Urban Minimal Investment Option.





Total Growth Figures – Option B1: Population



Total Growth Figures – Option B1: Population

The total growth figures for this Option can be summarised as follows:

[103]	2051 Population	2051 Population Growth	2051 Households	2051 Household Growth	2051 Employment	2051 Employment Growth
CC2M corridor total	365,700	145,500	126,400	59,100	272,400	97,300
Rest of Auckland	1,965,500	519,100	717,400	222,200	688,100	157,700
Auckland total	2,331,200	664,600	843,800	281,300	960,500	255,000

The following urban enabling infrastructure category costs* have been identified for Option B1: Incremental Growth (Distribution 1): [104]

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social[105]	Transport	**Total**
$106m	$240m	$158m	$79m	$110m	Not calculated at this stage in the optioneering process	$719m	$1,413m

*Present value costs ($m) to June 2022, discounted at 4% real.

Key Factors

- This option focusses on accessibility driven growth.
- Employment growth is focussed at each end of the corridor.
- Population is distributed primarily along the northern end of the corridor.

Table 0-12-3 Option B1 Summary Description

[103] At the time of this stage in the optioneering process this option had a 150k population growth and 55k household growth (now superseded but referenced here for completeness). The most recent population, household and employment figures are set out above.

[104] Note, the costs presented comprise the refined figures. Please note, previous figures were provided at the time of optioneering which have now been superseded. The refined figures do not fundamentally change the outcome of the overall optioneering process.

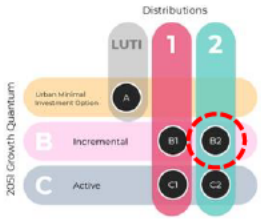
[105] At this stage in the process, the MoE had not yet reviewed the indicative growth/distribution options. As such the 'Social' category is represented as $0 in this stage of the optioneering process.

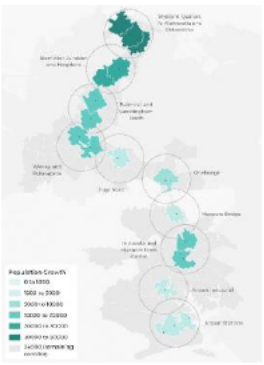
Option B2: Incremental Investment (Distribution 2)

Summary Description

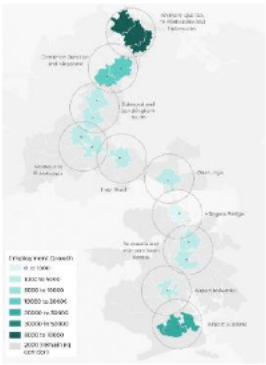
This option assumes that the component of growth in the Urban Minimal Investment Option resulting from ALR's increased accessibility could be brought forward from 2051-2065 and occur prior to 2051.

Distribution 2 focuses on growth in catchments considered to have the greatest potential to grow and achieve urban outcomes.





Total Growth Figures – Option B2: Population



Total Growth Figures – Option B2: Employment

The total growth figures for this Option can be summarised as follows:

[106]	2051 Population	2051 Population Growth	2051 Households	2051 Household Growth	2051 Employment	2051 Employment Growth
CC2M corridor total	365,700	145,500	126,200	58,900	272,400	97,300
Rest of Auckland	1,965,500	519,100	717,400	222,200	688,100	157,700
Auckland total	**2,331,200**	**664,600**	**843,600**	**281,100**	**960,500**	**255,000**

The following urban enabling infrastructure category costs* have been identified for Option B2: Incremental Investment (Distribution 2): [107]

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social[108]	Transport	**Total**
$123m	$217m	$176m	$75m	$112m	Not calculated at this stage in the optioneering process	$719m	$1,422m

*Present value costs ($m) to June 2022, discounted at 4% real.

Key Factors

- This distribution focuses on areas which are anticipated to have the greatest potential to grow and achieve urban outcomes.
- Employment distributions are focused at each end of the corridor. Employment is also focussed at Dominion Junction and Kingsland Junctions.

Table 0-13-4 Option B2 (Summary Description)

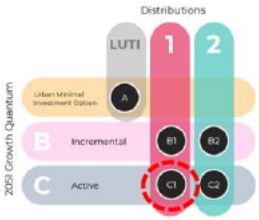
[106] At the time of this stage in the optioneering process, this option had a 150k population growth and 55k household growth (now been **superseded** but referenced here for completeness). The most recent population, household and employment figures are set out above.
[107] Note, the costs presented comprise the refined figures. Please note, previous figures were provided at the time of optioneering which have now been superseded. The refined figures do not fundamentally change the outcome of the overall optioneering process.
[108] At this stage in the process, the MoE had not yet reviewed the indicative growth/distribution options. As such the 'Social' category is represented as $0 in this stage of the optioneering process.

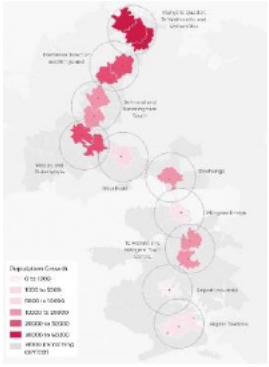
Option C1: Active Investment (Distribution 1)

Summary Description

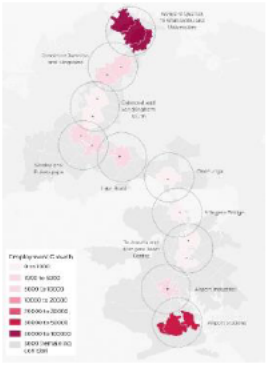
This option assumes that the component of growth in the Urban Minimal Investment Option resulting from ALR's increased accessibility and baseline population change could be brought forward from 2051-2065, and occur prior to 2051.

Distribution 1 would maintain the same pattern of growth forecast within each catchment by LUTI that informs the Urban Minimal Investment Option.





Total Growth Figures – Option C1: Population



Total Growth Figures – Option C1: Employment

The total growth figures for this Option can be summarised as follows:

[109]	2051 Population	2051 Population Growth	2051 Households	2051 Household Growth	2051 Employment	2051 Employment Growth
CC2M corridor total	412,700	192,500	143,400	76,100	297,200	122,100
Rest of Auckland	1,918,500	472,100	699,800	204,600	663,300	132,900
Auckland total	2,331,200	664,600	843,200	280,700	960,500	255,000

The following urban enabling infrastructure category costs* have been identified for Option C1: Active Investment (Distribution 1): [110]

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social[111]	Transport	**Total**
$128m	$268m	$170m	$79m	$143m	Not calculated at this stage in the optioneering process	$719m	$1,507m

*Present value costs ($m) to June 2022, discounted at 4% real.

Key Factors

- This option comprises the highest level of three waters infrastructure investment, aswell as the highest level of total urban enabling infrastructure investment of all the options.
- Population growth is focussed at the northern end of the corridor, including in the City Centre, Dominion Junction and Kingsland, and Wesley and Puketāpapa.

Table 0-14-5 Option C1 (Summary Description)

[109] At the time of this stage in the optioneering process this option had a 196k population growth and 73k household growth (now superseded but referenced here for completeness). The most recent population, household and employment figures are set out above.

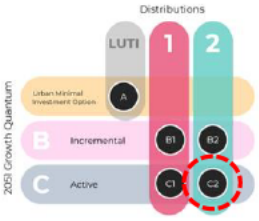
[110] Note, the costs presented comprise the refined figures. Please note, previous figures were provided at the time of optioneering which have now been superseded. The refined figures do not fundamentally change the outcome of the overall optioneering process.

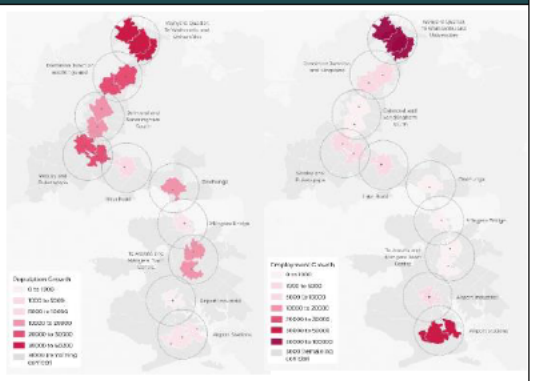
[111] At this stage in the process, the MoE had not yet reviewed the indicative growth/distribution options. As such the 'Social' category is represented as $0 in this stage of the optioneering process.

Option C2: Active Investment (Distribution 2)

Summary Description

This option assumes that the component of growth in the Urban Minimal Investment Option resulting from ALR's increased accessibility and baseline population change could be brought forward from 2051-2065, and occur prior to 2051.
Distribution 2 differs from Distribution 1 by focusing on growth in catchments considered to have the greatest potential to grow and achieve urban outcomes.





Total Growth Figures – Option C2: Population

Total Growth Figures – Option C2: Employment

The total growth figures for this Option can be summarised as follows:

[112]	2051 Population	2051 Population Growth	2051 Households	2051 Household Growth	2051 Employment	2051 Employment Growth
CC2M corridor total	412,700	192,500	142,600	75,300	297,200	122,100
Rest of Auckland	1,918,500	472,100	699,800	204,600	663,300	132,900
Auckland total	2,331,200	664,600	842,400	279,900	960,500	255,000

The following urban enabling infrastructure category costs* have been identified for Option C2: Active Investment (Distribution 2): [113]

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social[114]	Transport	**Total**
$128m	$276m	$179m	$79m	$144m	Not calculated at this stage in the optioneering process	$719m	$1,523m

*Present value costs ($m) to June 2022, discounted at 4% real.

Key Factors

- Employment growth is focused at each end of the corridor (City Centre and Airport Locations)
- Population growth is primarily focused to the north of the Manukau Harbour, with the exception of Māngere Town Centre and Te Ararata also forecasting higher population growth.
- This option would comprises the highest levels of population of being located in the corridor.

Table 0-15-6 Option C2 (Summary Description)

[112] At the time of this stage in the optioneering process, this option had a 196k population growth and 73k household growth (now superseded but referenced here for completeness). The most recent population, household and employment figures are set out above.
[113] Note, the costs presented comprise the refined figures. Please note, previous figures were provided at the time of optioneering which have now been superseded.. The refined figures do not fundamentally change the outcome of the overall optioneering process.
[114] At this stage in the process, the MoE had not yet reviewed the indicative growth/distribution options. As such, the 'Social' category is represented as $0 in this stage of the optioneering process.

3.4.1 Understanding the need for urban enabling infrastructure

For a full comparison of each of the options, the total indicative urban enabling infrastructure costs[115] (Present Value[116]) are set out in the table below:

	Blue			Black	Green	Pink	Grey	Total
	water	wastewater	stormwater	power	green	social	transport	
Baseline: Transport Do Minimum Without ALR	*$38m*	*$123m*	*$123m*	$75m	$70m	Not calculated at this stage	$446m	**$874m**
Option A: Urban Minimal Investment	*$90m*	*$182m*	*$168m*	$75m	$91m	Not calculated at this stage	$719m	**$1,324m**
Option B1: Incremental Investment (Distribution 1)	*$106m*	*$240m*	*$158m*	$79m	$110m	Not calculated at this stage	$719m	**$1,413m**
Option B2: Incremental Investment (Distribution 2)	*$123m*	*$217m*	*$176m*	$75m	$112m	Not calculated at this stage	$719m	**$1,422m**
Option C1: Active Investment (Distribution 1)	*$128m*	*$268m*	*$170m*	$79m	$143m	Not calculated at this stage	$719m	**$1,507m**
Option C2: Active Investment (Distribution 2)	*$128m*	*$276m*	*$179m*	$79m	$144m	Not calculated at this stage	$719m	**$1,523m**

Table 0-16-7 Total indicative urban enabling infrastructure costs

All costs are Present Values $M Jun 2022 discounted at 4% real

A full breakdown of the urban enabling infrastructure categories cost for each of the walkable catchments along the corridor, along with details of method of assessment for each category, can be found within the appendices[117]. The approach to develop

[115] For full details relating to following, please see Appendix 3.A.K:
- The summary of urban enabling infrastructure costs (gross and incremental to the baseline position 'without ALR');
- Gross urban enabling infrastructure costs (including 'Without ALR costs'); and
- The incremental urban enabling infrastructure costs (incremental to the baseline position 'without ALR').

[116] All costs are present value ($m) to June 2022, discounted at 4% real.
[117] Appendix 3.A.K – Infrastructure Categories – Costs Breakdown

costs was tested with asset owners and Auckland Council's Development Programme Office, and feedback incorporated (please refer to Section 3.6).

It should be noted that these infrastructure costs fall to the public sector – the Council directly, Council-controlled organisations (CCOs), or the Crown – although some will partly be recouped from developers in accordance with the Council's Development Contributions Policy. The default assumption is therefore that these are not costs that would fall to ALR. However, one of the interventions considered in Section 5.6 is for these costs to be met by ALR as an urban intervention capable of delivering additional benefits.

3.4.2 Understanding the costs per person in the context of Auckland's growth

The numbers presented in table 5.7.7 highlight a necessary investment in urban enabling infrastructure categories along the ALR corridor in all cases, including the Transport Do Minimum without ALR. However, without being able to compare the need for investment per additional household/population to other project examples, it is not possible to understand this need for investment in a wider context, nor contextualise this spend fully against Auckland's planned infrastructure spend. Therefore, it became clear that a comparison process was necessary to help understand how the indicative infrastructure cost in context of what is already happening in Auckland, a number of comparator assessments were completed including:

- Understanding historic and planned spend of infrastructure asset owners;
- Utilising the Drury development as a cost comparator opportunity in understanding development of brownfield land vs. greenfield land; and
- Taking an international benchmark, in this case in New South Wales, Australia.

Historic and Planned Spend

It is well understood that Auckland faces significant urban infrastructure challenges, and all asset owners and Auckland Council are investing significant amounts to address this. The level of investment is constrained by the amount that each entity can afford to spend, and total sector capacity to deliver the work.

Given that significant investment is underway, we sought to understand how the level of investment per additional population/household in the corridor compares to what Auckland is already spending, per additional population/household. The purpose of this comparison is to identify whether the costs identified are proportionately greater or lesser than what Auckland already spends on infrastructure growth. This helps to contextualise the extent to which investment in the corridor is a matter for prioritisation by existing asset owners, or whether it would present significant affordability challenges. Specifically, if the investment required per additional population/household is significantly greater than what Auckland already spends per additional population/household, then that would indicate a potential prioritisation/affordability challenge for Auckland.

A high-level analysis of historic and planned spend by infrastructure asset owners in Auckland was completed in order to compare ALR's anticipated urban enabling infrastructure costs with how much the respective asset owners are already spending to address growth and renewal.

For the purposes of this exercise, data was obtained from the following sources:

- Water Supply and Wastewater infrastructure spend was obtained from Watercare's 2023 Asset Management Plan[118] and Watercare Services Ltd Annual Report 2022[119].
- Power infrastructure spend was taken from Vector's Electricity Asset Management Plan 2023-2033[120] and Vector 2022 annual report[121].
- Stormwater infrastructure spend was calculated from Auckland Council Healthy Water's 2015 - 2045 Stormwater Asset Management Plan[122].
- Green infrastructure was calculated from Auckland Council's Open Space Strategic Asset Management Plan 2015-2025[123].

In order to understand how this looks for Auckland generally, how much Auckland has spent historically, and plans to spend, on infrastructure on a household/population basis for growth was tested (noting much of this spend is also on renewal). This was done through comparison of the planned/historic costs to statistics published by stats NZ actual and projected (med) population and household growth[124].

It was identified that over the 2019-2023 period, Auckland spent on average, $51,958 per additional person and $167,051 per additional household on necessary capital expenditure infrastructure spend. Note, these costs are not inclusive of Transport Infrastructure. This cost estimate is total cost and based on nominal figures, and also includes investment in asset renewal and capital maintenance, as spend types was not able to be differentiated in the reporting. Please see the below table for per person and per household spends year on year.

[118] https://ourauckland.aucklandcouncil.govt.nz/media/yoohwxhv/watercare-amp-2021-2041.pdf

[119] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-annual-reports/docsccosannualreports/watercare-annual-report-2022.pdf

[120] https://blob-static.vector.co.nz/blob/vector/media/vector-2023/vec246-vector-amp-2023-2033_120523_1.pdf

[121] https://blob-static.vector.co.nz/blob/vector/media/vector-2022/vector-2022-annual-report.pdf

[122] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/topic-based-plans-strategies/docsassetmanagementplan/stormwater-asset-management-plan.pdf

[123] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/topic-based-plans-strategies/docsassetmanagementplan/open-space-strategic-asset-management-plan.pdf

[124] https://www.stats.govt.nz/information-releases/subnational-population-projections-2018base2048-update/#:~:text=Population%20growth%20slows,-New%20Zealand's%20population&text=Assuming%20an%20average%20net%20migration,percent%20between%202033%20and%202048.

https://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE8609&_ga=2.207183187.1731899717.1695846777-892357588.1694998465

Per Person						
	2019	2020	2021	2022	2023	Average
Wastewater and Potable Water	$17,718	$24,343	$31,676	$20,933	$26,687	$26,840
Power	$15,703	$17,879	$19,373	$20,972	$18,160	$18,200.68
Stormwater	$2,847	$3,019	$3,060	$3,060	$3,130	$3,023
Parks	$6,415	$6,451	$6,451	$6,451	$6,451	$6,451
Total	*$42,719*	*$51,693*	*$60,560*	*$51,476*	*$53,345*	**$51,958**
Per Household						
Wastewater and Potable Water	$56,964	$78,265	$101,842	$67,494	$85,501	$78,073
Power	$50,485	$57,484	$62,286	$67,427	$54,902	$58,517
Stormwater	$9,154	$9,707	$9,838	$9,837	$10,065	$9,720
Parks	$20,471	$20,471	$20,471	$20,471	$20,741	$20,741
Total	*$137,344*	*$166,197*	*$194,707*	*$165,498*	*$171,508*	**$167,051**

Table 0-17-8 Historic and Planned spend

The above table of costs are discounted.

In comparison, the ALR corridor analysis identified a cost per person of between $7,772 – $10,046 and $20,868 – $24,279 per household discounted, and a cost per person of $14,187 –$18,009 and $$38,092 – 43,522 per household undiscounted, dependent upon the growth/distribution option utilised. Asset renewal is also embedded within the ALR investment as the total replacement cost was estimated, however, ALR cost estimation focuses only at trunk/transmission infrastructure for the comparator asset categories, and does not include capitalised maintenance spend, etc.

The following notes help to understand the comparison points, and the broader factors included in the historic spend figures:

- For Wastewater and Potable Water, for 2022 onwards, capex was taken from WSL's 2021-2031 Asset Management Plan. Only Water and Wastewater costs were included from the AMP, with Shared Services being excluded. Shared Services make up approximately 2% of overall capex. Based on this, 98% of the overall past capex spend was taken from WSL's 2022 Annual Report for previous years spend.
- For power, spend was based on Vector's 2021 to 2031 AMP. The AMP capex spend covers a broad range of activities, including (Consumer connection 22%, System growth 22%, Asset relocations 8%, Asset replacement and renewal 26%, Reliability, safety and environment 15% and non-network assets 7%), whilst some of these are more comparable to others in terms of the ALR cost analysis, all costs have been carried over for this assessment as power intervention would likely address components of all these categories. Based on this, 93% of the overall past capex spend was taken from Vector's Annual Report for previous years spend.
- For stormwater, costs were based on Auckland Council's 2015 to 2051 AMP. The AMP capex spend covers a broad range of activities, including (Catchment Planning 10%, Asset Renewal 27%, Growth 46%, Flood Protection 12%, Healthy Waterways 4%), whilst some of these are more comparable to others in terms of the ALR cost analysis, all costs have been carried over for this assessment as stormwater intervention would likely address components of all these categories.

- For green infrastructure, costs were based on Auckland Council's Open Space Strategic Asset Management Plan 2015-2025. For the purposes of this analysis, the total spend was equally divided between the 10 years, as year by year spend was not presented in a reference table with the plan.
- All reference documents were prepared at slightly different points in time, and presented in current dollars at that point in time. Discounting adjustments have not been made in this comparison, and are not considered to significantly impact the results.

This comparison shows that the cost estimated are significantly less than the current level of expenditure over growth. This does not mean that infrastructure costs in the corridor are comparatively low cost, as existing expenditure includes very significant renewal and capitalised maintenance. However, it does put the values identified into context, and helps to illustrate the importance of prioritisation of Auckland's spend, rather than an affordability challenge.

Understanding greenfield development costs

ALR, by virtue of its urban location will largely build on land classified as 'brownfield land', i.e. land that has been previously developed. The cost of developing brownfield land in comparison to greenfield land (land which has not been developed) brings differing development costs and infrastructure constraints, and infrastructure development requirements and costs can vary significantly from site to site as a result. Generally, greenfield is considered cheaper at a site level due to efficiencies in the laying of site infrastructure, and no need to work in an existing urban environment, etc. However, greenfield is typically considered more expensive at a city scale due to the need for greater transmission infrastructure servicing, and less efficient use of infrastructure assets.

To understand this in more detail, the project's urban enabling infrastructure costs were assessed against a comparable benchmark scheme – in this case Drury[125], a new greenfield urban growth development location to the south of Auckland, to ascertain the differences between brownfield and greenfield development. Drury was chosen due to the relatively well planned nature of the development (including investment in highway and rail infrastructure), and the availability of cost information via recent Auckland Council work to address cost of growth[126].

Greenfield infrastructure cost analysis was assessed based on major trunk infrastructure from Drury, sourced from publicly available sources as a part of recent development contribution policy work. For Wastewater and Potable Water household cost, major transmission infrastructure costing rates were agreed with Watercare Services Limited ('WSL') – and are considered comparable to the trunk and transmission water and wastewater investment for ALR. Transport, community and park infrastructure was calculated by dividing the total cost by the number of households.

[125] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/place-based-plans/structure-plans/Pages/drury-opaheke-structure-plan.aspx
[126] Sharing the cost of Drury's growth – Contributions Policy 2022 variation A | AK Have Your Say (aucklandcouncil.govt.nz)

For the purposes of this analysis, stormwater and power rates for Drury have not been calculated, and therefore not compared. For community infrastructure, schooling costs were removed from ALR in order to be directly comparable to published Drury costs.

The below table compares per household rates of the Drury project (i.e greenfield development) and ALR (brownfield development):

Drury (greenfield)		ALR (brownfield)					
[127]		Baseline: Transport Do Minimum without ALR	Option A: Urban Minimal Investment	Option B1: Incremental Investment (Distribution 1)	Option B2: Incremental Investment (Distribution 2)	Option C1: Active Investment (Distribution 1)	Option C2: Active Investment (Distribution 2)
Water	$2,872	$3,039	$4,622	$3,934	$4,856	$3,758	$3,798
Wastewater		$6,753	$8,787	$10,558	$7,504	$8,200	$8,287
Stormwater	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Power	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Parks	$18,299	$3,558	$3,856	$4,061	$4,084	$4,182	$4,214
Community	$8,409	$4,357	$4,631	$4,037	$4,690	$4,273	$4,794
Subtotal	$29,580	$17,887	$21,896	$22,591	$21,134	$20,143	$21,093
Transport	$85,548	$16,473	$20,338	$17,310	$17,368	$13,443	$12,586
Total inc. transport	**$115,128**	**$34,360**	**$42,234**	**$39,900**	**$38,502**	**$33,855**	**$34,679**

Table 0-18-9 Greenfield v.s Brownfield infrastructure costs (Drury comparison)

The above table of costs are undiscounted in order to be comparable.

Note, the allowance for schools has been taken out of community infrastructure in order for the costs to be more comparable. Transport costs for both schemes are included, however, they differ greatly. The ALR transport costs are the urban enabling infrastructure costs, not the costs of the rail and stations infrastructure. Drury transport costs include new roading, and upgrades to existing state highway and rail infrastructure.

The table highlights that comparative differences between the two projects, in as comparable terms as possible with current information. It highlights how for some infrastructure categories, like water and wastewater, costs for brownfield are higher due to the cost and complexity of replacing trunk and transmission infrastructure in an existing urban environment, and the fact that much of the network is laid by greenfield developers. However, for other infrastructure categories like community and parks, the cost is lower due to ability to leverage existing assets.

Whilst transport is compared between the two projects, the comparability is limited due to the very different nature of the transport investment included.

International Benchmarking

To further contextualise anticipated urban enabling infrastructure spending, an international benchmarking precedent was also reviewed.

[127] All figures shown are present value discounted at 0%

Research was recently completed by the New South Wales Productivity Commission[128] which identified that building homes in lower cost places (i.e infill, brownfield land) could save up to $75,000 AUD per household to deliver necessary urban enabling infrastructure such as roads, train services, water infrastructure, schools and open space. Put simply, there was a clear differentiation in infrastructure cost savings when building on brownfield land in a city centre location, compared to greenfield sprawl in the outer Sydney suburbs.

In a Sydney-specific scenario analysis, the Centre for International Economics (CIE, 2010[129]) likewise found that homes in infill-focused growth pathways would be less costly. A higher transport infrastructure costs in the greenfield scenario—such as new main roads and public transport expansions—made up three-quarters of the cost difference.

3.5 Key headlines from initial analysis

Any form of intensification of the urban environment in any of the growth/distribution options results in the requirement for infrastructure investment, including the Transport Do Minimum without ALR. The extent of infrastructure investment required is not disproportionate to what Auckland is currently spending, further, over the assessment period it is likely that much of the infrastructure would reach end of life and require renewal. Comparison to a Greenfield project shows the efficiencies gained for some areas, such as community infrastructure, as well as increased cost of replacing water infrastructure in an existing urban environment.

Of the individual infrastructure categories, Blue infrastructure (Potable, Waste and Stormwater) was shown to be the highest cost. It is also one of the greatest barriers to intensification as development is not able to proceed without blue infrastructure capacity already being in place.

Regardless of any option presented, the costs of urban enabling infrastructure did not vary significantly. These findings indicate that the cost of urban intensification, if adequately planned for and managed well, should not be a barrier to ALR enabled urban intensification.

3.6 The shortlisting process

In order to shortlist the suggested options from four to two, the initial analysis was presented at a workshop with participants from a number of relevant workstreams in attendance. The workshop pack (Appendix 3.A.L) was shared in advance of the workshop[130].

It was considered that, due to the urban response of the project being presented at an IBC stage and the different nature of growth options, alignment to the MCA criteria as utilised in Phases 1 and 2 of the transport optioneering process was not

[128] https://www.productivity.nsw.gov.au/sites/default/files/2023-08/202308_NSW-Productivity-Commission_Building-more-homes-where-infrastructure-costs-less_accessible-v2.pdf [Accessed 3/10/2023]
[129] https://www.thecie.com.au/publications-archive/costs-and-benefits-of-alternative-growth-paths-for-sydney [Accessed 3/10/2023]
[130] Appendix 3.A.L - Shortlisting Workshop - presentation

considered necessary to shortlist options. Instead, shortlisting was completed through analysis and feedback received at the shortlisting workshop.

At the workshop, a number of questions were raised in connection with the analysis, with the intention of collating views and to shortlist the options from four to two.

The questions presented were as follows:

- **Q1** – *Why would it make sense to intervene in the corridor beyond ALR ' s transport investment? What could be achieved by urban investment?*
- **Q2** - *What factors should be considered when differentiating between growth Distribution 1, and Distribution 2?*
- **Q3** – *What factors should be considered when different differentiating between the two quantums of growth being considered (Incremental Investment Option and Active Investment Option)*?
- **Q4** – *What are the relative risks and opportunities for each of the four resultant options?*

All responses were collated on a miro board, as a way of obtaining qualitative feedback responses.

Following the four questions presented, an additional question – and suggested shortlisting approach was put forward to the group. This resulted in the suggested outcome of Options B2 and C2 being shortlisted to proceed to the full economic assessment.

The question was presented as follows:

- **Q5** – *Based on analysis to date, the two potential distributions do not differ significantly in terms of urban enabling infrastructure costs. We therefore consider that two 'book-end' growth quantum options should be shortlisted. Where also think these should follow Distribution 2 given its focus on achieving the best urban outcomes. This would result in Options B2 and C2 being shortlisted (alongside option A). What are your comments on this conclusion?*

This approach was agreed as a way of understanding growth quantum options at both ends of the scale, using Distribution 2 which focused on achieving the best urban outcomes for the corridor. The minutes to the workshop are appended[131] to this report.

As part of the shortlisting workshop, current water supply from the Waikato River was communicated as a potential concern due to the significance to Mana Whenua. This question was subsequently raised with WSL.

In response, it was advised that the water take from the Waikato River depended on the rate of growth in Auckland, not the distribution of growth. If the project accelerated at a rate of growth above what has been planned for in the water supply/demand balance, then it will likely accelerate the use of the Waikato River. However, given the project is redistributing the growth within a closed city model, it is not considered to make a material difference to the need to take water from the Waikato River.

This view does not take into account treaty partner views, and further engagement will be required with Iwi leaders and the Waikato River Authority to understand the full impact of the water take on the Waikato River.

Engagement

In the context of considering growth quantum's and distributions at a corridor wide scale, a series of engagement workshops took place with external working groups. Groups included; Kāinga Ora, Auckland Council, Watercare Services Limited, Ministry of Education, Auckland Transport, Waka Kotahi (NZTA) and Eke Panuku. These workshops were used as a forum to share information, answer questions and further refine the two options presented. Information packs were also shared with the group[132].

Stakeholders were then asked to answer the same five questions discussed at the internal workshop, set out at section 5.3. Further details [133] can be found within the appendices to this report.

In summary, the engagement which took place highlighted the following themes:

- Growth distributions acknowledging existing employment and urban growth areas within Auckland.
- Other planned transport projects should be taken into account when developing and analysing ALR growth distributions.
- What policy changes, land acquisition and urban interventions that will be needed to accommodate growth in the ALR corridor.
- Budget considerations for infrastructure asset owners, particularly keeping up with the demand which will be directly linked to growth in the corridor.
- Commentary regarding the extent of anticipated urban enabling infrastructure required

[131] Appendix 3.A.M – Workshop minutes
[132] Appendix 3.A.N – Stakeholder Presentation pack
[133] Appendix 3.A.O – Stakeholder Summary information

- The incorporation of other stakeholders development plans and priorities within the ALR corridor catchments.

Further engagement was also undertaken with the Development Project Office (DPO) at Auckland Council. The DPO oversees selected infrastructure, housing and public realm development projects, enabling improvements to, and facilitating the necessary required growth to take place in Auckland. Given the DPO's significance and relevance in infrastructure development in Auckland, the urban enabling infrastructure and costing methodology and preliminary results were shared, and DPO input sought.

The DPO noted that the method of estimating infrastructure cost is different from a typical study, which would be much more detailed, and equally recognised that such a study was appropriate for the level of analysis being considered for the ALR corridor at an IBC level. Overall, the DPO commented that the method used is reasonable given the time and details available, but notes the limitations in the approach. The DPO also suggesting adding sensitivities for exclusions – like local infrastructure and stormwater quality. These sensitivities are illustrated below, and help to identify what some of the broader infrastructure costs could be.

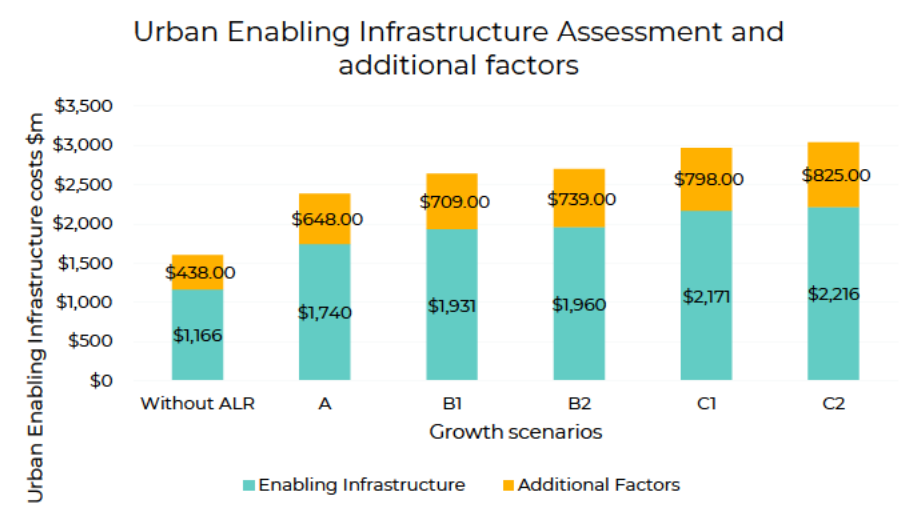


Figure 0-8-1: Urban enabling Infrastructure assessment and additional factors

Urban Enabling Infrastructure Category	Additional Factors
Potable Water	Multiplied by two to allow for local infrastructure
Wastewater	Multiplied by two to allow for local infrastructure
Stormwater	Multiplied by three to allow for local infrastructure and water quality
Green	The current cost per person of $1,790 is derived from the assumption that each dwelling is 0.7 HUE. DPO suggested to change the HUE assumption to 1.0 which makes the green cost $2,560 per person.

Table 0-19-10 Additional factors for consideration

	Blue			Green	Total	Difference between growth options
	water	wastewater	stormwater	green		
Baseline: Without ALR	*$38*	*$123*	*$123*	*$70*	**$354**	$437
Baseline: Without ALR sensitivities applied	*$76*	*$246*	*$369*	*$100*	**$791**	
Option A: Urban Minimal Investment	*$90*	*$182*	*$168*	*$91*	**$531**	$648
Option A: Urban Minimal Investment, sensitivities applied	*$180*	*$364*	*$504*	*$131*	**$1,179**	
Option B1: Incremental Investment (Distribution 1)	*$106*	*$240*	*$158*	*$110*	**$614**	$710
Option B1: Incremental Investment (Distribution 1) sensitivities applied	*$212*	*$480*	*$474*	*$158*	**$1,324**	
Option B2: Incremental Investment (Distribution 2)	*$123*	*$217*	*$176*	*$112*	**$628**	$740
Option B2: Incremental Investment (Distribution 2) sensitivities applied	*$246*	*$434*	*$528*	*$160*	**$1,368**	
Option C1: Active Investment (Distribution 1)	*$128*	*$268*	*$170*	*$143*	**$709**	$798
Option C1: Active Investment (Distribution 1) sensitivities applied	*$256*	*$536*	*$510*	*$205*	**$1,507**	
Option C2: Active Investment (Distribution 2)	*$128*	*$276*	*$179*	*$144*	**$727**	$824
Option C2: Active Investment (Distribution 2) sensitivities applied	*$256*	*$552*	*$537*	*$206*	**$1,551**	

Mana whenua engagement

There was no engagement with mana whenua during this stage of the process. At the time the need for engagement as a part of Te Tiriti partnership was considered, it was concluded that it was not considered appropriate due to the condensed timeframes the project was operating under, and the current level of engagement load with mana whenua at that time. Overall, it was determined better to work with

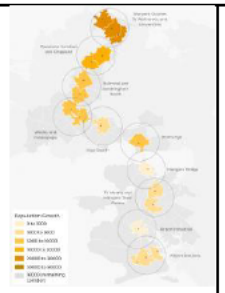
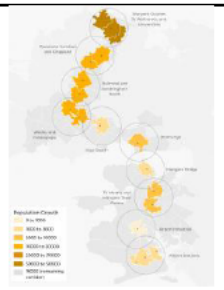
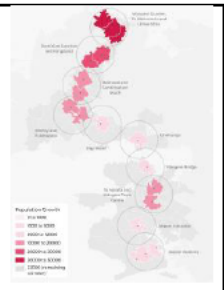
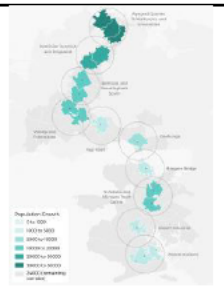
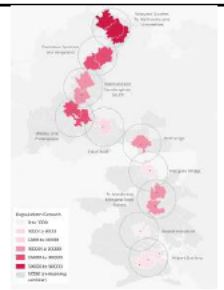
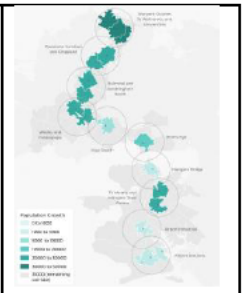
mana whenua at a later stage in the process when there is more time, and ability to work at a greater level of detail about what specific interventions are and how they could be implemented.

Focussing on an urban distribution of growth

Following the analysis completed, it was recommended that the two options selected should follow and focus on an urban distribution of growth (Options B2 and C2). It was concluded that the LUTI distributions of growth would not be selected because the urban distribution was derived from an evidence base which built around some of Auckland's largest development priority areas, and improved urban outcome opportunities along the corridor. In contrast, the LUTI model focuses on accessibility improvements and re-enforces current patterns of development with two large employment zones (the City Centre and the Airport) at either end of the corridor. With a focus on improved urban outcomes, Options B2 and C2 were put forward and tested in a workshop format, as discussed at Section 5.3 above.

Summary

To summarise, the options presented were as follows:

						
	Baseline: Without ALR (Transport Do Minimum)	**Option A: Urban Minimal Investment**	**Option B1: Incremental Investment (Distribution 1)**	**Option B2: Incremental Investment (Distribution 2)**	**Option C1: Active Investment (Distribution 1)**	**Option C2: Active Investment (Distribution 2)**
			Key Findings from Analysis			
Population Change	**84k**	**119k**	**146k**	**146k**	**193k**	**193k**
Total Cost ($m)	**$874m**	**$1,324m**	**$1,413m**	**$1,422m**	**$1,507m**	**$1,523m**
Summary	The baseline position highlights that investment would be required in any case, whether ALR would come forward or not.	This option comprises the growth model fed into the transport model forecast by LUTI (the EPO). It highlights that the population uplift within the corridor would require urban investment regardless of the extent of uplift.	This option follows the LUTI distribution instead of the urban distribution. The option is feasible to deliver, but does not comprise a 'book-end' option of growth.	This option is preferred as it follows a distribution which takes account of improved urban outcomes in the areas of greatest urban potential.	This option follows the LUTI distribution instead of the urban distribution. This option is feasible to deliver, but does not comprise a 'book-end' option of growth.	This option is preferred as it follows a distribution which takes account of improved urban outcomes in the areas of greatest urban potential.
	N/A – Baseline position	This option already being incorporated into the economic assessment	Option not selected to proceed	Option selected as preferred for shortlisting	Option not selected to proceed	Option selected as preferred for shortlisting

3.7 Refinement

Following confirmation of the shortlisted two options developed through the optioneering process to proceed into the transport model, a series of additional details were identified for further option refinement and cost finalisation.

The table below also sets out topics which were explored further, including outputs from the internal shortlisting workshop and external stakeholder input:

Topic	Requirement	Justification and Approach
School Places & Community Infrastructure	Defining anticipated costs for likely school place requirements along the corridor.	ALRL engaged with the Ministry of Education to request input of the growth/distribution options input into their catchment modelling. Following assessment, it was concluded that, at this stage, possible costings would be too indicative given the complexity of future schooling infrastructure requirements and the level of information available at this stage. In place of this, a high level estimate of capital cost for additional students was developed[134], and applied as a proxy for education costs. In addition to this, community infrastructure costs were sourced from Auckland Council's development contributions policy.
Growth in the context of other transport projects	Understand the relationship between anticipated growth scenarios for the Harbour crossing and Northwest connections projects	In consultation with the integration team, it was noted that the timescales between the projects would resolve any competition for growth issues. In particular, for additional harbour crossing, any urban intensification from rapid transit would occur after 2050.
Local Transport Infrastructure	Further development of local and active travel transport infrastructure costings	The ALR Transport Planning team analysed local active travel needs for each key catchment area. Based on this analysis, a number of specific changes or upgrades were identified, and costed using Waka Kotahi cost estimation guidance. These costs were within the amounts already identified from earlier high level analysis, and are considered to validate the costs already used. The earlier high level amounts have been retained as they apply to all stations (not just key catchments) and make allowance for broader interventions, not just active modes.
Development Project Office (DPO)	Provision of the urban enabling infrastructure category methodology and analysis to the DPO.	ALRL engaged with DPO due to their relevance and importance in relation to enabling infrastructure in Auckland. Feedback on methodology was incorporated, and sensitivities for additional cost factors are now included in the report.
CAT Modelling	Completion of a 'book-end' approach to CAT testing.	Given the limitations of a 2-dimensional approach to calculating development capacity, particularly considering the sensitivity of capacity to height restrictions, it was agreed to use a 3-dimensional approach to test capacity at key catchments. Through this analysis, it was found that supply may be more constrained than earlier thought, particularly for Option C2.

Table 0-20-11 Urban Optioneering refinement overview

[134] Please see Appendix 3.A.H – Urban Enabling Infrastructure Methodology

Refined urban enabling infrastructure costs

On completion of the refinement process, the final urban enabling infrastructure costs set out in the table below were inputted into the economic case model:

	Blue			Black	Green	Pink	Grey	Total	Total per person[135]	Total Per Household
	water	wastewater	stormwater	power	green	social	transport			
Baseline: Without ALR	*$38m*	*$123m*	*$123m*	$75m	$70m	$292m	$446m	**$1,166m**	**$13,932**	**$30,288**
Option A: Urban Minimal Investment	*$90m*	*$182m*	*$168m*	$75m	$91m	$415m	$719m	**$1,740m**	**$14,582**	**$34,584**
Option B1: Incremental Investment (Distribution 1)	*$106m*	*$240m*	*$158m*	$79m	$110m	$518	$719m	**$1,931m**	**$13,272**	**$32,675**
Option B2: Incremental Investment (Distribution 2) ***ALR + Incremental Investment***	*$123m*	*$217m*	*$176m*	$75m	$112m	$537m	$719m	**$1,960m**	**$13,469**	**$33,273**
Option C1: Active Investment (Distribution 1)	*$128m*	*$268m*	*$170m*	$79m	$143m	$664	$719m	**$2,171m**	**$11,278**	**$28,528**
Option C2: Active Investment (Distribution 2)	*$128m*	*$276m*	*$179m*	$79m	$144m	$692	$719m	**$2,216m**	**$11,510**	**$29,424**

Table 0-21-12 Refined urban enabling infrastructure costs (All are Present Values $m discounted at 4% real)

3.8 Testing of Urban uplift opportunities

To expand upon the Catchment Capacity Analysis prepared by PwC, additional modelling was completed in order to verify growth/distribution options in an urban form and spatial context. A 3-dimensional approach, known as the City Algorithmic Tool (CAT) model, was used. CAT modelling[136] takes a parametric approach to testing the potential Gross Floor Area 'GFA' of a location, based upon a series of defined assumptions, and importantly, also factoring in potential building envelopes. The CAT model was able to generate an understanding of 'constrained supply' along the corridor based upon urban form constraints and created a 3D model of bulk and massing of catchments along the corridor.

In particular, the model software utilised incorporated the following:

[135] Cost per person, per head of population growth
[136] Appendix 3.A.P – CAT Modelling assumptions and outputs

- A combination of data sets to inform the development potential of sites, precincts and catchments;
- The ability to filter constraints layers which would otherwise remove or restrict development; and
- Adjustable parameters used to test different uplift scenarios.

CAT modelling was completed to refine and verify the options presented in a 3 dimensional context as part of Phase 3 of the urban response. The CAT modelling process focussed on the two 'bookend' options and growth quantums (**Option A**: Urban Minimal Investment and **Option C2**: Active Investment (Distribution 2)) in order to test the lower and upper bounds of growth and distribution opportunities. This approach was taken as it was assumed that if the higher growth quantums in Option C2 could be achieved, then it would also be possible for the quantums in **Option B2** to be delivered. The options were tested through the following scenarios:

- *Scenario 1*: Urban Minimal Investment Option (LUTI and National Policy Statement on Urban Development 'NPSUD' (minimum requirements (6 storeys)
- *Scenario 2*: Option C2 (Active Investment (Distribution 2)) and the NPSUD – 12 storeys)

Scenario 1 testing was completed for six priority locations along the corridor:

- City Centre (*Wynyard, Te Wai Horotiu, Universities*);
- New North Road Corridor (*Dominion Junction and Kingsland*);
- Balmoral / Sandringham (*Balmoral Road and Sandringham South*);
- Te Auaunga Creek (*Wesley and Puketāpapa*);
- Onehunga (*Onehunga and Depot*); and
- Māngere (*Māngere Town Centre and Te Ararata*)

Further testing under a Scenario 2 was completed for the two priority locations:

- New North Road Corridor (*Dominion Junction and Kingsland*); and
- Onehunga (*Onehunga and Depot*);

The full list[137] of the testing parameters and assumptions made as part of the modelling exercise can be found within the report appendices, but are summarised as follows:

- No changes were made to land uses (i.e. it was assumed that residential uses would remain residential, business and mixed uses would remain to mixed use);
- It was assumed that designated Special Character Areas and Volcanic View Shafts, the significance of these having been identified through mana whenua engagement, would continue to exist and place the same spatial limitations on the locations to which they apply that they do currently;

[137] Appendix 3.A.P CAT modelling methodology and outputs

- Different typologies were established for increasing sizes of site, as the basis for establishing the potential GFA that could be yielded from each;
- To map the development requirements of each growth option onto potential GFA supply, assumptions were made around the GFA required per household and job in different catchments. These decrease along the ALR corridor, reflecting the different typologies of both residential and commercial use typically observed (e.g. a greater tendency towards larger family homes in Māngere, and towards apartments in the City Centre).

The outputs of the modelling further framed the possible urban intervention lever opportunities (see section 4.6) which would be able to further influence development within the corridor, and began to formulate potential catchment specific interventions for certain station catchments in order to theoretically achieve full growth potential along the corridor.

Urban Uplift 3D modelling outcomes

Using the parameters and assumptions defined within the CAT methodology (see Appendix 3.A.P) the following outcomes were modelled, defining whether there would be theoretical supply of land available based upon the growth and distribution options identified. Full details are set out within the appendices[138].

Under Scenario 1, the National Policy Statement on Urban Development 2020 (updated 2022[139]) 'NPS-UD' guided theoretical model capacity outside of the City Centre. Policy 3 of the NPS provides for 6 storey development, with this being applied along the corridor. This did not result in the required GFA supply being achieved in two catchments – New North Road and Onehunga. In these catchments a refined modelling run (Scenario 2) was undertaken, under which the implications of achieving 12 storey development were examined. This increased height was considered to remain appropriate given that New North Road and Onehunga are main urban centres, and this reflects the logic applied when defining Distribution 2 with these locations being focussed areas for greater urban opportunity of achieving NPS-UD-guided development at 12 storeys in height.

A different, bespoke approach was taken for the City Centre where the nature of existing development and foreseeable future market conditions facilitate much taller buildings. The approach taken factors the following requirements from the Auckland Unitary Plan:

- Enabled building heights, and the specific maximums outside the Special Height Area;
- Within the Special Height Area, the defined variations relating to landmarks and volcanic viewshafts;
- Admission of Sunlight location requirements;
- Harbour Edge Height Controls;

[138] Appendix 3.A.P – CAT modelling methodology and outputs.
[139] https://environment.govt.nz/assets/publications/National-Policy-Statement-Urban-Development-2020-11May2022-v2.pdf

- Site Intensity Controls in terms of maximum floor area ratio.

The graph below illustrates that the GFA supply derived from the CAT modelling exceeds the GFA quantum required for each growth option in all but two cases – the Active Investment Option at New North Road, and all growth options in the city centre. For the Balmoral Mile and Te Auaunga Awa, the extent to which supply exceeds the required GFA quantum is significant.

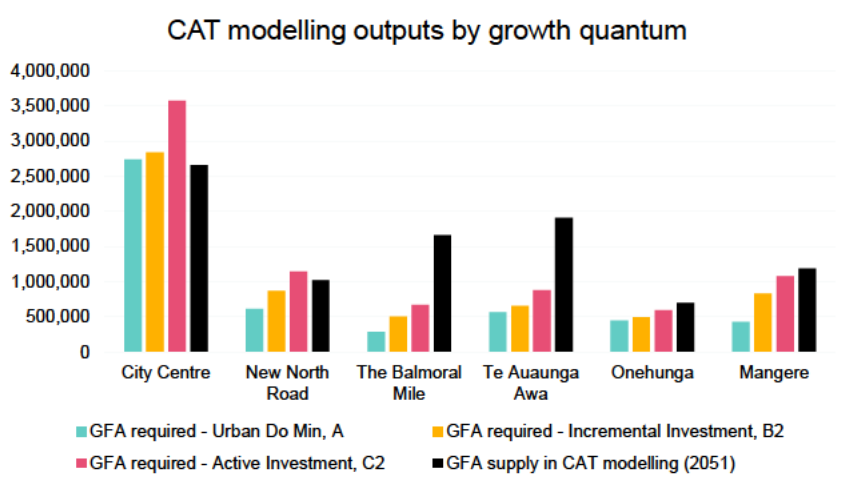


Figure 0-9-2: CAT modelling outputs by growth quantum

Whilst gaps exist between CAT-modelled supply and the potential requirement figures for New North Road and the City Centre, these are not considered to be significant concerns in considering whether growth can be realised:

- In the City Centre, future land supply is part of a wider story of evolving land use affecting central business districts worldwide, which is difficult to foresee over the length of time that ALR will be built out. For example, increasing trends in the conversion of office buildings to residential uses could address a significant part of the supply gap.
- In New North Road, the supply gap is relatively small and only applies to the GFA required for the Active Investment Option. It is therefore within a margin of error.
- CAT modelling is focused only on the walkable catchments, and only on sites considered likely to develop (where current land value equates to >75% of total capital value). Over the wider corridor and all sites there is significantly more capacity, albeit less likely to develop.
- In all catchments, urban interventions offer the potential to result in significantly different urban outcomes. These are set out in the section below.

3.9 Developing and engaging the urban intervention levers

Over time, market forces will translate the enhanced connectivity brought about by ALR into a series of outcomes. However, there is opportunity to intervene to further enhance urban outcomes, or to accelerate/distribute demand as anticipated by the different growth options. On that basis, work undertaken through the urban optioneering process has identified that complementary urban intervention that could be applied alongside the transport investment.

There are considered to be two rationale for intervention:

1. To create conditions under which the quantum or distribution of development in each of the urban growth options can be delivered, in terms of enabling supply or attracting demand;
2. To increase the quality of urban outcomes that can be achieved, and provide greater certainty around the achievability of those outcomes.

The outcomes of the CAT modelling process detailed in Section 4.5 above – i.e. the demonstration that there is mostly sufficiently theoretical capacity to allow the development quantum of the growth options to be met – mean that the focus for urban interventions is able to be more so on the attracting demand component of the first rationale, and the second rationale around quality of urban outcomes. However, during the initial stages of intervention development the focus was on all of demand, supply and quality.

This process taken to consider and potential urban interventions followed the steps set out in the diagram below:

- **Step 1**: Longlist identification
- **Step 2**: Consideration of intervention purpose
- **Step 3**: Consideration of intervention performance
- **Step 4**: Further development of intervention and cost parameters
- **Step 5**: Priority urban intervention listing

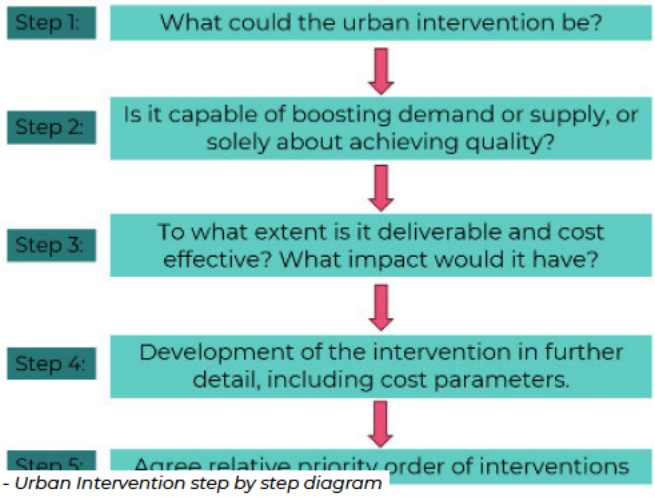


Figure 0-10-3 - Urban Intervention step by step diagram

Step 1: Longlist identification

As part of the longlist identification process, workstream teams across ALR were asked to pool suggestions of possible urban intervention measures which could be used to achieve urban outcomes alongside the transport investment. Once these were gathered, thematic analysis was used to group the interventions into the following four categories:

- **Physical** – interventions that would involve works or on-the-ground actions by ALRL or other partner entities.
- **Financial** – interventions that reduce the cost and risk of development, and make it more attractive to developers and/or occupiers.
- **Planning and Policy** – interventions that remove, amend or (outside the ALR corridor) create planning controls to facilitate alternative outcomes.
- **Coordination** – interventions that provide new or enhanced public sector powers and mechanisms to achieve spatial outcomes.

Around 30 possible intervention measures were initially identified, with the longlist being expanded to around 40 possible intervention measures through a workshop that included exercises to categorise the measures as above.

Step 2: Consideration of intervention purpose

To progress, it is important for intervention measures to fulfil a purpose aligned to the two rationales for intervention. Consideration was therefore undertaken of whether each would:

- Increase the demand for development in a particular location, and hence help to achieve desired quantum of development.
- Increase the supply of development in a particular location, and hence help to achieve desired quantum of development.
- Improve the quality of urban outcomes achieved through development, and provide greater certainty that desired urban outcomes can be achieved.

To help structure the interventions, care was taken to categorise purposes between either demand or supply. Many of the intervention measures would also help to improve the quality of urban interventions, as well as boosting demand or supply.. Intervention measures which would not fulfil any of these purposes have not been progressed into the economic case at this time – although these should continue to be considered at urban DBC stage and as part of the PCDF. Examples of such intervention measures would include opportunities for ALR to support Māori identify and deliver specific mana whenua objectives.

Step 3: Considertion of intervention performance

The relative performance of each urban intervention measure was then considered in terms of how the relative deliverability and cost of each intervention would balance against the impact that the intervention measure could have. In order to establish which urban intervention measures should be assessed in further detail through subsequent steps, a refinement and shortlisting process was undertaken

through two workshops.[140][141] The first workshop re-enforced the outputs of steps 1 of 2 of the urban intervention development process, with an agreement to how possible urban intervention measures should be categorised.

Following this, the detailed urban intervention measures were grouped into a condensed set of interventions – with overall categories which have the ability to incorporate a number of individual measures. A total of eight interventions were agreed at a second workshop. These were as follows:

Category	Intervention
Physical	Catalyst development
Physical	Place-making
Financial	Funding urban enabling infrastructure
Financial	De-risking development
Financial	Direct funding
Planning	Strategy and Policy
Planning	Development and zoning
Coordination	Powers and mechanisms

Table 0-22-13 Urban Intervention measures

The further development of the specific measures sitting under each of these eight interventions will be undertaken at a DBC stage.

Step 4: Development of urban intervention and costings approach

The next step focussed on the development of each urban intervention in further detail, with a particular focus on potential costing mechanisms to allow the overall costs of intervention to be fed into the economic case model. Subject area experts were assigned to each intervention, with the details captured in urban intervention card templates[142].

Subject area experts, together with the urban optioneering team, worked through what would be most likely to occur under a particular intervention category, drawing on experience and professional judgement. This was then used to determine a costing method for each intervention category. Costings were then developed either for the entire corridor, or specific catchments, depending on the specifics of the intervention and growth option.

In order to establish a costing method, subject area experts agreed the most probable possible detailed intervention measure for each intervention category. This was further developed as a costing reference point.

The outputs of the above process are shown in the table below. Full details relating to the cost model approach, methodology and assumptions can be found within appendix 3.A.H[143].

Intervention Group	Intervention Categories	Description	Possible detailed intervention measures	Costing method
Physical	Place-making	*Measures which make places more attractive and increase their usability, in order*	Placemaking pop-ups/meanwhile uses Place branding and marketing	A general place enhancement cost for each station is included in the EPO.

[140] Appendix 3.A.Q Workshop 21.09.2023
[141] Appendix 3.A.R Workshop 29.09.2023
[142] Please see Appendix 3.A.R for details of the urban intervention catchment cards.
[143] Appendix 3.A.H

Intervention Group	Intervention Categories	Description	Possible detailed intervention measures	Costing method
		to create conditions to catalyse development in locations where it might otherwise be less attractive or be undertaken in a less desirable manner.	Targeted urban enhancements in public realm	Therefore, this intervention focused on costs over and above that, in order to generate demand. Based on experience from other projects, a place-making cost of $1,815/additional household was used. This covers urban design, marketing and limited intervention in physical space
	Catalyst development	*Measures which catalyse the market to deliver market interventions at scale in locations otherwise not currently conducive for development*	Direct development Suboptimal use relocation Strategic land acquisition Catalytic conversion of commercial to residential/mixed use. Land acquisition/consolidation Local/Central government tenancy	Catalyst development can take a range of forms, from land assembly and packaging through to loss leader developers. In all cases, for it to be a catalyst development it is assumed there is some form of financial loss. Costing for catalyst development estimated a range of costs and revenues for a hypothetical catalyst development, and used a mid point. This 'net loss' was used as the intervention cost.
Financial	Investment in urban enabling infrastructure	*The direct provision of (and payment for) urban enabling infrastructure within the corridor by the public sector, to help direct development towards it and allow developers to undertake different forms of development to what would otherwise be viable.*	Partial or full contribution to urban enabling infrastructure costs by Crown/ALR project Infrastructure planning and coordination capability within ALRL to work CCOs and Council to obtain funding through LTIP processes.	The urban enabling infrastructure investment requirement incremental to the Urban Minimal Investment Option were used as the basis for costing this intervention, plus costs derived for micromobility investment (as detailed in the appendix). Specifically, it is assumed that in the Urban Minimal Investment Option the costs are met by asset owners / developers, and in the other growth options the incremental cost is funded by the light rail project.
	De-risking development	*Measures which de-risk development using financial tools, in order to encourage greater development supply.*	Lower cost debt Public sector lease commitment Rental or pre-sale underwriting Deferred land settlement	In order to proxy de-risking development, it was considered that an underwrite was likely the most effective tool to de-risk development. Cost of the under write is assumed to be two years of interest cost on the capital required for the underwrite, should it be exercised. This method did not take into account the market risks and potential

Intervention Group	Intervention Categories	Description	Possible detailed intervention measures	Costing method
				of purchasing underwritten assets and holding them for a longer period until values recover.
	Direct funding	*Measures which provide direct funding at public cost, to bring down the end price point and attract demand.*	Employment incentives Joint ventures Cost subsidies or rebates	To estimate cost of direct funding, a GST rebate on all construction costs was applied. It is likely that a GST rebate is not the most effective way to bring down price points to attract demand, but it serves as a conservative proxy of the likely cost of such an intervention. More effective means may be home buying grants or rates rebates paid for by the project.
Planning and Policy	Strategy and Policy	*Measures which would alter the mechanics of the planning system to bring about wider strategic policy changes, which help to encourage development in the ALR corridor.*	Review and amend the relevant sections of the Government Policy Statement (HUD) to ensure outcomes sought in RTN corridors are included. Review and amend aspects of the FDS to better reflect increasing focus on RTN corridors to cater for long-term growth. Introduce a fast-track consenting process for urban development in RTN corridors. Investigate value of introducing a new NPS on transit-oriented development Review and amend planning related sections in the LGA and RMA (or new legislative framework) to better reflect outcomes sought	A fixed cost for both planning interventions was applied, this fixed cost was increased for growth options with a greater quantum of growth, as more planning work would be required.
	Development and zoning	*Measures which would change local development and zoning rules within the context of the existing planning system and framework, to facilitate greater levels of development within the ALR corridor.*	Removal of particular special character areas in some catchments Minimum density requirements Density Bonus Incentive Introduction of new zone(s) or overlay(s) to the existing suite of zones that better reflect the development outcomes sought	A fixed cost for both planning interventions was applied, this fixed cost was increased for growth options with a greater quantum of growth, as more planning work would be required.

Intervention Group	Intervention Categories	Description	Possible detailed intervention measures	Costing method
			Where density is restricted, introduce transferable development rights to allow high density in areas less restricted. Inclusionary zoning (affordable housing) MDRS removal in walkable catchments	
Co-ordination	Powers and mechanisms	*Measures which would provide new powers to coordinate development, potentially through a new urban delivery entity, supporting development within the ALR corridor and directly intervening to achieve desirable outcomes.*	Urban delivery entity Access powers via existing legislation - most likely Urban Development Act Land consolidation powers Place branding and marketing Business concierge service to encourage relocation Alternative tenure mechanisms	Coordination costs are considered to be organisational costs for the entity undertaking the functions. These have not been estimated here due to their relatively small scale, and that they are included in consideration of operational cost elsewhere.

Table 0-23-14 Summary of Urban Interventions and Costing Approach

For the purposes of this study, urban interventions were considered at a high level, in order to understand what may be required and potential need for investment. In practice, for any urban intervention there are treaty principles and expectations that any specific intervention be developed in partnership with mana whenua, and include opportunities for equity and participation by Māori communities.

Step 5: Urban intervention priorities

The final stage of urban intervention development was to prioritise the interventions, and make judgements on the degree (and resultant cost) of intervention that would be most appropriate. This was undertaken through further internal workshops[144][145][146].

The following priority order ranking was established for the eight interventions. This responded to the earlier consideration of intervention performance in Step 3 (relative impacts when considered against the cost and deliverability of the interventions) and the further development of detail in Step 3:

1. ***Planning: Development and zoning*** (Low cost, easy deliverability, high impact)
2. ***Planning: Strategy and Policy*** (Low cost, moderate deliverability, high impact)

[144] Appendix 3.A.S – Urban Intervention workshop 4
[145] Appendix 3.A.T – Urban Intervention workshop 5
[146] Appendix 3.A.U – Urban Intervention meeting summaries

3. ***Physical: Place-making*** (Low cost, easy deliverability, moderate impact)
4. ***Financial: Direct funding*** (Low cost, moderate deliverability, moderate impact)
5. ***Physical: Catalyst development*** (High cost, moderate deliverability, high impact)
6. ***Financial: Funding urban enabling infrastructure*** (Moderate cost, easy deliverability, moderate impact)
7. ***Financial: De-risking development*** (Moderate cost, moderate deliverability, moderate impact)

The **Coordination: Powers and mechanisms** intervention was considered to be a pre-requisite for the other interventions. In addition the cost of this intervention is assumed not to be additional for the purposes of the economic case, because the introduction of powers and mechanisms for ALR would be an inherent part of the project's management case. It was therefore established that it should sit alongside the other interventions rather than being ranked with them.

Having regard to this ranking, the appropriate 'amount' of intervention was then established. Two broad approaches were considered:

- *Low levels of catchment intervention* – focussed on increasing the supply of development or increasing the demand for development (the first and second rationale for intervention considered in Step 1). This would supply in specific catchments where gaps exist between the CAT modelled capacity of development or and required development quantums or the position is marginal – the City Centre, New North Road and Onehunga.
- *High levels of intervention* – focussed on the quality of urban outcomes (the third rationale for intervention) as well as supply and demand, within all catchments.

For growth options B1, B2, C1 and C2, the established amounts of intervention are set out in the table below. It was established through workshop discussions and subsequent refinement that the high levels of intervention should apply for the five highest-ranked interventions. The other two as set out above would receive the lower level of intervention specifically targeted at addressing supply and demand gaps in the three catchments where these exist or the position is marginal, and the balance of costs and deliverability against the benefits to be realised are not considered to warrant corridor-wide intervention.

The amount of intervention also differs between B1/B2 and C1/C2. For those interventions that scale to the quantum of growth (place-making, funding urban enabling infrastructure and de-risking development) the differences in the amount of intervention are a direct product of this. For the other interventions, the additional amount under C1/C2 over B1/B2 reflects the application of increased multipliers as the means to achieve the additional urban outcomes.

For the Urban Minimal Investment Option (A) no urban interventions are made, reflecting its nature as a growth option in which the public sector and ALRL are 'hands off' other than making the transport investment. This means that the gaps between required development quantum and CAT modelled development capacity may not be filled, and broader urban outcomes may not be realised, the only

capacity gap is in the City Centre and is very modest at 3% - meaning that 97% of the Urban Minimal Investment growth quantum has been modelled to be achievable. This is effectively a margin of error within the context of how the City Centre could evolve over the coming decades, and is therefore not considered to undermine the validity of the Urban Minimal Investment Option.

Urban intervention	Intervention amount	Option A: Urban Minimal Investment	Options B1 and B2: Incremental Investment	Options C1 and C2: Active Investment
Physical: Place-making	High	None	Fixed cost per additional household in all catchments compared to Urban Minimal Investment (A) quantum of growth.	Fixed cost per additional household in all catchments compared to Urban Minimal Investment (A) quantum of growth.
Physical: Catalyst development	High	None	Assumes 2% of development in all catchments, in order to demonstrate quality outcomes and signal to the market..	Assumes 4% of development in all catchments, in order to demonstrate quality outcomes and signal to the market.
Financial: Funding urban enabling infrastructure	Low	None	Urban enabling infrastructure costs incremental to option A	Urban enabling Infrastructure costs incremental to option A
Financial: De-risking development	Low	None	Funding the two year holding costs of new homes based on current median house prices, for the City Centre, New North Road and Onehunga. Applied to a reduced proportion of the required quantum which cannot be met.	Funding the two year holding costs of new homes based on current median house prices, for the City Centre, New North Road and Onehunga. Applied to the proportion of the required quantum which cannot be met.
Financial: Direct funding	High	None	Funding a proportion of the construction cost for 15% of new development in all catchments.	Funding a proportion of the construction cost for 30% of new development in all catchments.
Planning: Strategy and Policy	High	None	Fixed costs associated with undertaking plan changes and other amendments, with a multiplier of 1.25x above what might typically be expected to reflect moderate complexity.	Fixed costs associated with undertaking plan changes and other amendments, with a multiplier of 1.5x above what might typically be expected to reflect high complexity.
Planning: Development and zoning	High	None		
Coordination: Powers and mechanisms	N/A – pre-requisite	Fixed cost already assumed as part of ALR management costs and therefore not additional in economic case		

Table 0-24-15 Overview of intervention requirements and method relative to each Option

The phasing and staging of interventions will be informed by more detailed analysis of planning opportunity, market readiness, and staging of transport investment at DBC stage. This staging would also tie into the project's wider urban narrative.

Resultant costs of the urban intervention levers

The table below provides a summary of total established costs of undertaking the urban interventions set out above – for B1, B2, C1 and C2.

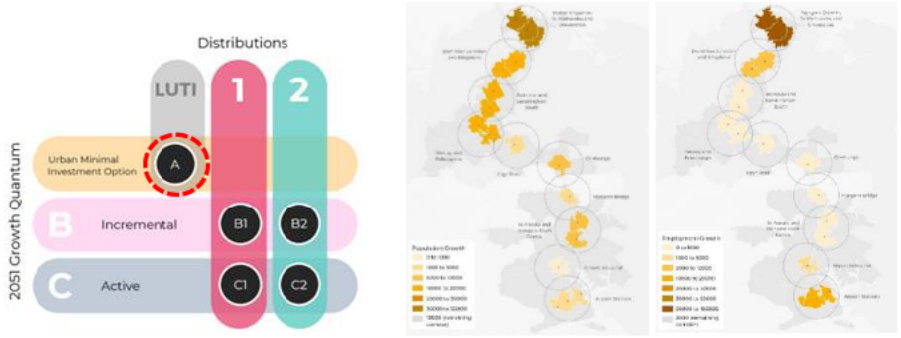
	Option A: Urban Minimal Investment	Option B1: Incremental Investment (Distribution 1)	Option B2: Incremental Investment (Distribution 2)	Option C1: Active Investment (Distribution 1)	Option C2: Active Investment (Distribution 2)
Physical: Place Making	$0	$6m	$6m	$17m	$17m
Financial: Direct Funding	$0	$46m	$47m	$247m	$250m
Planning: Development and Zoning & Strategy and Policy	$0	$3m	$3m	$4m	$4m
Financial: De-risking development	$0	$54m	$54m	$183m	$177m
Financial: Funding urban enabling infrastructure	$0	$76m	$74m	$120m	$106m
Physical: Catalyst Development	$0	$64m	$63m	$142m	$141m
Total intervention costs	$0	$249m	$247m	$712m	$693m

Table 0-25-16 Summary table - Urban Intervention costs

3.10 Final refined shortlisted options

The final refined and shortlisted options are as follows:

Option A (Urban Minimal Investment)



Final urban enabling infrastructure category costs* have been identified for Option A: Urban Minimal Investment:

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social	Transport	Total
$90	$182	$168	$75	$91	$415	$719	**$1,740**

*Type of costs

The total indicative cost per additional person is: **$14,582**

The total indicative cost per household is: **$34,584**

Urban Uplift in priority areas and proportion of CAT model-derived Theoretical Uplift Potential (TUP)

City Centre	New North Road	Balmoral	Te Auaunga Creek	Onehunga	Māngere
2,738,000sqm (97% of TUP)	615,000sqm (166% of TUP)	286,000sqm (580% of TUP)	566,000sqm (337% of TUP)	477,000sqm (135% of TUP)	429,000sqm (277% of TUP)

Final urban intervention lever costs:

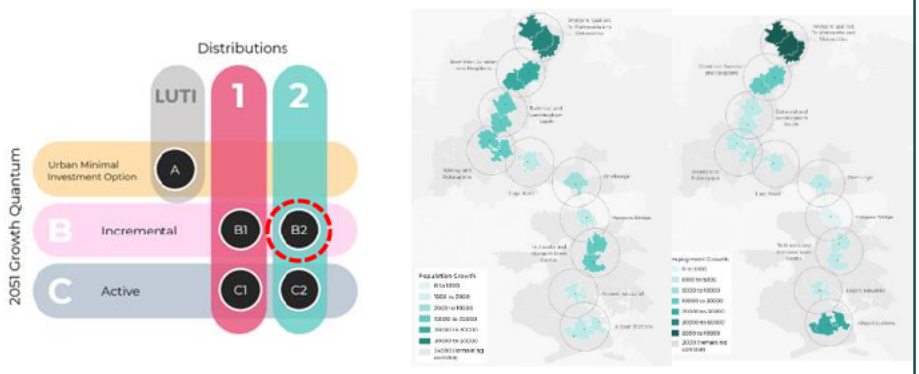
Physical: Place Making	Financial: Direct Funding	Planning: Development and Zoning & Strategy and Policy	Financial: De-risking development	Financial: Funding urban enabling Infrastructure	Physical: Catalyst Development
$0m	**$0m**	**$0m**	**$0m**	**$0m**	**$0m**

Total: $0m

There are no Urban Interventions in an Urban Minimal Investment Option.

Table 0-26-17 Option A - Refined Summary description

Option B2: Incremental Investment (Distribution 2)



Final urban enabling infrastructure category costs* have been identified for Option B2: Incremental Investment (Distribution 2):

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social	Transport	Total
$123m	$217m	$176m	$75m	$112m	$537m	$719m	**$1,960m**

***Type of costs**

The total indicative cost per additional person is**: $13,469**

The total indicative cost per household is: **$33,273**

Urban Uplift in priority areas and proportion of CAT model-derived Theoretical Uplift Potential (TUP)

City Centre	New North Road	Balmoral	Te Auaunga Creek	Onehunga	Māngere
2,837,000sqm (94% of TUP)	870,000sqm (117% of TUP)	508,000sqm (327% of TUP)	657,000sqm (290% of TUP)	499,000sqm (121% of TUP)	833,000sqm (143% of TUP)

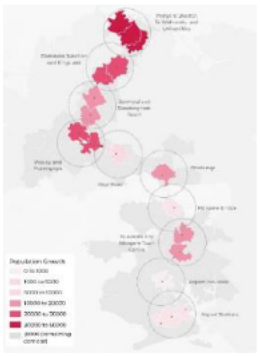
Final urban intervention lever costs:

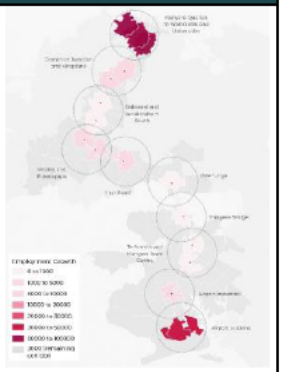
Physical: Place Making	Financial: Direct Funding	Planning: Development and Zoning & Strategy and Policy	Financial: De-risking development	Financial: Funding urban enabling Infrastructure	Physical: Catalyst Development
$6m	**$47m**	**$3m**	**$54m**	**$74m**	**$63m**

Total: $247m

Table 0-27-18 Option B2 'ALR + Incremental Investment' Refined Summary description

Option C2: Active Investment (Distribution 2)





Final urban enabling infrastructure category costs* have been identified for Option C2: Active Investment (Distribution 2):

Blue			Black	Green	Pink	Grey	
Water	Wastewater	Stormwater	Power	Green	Social	Transport	**Total**
$128m	$276m	$179m	$79m	$144m	$692m	$719m	$2,216m

*Type of costs

The total indicative cost per additional person is: **$11,510**

The total indicative cost per household is: **$29,424**

Urban Uplift in priority areas and proportion of CAT model-derived Theoretical Uplift Potential (TUP)

City Centre	New North Road	Balmoral	Te Auaunga Creek	Onehunga	Māngere
3,574,000sqm (74% of TUP)	1,145,000sqm (89% of TUP)	672,000sqm (247% of TUP)	878,000sqm (217% of TUP)	599,000sqm (101% of TUP)	1,078,000sqm (110% of TUP)

Final urban intervention lever costs:

Physical: Place Making	Financial: Direct Funding	Planning: Development and Zoning & Strategy and Policy	Financial: De-risking development	Financial: Funding urban enabling Infrastructure	Physical: Catalyst Development
$16m	**$250m**	**$4m**	**$177m**	**$106m**	**$141m**

Total: $693m

Table 0-28-19 Option C2 'ALR+ Active Investment' Refined Summary description

3.11 The Urban response and its relationship with the wider business cases

The urban response has identified the opportunities for improved urban outcomes along the ALR corridor from an optioneering perspective and lens. It is recognised that the story does not end here, and the urban story of ALR continues to be developed through later work stages, including at detailed business case level.

Throughout this chapter, there are numerous references to the detail discussed and its correlation with other business cases, including the economic, urban commercial, financial and management chapters. It was anticipated that the details referenced would be available for further development at both IBC level and DBC level as required.

It was also recognised that the full analysis of mana whenua and Māori outcomes would also be further assessed, and engagement undertaken with Mana Whenua to support their aspirations. There is the opportunity for these aspirations to developed further in line with the development of the urban response at DBC level.

3.12 Summary of Shortlisted options

After the shortlist and refinement process was completed, the Urban Minimal Investment (Option A) and the two further shortlisted options are shown below.

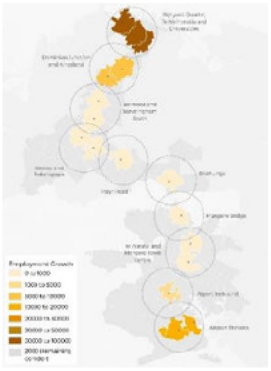
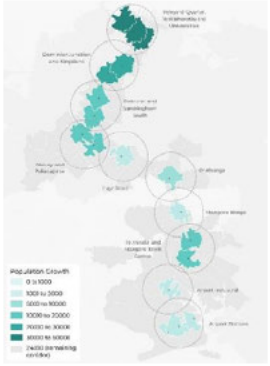
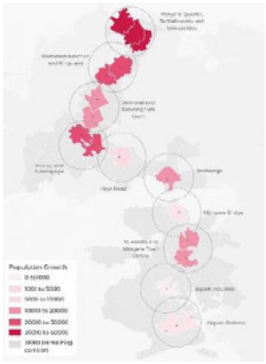
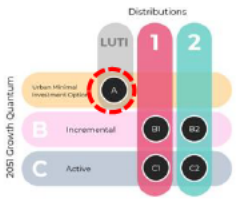
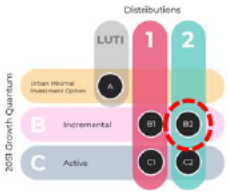
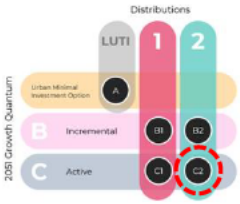
Shortlist Option 1	Shortlist Option 2	Shortlist Option 3
Option A: Urban Minimal Investment	**ALR+ Incremental Investment**	**ALR + Active Investment**
		
		
Urban enabling infrastructure required: **$1,740m**	Urban enabling infrastructure required: **$1,960m**	Urban enabling infrastructure required: **$2,216m**
Indicative urban intervention cost: **$0m**	Indicative urban intervention cost: **$247m**	Indicative urban intervention cost: **$693m**

Table 0-29-1 Final Shortlist options for input into economic case assessment

Next Steps

The two shortlisted options, ALR+ Incremental Investment (Option B2) and ALR + Active Investment (Option C2), proceeded into the economic assessment along with option A as a counter-factual, and provided a direction of approach to other areas of the business case.

Option A was developed further in the urban commercial case, on the basis that it is the minimum required commercial work to support the transport decision, and any further urban commercial considerations can be made in future urban business cases.

These shortlisted options will guide catchment requirements relating to the PCDFs and their anticipated population, households and jobs uplifts for each station along the corridor.

It is considered that the optioneering process for the urban response provided a suitable level of detail at IBC stage, to inform the continuum of potential urban intervention, in order to assist sponsors in making a decision about the extent of future urban intervention to be explored in urban DBC(s). It is acknowledged that further engagement with mana whenua to identify urban development and commercial opportunities will also be explored further and completed at a DBC phase.