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Auckland LIGHT RAIL
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Economic Case

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Security Classification

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Work In Progress Draft

90% complete outstanding gaps and final editing and formatting yet to be completed.

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E-E	Transport Modelling Summary
E-F	Land Use and Urban Economics Methodology Report
E-G	Monetised Impacts Summary
E-H	SDI Report
E-I	Carbon Methodology and Assessment Report
E-J	Carbon Opportunities Report
E-K	Transport Modelling Results Sensitivity Review

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Acronyms

Abbreviation	Term	Abbreviation	Term
AACEI	Association of Advancement of Cost Engineering International	KPI	Key Performance Indicator
AEE	Assessment of Environmental Effects	LSF	Living Standards Framework
AFC	Auckland Forecasting Centre	LUTI	Land use and transport interaction
ALR	Auckland Light Rail	MBCM	Monetising Benefits and Costs Manual (Waka Kotahi)
ALRL	Auckland Light Rail Limited	MCA	Multi-Criteria Assessment
AUP	Auckland Unitary Plan	MSM	Macro Strategic Model
AWHC	Additional Waitematā Harbour Connection	NPV	Net Present Value
BCR	Benefit-Cost Ratio	NSW	New South Wales
BCR_N	National Benefit-Cost Ratio	NW	North West Rapid Transit Project
BCR_G	Government Benefit-Cost Ratio	OpEx	Operational Expenditure
CapEx	Capital Expenditure	PSL	Potential Station Location
CAR	Context Analysis Report	PSZ	Potential Station Zone
CBC	Corridor Business Case	PT	Public transport
CBD	Central business district	$PV	Present Value (discounted) in July 2022 prices
CC2M	City Centre to Māngere	PWF	Preferred Way Forward
CPI	Consumer Price Index	SCO	Segment Corridor Options
CSF	Corridor Strategic Framework	SDI	Social and Distributional Impacts
DBC	Detailed Business Case	SIA	Social Impact Appraisal
DIA	Distributional Impact Appraisal	RMA	Resource Management Act
DPO	Development Project Office	RTN	Rapid Transit Network
DSI	Deaths and serious injuries	UK	United Kingdom
GDP	Gross Domestic Product	VEPM	Vehicle Emissions Prediction Model
GFA	Gross Floor Area	VKT	Vehicle Kilometres Travelled
IBC	Indicative Business Case	WEBs	Wider Economic Benefits
ILM	Investment Logic Map		

Te Tiriti o Waitangi (Treaty of Waitangi)

ALR recognises and respects Te Tiriti o Waitangi as the foundation to Māori and Crown relations.

Mana Whenua are kaitiaki, the custodians of the land and people in Tāmaki Makaurau and have responsibilities to care for Tāngata (people) and Whenua (land). ALR recognises the significance of these connections to Mana Whenua as kaitiaki and their values.

In providing direction for transport and urban investment and decision making, Auckland Light Rail recognises the relationship and obligations between Māori and the Crown. These include:

- Partnership, Participation and Protection
- Kāwanatanga: The Crown's right to govern
- Tino Rangatiratanga: Self-determination/autonomy
- Ōritetanga: The rights of Māori as citizens

Continuing Engagement

The Economic Case, including the assumptions, analysis, and findings it contains, will require in-depth engagement, testing, and review with Mana Whenua leadership and kaitiaki.

1. Executive summary

Auckland Light Rail delivers against transport, urban and sustainability objectives. It represents a clear value for money investment that can deliver between $30bn and $38bn in economic benefits over the appraisal period.

The economic case for Auckland Light Rail (ALR) presents a consistent and compelling case for investment delivering up to $2.80 of economic, social, and environmental benefits for every dollar invested.

ALR delivers significant positive benefits for the Tāmaki Makaurau Auckland and New Zealand population now, as well the future generations to come. Expecting to support up to 75,000 homes by 2051, this scheme represents one of the largest single interventions able to address the city's housing needs, while also generating significant employment (up to 122,000 jobs) and economic growth ($13bn in additional GDP[1]). As an investment it represents good value for the public sector.

Through the development of this Corridor Business Case (CBC), the Auckland Light Rail scheme has been refined and optimised to maximise the potential benefits across the transport, urban, and sustainability objectives of this investment, whilst ensuring its ability to integrate and support a future Rapid Transit Network (RTN) across Tāmaki Makaurau Auckland. Options are identified and assessed for potential integrated investment in the Urban Response alongside ALR to harness the full potential of ALR and maximise the benefits it can deliver to Tāmaki Makaurau Auckland, and New Zealand.

Figure 1: ALR economic outcomes at a glance

Figure 2: ALR payback post opening

ALR will pay for itself as early as 12 years post opening

The investment in ALR and integrated urban outcomes can be recovered through unlocked economic benefits as early as 2044—12 years after the planned start of operations.

ALR is the right solution to address the generational challenges facing Auckland's future.

By delivering a fully separated, highly frequent service, ALR provides a reliable public transport alternative that attracts people out of their cars and allows for the accommodation of positive urban change. That means quality, compact, transport-oriented growth which provides greater housing opportunities and choice for our current and future generations. **The results of the optioneering assessment are a project that directly delivers on the objectives set by sponsors for this investment.**

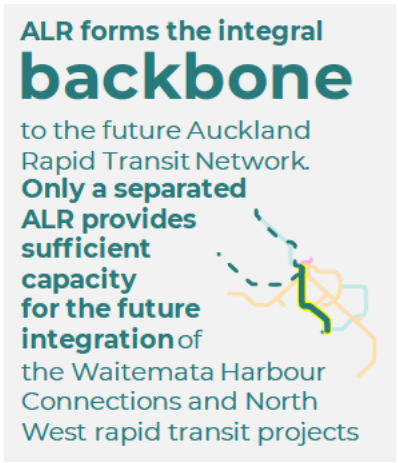
[1] From agglomeration and productivity growth over 60 years.

A fast, reliable, and attractive public transport service that helps Aucklanders get to where they need to go faster and unblocks congestion on our streets.

By providing transformational public transport services connecting key economic areas of the city, ALR delivers significant timesaving and reliability benefits for Aucklanders. The benefits will be experienced across the city by both users of ALR and those who continue to travel by car or other means every day—delivering a benefit of approximately $10bn to the Tāmaki Makaurau Auckland economy over the appraisal period.

Figure 3: reducing journey times, improving access.

Figure 4: ALR and the Auckland RTN



As a fully separated, reliable, system, ALR can scale up over time to provide the high frequencies and sufficient capacity necessary to service and integrate with a future Auckland RTN. This includes key connections to the North-shore and North-west of Tāmaki Makaurau. Development of the RTN is fundamental to delivering the quality, compact urban form that Auckland aspires to deliver.

Growth unlocked by ALR helps secure the continued increase of prosperity and productivity in Auckland, for the next generation while creating economic efficiency for the city.

Figure 5: ALR impact on economic output

Through the delivery of up to 122,000 jobs and 75,000 homes, ALR is a key enabler of Auckland's future productivity. The accessibility improvement created by ALR will act as a catalyst for increased productivity and economic development in Auckland.

By supporting quality, compact growth ALR improves the efficiency and affordability of delivering public services. Saving the city and ratepayers up to $1.1B over the appraisal period.[2]

There is a strong and resilient economic rationale for ALR as a standalone investment. Through the optioneering process a range of urban interventions were considered to accelerate, maximise and improve the certainty of benefits. ALR as an investment is enhanced when integrated with a supporting 'Urban Response' and represents very good value for money. There are further opportunities for the continued enhancement of benefits and mitigation of impacts through delivery.

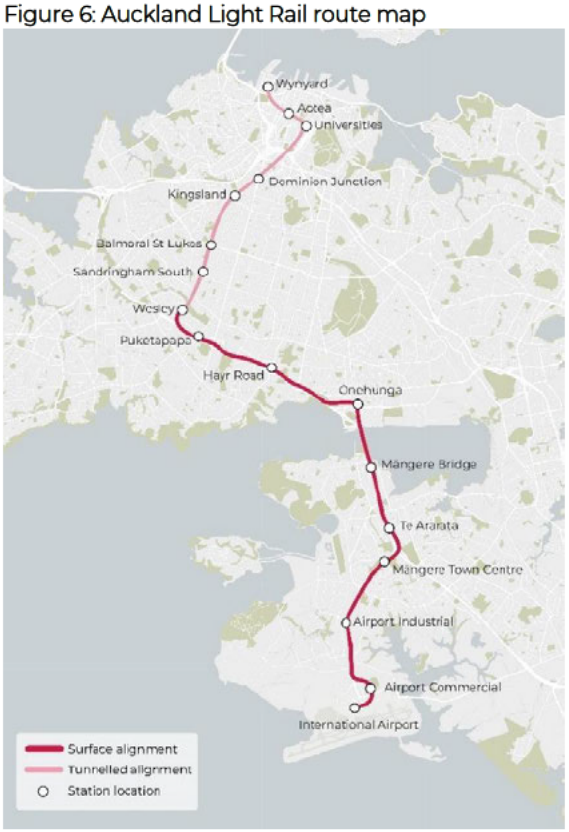
Auckland Light Rail is the right option for Auckland's economic future. It delivers up to a three-fold return on investment securing significant economic benefit that stretches well beyond the City Centre to Māngere corridor and reaches across Auckland. Moreover, it lays the foundation to support Auckland's future Rapid Transport Network and ensure the continued strong economic and productivity growth of Tāmaki Makaurau Auckland.

[2] $2022 undiscounted

1.1 Optimising the Preferred Option for ALR

In 2021, the CC2M Rapid Transit IBC considered the transport solution that would best meet the desired outcomes of the ALR project (as identified in the ILM). Following a shortlist assessment, of three options that all represented good economic value for money, the Tunnelled Light Rail option was selected as the Preferred Way Forward (PWF). This selection was driven by the schemes service capacity, flexibility, limited disruption, and relative affordability.

Figure 6: Auckland Light Rail route map



Cabinet endorsed the IBC in December 2021, and in June 2022, the Minister of Transport confirmed that Tunnelled Light Rail, as set out in the IBC, should be the broad 'point of entry' for the CBC.[3]

Reflecting the aims of sponsors for ALR, the transport investment has been reviewed and refined. Through the Detailed Business Case (DBC), particular focus has been taken to consider how ALR can best enable and ensure the successful delivery of jobs, homes, and quality integrated communities, that were initially identified in the Indicative Business Case (IBC) in 2021.

Alongside and supporting the transport investment, urban development options have been identified and considered at an Indicative Business Case level for further supporting integrated urban investments. This includes an assessment of urban enabling infrastructure, to further enhance the potential outcomes unlocked by ALR.

As part of the CBC methodology, the Tunnelled Light Rail scheme was interrogated and revisited to confirm and progressively optimise the appropriate corridor, alignment and stations that best supported the Investment Logic Map. This was undertaken through a series of phases and multi-criteria assessments involving an integrated mix of disciplines, key stakeholders (like Auckland Transport and Auckland Council) and Mana Whenua Kaitiaki as Treaty Partners (see chapter 4).

The process to optimise the preferred option for Auckland Light Rail involved assessment of trade-offs. Key considerations for the alignment and station locations included how ALR could meet future expected demand and allow for integration with other planned RTN projects (including AWHC and NW). The preferred option was also determined by investigating the urban opportunities along the corridor, selecting alignment and station locations that best provide the potential for quality urban development.

The optioneering process led to an emerging end-to-end solution that was optimised to remove the on-street running elements of the scheme (c. 10% of the route length of

[3] Cabinet and Minister of Transport refer to the Cabinet and Minister of Transport at the time of decisions.

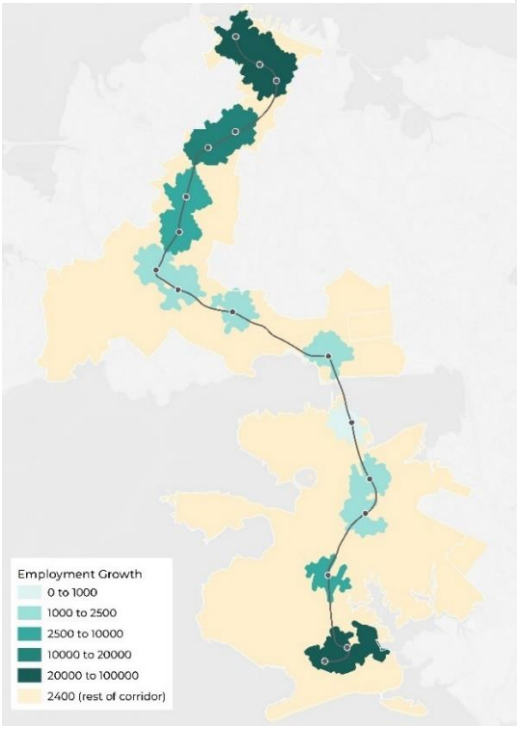
the IBC preferred option) to enable significant operational, capacity, and potential cost improvements by creating a fully separated solution. From an urban development perspective, it was determined that the removal of the street running section would also provide greater opportunity for urban growth. More demand should be attracted to the CC2M corridor by a faster, more frequent, and more reliable service.

Key alignment and station location decisions were made along the route to balance and maximise the transport and urban outcomes of the project while maintaining affordability and a consentable project. This included optimising the location of Dominion Junction, Kingsland, Wesley, Onehunga and Māngere stations, as well as the alignment through the CBD, along SH20 to Onehunga and the best approach to cross the Manukau Harbour.

Figure 6 shows the preferred Auckland Light Rail route map which includes 17 stations and an end-to-end journey time of 39 minutes. This solution will provide infrastructure that will initially enable a service frequency of every 3 minutes and capacity for up to 9,900 passengers per hour per direction during peak periods, with plans to increase to a frequency and train length to every 2 minutes and 19,800 passengers per hour per direction in future years as required.

1.2 Supporting ALR's 'Urban Response' with integrated investment

Figure 7: Employment growth to 2051 under ALR + Active Investment option



Taking the ALR transport investment as a starting point, the Economic Case also identifies and appraises a series of 'Urban Response' options which have been developed to an Indicative Business Case standard. Two options, ALR + Active Investment and ALR + Incremental Investment, were identified for appraisal[4]. The Urban Response [5] options seek to demonstrate how to best secure and maximise the urban opportunity through the delivery of ALR.

The development of Urban Response options aligns with the Context Analysis Report (CAR) and the Corridor Strategic Framework (CSF). This sets out the future vision and aspiration for the ALR Corridor, considering; environmental sustainability, community development, economic development, built form, public realm, local urban mobility, and urban infrastructure.

With consideration of urban enabling infrastructure requirements and direct urban interventions the economic appraisal of 'Urban Response' options focuses on two shortlisted options that increase the growth unlocked through ALR. This is particularly

[4] Refer to Appendix E-B for complete overview of Urban Response options.
[5] Refer to Chapter 8 for a full explanation of the Urban Response

important in the context of residual land assets (over-site and integrated station development) within ALR control. ALR can facilitate broader urban and economic outcomes by engaging with the market and leveraging the sale of residual assets to secure or accelerate development expectations.

1.3 Delivering the objectives of the Investment Logic Map

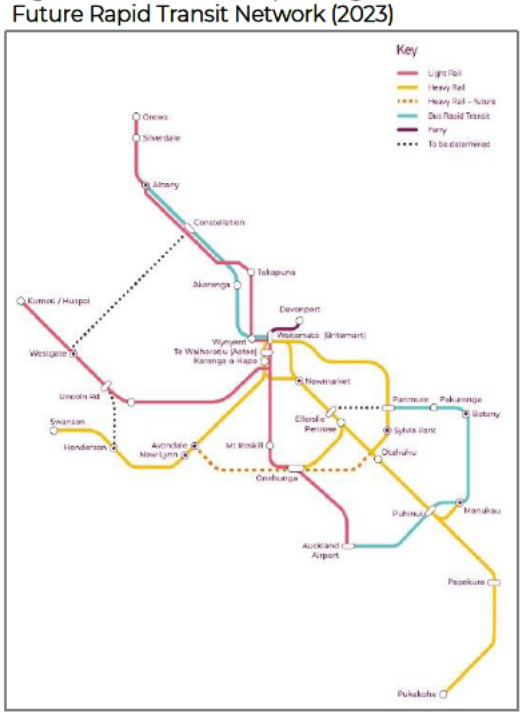
Figure 8: How ALR supports the delivery of the Investment Logic Map Objectives

Objective 1 Urban Change	Objective 2 Sustainability	Objective 3 Transport and Accessibility
Up to **75,000** new homes and **122,000** new jobs supported in the CC2M corridor by 2051 with coordinated investment in ALR and urban change	**Savings** between **400** and **1,600 kilotonnes of carbon** over the project lifecycle. Equivalent to between 15% and 60% of Auckland's single year household emissions	Up to **49m** **Annual ALR journeys by 2051** with integrated urban investment alongside ALR. 20% more than delivering ALR as a standalone investment

There is consistent and compelling evidence to suggest that ALR will deliver clear positive impacts against the three core investment objectives set out in the Investment Logic Map (ILM).[6] ALR will:

- Encourage denser urban development and enable higher future growth, enhancing economic opportunity and improving quality of life.
- Increase transport network capacity, support mode shift to public transport and active travel, reduce carbon emissions, and improve health outcomes.
- Provide a reliable service that improves accessibility to employment, education and everyday amenities and reduces total trips and journey times across the corridor.

Figure 9: Auckland Transport Alignment Plan Future Rapid Transit Network (2023)



Integrated investment in transport and urban outcomes could significantly enhance the project's ability to deliver the ILM Objectives. The Urban Response options directly accelerate and magnify the opportunity for ALR to deliver transformative impacts across the ILM Objectives and their KPIs.

ALR also establishes the backbone of a future Auckland Rapid Transit Network (RTN). A core non-monetised benefit of ALR is its ability to service and integrate with a future Auckland RTN, including key connections to the North-shore and

[6] See Strategic Case.

North-west of Tāmaki Makaurau. Development of the RTN is fundamental to delivering the quality, compact urban form that Auckland aspires to deliver.

A selection of key measures demonstrating how ALR (with and without integrated urban investment) supports the ILM is shown in Table 1.

Table 1: Summary of impacts of ALR and ALR + Active Investment options on the ILM objectives by 2051

	KPI	Measure		**ALR** (As a standalone investment)	**ALR + Active Investment option** (with integrated urban investment)
Objective 1: Urban	KPI 1.1: Increased residential & employment density	Population density (CC2M) *people/ha (% change from 2021)*		40 (+60%)	48 (+93%)
		Employment density (CC2M) *jobs/ha (% change from 2021)*		29 (+49%)	34 (+69%)
	KPI 1.2: Increased housing and employment growth	Household growth (CC2M)		50,000	75,000
		Jobs growth (CC2M)		85,000	122,000
		Public transport capacity to accommodate growth		Significant long-term capacity for growth	
	KPI 1.3: Improved quality of life	Improved social connectedness		Anticipated to deliver moderate benefits.	
Objective 2: Sustainability	KPI 2.1: Reduced carbon emissions	Range[7] of likely whole of life (net) carbon emissions CO_2e		+700kt to -400kt	-500kt to -1,600kt
	KPI 2.2: Improved health outcomes	Annual road incidents (crashes) reduced[8]		75	95
		Annual active travel growth kilometres in 2051 (Auckland)[9]		15m (+6%)	20m (+8%)
Objective 3: Transport	KPI 3.1: Improved access to employment, education & health services across Tāmaki Makaurau Auckland	Jobs within 45 mins by PT from[10]	Mt. Roskill:	440k (+35%)	470k (+45%)
			Onehunga:	450k (+150%)	480k (+165%)
			Māngere:	430k (+305%)	460k (+330%)
		Homes within 45 mins by PT to[10]	City centre	400k (+7%)	410 (+10%)
			Airport	220k (+880%)	230K (+900%)
	KPI 3.2: Increased public transport capacity	PT capacity (CC2M)		Up to 19,800 passengers per hour	
		Ability to connect and support demand from other RTN projects		Significant capacity to support long-term integration with RTN	
		Annual ALR trips in 2051		40 million	49 million
		Daily vehicle trips reduced in 2051 (Auckland)		93k	160k
	KPI 3.3: Reduced travel times	Key Corridor Public Transport Travel Times and Savings[11] (Peak)	Mt. Roskill to University	10 minutes (29 to 30-minute saving)	
			Māngere to Te Waihorotiu	27 minutes (33 to 54-minute saving)	
			Airport to Wynyard	39 minutes (37 to 69-minute saving)	

[7] Range spans baseline scenario to carbon opportunities scenario. See Appendix E-I and Appendix E-J for more details.
[8] Reduction relative to Do Minimum option.
[9] Overall growth and percentage growth is calculated relative to Do Minimum option in 2051.
[10] Percentage equals change relative to Do Minimum option in 2051.
[11] Relative to current (peak) public transport travel times.

1.4 The Economic Appraisal

1.4.1 Monetised Impacts (costs and benefits)

The monetised economic analysis of ALR illustrates a scheme with a definitively positive benefit-cost ratio and the option available to explore further urban investment that yields good economic return.

The project has a net present value of between $17.2B and $24.6B and a benefit cost ratio between 2.4 and 2.8, depending on the level of additional urban investment pursued alongside the ALR project. [12]

Reflective of the city-shaping scale of the ALR project, a comprehensive cost-benefit analysis has been undertaken, including consideration of over 20 individual monetised impacts (as shown in Table 2).

Table 2: Costs and benefits in appraisal

User benefits
Public transport users travel time savings
Public transport journey reliability
Public transport experience
Active transport (public transport users)
Residual asset value
Non-user benefits
Traffic benefits
Road journey reliability
Crash cost savings
Embodied emissions
Enabled emissions
Land Value Uplift
Land value uplift (rezoning or other land use change)
Land value uplift (option / non-use value)
Infrastructure cost savings
Wider economic benefits
Agglomeration
Imperfect competition
Increased labour supply
Movement to more productive jobs
Costs
Capital Expenditure (CapEx)
Operational Expenditure (OpEx)
Renewals
Revenue

Creating faster more reliable journeys for existing and new public transport users: By providing a frequent, highly reliable, and fast service connecting key economic areas of the city, ALR delivers timesaving and reliability benefits for public transport users worth between $6.9B and $7.2B over the appraisal period.

Saving time and reducing congestion for drivers: With reduced delays, investing in ALR delivers significant benefits to roads users, collectively saving the Tāmaki Makaurau Auckland economy over $3B over the appraisal period.

Supporting increased business activity and productivity in Tāmaki Makaurau Auckland: The wider economic benefits of ALR are estimated to support significant increases in economic activity, through agglomeration, increased labour supply and improved productivity. Together these factors lead to an estimated increase in annual economic output (GDP) of on average between $1.3B and $1.6B every year[13].

Reducing the cost of growth for government and taxpayers: By accommodating up to 75,000 new homes and 122,000 new jobs before 2051 in the CC2M corridor ALR delivers sustainable, compact growth for Tāmaki Makaurau Auckland that reduces the infrastructure burden of growth on government and the public sector. The density enabled by ALR is expected to save government up to $1.1 billion in infrastructure spending over the appraisal period.[14]

[12] Incorporating land-use impacts from transport accessibility improvements.
[13] $2022 undiscounted.
[14] $2022 undiscounted.

1.4.2 Social, distributional, and other non-monetised impacts

Crucially, beyond the monetised benefits and costs, there are significant additional benefits that will be delivered through the investment in ALR. This will have a major social and economic impact for all Aucklanders, as well as specific segments of the population.

The economic appraisal incorporates several additional components to capture the impacts that are not covered in the cost-benefit analysis. Social, distributional, and non-monetised impacts are identified and appraised, highlighting the potential effect of additional urban investment where applicable, to identify the scope and distribution of social and non-measurable benefits of the project.

Improving social conditions along the corridor and across Tāmaki Makaurau Auckland: ALR is expected to deliver slight to moderately beneficial community-related impacts through improved severance, social connectedness, safety, and journey quality outcomes. Moderately beneficial accessibility improvements are anticipated through improved travel time reliability and time savings. Slightly beneficial health impacts are expected to arise through greater uptake in active travel to/from public transport stations, changes in the physical environment and a reduction in road vehicle casualties.

Enhancing equity outcomes through the fair distribution of project costs and benefits: Moderately beneficial improvements to safety, security, air quality and user benefits are expected to improve outcomes for a range of identified priority groups including children, young adults, older people, women, Māori, and Pacific communities.

Enabling additional non-monetised benefits that support the Auckland and national economy: Direct jobs during construction, increases in tourism and foreign investment are all expected to generate additional economic opportunities across Tāmaki Makaurau Auckland that, while not monetised, are important impacts unlocked by ALR.

1.4.3 Summary of Impacts

ALR is transformational for the next generation of Aucklanders. While a significant investment is required for its delivery the economic impacts unlocked by ALR will have paid off the initial investment as early as 12 years after the scheme begins operations and under all options within 20 years.

Table 3: Summary of impacts of ALR and potential Urban Response options

	Auckland Light Rail (ALR)	ALR + Incremental Investment	ALR + Active Investment
Jobs (2051)	85,000	97,000	122,000
Homes (2051)	50,000	59,000	75,000
Annual Journeys (2051)	40m	44m	49m
Whole-of-life potential carbon saved[15] (t CO_2e)	400kt	900kt	1,600kt
Connection with future Rapid Transit Network	Full integration with a future RTN possible with sufficient scalable capacity to support public transport growth		
Support for Objective 1: Urban Growth & Density	Good	Very Good	Excellent
Support for Objective 2: Sustainability	Limited to Good	Very Good	Excellent
Support for Objective 3: Improving Accessibility & Public Transport Capacity	Very Good	Very Good	Excellent
Social Impact	Moderately Positive	Moderately Positive	Positive
Total Economic Costs:	$12.6B	$13.0B	$13.8B
Total Economic Benefits: (Without WEBs)	$16.4B	$17.8B	$20.7B
Total Economic Benefits:	$29.7B	$31.6B	$38.4B
BCR_N	**2.4**	**2.4**	**2.8**
BCR_N range under Sensitivity Analysis	1.9 - 2.5	2.0 - 2.4	2.3 - 2.9
Net Present Value	**$17.2B**	**$18.6B**	**$24.6B**
Economic payback year[16]	**2050**	**2048**	**2044**

[15] If the reasonable low carbon opportunities identified are pursued. See Appendix E-I and Appendix E-J for further details.
[16] Economic payback refers to the time when the cumulative monetised impacts (costs and benefits) equal zero (in discounted, present value terms).

1.4.4 Ensuring robustness of the economic case by considering the relative economic impacts of an Intermediate Comparator

Equivalent economic analysis was undertaken on an Intermediate Comparator scheme, street-running light rail. While still presenting a favourable and comparable benefit-cost ratio to ALR, the scheme delivers significantly fewer benefits and is not equivalently able to meet the objectives of the ILM.

An Intermediate Comparator scheme was developed that was lower cost than ALR but still capable of delivering the objectives of ALR. The Intermediate Comparator was developed building from the street-running light rail scheme that was included as a short-list option within the ALR indicative business case (2021).

Limitations delivering the ILM objectives

The Intermediate Comparator does not perform as strongly on an overall value for money assessment against ALR. When assessed against the ILM objectives, the Intermediate Comparator:

- Provides **constrained** additional public transport **capacity** that **does not meet** peak-hour ALR **demand in the corridor by 2041**.
- Has a **lower potential for urban development** and cannot provide capacity to support further growth.
- **Reduces carbon emissions** but has limitations on additional enabled carbon savings.
- **Does not allow integration** with future RTN in particular preventing AWHC or the North West rapid transit project from realising their full benefit or reducing City Centre bus congestion.

Table 4: Intermediate Comparator ILM assessment

Support ILM Objective 1: Urban Growth & Density	**Limited**
Support ILM Objective 2: Supporting Sustainability	**Limited**
Support ILM Objective 3: Improving Accessibility & Public Transport Capacity	**Limited**

Good economic value for money as an investment

The Intermediate Comparator presents good economic value, with a **benefit-cost ratio of 2.4** Intermediate Comparator produces a comparable result to the ALR scheme as a standalone investment.

The Intermediate Comparator presents an option that represents **approximately 70% of both the costs and benefits expected of ALR**.

The Intermediate Comparator's capacity constraints mean that accelerated or increased growth in the CC2M corridor through urban intervention are not considered.

Table 5: Intermediate Comparator economic appraisal summary

Total Economic Costs:	$9.0B
Total Economic Benefits: (Without WEBs)	$11.5B
Total Economic Benefits:	$21.9B
BCR_N	**2.4**
Net Present Value	**$12.8B**
Economic payback year[16]	**2047**

On balance, the findings of this assessment demonstrate that a robust comparator option for investment continues to exist, which represents good value for money as an investment, but the findings of the IBC and subsequent sponsor direction remain valid. While a street-running light rail scheme is an economically viable investment, it does not provide a comparable ability to deliver against the defined investment objectives for ALR.

1.4.5 Outcome, way forward and future opportunities

There is a strong and resilient economic rationale for Auckland Light Rail as a standalone investment. The investment in ALR is enhanced when integrated with a supporting 'Urban Response' and ALR represents very good value for money. There are further opportunities for the enhancement of benefits and mitigation of impacts through delivery.

Building on the analysis undertaken within the IBC, the Detailed Business Case level economic appraisal for ALR (as a standalone transport investment) demonstrates that there is strong economic rationale for the delivery of the project. The Commercial, Financial and Management cases will further discuss the affordability, the viability in the marketplace and the approach to ensuring successful delivery of ALR.

Based on the strong performance of the Urban Response options, there is a clear economic rationale for proceeding to further investigate the delivery of the Urban Response options through one or multiple Detailed Business Cases. Identifying the appropriate quantum and distribution of additional Urban Response will require further and more detailed investigation.

Consideration of the Urban Response in the Commercial, Financial and Management cases will review and assess the market attractiveness, affordability, and deliverability of the proposed Urban Response interventions. These considerations are critical to provide the necessary certainty of the delivery of the additional economic benefits that have been identified.

Opportunities for future consideration identified in the Economic Case

Key opportunities for further consideration have been identified and are highlighted below:

- The ability to realise increased population and economic change through attracting growth from outside the Auckland Region ('Open City')
- Pushing the boundaries of green delivery and coordinating with other government policy to further reduce the carbon investment required and increase the potential scale of net carbon emissions savings secured.
- Securing and supporting further urban growth as a key source of benefits for ALR, both through the development of the Urban Response Detailed Business Case(s) and continued partnership with the Crown, Auckland Council, Mana Whenua, and key stakeholders.
- Assessment of how the investment in ALR can be enhanced by delivering additional urban benefits at specific locations. Place-based interventions to deliver improved urban outcomes (for example, the provision of amenity or green space) could be considered as part of future considerations.

2. Introduction

2.1 Purpose

The purpose of the Economic Case is two-fold:

1. To assess and confirm the value for money of Auckland Light Rail (ALR) based on an identified preferred transport investment, including mode, route, and stations that maximise the urban development opportunity.
2. To assess options for further potential urban investments to IBC level, that support unlocking additional population and employment growth through delivery of quality urban regeneration.

Transport and urban interventions are assessed against the issues and objectives set out in the Strategic Case Investment Logic Map (ILM).

The Economic Case builds from previous work including the ALR Indicative Business Case (IBC) to identify the best value for money approach to addressing the ILM objectives. The economic assessment of ALR aligns with Waka Kotahi guidance and the NZ Treasury Better Business Case approach and has sought to incorporate international best-practice in transport and urban economic appraisal with agreement and proper consideration of the New Zealand context. The value for money appraisal has also been developed to align with the Living Standards Framework (LSF) and He Ara Waiora—Treasury's Māori wellbeing framework.

Assessing value for money includes:

1. The **strategic alignment** of the investment—how well the investment aligns to the investment objectives and priorities set out in the Investment Logic Map.[17]
2. The **effectiveness** of the investment—the extent to which it will achieve the desired outcomes.
3. The **efficiency** of the investment in terms of resources, including cost-benefit appraisal.

This Economic Case focuses on identifying the preferred investment option for the CC2M corridor, whilst considering the wider Tāmaki Makaurau Auckland context within which the CBC is being delivered. This includes other regional policy documents including the broader Auckland Plan 2050 and Future Development Strategy for Tāmaki Makaurau Auckland.[18]

Throughout the Economic Case, Te Rautaki Huanga Māori 2021, developed in alignment with the LSF and He Ara Waiora, has been applied as a baseline for Mana Whenua and Māori aspirations and social, cultural, economic, and environmental advancement. Considerations of kaitiakitanga were used to guide the optioneering process (see section 4) and the Social and Distributional Appraisal was designed to include marae and Māori schools (See section 6.3 and 6.4) Several components of the economic appraisal also highlight the potential for Mana Whenua investment and commercial partnerships (See section 6).

[17] Refer to the Strategic Case for more details on the ALR Investment Logic Map.
[18] Auckland Future Development Strategy (2023).

2.2 Approach

The Economic Case first considers the value for money of the proposed transport intervention before evaluating different options for supplementary investment to support and accelerate urban growth.

Reflecting the direction of Sponsors[19], the transport elements of the CBC are developed for economic assessment at a level commensurate with Detailed Business Case (DBC) guidance, and the urban elements are developed to a minimum Indicative Business Case (IBC) level of detail for assessment. [20]

As each component has been developed to a differing level of detail, the transport and Urban Response are presented sequentially, beginning with an assessment of the transport intervention before presenting a shortlist of Urban Response options that build upon the Auckland Light Rail to maximise the investment outcomes. While the transport and urban elements are presented sequentially throughout the economic case, the two interventions have a continuous and intrinsic influence on one another.

2.2.1 Structure

Reflecting the approach, the Economic Case is broadly structured in four parts:

- An introduction to the **purpose and approach** *(chapter 2)* of the Economic Case, as well as a description of the **Do Minimum** *(chapter 3)* option which acts as the counterfactual for assessment.
- The **Reviewing and refining the ALR scheme** *(chapter 4)* based on the current context and ILM objectives to confirm the preferred option for DBC economic assessment. Evidence is presented to demonstrate how the ALR preferred option **supports the ILM objectives** (*chapter 5*) and is **economically valuable** *(chapters 6 and 7).*
- chapter 8 proceeds to **identify and initially assess urban response options,** which look to secure, accelerate, and enhance the urban outcomes of ALR through additional investment. The shortlisted urban response are reviewed commensurate with their IBC level of development to understand their potential impact on the ability of ALR to best deliver the ILM objectives and ensure it provides robust economic value for money *(chapters 9 and 10).*
- The economic case concludes with a presentation of the **overall assessment of the combined ability of the preferred transport and urban investments** *(chapter 11),* demonstrating that the economic opportunity of delivering ALR with integrated investment which can best secure and magnify the delivery of the ILM objectives and is economically valuable.

[19] Refer to CBC Appendix B-C ALR IMS Letter.
[20] Refer to the Waka Kotahi Business Case Approach Guidance for more detail on the level of detail associated with DBC and IBC respectively.

3. Assembling the Do Minimum

3.1 Purpose

The Do Minimum option is the baseline against which the benefits and costs of ALR are assessed. The Do Minimum includes both the transport and urban elements of the scheme. The approach to forming the Do Minimum option has been developed with input and agreement from Auckland Council, Waka Kotahi, and Auckland Transport.

The Do Minimum considers patterns of urban growth and land use, transport, costs of urban enabling infrastructure and the corresponding carbon emissions.

3.2 Key assumptions

The Do Minimum has been developed to align with the assumptions agreed across the three RTN projects[21] (ALR, North West Rapid Transit, either a bus rapid transit or rail from Brigham Creek to the City Centre, and Additional Waitematā Harbour Connections, a multi-modal solution to cross the Waitematā Harbour) to ensure there is a common baseline across all projects.

An aligned baseline, the Do Minimum, is critical to ensuring the three projects undertake assessments with a shared view of the future that allows for comparison of impacts and benefits across all three proposed investments.

The assumptions and sources for each element are summarised below. A detailed explanation is set out in Appendix E-A.

Table 6: Do Minimum key assumptions

Category	Assumptions and Source
Urban growth and land use	• Population projections are based on 2021 Stats NZ medium projection figures.[22] • Spatial distribution of growth (population, employment, households as well as development and infrastructure) is based on the I-11.6 growth scenario produced by Auckland Forecasting Centre using inputs from Auckland Council (see Figure 11).
Transport	• Committed schemes, and other schemes that are not committed but are considered highly likely to proceed, have been discussed and approved by the ALR project steering group, which included representatives from Auckland Council, Auckland Transport and Waka Kotahi. These are shown in Figure 10. • Māori travel assumptions are based on Māori population travel to school and work data. Patterns of travel are assumed to remain the same and travel growth is assumed to align with population growth across the region. • The operational and maintenance costs of existing infrastructure committed schemes, and other schemes have been included.

[21] Auckland Transport, Auckland Rapid Transit Plan

[22] Due to data limitations specific Māori population growth projections are based on the 2018 Stats NZ census (forecasted to 2038 and further extrapolated to 2051).

Urban enabling infrastructure	• A range of urban enabling infrastructure has been assumed in line with current growth patterns. Interventions included in the Do Minimum option have been determined by assuming asset owners' plans to support forecast population growth over the next 30 years. These are based on Council's I-11.6 scenario as well as the Auckland Unitary Plan (AUP). • Interventions are categorised as primary assets (interventions that a developer must deliver to implement their scheme) and secondary assets (interventions cumulatively required for urban growth, including schools and parks).
Carbon	The Do Minimum carbon assessment is split into three components: the transport network, urban enabling infrastructure and household growth. • Transport: the operational transport emissions are estimated by the Vehicle Emissions Prediction Model (VEPM) and the MSM model. The vehicle fleet embodied carbon emissions use inputs from the VEPM model, vehicle ownership data, industry standard practice and embodied carbon calculation values. • Urban enabling infrastructure is determined based on growth scenarios from I-11.6 projections. • Household growth is based on carbon emissions factors for different housing typologies supplied by Kāinga Ora.

Figure 10: Summary of major projects included in the Do Minimum scenario

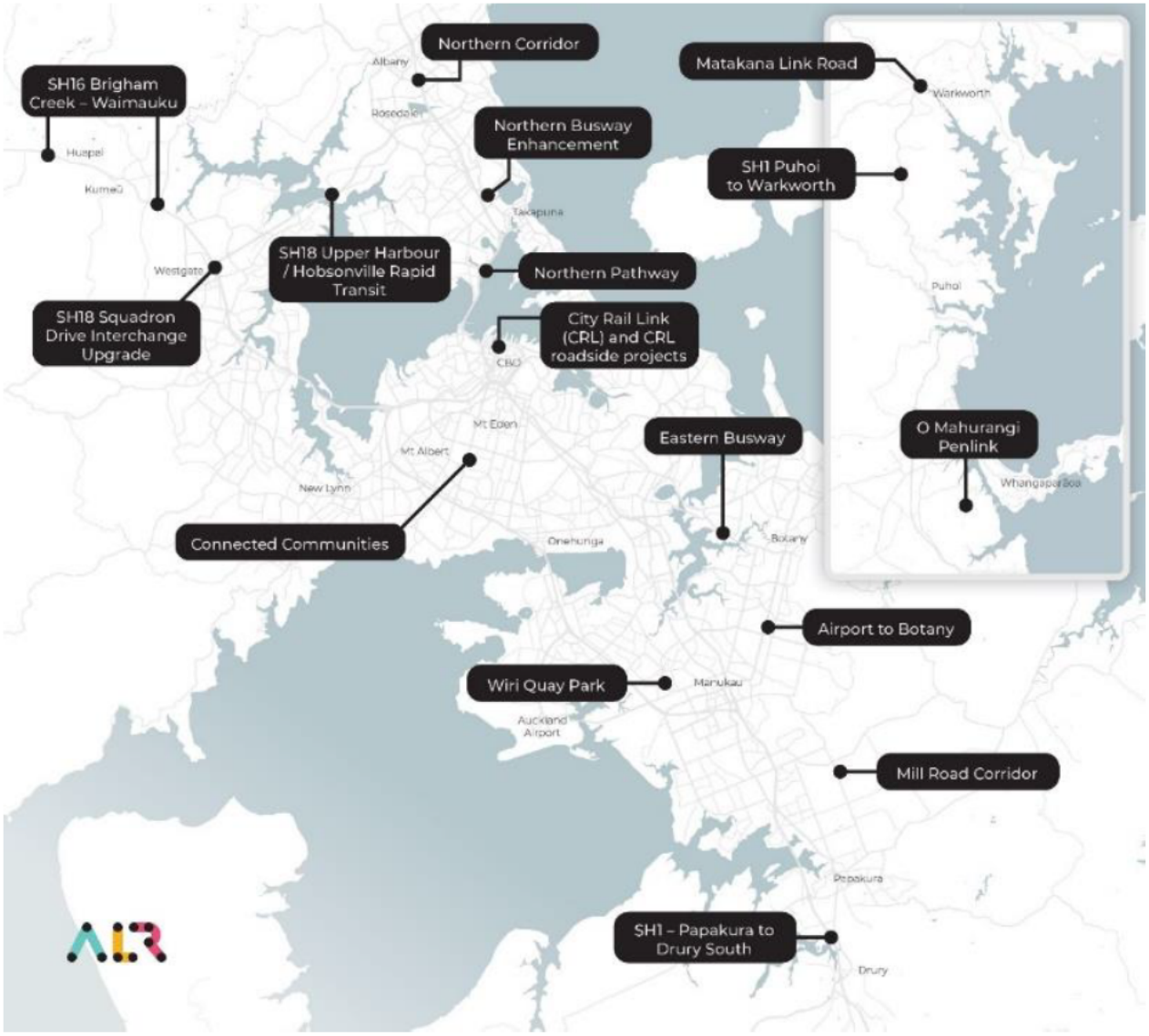
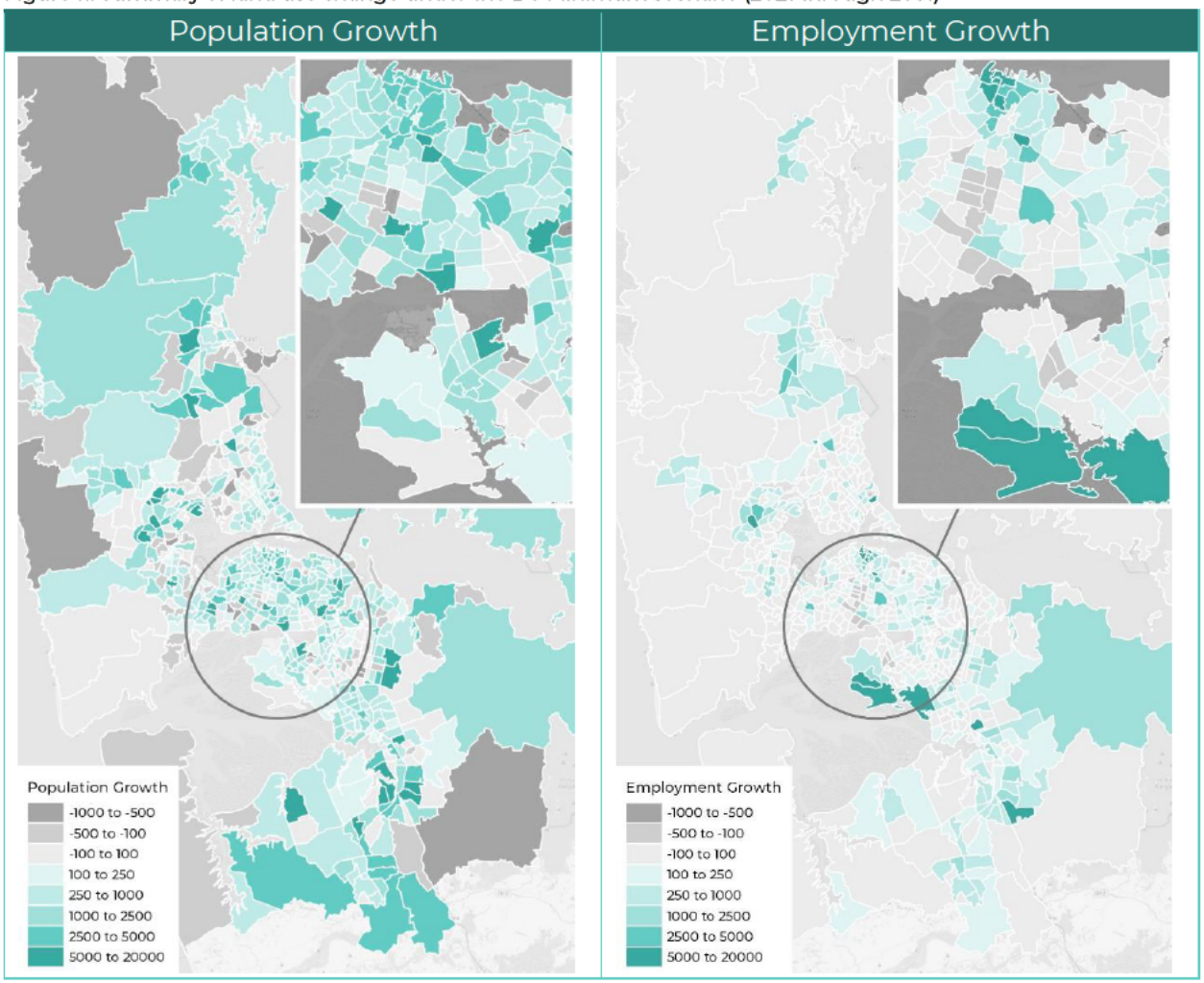


Figure 11: Summary of land use change under the Do Minimum scenario (2021 through 2051)



4. Reviewing and Refining the ALR Scheme

4.1 Point of entry and backcheck

In 2021, the CC2M Rapid Transit IBC considered the transport solution that would best meet the desired outcomes of the ALR project (as identified in the ILM). An initial shortlist option assessment identified the three best-performing options as:

- Light Rail
- Light Metro
- Tunnelled Light Rail

A detailed assessment of these three options demonstrated that all options could be justified economically (delivering value for money). The **Tunnelled Light Rail option** was selected as the **Preferred Way Forward (PWF)** based on its ability to meet the project objectives and deliver value for money, given its service-capacity, flexibility, limited disruption, and relative affordability.

Endorsing the IBC in December 2021, **Cabinet confirmed Tunnelled Light Rail as the PWF** and noted that the next phase of investigation should increase focus on integrating transport and urban development components to optimise the outcomes of the intervention.

In June 2022, the Minister of Transport issued a letter to the ALR Establishment Unit Board to confirm that Tunnelled Light Rail, as set out in the IBC, should be the 'point of entry' for the CBC.[23] A number of areas were identified for further exploration and refinement through the business case process including grade separation. The letter notes:

> "Grade separation is integral to the decision made by Cabinet and the tunnelled section through the central isthmus to Mt Roskill should not be revisited, but grade separation options further south may be further explored, in particular when considering whole of system impacts."

Aligned with recommended best practices, a backcheck of the IBC was carried out to identify any relevant changes in the project's context and evaluate the continued applicability of the assessment undertaken prior to the commencement of the CBC. The backcheck concluded that none of the identified contextual changes were likely to have materially altered the conclusions or options assessment of the IBC.[24]

4.2 Aim, guiding considerations and multi-criteria assessment

Reflecting NZ Treasury Better Business Cases™ and Waka Kotahi guidance, and in alignment with Resource Management Act (RMA) requirements, the core aim for the transport optioneering process was as follows:

[23] Refer to CBC Appendix B-C ALR IMS Letter.
[24] Further details included in Appendix E-B Optioneering Report.

Review, refinement, and optimisation of the ALR Preferred Way Forward from the IBC to confirm an appropriate transport option for economic appraisal.

This objective was underpinned by a series of Guiding Considerations, including the Investment Logic Map (ILM), Te Rautaki Huanga Māori 2021 (Māori Outcomes Strategy) endorsed by Mana Whenua leaders as part of the IBC and the RMA[25], as well as other feasibility considerations. These Guiding Considerations sit at the heart of the optioneering process and were directly applied through a multi-criteria assessment (MCA) framework which was developed to guide the optioneering exercise.

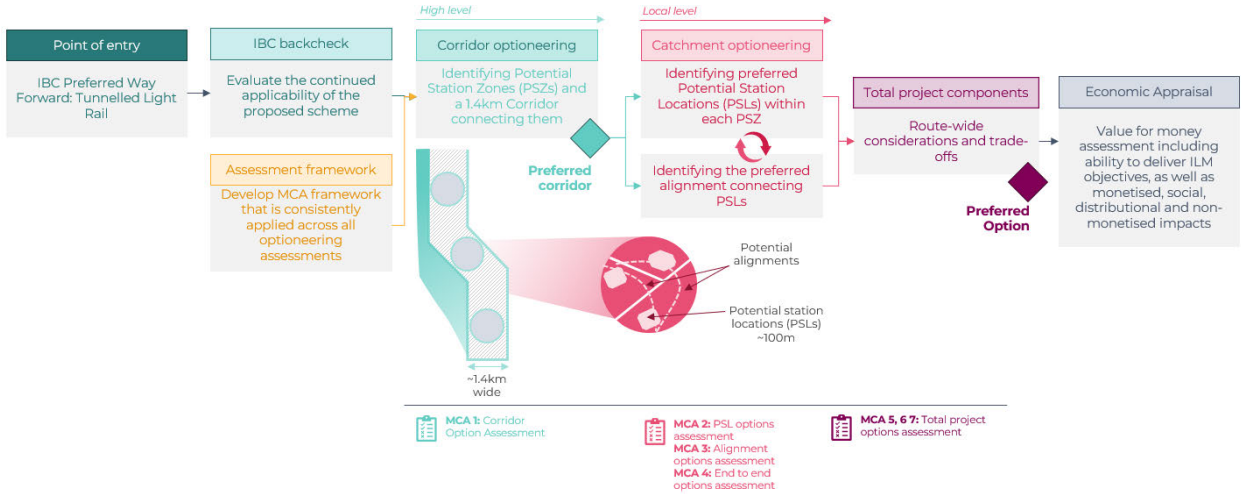
The MCA framework was developed collaboratively to ensure MCAs satisfied the Better Business Case™ guidance through a single, integrated optioneering process. The framework was deployed consistently across the various MCA assessments undertaken to support the review and refinement of the Auckland Light Rail scheme.

The optioneering process involved extensive engagement with Mana Whenua Kaitiaki. While attributing numerical scoring through MCA assessments to convey value is not a practice adopted by Mana Whenua, Mana Whenua and their specialists were invited to attend the MCA workshops to directly feedback into the options being considered. Feedback from Mana Whenua Kaitiaki hui have been captured in meeting transcripts, and in the Mana Whenua Kaitiaki engagement in the Optioneering Report[26].

4.3 Optioneering process

The optioneering process aimed to review, refine, and optimise the IBC PWF through a series of phases which considered the corridor, individual catchments (route and stations), and project-wide components (see Figure 12).

Figure 12: Approach to the optioneering process



4.3.1 Corridor optioneering

The corridor optioneering process sought to confirm the ALR corridor by identifying potential station zones (PSZs) within a 1.4km width spanning four geographic segments from Waitematā Harbour to the north and Auckland Airport to the south.

[25] Refer to CBC Appendix B-E Te Rautaki Huanga Māori.
[26] See Appendix E-B Optioneering Report.

The process involved three steps:

1. **Segment Corridor Option Development** – A series of PSZs were identified in each geographic segment based on their ability to deliver urban regeneration and transport opportunities. The PSZ options within each geographic segment were then connected in various combinations to create Segment Corridor Options (SCOs) for assessment.
2. **SCO Assessment** – The proposed SCOs were subjected to MCA incorporating commentary and scoring to support identification of emerging preferred corridor option(s) for each geographic segment.
3. **Whole Corridor Assembly** – Following the MCA assessment for all geographical segments along the corridor, a top-down review of the emerging preferred segment options was carried out to understand their ability to connect and form an effective Whole Corridor which reflected the Guiding Considerations.

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

Table 7: Shortlisted PSZ options and emerging preferred whole-of-corridor option

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 Onehunga	Puketāpapa-Mt Roskill, Hayr Road, Queenstown Road, Onehunga Town Centre
Māngere to Airport	Māngere Bridge Precinct, Te Ararata Creek, Bader Drive Precinct/Favona, Māngere Town Centre, Landing Drive Industrial Employment, Airport Precinct

4.3.2 Catchment optioneering

Taking the preferred corridor as the starting point, 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. Potential Station Locations (PSLs) within PSZs 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 through an end-to-end MCA assessment to identify the preferred option for finalisation. This step brought together the combinations of the two component parts (station locations and connecting routes) to derive a rounded view of the full route and station options which would best address the Guiding Considerations. The end-to-end route and stations are indicated geographically in section 4.4.

A hospital station was identified as a minimum requirement by Mana Whenua for the project to address transport equity issues. This station would be deep with lift-only access (which results in lower quality customer experience), has high capital cost ($440 to $490 million), with marginal transport patronage and urban uplift benefits overall. It would also only reduce walking times from Grafton station by 2-to-3 minutes). Alternative options to improve accessibility to the hospital were considered more appropriate.[27]

[27] Further detail on the assessment undertaken can be found in Appendix E-B Optioneering Report.

4.3.3 Total project components

With an emerging preferred end-to-end route and station alignment identified, a series of route and station finalisation tasks were completed to confirm the complete preferred option. These tasks are summarised in Table 8 below:

Table 8: ALR transport optioneering total project components[28]

Finalisation Task	Purpose
Consideration of AWHC and Airport integration	Consideration was given to how ALR would integrate with the Additional Waitematā Harbour Crossing (AWHC) and the Airport at the Northern and Southern extents of the alignment respectively.
Location of Depot	Identification and assessment were undertaken to confirm the location of a depot site for supporting operations and maintenance activities.
Station Optimisation	A route-wide station optimisation process was undertaken 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. This process slightly reduced the overall number of stations from those referenced in Table 7.
Staging Considerations	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.[29]

4.4 The Preferred Option – Auckland Light Rail[30]

At the end of the optioneering process, a 23km separated light-rail system with 17 stations was identified as the preferred option, traversing key locations such as Auckland City Centre and University, Dominion Junction and Kingsland, Wesley, Onehunga, Māngere and the Airport (see Figure 13)—with an end-to-end journey time of 39 mins.

The ALR Preferred Option is an evolution of the IBC option. The most significant refinement relative to the IBC is to achieve full separation for the end-to-end route. The IBC system mixed separated and street-running operations—with roughly 10% of the length of the IBC alignment operating as street-running. Through the optioneering process opportunities were identified to achieve full separation that are deliverable within the existing cost envelope. Full separation of ALR significantly increases the capacity and reliability of ALR, while shortening journey times. All factors that allow ALR to better deliver the both the Urban and Transport ILM objectives across the corridor.

Another significant refinement from the IBC option was the design refinement of delivering the infrastructure through a single (monobore) tunnel rather than a more traditional two-tunnel (twin-bore) design. The monobore design solution directly enables and secures over-station development (OSD) opportunities which supports the delivery of the expected urban outcomes of the ALR investment.[31]

The CC2M corridor is highlighted in Figure 13 to illustrate the expected area of direct project influence, incorporating:

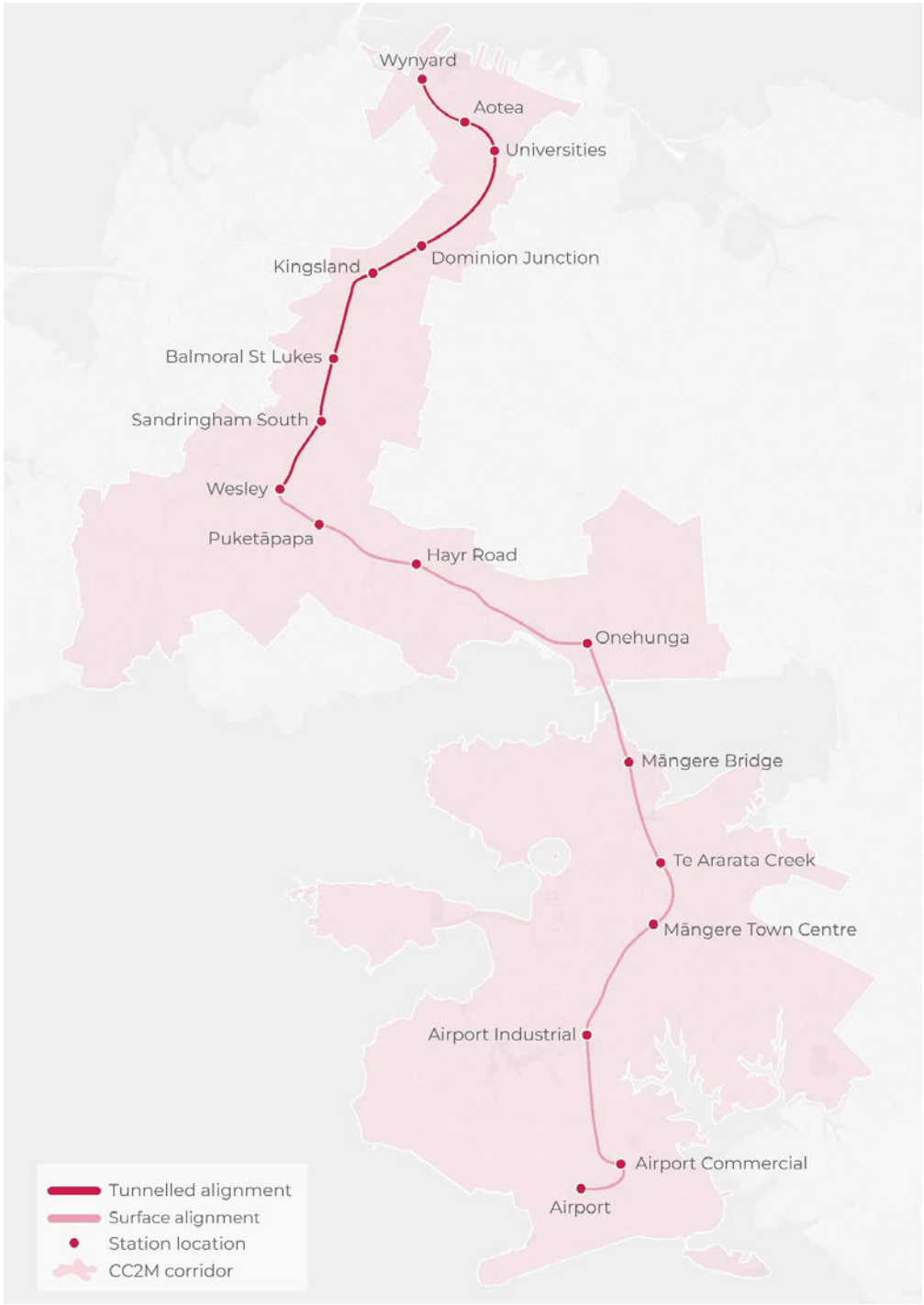
- Travel zones that are within an 800-metre walking catchment of a station, or

[28] For more details on the total project component please refer to Appendix E-B Optioneering Report.
[29] Refer to Appendix E-B Optioneering Report for information on the central staging option that has been adopted.
[30] For more details on the Preferred Option please refer to Appendix E-B Optioneering Report.
[31] Subsequent cases of the CBC explore the commercial and financial opportunities associated with OSD in more detail.

- Areas where 5%+ of the residential population are forecast to regularly use ALR[32].

The separated light-rail system was modelled and measured against project objectives and the ILM (see chapter 5) and subsequently taken through an economic appraisal (see chapter 6). Within these sections and throughout the remainder of this report, the preferred option is referred to as 'Auckland Light Rail' and is measured against the Do Minimum option (see chapter 3).

Figure 13: Map of the Auckland Light Rail Preferred Option and CC2M Corridor



[32] 5% of population using ALR prior to any dynamic land use change from the project. Further information on definition of the project study area included in Appendix E-F Land Use and Transport Interaction Modelling.

5. ALR delivers against the ILM Objectives

There is consistent and compelling evidence to suggest ALR will deliver positive impacts against the three objectives set out in the Investment Logic Map (ILM).[33]

ALR will encourage denser urban development and enable future growth, enhancing economic opportunity and improving quality of life. It will increase capacity, speed, and reliability on the overall transport network connecting people to jobs and education. ALR will introduce a new competitive public transport option, which supports mode shift and active travel, reducing carbon emissions and improving health outcomes.

Table 9 summarises the anticipated impacts of ALR in relation to the ILM objectives—demonstrating that the transport investment alone will deliver substantial improvements. Chapter 9 explores how these outcomes can be enhanced through coordinated urban investment.

Table 9: Summary of impacts of ALR on the ILM objectives by 2051

	KPI	Measure		ALR
Objective 1: Urban	KPI 1.1: Increased residential & employment density	Population density (CC2M) *people/ha (change from 2021)*		40 (+60%)
		Employment density (CC2M) *jobs/ha (change from 2021)*		29 (+49%)
	KPI 1.2: Increased housing and employment growth	Household growth (CC2M)		50,300
		Jobs growth (CC2M)		85,300
	KPI 1.3: Improved quality of life	PT capacity for future growth		Long-term capacity for growth
		Improved social connectedness		Moderately beneficial impacts anticipated
Objective 2: Sustainability	KPI 2.1: Reduced carbon emissions	Range[34] of likely whole of life (net) carbon emissions CO_2e		+700kt to -400kt
	KPI 2.2: Improved health outcomes	Annual road incidents (crashes) reduced[35]		75
		Annual active travel growth kilometres in 2051 (Auckland)[36]		15m (+6%)
Objective 3: Transport	KPI 3.1: Improved access to employment, education & health services across Tāmaki Makaurau Auckland	Jobs within 45 mins by PT from[37]	Mt. Roskill:	440k (+35%)
			Onehunga:	450k (+150%)
			Māngere:	430k (+305%)
		Homes within 45 mins by PT to[37]	City centre:	400k (+7%)
			Airport:	220k (+880%)
	KPI 3.2: Increased public transport capacity	PT capacity (CC2M)		Up to 19,800 passengers/hr
		Ability to connect and support demand from other RTN projects		Significant capacity to support long-term integration with RTN
		Annual ALR trips in 2051		40 million
		Daily vehicle person trips reduced in 2051 (Auckland)		93K
	KPI 3.3: Reduced travel times	Key Corridor Public Transport Travel Times and Savings[38] (Peak)	Mt. Roskill to University	10 minutes (29 to 30-minute saving)
			Māngere to Te Waihorotiu	27 minutes (33 to 54-minute saving)
			Airport to Wynyard	39 minutes (37 to 69-minute saving)

[33] See Strategic Case
[34] Range spans baseline scenario to carbon opportunities scenario. See Appendix E-I and Appendix E-J for more details.
[35] Reduction relative to Do Minimum option.
[36] Overall growth and percentage growth is calculated relative to Do Minimum option in 2051.
[37] Percentage equals change relative to Do Minimum option in 2051.
[38] Relative to current (peak) public transport travel times.

5.1.1 Supporting projected employment and population growth

KPI1.1	**Increased residential & employment density**
KPI1.2	**Increased housing and employment growth**
KPI1.3	**Improved quality of life**

Supporting nearly one-fifth of Auckland's future population growth and one-third of future jobs growth

ALR will support significant household and employment growth over the next 30 years and beyond. Based on dynamic land-use modelling[40], ALR, without any further investment in urban infrastructure, will directly unlock homes for **over 35,000 additional people and enable over 15,000 additional jobs** in the CC2M corridor.

Table 8: Expected Growth in the CC2M Corridor between 2021-2051

	Background growth in CC2M corridor	**Additional delivered by ALR** (No urban intervention)	**Total growth in CC2M corridor[39]** (% of Auckland total growth)
Population	84,000	36,000	119,000 (18%)
Households	39,000	12,000	50,000 (18%)
Jobs	70,000	15,000	85,000 (33%)

Beyond unlocking directly induced growth in jobs and homes, the major upgrade in transport accessibility provides a significant increase in capacity to support additional growth across the CC2M corridor. As elaborated in chapters 8-10, there are significant opportunities for further enhancing the number of homes and jobs delivered through ALR with an integrated and targeted approach to additional urban investment.

Significant impacts on the future urban form of Tāmaki Makaurau Auckland

By improving accessibility, reliability, and choice, ALR will create a gravitational attraction to the CC2M corridor—driving urban change and enabling quality and sustainable compact growth that increases the residential and employment density of Auckland.

With ALR, residential density in the CC2M corridor will reach **over 42 people per hectare** by 2051, increasing by over two thirds of the existing average density across the urbanised area of Auckland (25 people per hectare).[41]

Similarly, ALR will support and accelerate a significant increase in employment density across the CC2M corridor, reaching **33 jobs per hectare** by 2051, an increase of nearly 70% compared to current densities.

By supporting a denser urban form, ALR will foster stronger, more integrated communities, improving connectivity and access between neighbourhoods and

[39] Numbers may not sum due to rounding.
[40] Derived from the Land Use and Transport Interaction (LUTI) modelling. See Section 6.1.1
[41] Auckland Council, Measuring Auckland's Population Density.

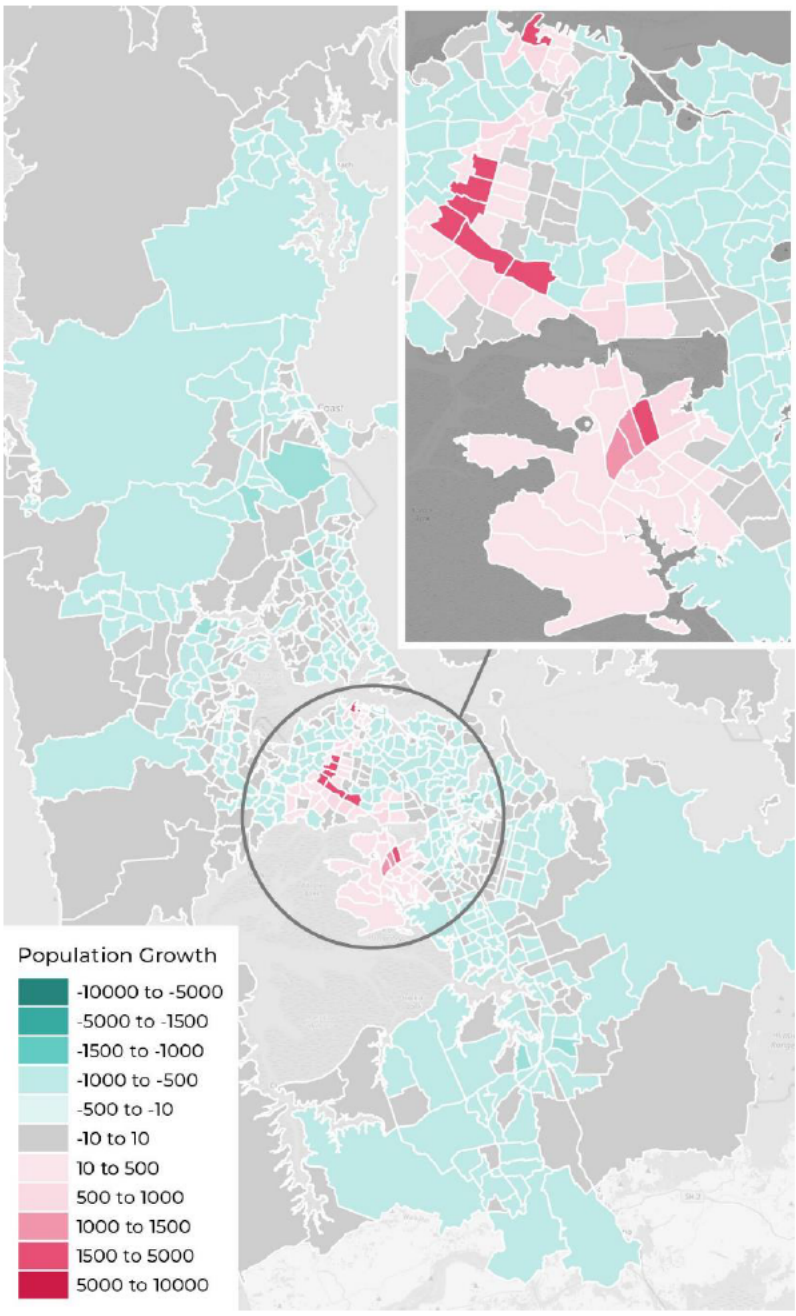
enabling better accessibility to everyday needs including health services, schools, recreation, and places of work.

As shown in Figure 14, improving transport accessibility along the CC2M corridor will draw in significant growth from across the Auckland region. Doing so will reduce sprawl at the fringes of the current urban boundary by redirecting development into the CC2M corridor. The impact will be amplified by additional integrated investment to support urban change, as described in chapters 8-10.

Supporting improved quality of life through increased connectivity, journey quality improvements and reduced travel times.

ALR is expected to improve quality of life standards across a range of measures, as identified in the Social and Distributional Impact (SDI) Assessment presented in sections 6.3 and 6.4. The SDI Assessment highlights the capacity for ALR to facilitate journey quality and travel time improvements, enhance social connectedness and improve safety and accessibility.

Figure 14: Change in expected population growth between the Do Minimum and ALR 2021-2051



5.1.2 Encouraging mode shift, improving air quality, and reducing accidents to support a low-carbon and healthy Auckland for future generations

KPI 2.1	**Improved carbon emissions**
KPI 2.2	**Improved health outcomes**

Promoting healthier and safer communities

Most public transport trips involve a portion of the journey (start, end, or both) being made by active means (predominantly walking or cycling). This reality is borne true in the transport modelling results which indicate there will be an 8% increase in the average annual active travel kilometres with ALR.

Figure 15: Average annual growth in active travel due to ALR

Active travel is a cornerstone of supporting community health and wellbeing. Even moderate exercise through short active portions of daily commuting is shown to have positive impacts on the mental and physical health of New Zealanders.[42] The growth in active travel resulting from ALR, and its impact on the health and wellbeing of Aucklanders, is estimated to have a direct positive impact $900m on the Auckland's economy over the appraisal period.[43]

Preventing accidents and casualties across Auckland's travel network

In line with Auckland's Vision Zero[44] targets, ALR is expected to reduce the total number of accidents occurring on the road network through providing an efficient, attractive alternative to private vehicles.

Figure 16: Average annual change in road accidents due to ALR

The provision of a high-quality rapid transit service is expected to induce a reduction in total vehicle kilometres, which consequently will reduce incidents on the road network by on average 75 crashes each year.

Analysis of traffic changes found that more than three quarters of casualties within the CC2M corridor currently occur on road links that are expected to experience a significant reduction in traffic (>10%) after ALR is built.[45]

Reducing exposure to harmful air pollutants

ALR will result in changes in the concentration of air pollutants through traffic redistribution, limiting harmful exposure and generating tangible health benefits for Aucklanders. Traffic modelling suggests ALR will reduce 1,100 tonnes of Nitrogen Oxides (NO_x) and 500 tonnes of particulate matter (PM2.5) from the air—both considered to have significant detrimental impacts on human health.

[42] Environmental Health Intelligence New Zealand
[43] See section 6.2.3 Non-user benefits.
[44] Vision Zero for Tāmaki Makaurau Auckland is an Auckland Transport strategy, which seeks to prevent any deaths or serious injuries from occurring across Auckland's transport system by 2050.
[45] See Appendix E-F SDI Report.

An investment in carbon to enable a more sustainable future

ALR is an investment in Carbon (to deliver infrastructure) which unlocks substantial carbon savings that support the long-term reduction of Auckland's carbon footprint and aid New Zealand in progressing its wider climate change commitments.

Beyond supporting a mode shift from private vehicles to public transport, ALR drives sustainable compact growth—limiting the requirements for carbon intensive infrastructure (e.g., three waters and roads) and enabling lower carbon lifestyles. For example, people living in compact urban environments own fewer vehicles per household than those living in traditional suburban environments.[46] The construction and delivery of a private vehicle requires a significant amount of embodied carbon which could be avoided with lower ownership rates.

Table 10 summarises the carbon investment required to deliver ALR as well as the potential carbon savings unlocked by ALR. Both a baseline (conservative) calculation as well as a calculation based on feasible carbon opportunities available in the market are presented.[47]

ALR can control and influence the projects whole of life carbon emissions through its design, construction, and operations. ALR can reduce embodied carbon emissions by designing more efficiently and procuring lower carbon construction materials. Net-zero operational emissions can be achieved by reducing the electricity consumption of rolling stock and stations or by signing power purchase agreements to ensure the service is powered by renewable energy sources. These potential opportunities can be magnified, and their certainty increased through a coordinated Urban Response to the ALR investment (see chapters 8-10). A whole-project approach to decarbonisation will help ALR support the net-zero transition whilst delivering high-quality transport connections.

ALR supports and embraces Mana Whenua values and principles that protect and enhance sustainability and the reduction of carbon emissions. Recognising the inherent link and relationship that Mana Whenua have as Kaitiaki, ALR provides an opportunity to foster sustainable and harmonious relationships with the environment to care for future generations.

Table 10: Whole of life carbon assessment of Auckland Light Rail

	ALR (baseline carbon approach)	**ALR** (harnessing low-carbon opportunities)
Embodied carbon investment	**+2,050kt CO_2e**	**+1,700kt CO_2e**
Enabled carbon reductions	**-1,370kt CO_2e**	**-2,130kt CO_2e**
Mode shift	-800kt CO_2e	-1,160kt CO_2e
Buildings and urban enabling infrastructure	-270kt CO_2e	-500kt CO_2e
Reduced car ownership	-300kt CO_2e	-470kt CO_2e

[46] See Appendix E-I Carbon Report for more details.
[47] The ALR core economic appraisal has been carried out under baseline (conservative) approach to carbon.

5.1.3 Increased access to employment, housing, and key services

KPI 3.1	**Improved access to employment, education, and health services**
KPI 3.2	**Increased public transport capacity**
KPI 3.3	**Reduced travel times**

Transforming access to employment, housing, and key services in the corridor and beyond.

Accessibility reflects the range of opportunities and choices available for individuals when connecting to employment, education, essential services, and social networks. The delivery of reliable, high-capacity public transport, ALR, will expand and enhance accessibility along the corridor and across the wider region.

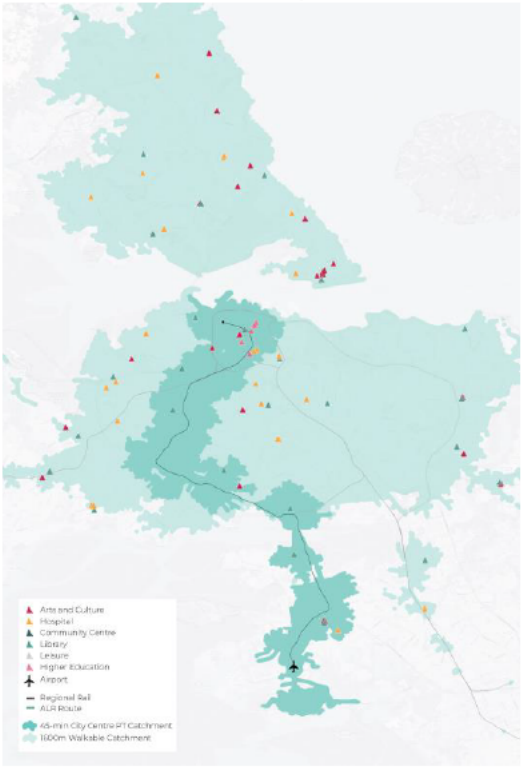
Figure 17: People within 45 minutes by public transport of the key centres in the CC2M corridor

From Mt. Roskill, Onehunga or Māngere, there are over

400,000

jobs accessible within 45 minutes by PT an increase of 35%, 150% and 305% respectively

Figure 18: Access to key destinations by 45 minutes to-and-from the city centre



In turn, higher accessibility will deliver better economic opportunities, improve health and wellbeing outcomes, and reduce social exclusion by providing a desirable transport alternative that is cheaper, safer, and more efficient than private vehicles.

ALR, as shown in Figure 18, integrates with the broader Auckland Transport Network to support 45-minute public transport accessibility to-and-from the city-centre over an area which extends across the majority of Auckland's urbanised area. Within a 45-minute public transport accessibility zone enabled by ALR from Auckland city-centre are: [48]

- 39 libraries (+8%)
- 26 hospital facilities (+12%)
- 6 higher education institutions
- 56 community centres (+9%)
- 31 leisure facilities (+10%)
- 37 arts and culture centres (+5%)

Separate analysis has been undertaken to understand changes in accessibility for Māori by identifying improvements in access to marae, Māori schools, Māori health facilities and hauora providers. The analysis indicates ALR will improve connections to key Māori facilities, and expand access to education, jobs, and other key services.

[48] Percent change shown in parentheses is relative to the Do Minimum in 2051.

Supporting a future public transport network that meets demand.

ALR will significantly enhance the public transport capacity through Tāmaki Makaurau Auckland's Central Isthmus, forming a vital spine of the future Auckland Rapid Transit Network (RTN).[49]

Figure 19 shows how ALR delivers the required additional capacity to service peak demand well into the future, a level of public transport capacity that cannot be provided by buses operating on the existing network or a street-running light rail system (see section 6.7).

Crucially, the separated nature of ALR means it can provide sufficient capacity to comfortably meet demand with the ability to further increase services over the next generation as growth and demand for public transport increases.[50]

As the backbone to the future Auckland RTN (Figure 20) the high-capacity separated system ALR delivers is required to meet the overall network demands. Critically, a separated system is also the only system that ensures sufficient capacity is freed up in the city centre, which currently constrains further investment in other RTN solutions for Tāmaki Makaurau Auckland. Without ALR the full benefits of the AWHC and North West projects cannot be realised due to insufficient capacity through the city centre and therefore an inability to create an integrated RTN.

A fast, reliable, service which attracts new riders and saves both public transport users and drivers' time.

ALR delivers drastically improved and highly reliable public transport journey

Figure 19: Peak Hour ALR demand and capacity[49]

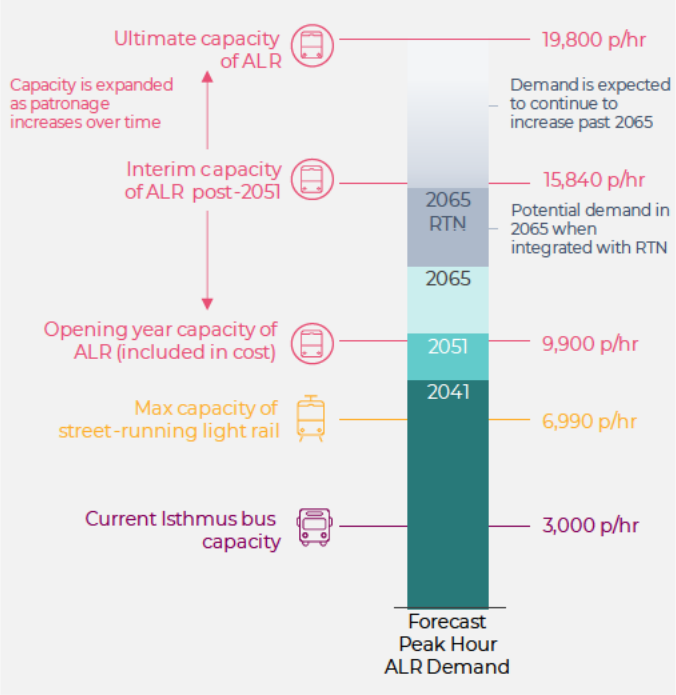


Figure 20: Auckland Transport Alignment Plan Future Rapid Transit Network (2023)

[49] Auckland Transport, Auckland Rapid Transit Plan.

[50] Initial capacity as shown in Figure 19 of ALR reflects the planned capacity during the initial operating period that reflects expected levels of demand. Ultimate Capacity of ALR reflects the designed capacity of the ALR network and the expected level of service that can be provided in later years as demand grows.

times across the corridor. Owing to the specific characteristics of the chosen system, including complete separation from other modes and automated operations, the system will allow for a highly reliable service. Equivalent systems operating globally have proven track-records with average punctual journey rates of over 99%.[51]

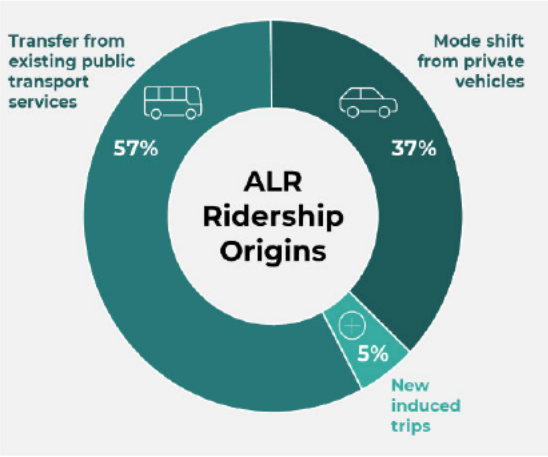
Figure 21: Travel time comparison of key ALR journeys

ALR provides journey times for residents and employees across the CC2M corridor that are truly transformational—not only for existing public transport users who in many instances will save 50% or more time off their existing journeys, but also for numerous drivers who, as shown in Figure 21[52], will in many instances now be able to use public transport to access key destinations as fast or faster than by using their vehicle.

The reliable service and transformative journey times create a true alternative for many journeys that were previously considered infeasible by public transport. The transformative impact is evidenced though the transport modelling outputs which, as captured in Figure 22, shows 37% of ALR users will be attracted out of their cars to use public transport.

Getting private vehicle users off the roads and on to ALR not only supports Auckland Council's Transport Emissions Reduction Pathway[53] but also provides improved reliability and journey times for vehicles which remain on the road—reducing congestion along key road corridors.

Figure 22: Ridership origins of ALR users



ALR allows over 80 buses to be removed from the city centre in 2051, freeing up significant capacity in the transport network across the Central Isthmus and in the city centre.

Mana Whenua recognise the need to provide quality public transport, including cycling and micro-mobility, as quickly as possible to reduce reliance on private car travel ahead of congestion charges and road user charges on electric vehicles. This is particularly significant for communities living along the corridor in South Auckland, an area that is poorly served by public transport which should be supported with more equitable transport options.

[51] Services departing and arriving at stations within 2 minutes of schedule.
[52] Car journey times based on Google Journey Planner for a 0800 departure on a weekday in 2023. Bus and Rail journey times from AT journey planner app for departures between 0800 and 0900. The time ranges reflect reasonable travel times across each mode.
[53] Auckland Council, Transport Emissions Reduction Pathway

6. Economic appraisal of ALR

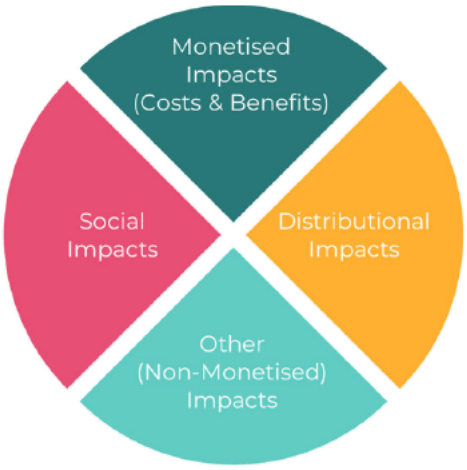
The economic appraisal of ALR presents both the monetised and non-monetised costs and benefits associated with this investment. Together this analysis depicts a clear story that conclusively demonstrates ALR as an investment that represents excellent value for money for Auckland, and New Zealand.

6.1 Approach

The economic appraisal and value for money assessment for the transport elements of the Corridor Business Case (CBC) is undertaken in line with Waka Kotahi's Monetised Benefits and Costs Manual (MBCM). Beyond this, in agreement with Waka Kotahi, Ministry of Transport, and NZ Treasury, the economic case incorporates innovative approaches to capture impacts that are not covered in the MBCM guidance, reflecting the principles of Better Business Case Guidance and the transformational wide-reaching nature of the scheme.

The economic appraisal assesses the impacts of ALR relative to the Do Minimum (see chapter 3) across four key axes. These axes are shown in Figure 23 and each discussed in turn in the following sections of this chapter:

Figure 23: Components of the Economic Appraisal



- Section 6.2: **Monetised Impacts** includes a detailed cost-benefit analysis to understand the overall **benefit-cost ratio** and **net-present value** of Auckland Light Rail considering all impacts that can be feasibly monetised.
- Section 6.3: **Social Impacts** considers the human experience of Auckland Light Rail, evaluating social factors not included in the cost-benefit analysis.
- Section 6.4: **Distributional Impacts** examines how the benefits and costs of Auckland Light Rail are distributed across different segments of society.
- Section 6.5: **Other Impacts** discusses benefits that are expected to occur but cannot feasibly be quantified or monetised through the other elements of the economic appraisal.

Together these four components of the economic appraisal provide a detailed and comprehensive understanding of the likely impacts of ALR—supporting a holistic value for money assessment of the investment.

6.1.1 Modelling

All four elements of the economic appraisal defined above are supported by a series of inputs and analysis from a variety of sources. The core supporting models to the appraisal are described in brief below. The Economic Assessment Methodology[54] sets out the approach, the inputs used, and assumptions made in more detail.

[54] See Appendix E-C ALR Economic Assessment Methodology.

Table 11: Core supporting models of the economic appraisal

Transport	Transport modelling and demand forecasting is provided by the Auckland Forecasting Centre (AFC) using the Auckland Macro Strategic Model (MSM), a multi-modal travel demand model for the Tāmaki Makaurau Auckland region.
Land Use and Transport Interaction	A tailored land use and transport interaction modelling framework has been developed for this assessment by LUTI Consulting. This framework adheres to the latest requirements by Australian Transport Assessment and Planning and Infrastructure Australia for the preparation land use forecasts and their application in transport project economic appraisals.
Cost	ALR has been developed and designed in accordance with the Association of Advancement of Cost Engineering International (AACEI) Class 4 cost estimate definition which is based on a project maturity level of up to 15%. Cost Estimates have been formerly peered review.[55]
Carbon	Carbon estimates have been prepared based on an assessment of six carbon emissions sources: construction emissions, operational emissions, transport emissions, emissions from urban enabling infrastructure, emissions from buildings, and the embodied emissions from new private vehicles. Where applicable, the models developed for ALR align with EN17472:2022 or Treasury Better Business Case Guidance where applicable.[56]
Economic	The ALR economic model collates, monetises, and annualises inputs from all the above models to assess the relative costs and benefits of ALR over a defined appraisal period. This allows for calculations conceptually aligned with the Waka Kotahi guidance including the benefit-cost ratio (BCR) and net present value (NPV) of ALR.

Key assumptions

The following key assumptions are used for the monetisation of costs and benefits in the economic appraisal. Reflecting the long-term nature of the scheme, in line with Waka Kotahi guidance, an appraisal period incorporating the construction period and 60 years of operations from the opening of the scheme is assumed. All costs and benefits (unless stated otherwise) are presented in present value ($PV) terms based on a 4% discount rate aligned with NZ Treasury and Waka Kotahi guidance.

Table 12: Key economic appraisal assumptions

Element	Value
Discount rate (real)[57]	4%
Discount year, appraisal start year and price year	2022
Construction start	2026
Operations start	Defined by the proposed staging of ALR delivery.[58]
Appraisal period	Construction period and 60 years of operations
Transport modelling years	2031, 2041, 2051 and 2065

Closed city approach

The core modelling approach to the economic appraisal is based on a 'closed city' method. This means that total (region-wide) forecast employment and population is kept consistent with official Stats NZ growth forecasts. As a result, any growth forecast in the CC2M corridor resulting from land use changes generated by ALR is 100% displaced from other parts of Auckland to keep total employment and population

[55] See Appendix E-D Cost Estimate Report.
[56] See Appendix E-I Carbon Methodology, Results, and Opportunities.
[57] The real discount rate reflects the long-term opportunity cost of capital as well as the rate at which society is willing to trade off present benefits and costs against future benefits and costs.
[58] For more details on staging approach for the options being assessed please refer to Appendix E-B ALR Optioneering Report.

constant. This approach is aligned with Waka Kotahi guidance, other major projects under development in Auckland. Section 6.6.2 briefly highlights the opportunity for increased growth associated with ALR in an 'open city' approach as a sensitivity test.

6.2 Monetised impacts

Figure 24: Monetised impacts (costs & benefits)

The assessment of monetised impacts is a cost-benefit appraisal undertaken primarily in accordance with the Waka Kotahi MBCM guidance.[59] The assessment contains four main benefit categories:

- **User Benefits:** Benefits that accrue directly to users of the public transport network including ALR. Including for example, time savings, improved reliability, and active travel benefits of first-last mile travel to and from public transport.
- **Non-user Benefits[60]**: Benefits that will accrue to those who will not use ALR but will benefit from the project outcomes. This includes users of other modes, and the wider population. For example, improved road safety and reduced congestion.
- **Land Value and Land Use impacts:** Improvements in transport accessibility are likely to lead to increased land values and more efficient land use. Care is needed to avoiding double counting as a significant portion of increased land values are reflected in other benefits. Land use change will also deliver a more efficient provision of infrastructure, creating cost savings.[61]
- **Wider Economic Benefits (WEBs):** WEBs are economic impacts which are additional to transport user benefits. As per guidance, these require "change (to) the distribution or density of households and firms within a major metro area, or deliver significant improvements in accessibility between regions, in order for wider effects to arise".[62]

The assessment also contains four primary cost considerations:

- **Capital Expenditure (CapEx):** The initial outlay cost required to implement ALR including the design, delivery, and commissioning of the system.
- **Operational Expenditure (OpEx):** The expected ongoing operating cost of the system including energy, labour, and other associated costs.
- **Renewals:** The anticipated cost of renewals of the system as particular components reach the end of their usable lifespan (e.g., rolling stock).
- **Revenue:** The expected operating revenue generated through ALR patronage.[63]

Together these four categories of benefits and four categories of cost provide the ingredients to understand the full monetised economic impacts of ALR (summarised in the total net-present value and benefit-cost ratio of ALR).

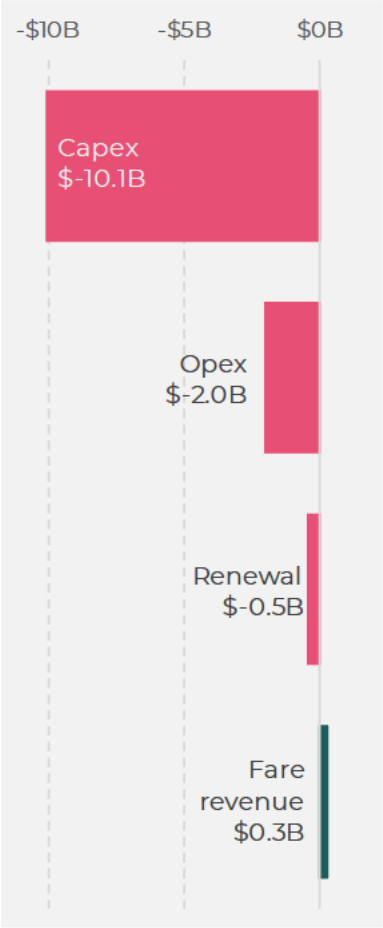
[59] See Appendix E-C ALR Economic Assessment Methodology for a detailed explanation on how each part of the monetised impact appraisal has been assessed.
[60] Unlike user benefits which only impact ALR users, non-user benefits are not explicitly felt by non-users. Non-user benefits will be accrued across the whole population, including those who use ALR and those who do not.
[61] Refer to Appendix E-F LUTI Land Use and Urban Economics Methodology Report for a detailed explanation of how land value and land use impacts have been monetised.
[62] Waka Kotahi, MBCM 3.9
[63] Only considered as part of the calculation of the National Benefit Cost Ratio in section 6.2.7 as per MBCM guidance.

6.2.1 Costs

As part of the development of the ALR Scheme, a cost-estimate (Class 4[64]) has been prepared to support the preparation of the Corridor Business Case. This estimate includes capital expenditure (CapEx), operating expenditure (OpEx) and renewals. The undiscounted $PV whole-of-life cost of ALR is $22.7B.[65] Converting to present value terms (in accordance with Waka Kotahi Guidance) the economic cost of ALR is $12.6B.

The Cost-estimate Report[66] provides a detailed methodology and cost breakdown of the ALR investment. In addition to the cost-estimate, to understand the net OpEx position of ALR, expected revenue (based on forecast ALR patronage) is also considered within the economic appraisal.

Figure 25: Breakdown of ALR costs and revenue ($PV)



Capital Expenditure (CapEx) — $10.1B

The capex has been estimated by taking into consideration the following key inputs:

- Concept designs
- Client, planning and design
- Programme
- On-site overheads
- Tunnelling, station civils, retaining walls, viaducts, MHX and the depot
- Risk
- Station fit-out, public realm, rail systems
- Utilities costs
- Rolling stock
- Temporary traffic management
- Property and business disruption

The final cost estimate is a Class 4 estimate as defined in the AACEI Recommended Practice Guide[67]. In line with the rest of the figures presented, CapEx is presented in discounted present value terms. The costs used in the economic assessment are un-escalated and in compliance with MBCM guidance, P50 costs are used which include a 29% risk allocation.

Operational Expenditure (OpEx) — $2.0B

The OpEx accounts for the ongoing operations and maintenance of the asset as delivered on opening.

Renewals — $0.5B

Renewals accounts for the replacement and upgrading of core infrastructure including rolling stock, platforms, and signal systems.

Fare revenue — $0.3B

ALR revenue is provided as an output of the transport modelling. In line with MBCM guidance, the public transport fare revenues are treated as both a disbenefit and negative cost in the calculation of BCR_g (Government Benefit Cost Ratio), an additional BCR in addition to the standard BCR_n (National Benefit Cost Ratio).[68]

[64] As defined by the AACE International Recommended Practice for Cost Estimation.
[65] The whole of life cost includes the capital cost of delivering ALR, the operations and maintenance costs as well as renewals of the infrastructure over the appraisal period (construction period plus 60 years of operations).
[66] See Appendix E-D Cost-estimate Report.
[67] Recommended Practice Guide 98R-18 for Road and Rail Transportation Infrastructure Industries.
[68] See section 6.2.7.

6.2.2 User benefits

At the core of ALR are a series of direct benefits that will be accrued to new and existing public transport users. Together these benefits amount to an estimated $8.6B in present value terms and 29% of the overall ALR benefits. User benefits have been monetised across the following categories:

Public Transport (PT) Time Savings	$4.0B

Public transport journey times reduce by over 50 per cent from some key destinations, delivering major time savings to existing public transport users. Improved public transport capacity and service frequencies also encourage many users onto ALR from other modes, delivering increased user savings. [69]

Public Transport (PT) Reliability	$2.9B

ALR provides benefits to users from a more reliable service than existing public transport. ALR users can avoid delays at stations and on trains, reducing the need for users to build buffer time into their journeys to get where they need to on time. This results in significant additional savings for users.

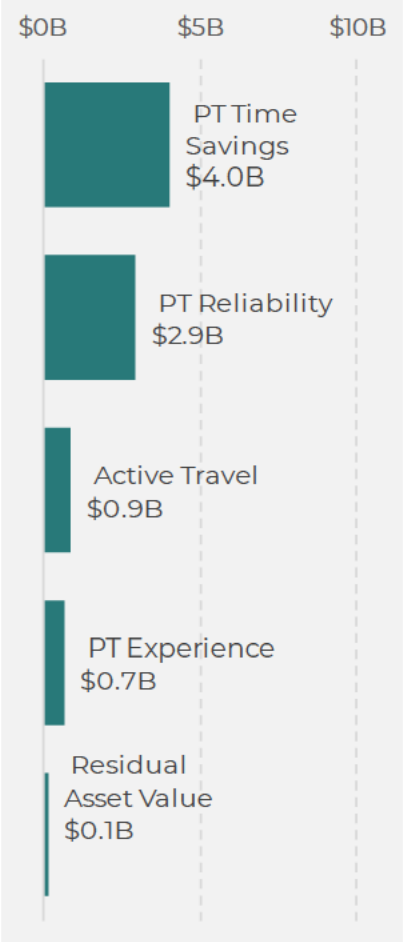
Active Travel	$0.9B

The users of public transport typically walk or cycle more than a comparative vehicle journey. This results in physical and mental health benefits of increased walking and cycling.

Public Transport (PT) Experience	$0.7B

This considers public transport users' experience of improvements in quality of facility and service enabled by ALR. This includes improved physical station infrastructure and more attractive services, improving users' perception of public transport.

Figure 26: User benefits of ALR ($PV)



Residual Asset Value	$0.1B

Residual asset value is a proxy for remaining user benefits beyond the appraisal period. Rail infrastructure tends to have a long operating lives, with tunnels recognised as having a useful economic life of 100 years.[70] There is real, long-term value that this infrastructure delivers beyond the appraisal period, which is monetised through the appraisal.[71]

[69] Savings are calculated based on generalised cost reductions, which are the sum of the monetary and non-monetary components of a trip (including actual monetary costs, time, crowding and interchange penalties) across all public transport modes.

[70] KiwiRail Annual Report. 2022. https://www.kiwirail.co.nz/assets/Uploads/documents/Annual-reports/2022/KiwiRail-Integrated-Report-2022.pdf (retrieved May 2023).

[71] Refer to Appendix E-C ALR Economic Assessment Methodology for a detailed description of how residual asset value is calculated.

6.2.3 Non-user benefits

Beyond the clear benefit ALR delivers to users, it has a significant impact beyond those who are directly using the system. This includes those who live and commute in the CC2M corridor and the broader city who benefit from more efficient road transport, cleaner air, and safer streets for example. Non-user benefits total an estimated $4.2B over the appraisal period in present value terms and 14% of the overall ALR benefits. The following benefits are monetised and included in this section:

Traffic Benefits	**$2.8B**

ALR enables a shift to public transport and increased density around stations. As people move from other parts of Tāmaki Makaurau Auckland into the CC2M corridor, significant capacity is freed up across the road network, reducing travel times, congestion, and operating costs for road users.

Road Safety	**$0.9B**

The ALR reduces the overall volume of vehicle kilometres travelled (VKT) on the road network and lead to an increase in PT usage. This results in a decrease in the number of crashes as a trip on a PT service has an overall lower safety risk than a comparable trip by a vehicle.

Enabled Emissions Reductions	**$0.5B**

The improved travel time reliability, service frequency and user experience of ALR lead to a shift in travel from private vehicles to public transport. This results in a reduction in transport emissions associated with fewer private vehicles on the road.

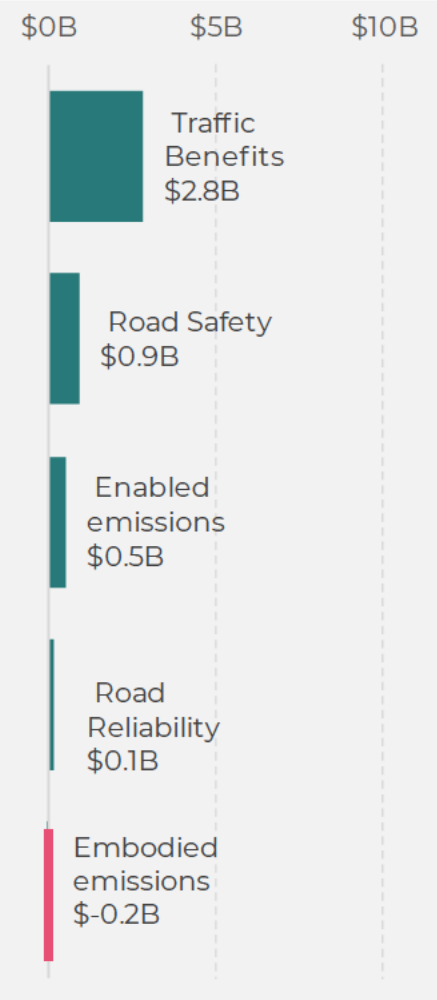
Road Reliability	**$0.1B**

An intervention like ALR also reduces the journey time variability in other parts of the network (in addition to traffic benefits). This results in a small overall increase in journey time reliability for vehicles.

Embodied Emissions	**$-0.2B**

The construction of ALR results in the release of carbon emissions through construction. These are treated as disbenefits in the economic appraisal.

Figure 27: Non-user benefits of ALR ($PV)



6.2.4 Land value and land use impacts

Improvements in transport accessibility provided by ALR lead to land-use changes and increased land values. However, care is needed in avoiding double counting as a significant portion of these increased land values are reflected in other benefits. As a result, the focus is on specific considerations around rezoning and option value. This category also contains the estimated infrastructure cost savings due to land use change, reducing sprawl and increasing the efficiency of delivering public services (for example, three waters). These benefits total an estimated $3.7B over the appraisal period in present value terms and 12% of the overall ALR benefits.

Rezoning or other land use change	$2.4B

This benefit results from rezoning or other land use change enabled by ALR. As increased density comes into the CC2M corridor, rezoning is required to accommodate this additional development, unlocking increased land value.

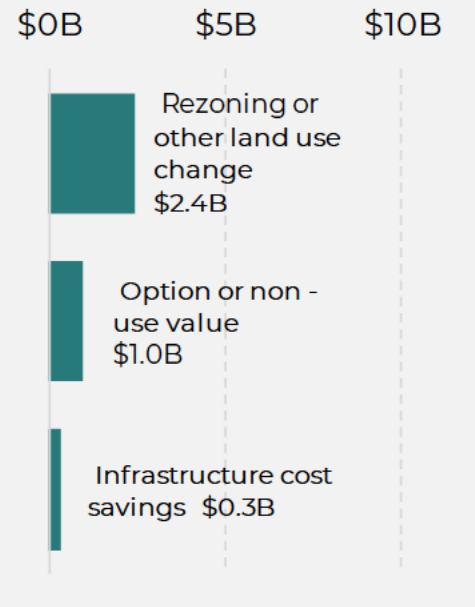
Option or non-use value	$1.0B

Land values also increase as transport accessibility improves and sites become more attractive to the market. The value people place on having a public transport option is partly captured in user benefits, but there is additional value delivered to people who are nearby to ALR but do not necessarily use it. This benefit captures this additional land value uplift, adjusted for non-users.

Infrastructure cost savings	$0.3B

Infrastructure and cost savings are benefits accrued by facilitating greater rates of urban infill over the alternative of greenfield expansion (or urban sprawl). Consistent analysis demonstrates there are cost savings associated with delivering growth in a more compact form that allows for a more efficient provision and use of infrastructure, like water and local roads.[72]

Figure 28: Land value and land use impacts of ALR ($PV)



[72] Appendix E-F LUTI Land Use and Urban Economics Methodology Report.

6.2.5 Wider economic benefits (WEBs)

ALR will provide a step change in accessibility across Tāmaki Makaurau Auckland, significantly improving access to jobs, businesses, and economic opportunity, not just within the corridor but across the city.

ALR directly connects the two largest employment centres in the region (the city centre and airport) along a corridor with a large and growing labour supply. This is particularly relevant in the context of growing knowledge-based sectors and clusters, which benefit the most from good connectivity and proximity to other businesses[73].

Improvements in accessibility will drive important agglomeration benefits generating increases in productivity, employment, and economic output. Tāmaki Makaurau Auckland is Aotearoa's economic power, currently generating 37% of the country's GDP. The Project has the potential to generate wider economic benefits (WEBs) of national significance.

These WEBs are additional to transport user benefits and are therefore quantified separately. WEBs include impacts on productivity, employment, and economic output, considering the full welfare impact of a transport intervention including factors which may not be captured in the transport market due to failures in non-transport markets such as labour and land markets. For ALR, these benefits total an estimated $13.3B over the appraisal period in present value terms, accounting for 45% of the overall ALR benefits.

The following WEBs are assessed as part of the appraisal:

Agglomeration	**$7.3B**

Improved connectivity provided by ALR will lead to increased spatial concentration of economic activity and land use changes, thereby generating productivity gains.

Increased Labour Supply	**$3.9B**

The improved transport infrastructure provided by ALR will increase the supply of labour, resulting in additional tax take.

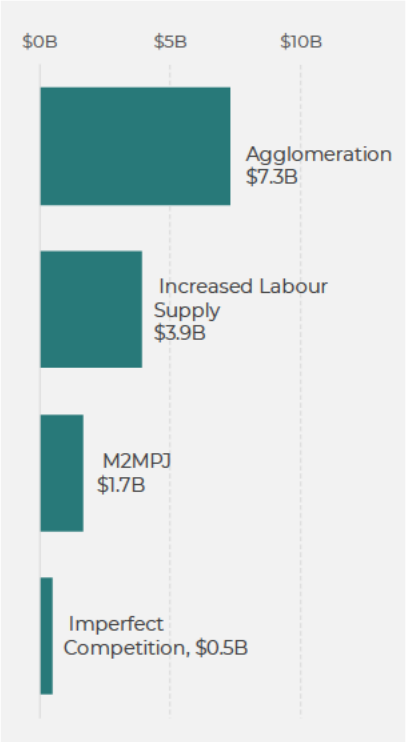
Movement to More Productive Jobs	**$1.7B**

ALR will generate additional tax revenue resulting from workers moving to more productive jobs because of improved transport infrastructure.

Imperfect Competition	**$0.5B**

A transport intervention such as ALR will induce increases in output in sectors with price cost margins.

Figure 29: Wider economic benefits of ALR ($PV)



[73] See Strategic Case for more information.

6.2.6 Summary of monetised impacts

A summary of all monetised impacts for ALR is provided in Table 13 below. In total, ALR is estimated to generate costs of $12.6B and benefits of $29.7B over the appraisal period.

Table 13: Summary of monetised impacts ($PV)

Costs	**$PV[74]**	**% of Total**
Capital Expenditure (CapEx)	$10.1B	80%
Operational Expenditure (OpEx)	$2.0B	16%
Renewals	$0.5B	4%
Fare Revenue	$0.3B	
Total Costs (excluding revenue)	**$12.6B**	**100%**
Benefits	$PV[74]	% of Total
Public transport time savings	$4.0B	13%
Public transport reliability	$2.9B	10%
Active travel	$0.9B	3%
Public transport experience	$0.7B	2%
Residual asset value	$0.1B	<1%
User benefits	**$8.6B**	**29%**
Traffic benefits	$2.8B	10%
Road safety	$0.9B	3%
Enabled emissions	$0.5B	2%
Road reliability	$0.1B	<1%
Embodied emissions	-$0.2B	<1%
Non-user benefits	**$4.2B**	**14%**
Rezoning or other land use change	$2.4B	8%
Option or non-use	$1.0B	3%
Infrastructure cost savings	$0.3B	1%
Land Value and land use impacts	**$3.7B**	**12%**
Agglomeration	$7.3B	25%
Increased labour supply	$3.9B	13%
Movement to more productive jobs	$1.7B	6%
Imperfect competition	$0.5B	2%
Wider economic benefits	**$13.3B**	**45%**
Total benefits	**$29.7B**	**100%**

Understanding the impacts of ALR over time

Figure 30, Figure 31, and Figure 32 overleaf showcase the profile of costs, benefits, and cumulative economic impacts over time. As is typical with a major investment in transport infrastructure there is a substantial initial economic cost associated with delivering the scheme in the early years of the appraisal.

[74] Numbers may not sum due to rounding.

Figure 30: Annualised cost of ALR over the appraisal period ($PV)[75]

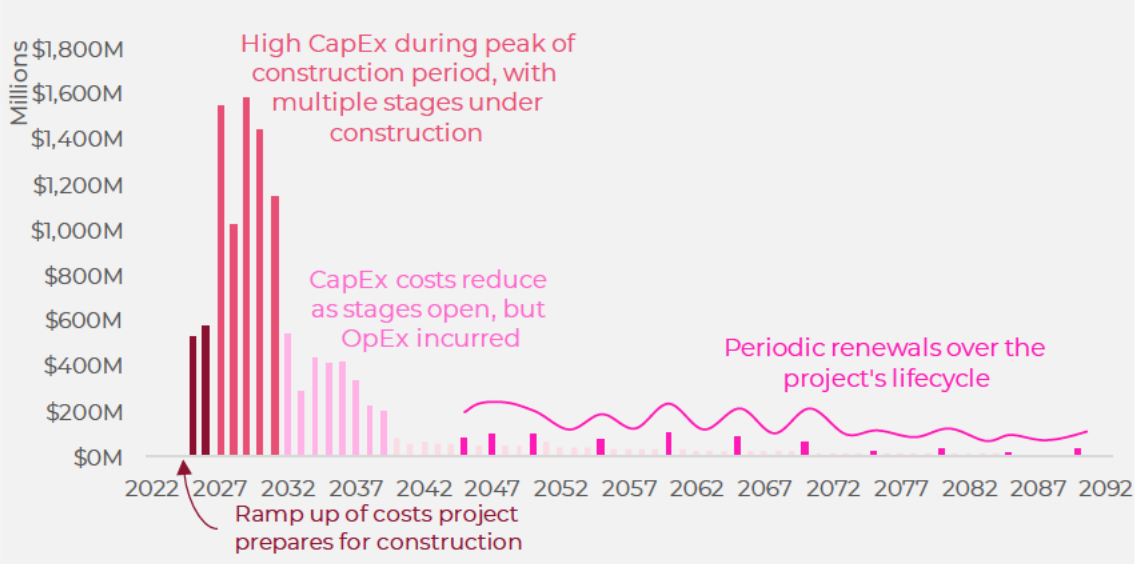


Figure 31: Annualised benefits of ALR over the appraisal period ($PV)

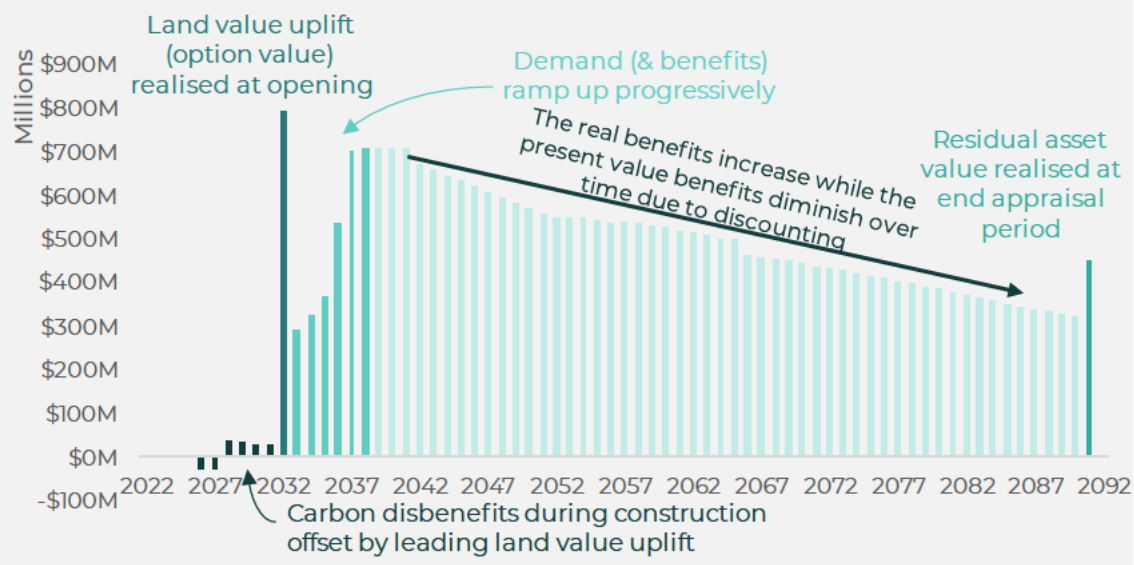
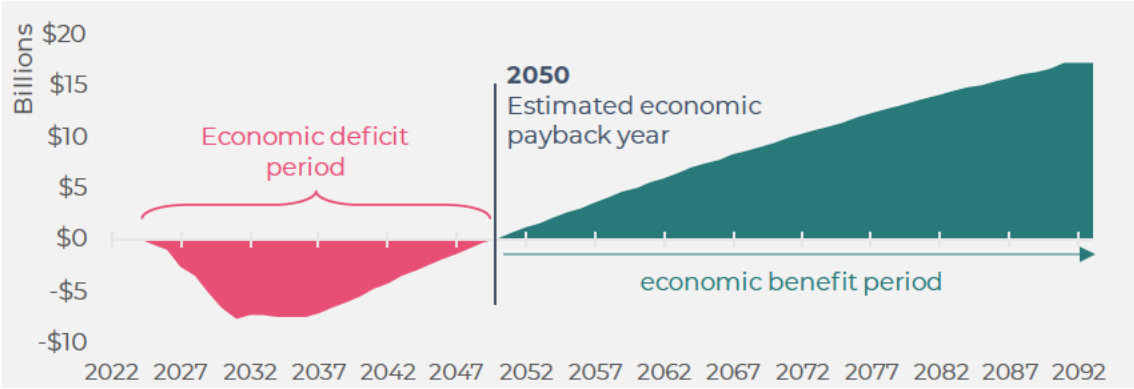


Figure 32: Cumulative economic profile of benefits over the appraisal period ($PV)[76]



[75] The values shown do not include revenue as it is not included within the core economic calculation of the BCR_N. Inclusion of revenues would decrease the ongoing net cost burden during operations.
[76] Economic payback refers to the time when the cumulative monetised impacts equal zero This is the time when cumulative economic benefits are equal to the cumulative economic costs (in discounted, present value terms).

6.2.7 ALR benefit-cost ratios

Based on the assessment of monetised impacts presented in this section, the benefit-cost ratio (BCR) of ALR has been calculated in line with MBCM guidance and is presented in two formats in Table 14 – national (BCR_N) and government (BCR_G).

Table 14 Benefit-cost ratio summary information for ALR

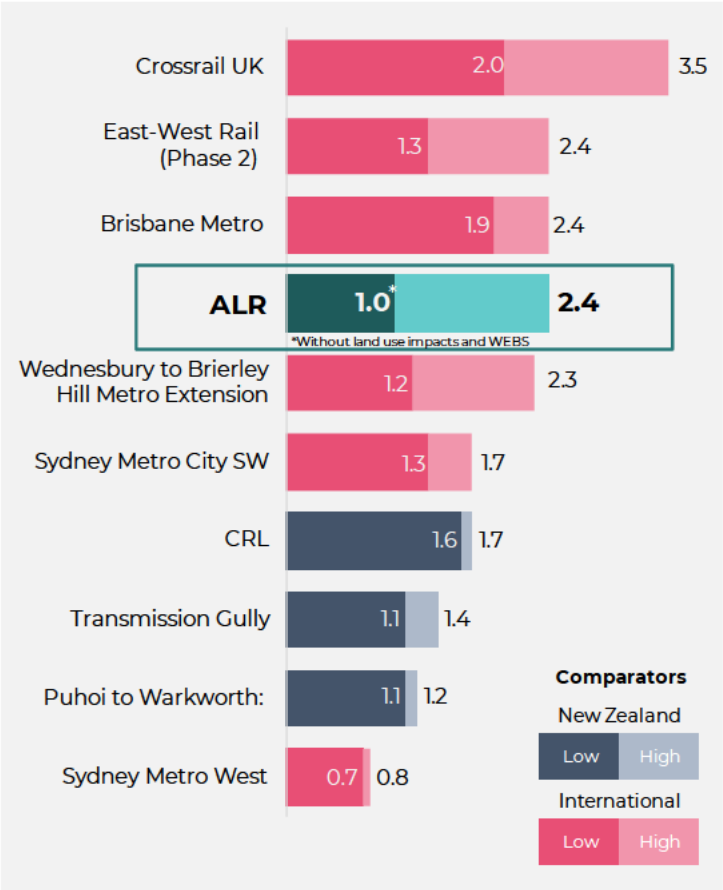
Value for money indicators	$PV
Total Costs	$12.6B
Total Benefits (without WEBs and Land use impacts)	$12.8B
Total Benefits (without WEBs)	$16.4B
Total Benefits (with WEBs)	$29.7B
Net Present Value (NPV)	$17.2B
National Benefit-Cost Ratio (BCR_N) (without WEBs and Land use impacts)	1.0
National Benefit-Cost Ratio (BCR_N) (without WEBs)	1.3
National Benefit-Cost Ratio (BCR_N) (with WEBs)	**2.4**
Government Benefit-Cost Ratio (BCR_G)	2.4
First year rate of return	6.3%

With a BCR_N between 1.0 and 2.4 ALR delivers good value for money and positive economic benefits for New Zealand. The project is estimated to deliver $17.2B in net present value economic benefits to Auckland and New Zealand over the appraisal period.

As shown in Figure 33, the ALR BCR performs relatively strongly when compared to a selection of recent national and international transport examples.[77]

The robustness of the ALR BCR is further considered and tested through sensitivity analysis in section 6.6.3 to understand how it may be impacted by key uncertainties and opportunities within the economic appraisal.

Figure 33: ALR BCR relative to recent New Zealand and international major transport projects



[77] Comparisons between projects are indicative and illustrative only. Individual results reflect different modelling assumptions, guidance and parameters and may not necessarily represent a like-for-like comparison.

6.3 Social impact appraisal

6.3.1 Introduction

The Social Impact Appraisal (SIA) evaluates the human experience of a transport system and assesses social factors that are not already considered in conventional transport appraisals.

The SIA has been prepared with reference to the Waka Kotahi *Transport Outcomes Framework* and *Social Impact Guide*. It is a new and innovative methodology for New Zealand transport projects and therefore draws heavily on international best practice, including primarily the *Social Impact Appraisal* guidance published by the UK Department for Transport and the *Social Impact Assessment Guideline for State Significant Projects* developed by the New South Wales (NSW) government. Details on the SIA approach and methodology are presented in Appendix E-H.

The following social outcome categories have been identified for the appraisal of ALR, each comprising one or several indicators that are assessed as part of the SIA:

Table 15: Social outcome categories included in the Social Impact Appraisal

Social Outcome Categories	Social Outcome Indicators
Community outcomes	Community severance
	Social connectedness
	Personal safety and fear of crime
	Journey quality
Health outcomes	Changes in levels of physical activity
	Impact of mode on physical and mental health
	Benefits to society arising from prevention of road accidents and casualties
Accessibility outcomes	Effect on the ability for people to travel and access services

It is relevant to note that while some social indicators listed above are also recognised as part of the monetised CBA, the focus of the SIA is to analyse the **benefits or impacts to society** that arise from changes in individual outcomes resulting from the project, rather than aggregating the value of individual impacts across the population.

6.3.2 Findings

A summary of preliminary findings for the SIA is presented in Table 17 overleaf. The results are presented on a seven-point scale as shown below, ranging from beneficial through neutral to adverse, to differentiate the relative impacts of different indicators.

Table 16 Scoring matrix for the SIA

Largely adverse	Moderately adverse	Slightly adverse	Neutral	Slightly beneficial	Moderately beneficial	Highly beneficial

Table 17: SIA preliminary findings

Impact Category		ALR Outcome
Community	Community severance	ALR will have a **slightly to moderately beneficial** impact on community severance. The effects of traffic flow changes are not anticipated to be significant, but proposed changes to pedestrian infrastructure are expected to enhance connectivity and reduce severance.
	Social connectedness	At a scheme-wide level, ALR will have **a slightly beneficial** impact on social connectedness. High benefits are expected around Māngere Bridge and the Airport. Impacts are assumed to be lower in those areas of the corridor which are already being used for residential or community purposes, such as Dominion Junction and Māngere Town Centre. Neutral impacts are assumed for areas that are primarily used for industrial purposes (i.e., Airport Industrial).
	Personal safety and fear of crime	ALR is likely to have a **slightly beneficial** impact on personal safety and fear of crime for individuals using rail or residing in the scheme's vicinity. Formal surveillance measures (e.g., CCTV monitoring) and informal surveillance instruments (e.g., design to encourage open visibility) are expected to enhance the level of security for transport users and local residents.
	Journey quality	The overall journey quality impact of ALR is likely to be **moderately beneficial.** The scheme design encompasses various elements aimed at enhancing the overall transport environment for passengers, pedestrians, and cyclists, leading to an improved user experience. Traveller care, traveller views and traveller stress are all expected to be improved.
Health[78]	Health benefits arising from changes in levels of physical activity	ALR is expected to generate a **slightly beneficial** health impact through inducing a small increase in the total active distance travelled to and from public transportation.
	Health benefits arising to active travel users from changes in the physical environment	A **slightly beneficial** impact is anticipated to arise through changes in the physical environment that increase total active kilometres travelled across the corridor.
	Prevention of road accidents and casualties	ALR is expected to result in a **slightly beneficial** impact through reducing total annual road crash rates.
Accessibility	Changes in accessibility	The accessibility impact of ALR is anticipated to be **moderately beneficial.** ALR provides improved PT access and enhanced job accessibility to a higher proportion of the population.

[78] These benefits are monetised and captured in aggregate through the cost-benefit analysis but are key social outcomes which are central to the SIA.

6.4 Distributional impact appraisal

6.4.1 Introduction

The Distributional Impact Appraisal (DIA) considers the distribution of ALR impacts (benefits and costs) among members of society and whether these impacts are distributed fairly[79]. The purpose of the DIA is to identify and evaluate groups that are likely to benefit and those that are likely to experience burdens from ALR. Particular attention is given to priority groups that may be socially or financially disadvantaged.

The approach to the appraisal of distributional impacts is based on the UK Department for Transport's *Distributional Impact Appraisal* guidance. While the DIA is a new and innovative methodology for New Zealand, additional context has been taken from a recent report commissioned by Waka Kotahi investigating available methods for identifying and assessing the distributional impacts of transport projects[80]. Further details on the DIA approach and methodology are presented in Appendix E-H.

The following distributional impacts are assessed as part of the DIA:

Table 18: Distributional outcome categories for the DIA

Distributional Outcome Category	Description
User benefits	Including travel time savings for private vehicles and public transport as well as vehicle operating costs and user charges where appropriate
Noise impacts	Effect on the acoustic environment.
Air quality impacts	Changes in air pollution levels experienced by the local community.
Safety impacts	Changes in transport-related accidents, serious injuries and deaths occurring as a result of the intervention.
Severance impacts	Effect on ALR as a physical or psychological barrier separating communities of built-up areas.
Security impacts	Effect on the overall safety and security of transport users
Accessibility impacts	Benefits or disbenefits associated with alterations in public transport accessibility to employment and other key destinations
Personal affordability impacts	Impact on the cost of travel.

A multi-stage methodology is undertaken which involves the following steps:

- **Step 1: Screening process** to evaluate the potential impacts of the transport intervention on priority groups, to determine if further appraisal is required.
- **Step 2a: Confirmation of areas** impacted by the transport intervention through defining an impact area for each indicator.
- **Step 2b: Identification of priority groups** within each impact area through socio-demographic profiling approach
- **Step 2c: Identification of amenities** within each impact area to further clarify the concentration of social groups.
- **Step 3: An appraisal** is undertaken to generate an assessment score for each relevant priority group based on the perceived impact of each indicator and the proportion of priority individuals within the impact area relative to the total population.

[79] Litman T (2017). Evaluating transportation equity.
[80] Torshizian, E., Byett, A., Isack, E., Fehling, A., & Maralani, M. (2022). Incorporating distributional impacts (equity) in the cost–benefit appraisal framework.

The results are presented on a seven-point scale, ranging from beneficial through neutral to adverse, to differentiate the relative impacts of different indicators. An overview of the seven-point scale is provided below:

Table 19 Scoring matrix for the DIA

Score	Description
Largely adverse	Adverse and the population impacted is significantly greater than the proportion of the group in the total population
Moderately adverse	Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population
Slightly adverse	Adverse and the population impacted is smaller than the proportion of the population of the group in the total population
Neutral	There are no significant benefits or disbenefits experienced by the group for the specified impact
Slightly beneficial	Beneficial and the population impacted is smaller than the proportion of the group in the total population
Moderately beneficial	Beneficial and the population impacted is broadly in line with the proportion of the group in the total population
Highly beneficial	Beneficial and the population impacted is significantly greater than the proportion of the group in the total population

6.4.2 Findings

A summary of findings from the DIA is presented in the Table 20 below.

Table 20: DIA Preliminary Findings

Impact	Priority Groups	ALR Outcome
User benefits	Income groups	User benefits are appraised as **moderately to largely beneficial.** ALR is expected to provide net benefits to all income quintiles, but the distribution is not uniform.
Affordability	Income groups	Affordability impacts are appraised as **slightly beneficial**. All income quintiles, except for the lowest 20% of income earners, are expected to experience net affordability benefits.
Noise	Income groups, children, older people	The distributional noise impact of ALR is likely to be **neutral** for all identified priority groups.
Air quality	Income groups, children, young adults	Air quality impacts are assessed as **moderately beneficial.** Children, young adults, and high-income earners are expected to experience moderate benefits, while the impact for low-income earners is expected to be slightly beneficial.
Safety	Children, older people, Māori, pedestrians, cyclists, wheeled pedestrians, male drivers	Safety impacts are appraised as **moderately beneficial** and moderate benefits are anticipated for most priority groups. Cyclists are expected to experience a neutral impact, while wheeled pedestrians are expected to experience a moderate adverse impact.
Severance	Children, older people, people with disabilities, households with no car	A **moderately beneficial** severance impact is anticipated for all priority groups due to changes in motorised traffic and the provision of additional walking infrastructure.
Security	Young adults, women, older people	**Moderately beneficial** impacts to security are anticipated. The benefits are expected to be most acute for women, who make up the largest proportion of the study area and who are affected by the highest number of security indicators.
Accessibility	Income groups, people with disabilities, females, Māori, Pacific Peoples, young adults, households without cars.	**Moderately beneficial** impacts are anticipated. Low-income earners, carers and people with disability are expected to experience large benefits, while high income earners, female and Māori are expected to experience moderate benefits. There will be slight benefits for young adults and households without cars. The impact on the pacific community is appraised as neutral, given the proportion of pacific peoples within the study area is in-line with the total population.

6.5 Other non-monetised impacts

ALR will also generate impacts on society which are beyond those capture in the monetised benefits the SIA and DIA. Key anticipated other non-monetised impacts are qualitatively assessed in Table 21 below:

Table 21: Assessment of non-monetised impacts

Impact	Assessment of the impact
Disruption from construction	Disruption from construction will mainly be limited to contained street disruption around selected sites. More substantial disruption is anticipated around specific underground station and tunnel portal locations. These disruptions may impact housing, community facilities, heritage buildings and the transport network. Around 1,300 buildings are anticipated to be impacted by construction and will be directly compensated. The vast majority of which are expected to be residential buildings (84%). Beyond compensation for directly impacted buildings, there is an allocation of $36 million included in the CapEx to compensate for business disruption. This has been included in the economic modelling and the BCRs.
Jobs during construction	The construction of ALR is expected to create approximately 4,000 jobs during design, planning and construction. During the peak month of construction, active ALR jobs are estimated to amount to approximately 2,500. Direct job opportunities are expected to directly support priority groups through an ALR progressive procurement strategy. This includes a baseline target (8%) for Mana Whenua/Māori employment (workforce) and/or of Māori businesses participation (supplier-use). Several design KPIs have also contractually committed to engaging with Māori business during delivery. [81] Major international rail schemes such as UK's Crossrail has also shown how construction resulted in employment and upskilling of workers locally (65% of people directly employed by Crossrail lived in London)[82].
Jobs during operation	The operation of ALR is expected to support approximately 400 jobs on an ongoing basis.
Tourism	Supported by international evidence, ALR can deliver benefits to the tourism sector through a high-speed single seat connection between the city centre and the airport. Specifically, three studies conducted in Spain, Japan, and Taiwan, all concluded that tourism was positively impacted through light rail investment.[83]
Foreign / inward investment	ALR will unlock foreign and inward investment along the corridor through improvements in accessibility (including improved connections to New Zealand's major international airport), travel capacity, and associated agglomeration benefits. This includes new opportunities for strategic Mana Whenua investment and commercial partnerships. Evidence from international case studies, shows a strong relationship between light rail and inward investment.[84]
Additional capacity / future proofing	The separated nature of ALR means it can provide sufficient capacity to comfortably meet demand with the ability to further increase services over the next generation as growth and demand for public transport increases (see Figure 19 in section 5.1.3.) ALR provides flexibility to connect, integrate and service future routes (e.g., Auckland's North Shore) and support the future delivery of the Auckland Rapid Transit Network.

[81] Refer to the Commercial Case for more details.
[82] https://content.tfl.gov.uk/construction-impacts-report-acc.pdf
[83] The Impact of High Speed Rail on Tourism Development: A Case Study of Japan (2016), High speed rail effects on tourism (2016), The Relationship between High Speed Rail and Tourism (2020)
[84] Leading Light: What Light Rail can do for City Regions (2021)

Resilience	ALR will be separated from other external events such as road accidents and climate events, thereby providing increased resilience against disruption and enabling a faster and more reliable transport system for users. The ALR also provides resilience to the city centre to airport link by providing an alternate route in addition to the one by road.
Wider environmental impacts	ALR is expected to generate and prevent wider environmental impacts on the natural environment, built environment, landscape and visuals, among other elements. A comprehensive identification and assessment of anticipated environmental impacts is presented in the Assessment of Effects on the Environment (AEE) report. The opportunity for Mana Whenua to work in partnership with ALR team in the early design and consenting phase of the Project will help the project to deliver on a range of non-monetised benefits for the environment as a result of the Transport project. Mana Whenua as kaitiaki see the Taiao (environment) as fundamentally important for its life-giving essence and spiritual values[85]. In recognition of their kaitiaki obligation, Mana Whenua have a bottom-line expectation that all cultural, social, environmental, and economic project outcomes should positively contribute to the restoration and enhancement of mauri at the project sites as well as the wider Tāmaki Makaurau region.

6.6 Scenario testing

6.6.1 Key opportunities for ALR to further achieve greater benefits

The 'open city' opportunity for increased growth

As described in section 6.1.1, the core modelling approach to the ALR economic appraisal was based on a 'closed city' method. Future population and employment growth was taken as fixed inputs across Auckland.

As a transformational project, ALR has the potential to influence growth in Auckland and could result in higher population and employment compared to existing forecasts.

ALR presents an opportunity to attract new business and people to Auckland. The gravitational influence of cities is impacted by broader national and global political and economic conditions, as well as the investments cities make to attract people and businesses in a competitive global environment. UK-based research suggests that access to high-quality transport connections is a key driver for business locations.[86]

Pushing the boundaries of green delivery through ALR

As a core objective of the project's Investment Logic Map is supporting Auckland to achieve net-zero by reducing carbon emissions in the near and long term. Through the development and refinement of the ALR scheme, the project has challenged itself to identify key feasible opportunities to reduce the carbon emitted during the delivery of the project as well as ways to magnify the carbon emission savings unlocked by ALR.[87]

While the cost of delivering these opportunities has not been included in the cost estimate for ALR, they would be expected to deliver a net economic benefit to the project. Initial analysis suggests that the cost associated with pursuing these opportunities is lower than the economic benefit that they would deliver (considering the cost of carbon relative to the cost of low carbon materials).[88]

[85] Auckland Light Rail – Mana whenua technical advisors – cultural expectations statement April 2023.
[86] Trading Places ; Reimagining Tāmaki Makaurau Auckland
[87] See Appendix E-I Carbon Methodology and Assessment Report for further details.
[88] See Appendix E-J Carbon Opportunities Report for further details.

Securing and supporting further urban growth

ALR will support significant urban growth through market-led change in response to the delivery of rapid transit, even without further urban investment. However, as noted in chapter 5, there remains considerable additional transport capacity to support further and accelerated growth in the CC2M corridor. The opportunity for additional urban growth is discussed in chapters 8-10.

Following the construction of ALR, for the purposes of the economic appraisal, the cost estimate has assumed that residual or surplus land will be disposed of and sold back to the market.[89] There are opportunities for ALR to realise additional commercial returns, facilitate urban outcomes, and increase the certainty benefits are realised through over-station or integrated station development.[90]

6.6.2 Key uncertainties of the economic appraisal

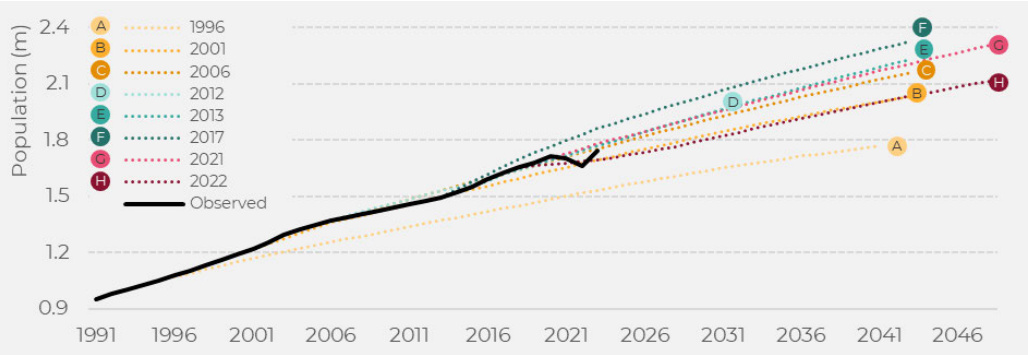
While the economic appraisal of ALR is underpinned by industry-leading (government compliant) methodology and analysis, uncertainty is a fundamental part of any large-scale, multi-decade infrastructure investment. While core macro-economic assumptions underpin all forms of analysis, to understand the resilience of the ALR economic appraisal (including the BCR as shown in section 6.6.3), major sources of potential uncertainty have been identified:

Population and employment growth

As discussed in chapter 3 and section 6.1.1, future population and employment growth at an Auckland Regional level is a fixed external input to the core economic appraisal.

Over recent decades Stats NZ has produced a number of regional population forecast estimates for Auckland (see A-H in Figure 34) which depict a range of estimated levels of growth. Observed growth, as shown in Figure 34, has often been aligned if not above Stats NZ estimates, but the spread of historical estimates of growth in the Auckland Region by the mid 2040s remains somewhat uncertain.

Figure 34: Auckland past and future population growth, Stats NZ Medium Projections 1991-2048



Transport demand modelling

Patronage forecasts are a foundation of the design, operation planning and business case for the Auckland Light Rail (ALR) project. Forecasting is necessary yet inherently uncertain. Statistical analysis has been undertaken[91] that suggests in 2051, there is a:

[89] The station design cost estimate has allowed for OSD (assuming it will be delivered) without yet capturing any of the potential (land) value benefit to the residual sites.
[90] Subsequent cases of the CBC explore the commercial and financial opportunities associated with OSD and ISD in more detail.
[91] See Appendix E- Risk Around Patronage for further details on the analysis undertaken.

- 79% chance that AM peak boardings are higher than the forecast patronage.
- 53% chance that the peak load demand is higher than the forecast patronage.

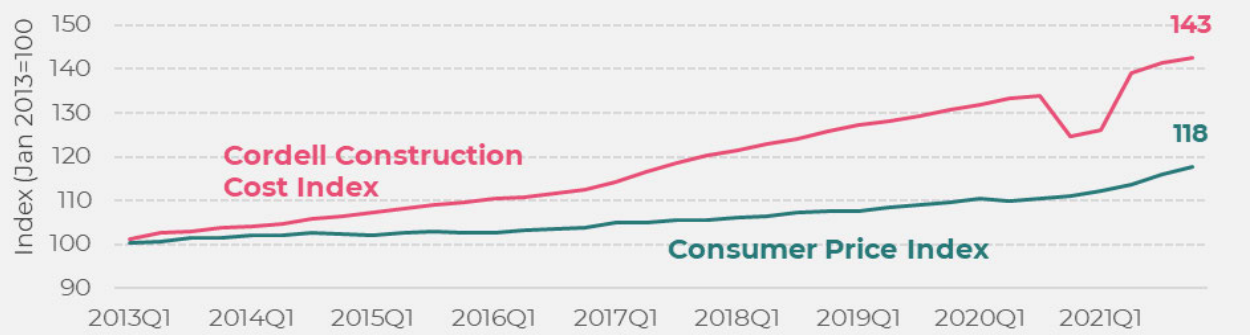
Real-term costs of construction

Global infrastructure projects have faced increasing delivery costs associated with disruptions and challenges during construction in recent history.

As shown in Figure 35, the cost of construction has increased by 43 basis points over the past decade, while background inflation (CPI) has only increased by 18 basis points[92]. This indicates a growth in real terms construction costs over the past decade.

A robust and rigorous approach has been taken to incorporate risk in the cost figures presented. However, a real terms increase in the cost of delivery has the potential to significantly impact the economic assessment[93].

Figure 35: Historical quarterly Construction Cost Index and Consumer Price Index in New Zealand[94]



Land-use change realisation

As was stressed through the ALR IBC (2021) and the subsequent direction for sponsors[95], securing the certainty of the land-use change opportunity of ALR is crucial to successfully delivering the ILM objectives.[96] Significant consideration has been given to ensuring the modelled land-use change is achievable, and further enhancements are presented in the Urban Response options discussed in chapters 8-10. However, land use change remains a critically important element of the project and its realisation will influence the ultimate economic outcome of ALR.

6.6.3 Sensitivity analysis

To understand the impact of uncertainty on the cost-benefit analysis and overall value for money assessment, sensitivity tests have been undertaken in alignment with the key opportunities and uncertainties highlighted in sections 6.6.1 and 6.6.2. Table 22 briefly describes the five key sensitivities tests that were undertaken, with results of the analysis presented in Table 23.[97]

[92] Ministry of Business Innovation & Employment (May 2022).
[93] Consistent with MBCM guidance, no real terms increase in the cost of construction has been considered in the economic appraisal. Further details in Appendix E-C ALR Economic Assessment Methodology.
[94] Ministry of Business Innovation & Employment (May 2022).
[95] Refer to CBC Appendix B-C ALR IMS Letter.
[96] Land use change outcomes within the scheme footprint (OSD and ISD opportunities) have a much higher degree of inherent certainty due to the direct control over the residual land.
[97] The list of key opportunities and uncertainties is not exhaustive and refers specifically to those that have been identified as relevant to the Economic Case. Uncertainties which affect other components of the Business Case have been identified within the specific cases for which they are relevant.

Table 22: Key ALR uncertainties and opportunities, and their associated sensitivity test

Key Uncertainty / Opportunity	Sensitivity test	Description
Population and employment growth	**Delayed benefits ramp-up**	ALR network demand and the associate benefits ramp up over 10-year rather than expected 2-year ramp up reflecting a slower ability to attract growth to the corridor and patronage to ALR.
Real cost of construction increase	**High Cost (P95)**	Assessing the project using the P95 cost estimate (compared to the P50 used in the core assessment). This reflects a significantly higher assumed level of risk and accordingly cost in project delivery, equating to a 14% increase in capital costs).
Land-use change realisation	**Benefit Reduction**	A 20% reduction in benefits across all benefit categories associated with the risk of the expected mode-shift and change in land-use brought on by ALR not materialising.
'Open city' increased growth	**Benefit Increase**	A 5% increase in benefits across all benefit areas due to population and economic growth in Auckland exceeding baseline expectations.
Green-focused delivery	**Increased cost of carbon and low-carbon delivery**	A higher value based on The Treasury's CBAx Guidance is attributed to carbon emissions through the whole-life assessment of ALR (approximately double the core assessment value).[98] Realistic opportunities to deliver lower embodied carbon through delivery are included.

Table 23: ALR sensitivity analysis results

Sensitivity test	User ($PV)	Non-user ($PV)	Land value / Use ($PV)	WEBs ($PV)	Total Costs ($PV)	BCR_n (with WEBs)	Anticipated SIA Impact	Anticipated DIA Impact
Delayed benefits ramp-up	$8.3B	$4.0B	$3.7B	$13.0B	$12.6B	**2.3**	Slight adverse	Slight adverse
High Cost (P95)	$8.6B	$4.2B	$3.7B	$13.3B	$14.3B	**2.1**	Broadly equivalent	Broadly equivalent
Benefit Reduction	$7.6B	$3.3B	$2.9B	$10.7B	$12.6B	**1.9**	Moderate adverse	Moderate adverse
Benefit Increase	$8.8B	$4.4B	$3.8B	$14.0B	$12.6B	**2.5**	Slight beneficial	Slight beneficial
Increased cost of carbon and low-carbon delivery	$8.6B	$4.3B	$3.7B	$13.3B	$12.6B	**2.4**	Broadly equivalent	Broadly equivalent

As is shown in the sensitivity analysis results the economic benefits of ALR are robust to key potential uncertainties and opportunities. The BCR remains healthy under all sensitivity tests and although there are some impacts on the social and distributional impacts of the scheme, these are considered slight to moderate, and opportunities for mitigation could be explored.

[98] Based on the 'High' scenario considered in Table 1, CBAx Tool User Guidance (2022)

6.7 Ensuring appropriateness and value for money of ALR by assessing an Intermediate Comparator

Reflecting Better Business Case guidance, a lower-cost comparator was developed to assess the appropriateness and value for money of the ALR scheme. The shortlisted IBC options were reviewed, including lower and higher capacity systems, to identify an alternative that presented sufficient divergence (in either costs or potential benefits) to be considered a reasonable comparator for the economic appraisal.[99]

Figure 36: Intermediate Comparator route and stations

The IBC shortlisted street-running light rail scheme was identified through the comparative assessment as the most appropriate comparator. The scheme was reviewed and updated to reflect current context and greater understanding since the IBC was completed. Key points of divergence from ALR are:

- Overall lower cost option, with significantly lower upfront capital costs but higher upfront OpEx
- Lower upfront carbon emissions
- Lower speed and capacity
- No major tunnelling requirements
- Significantly reduced operational capacity, lacks ability to service demand and integrate with other proposed RTN projects, and longer journey times.

A comparison of key system specifications is presented in Table 24 below. Further details about the process for developing the Intermediate Comparator is contained in Appendix E-B Transport DBC Optioneering Report. The Intermediate Comparator was developed to a level sufficient for economic appraisal and comparison but was not developed, designed, and costed to the same detail as the preferred ALR option.

Table 24: ALR and Intermediate Comparator key system specifications comparison

Specification	Auckland Light Rail	Intermediate Comparator
Length	24.9km	25.1km
Max Speed	58kph	50kph
End-to-end journey time	36.9 min	55.4min
Average speed	41kph	27kph
Rolling stock	85m light metro vehicles	66m light rail vehicle
Peak hour capacity	9,900 (initial) 19,800 (ultimate)	6,990 (max)
Peak frequency	24 trains/hr (initial) 30 trains/hr (ultimate)	Max 15 trains/hr
Train operations	Fully automated	Driver controlled, signal priority

[99] For more on how the Intermediate Comparator was identified and defined refer to Appendix E-B Optioneering Report.

6.7.1 Performance of the Intermediate Comparator against ILM Objectives

The Intermediate Comparator delivers benefits relative to the Do Minimum against the ILM objectives. However as discussed below, there are key limitations with the Intermediate Comparator in supporting the delivery of each of the ILM Objectives.

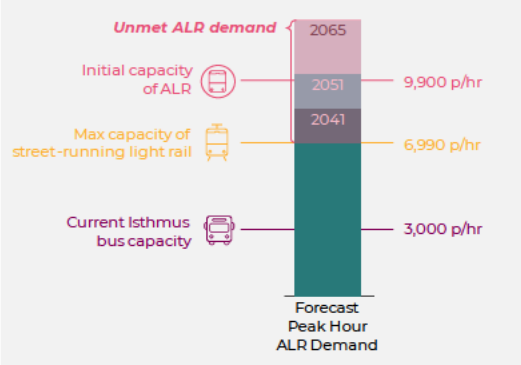
Objective 1: Unlocking significant urban development potential, supporting a compact urban form, and enabling quality Integrated communities	**Limited**

The Intermediate Comparator displays a **lower potential for attracting significant urban development** and **restricts the ability to support further accelerated or increased growth** in the CC2M corridor.

The Intermediate Comparator does unlock significant initial land use change, albeit to a lesser degree than ALR. The Intermediate Comparator leads to approximately 3,000 fewer homes and 2,000 fewer jobs than ALR as a standalone investment by 2051.

The Intermediate Comparator cannot provide capacity to support further growth in the CC2M corridor. As shown in Figure 37, by 2041 peak hour demand for ALR exceeds the available capacity of the Intermediate Comparator. With further growth in the CC2M corridor, the Intermediate Comparator would become increasingly crowded and lead to significant disbenefits for users, limiting economic benefits and the potential for ridership growth.

Figure 37: Peak hour ALR demand and Intermediate Comparator capacity



While the Intermediate Comparator would service the existing population and support modest growth in the CC2M corridor it is not capable of supporting a similar scale of compact urban form as that unlocked by ALR.

Objective 2: A transport intervention that reduces Auckland's carbon footprint	**Limited**

The **lower upfront carbon emissions** associated with the delivery of a street-running light-rail system, are a clear benefit of the Intermediate Comparator. The **Intermediate Comparator can** be carbon neutral over its lifetime, however, the less attractive service, and restricted potential to support compact growth in the CC2M corridor **limit the ultimate carbon saving potential** of the Intermediate Comparator.

The carbon assessment of the Intermediate Comparator shows that beyond achieving carbon neutrality it can deliver between 200 and 300 kilotonnes of net carbon savings over its lifespan (approximately 10% of Auckland's emissions each year).

While the upfront carbon investment to deliver ALR would be over 2.5 times greater than the Intermediate Comparator, the potential savings are also greater. Greater potential savings can be delivered *only if* low-carbon delivery opportunities,[100] and Urban Response interventions to increase growth in the corridor (see chapters 8-10) are pursued. If pursued, ALR could ultimately support Auckland to achieve net whole-of-life carbon savings between 50% and 5 times greater than the Intermediate Comparator.

[100] Refer to Appendix E-I Carbon Methodology and Results for more details.

Objective 3: A rapid transit service that: •Is attractive, reliable, affordable, frequent, safe, and equitable •Is integrated with the current and future public transport network •Improves access to jobs, education, and other opportunities.	**Limited**

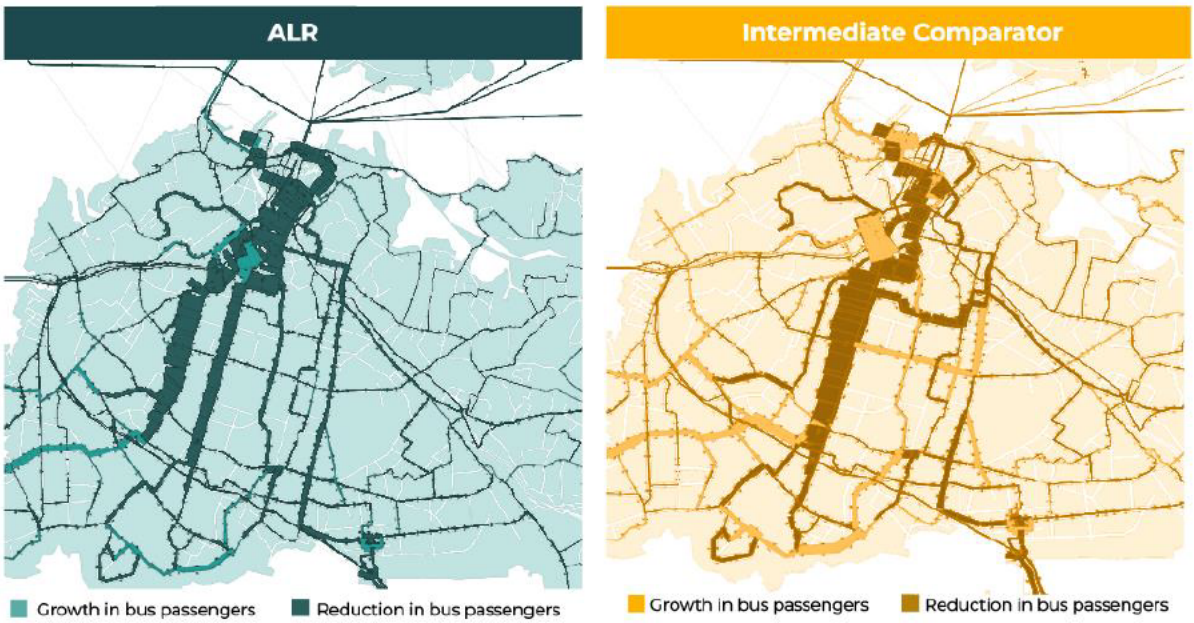
The Intermediate Comparator provides a service that can attract over 19 million trips by 2051. While this represents a significant increase in public transport usage in the CC2M corridor, it represents **only half (52%) of the journeys expected with ALR.**

The Intermediate Comparator provides slower, slightly less reliable, and less frequent public transport service in the CC2M corridor. It does not attract the same level of demand or provide the same level of public transport supply as ALR.

This reduced public transport capacity **limits the ability of the Intermediate Comparator to reduce bus congestion**. As shown in Figure 38, the Intermediate Comparator does not allow for a reduction in bus passengers through the Central Isthmus and City Centre which is a critical pre-requisite for broader RTN network integration.

While the Intermediate Comparator, can integrate with existing bus networks and heavy rail stations (for example, Onehunga), the capacity and maximum frequency of a street running system **preclude the Intermediate Comparator from being able to fully integrate with AWHC or the North West rapid transit project. The Intermediate Comparator** cannot support the level of service required to meet the anticipated RTN demand.

Figure 38: ALR and Intermediate Comparator impact on City Centre and Central Isthmus bus flows



Note: The thickness of the growth/reduction lines denote the relative scale of change on each link in relation to the wider bus network. The figures examine passenger capacity during the AM peak.

6.7.2 Summary of Economic Appraisal of the Intermediate Comparator

The economic appraisal of the Intermediate Comparator shows that it represents good economic value for money as an investment. It presents a lower cost investment relative to ALR, with estimated economic costs ($PV) of $9.0B and an estimated $21.9B in economic benefits. The Intermediate Comparator presents an option that represents **approximately 70% of both the costs and benefits expected of ALR** (before consideration of supporting Urban investment).

With a **benefit-cost ratio of 2.4** the monetised impacts appraisal of the Intermediate Comparator produces a comparable result to the ALR scheme as a standalone investment. The economic benefits of the Intermediate Comparator are divided across the four monetised impacts categories as follows:

- User benefits $5.9B
- Non-user benefits $2.4B
- Land use benefits $3.2B
- Wider economic benefits $10.4B

The distribution of benefits across categories in the Intermediate Comparator appraisal is comparable to ALR.

Table 25: Summary of Intermediate Comparator performance

	Intermediate Comparator
Jobs (2051)	84,000
Homes (2051)	48,000
Annual Journeys (2051)	19m
Whole-of-life potential carbon emitted[101] (t CO_2e)	-200k to -300k
Connection with future Rapid Transit Network	Full integration not possible
Support ILM Objective 1: Urban Growth & Density	Limited
Support ILM Objective 2: Supporting Sustainability	Limited
Support ILM Objective 3: Improving Accessibility & Public Transport Capacity	Limited
Social Impact	Moderately Positive
Total Economic Costs:	$9.0B
Total Economic Benefits: (Without WEBs)	$11.5B
Total Economic Benefits:	$21.9B
BCR_N	**2.4**
BCR_N range under Sensitivity Analysis	**1.5 – 2.5**
Net Present Value	**$12.8B**
Economic payback year	**2047**

Table 26 below, provides a summary of the relative performance of the Intermediate Comparator to ALR across the Social, Distributional and Non-monetised Impacts elements of the economic appraisal.

Table 26: Relative performance of the Intermediate Comparator in social, distributional, and non-monetised impacts

	Intermediate Comparator
Social impacts	This option performs similarly to ALR across all impact categories except for accessibility. Accessibility benefits are expected to be slightly lower as the Intermediate Comparator is anticipated to generate a smaller net improvement in job accessibility and overall station access.
Distributional impacts	This option performs slightly worse than ALR in terms of user benefits, air quality, accessibility, and affordability. The distributional impact of noise, safety, severance, and security benefits are expected to be similar.
Non-monetised impacts	The non-monetised impact of this option remains broadly the same as that of ALR across most categories except disruption from construction and additional capacity/future proofing. The Intermediate Comparator will involve substantial disruption during construction. It also does not have the sufficient capacity to fully meet projected passenger demand for future CC2M and potential RTN demand.

[101] If the reasonable low carbon opportunities identified are pursued.

Value for money summary of the Intermediate Comparator

The Intermediate Comparator presents a robust comparator that has the potential to deliver significant economic benefit to Auckland. The intermediate comparator will deliver over $2.40 of economic benefit for each dollar invested, however, there remain significant limitations in the ability for the Intermediate Comparator to deliver key aspects of the ILM Objectives. The scheme is not capable of unlocking the same scale of transformational and multi-generational urban and transport outcomes that can be supported by ALR.

On balance, the findings of this assessment demonstrate that a robust comparator option for investment continues to exist, which represents good value for money, but the findings of the IBC and subsequent sponsor direction remain valid. While a street-running light rail scheme is an economically viable investment, it does not provide a comparable ability to deliver against the defined investment objectives for ALR.

Urban Response Considerations for the Intermediate Comparator

Chapter 8-10 of the Economic Case consider potential for integrated urban investment to accelerate growth in the CC2M corridor and enhance the benefits of ALR. As noted in section 6.7.1, one of the key limitations of the Intermediate Comparator is its ability to support additional growth in the corridor due to the restricted capacity of a street-running light rail system.

As Figure 37 showed, with existing growth as well as initial land use change unlocked by the Intermediate Comparator the scheme would be operating near to or above capacity by 2041. As such, there is minimal opportunity to support accelerated or additional growth in the CC2M corridor through integrated urban investment alongside the Intermediate Comparator. It is likely that accelerated or increased growth in the CC2M corridor alongside the Intermediate Comparator would be increasingly difficult to attract and, if delivered, could lead to significant disbenefits through crowding and congestion within the CC2M corridor.

As a result, no Urban Response options to further accelerate or increase growth in the CC2M corridor have been considered for the Intermediate Comparator.

7. Value for money conclusion of ALR as a standalone transport proposal

As a standalone transport investment Auckland Light Rail directly supports the objectives of the Investment Logic Map[102] and represents a value for money investment that can deliver $30bn in economic benefits over the appraisal period.

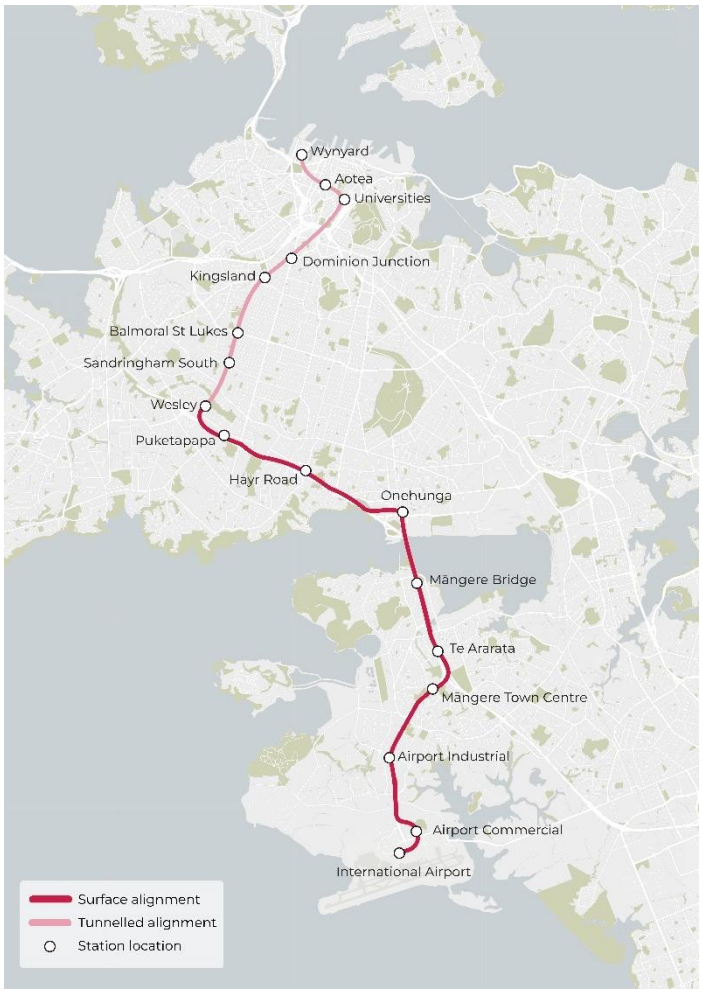
The economic case for transport investment in ALR presents a compelling case for investment ***delivering 2.4 dollars of economic, social, and environmental benefits for every dollar invested***.

ALR unlocks generationally significant positive benefits for Tāmaki Makaurau Auckland, and Aotearoa New Zealand that as an investment represents good value for the Crown, Mana Whenua, Auckland Council, and New Zealanders.

Through the development of this Corridor Business Case, the Auckland Light Rail scheme has been refined and optimised to maximise the potential benefits across the urban, transport, and sustainability objectives while ensuring its ability to integrate and support a future Rapid Transit Network (RTN) across Auckland.

While there is opportunity to further enhance the outcomes of ALR through supporting integrated investment in enabling urban growth (refer to chapters 8-10), the Detailed Business Case assessment of ALR, which aligns to Waka Kotahi guidance, demonstrates a robust economic case for investment.

Figure 39: Auckland Light Rail route and stations



[102] See Strategic Case.

8. Options for supporting integrated investment to enable urban change

8.1 Point of entry

As discussed in chapter 2, direction from sponsors following the ALR IBC (2021) requested for the next stage of the business case to investigate how transport improvements can be integrated with urban regeneration to create conditions that could full release the urban development potential (i.e. wider urban benefits) of transport investment.

While chapters 5-7 demonstrate that the transport investment in ALR alone will trigger a significant degree of market-led urban growth in the CC2M corridor, the full scope of the CBC includes consideration of supporting targeted investments that can lead to improved urban outcomes. This is referred to as the supporting 'Urban Response' of the project.

8.1.1 Approach and context

Taking the ALR transport investment as a starting point, further 'Urban Response' options have been developed through an optioneering process involving an initial longlist which has been considered against the ILM. This resulted in two emerging shortlisted Urban Response options identified and developed for appraisal in the Economic Case.

The development of Urban Response options has been guided by the Corridor Strategic Framework (CSF) which sets out the future vision and aspiration for the transformation of the ALR Corridor, considering; environmental sustainability, community development, economic development, built form, public realm, local urban mobility, and urban infrastructure.

8.1.2 Methodology overview

The Urban Response optioneering methodology can be summarised in the following three steps:[103]

Step 1: Generating the Urban Options

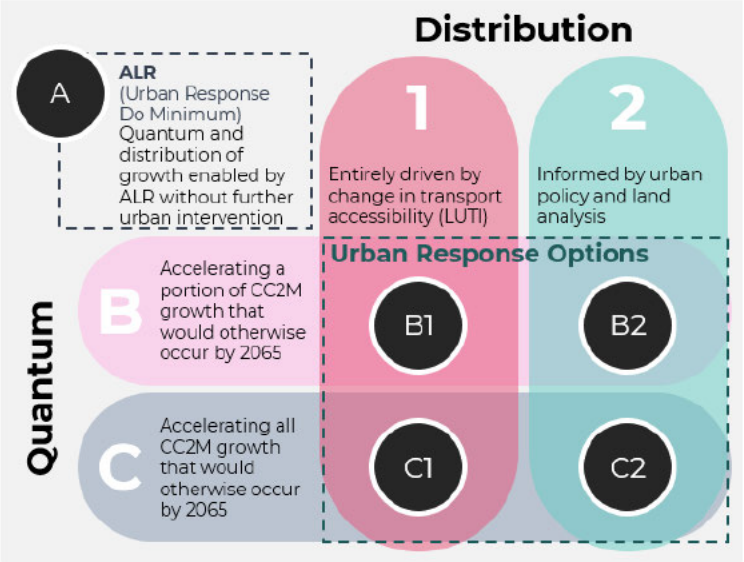
- An assessment to understand the opportunities, constraints, role, and function of areas within the ALR corridor.
- Development of options for the quantum and distribution of population and employment growth that could be delivered in the CC2M corridor. Initially drawn from LUTI modelling[104]. This was further expanded based on opportunities identified in strategic growth policies and informed understanding of the urban conditions of the corridor from the ALR CSF and commercial land analysis.
- Stretching above the population and employment growth triggered by the ALR transport investment (A)[105], four urban response options were identified for

[103] For a full description, please refer to Appendix E-B Optioneering Report.
[104] Refer to Appendix E-F Land Use and Transport Interaction Modelling.
[105] For the purposes of the Urban Response Optioneering this was treated as the 'Do Minimum' option.

consideration (B1 and B2, C1 and C2). These span two quanta of growth and two approaches to their distribution (See Figure 40).

- Distribution 1 focuses on growth which would incur as a result from ALR (as modelled by LUTI). This follows a traditional method of analysing the additional population, household and employment growth that could be realised solely by investing in rapid transit. This method does not reflect all planned investment in urban development projects in the city.

Figure 40: Quantum and distribution of ALR + Urban Response options



- Distribution 2 was developed to take account of known opportunities identified in strategic growth plans, including the Auckland Plan 2050 Future Development Strategy, as well as areas where the project has high urban development ambitions along the corridor. This means Distribution 2 supports the implementation of key urban policy and provides greater opportunity to achieve urban outcomes.

Step 2: Urban Response Options Catchment Analysis

To assess the capacity and investment requirements of each catchment, a set of metrics were developed covering a series of categories of urban enabling infrastructure as well as other specific urban interventions that can facilitate or attract additional growth—shown in Table 27.

Table 27: Urban Response capacity and investment requirement categories

Urban enabling Infrastructure	**Blue**	Three waters (Potable, Storm, Waste)
	Green	Public realm, open space, environment
	Grey	Transport
	Black	Energy utilities
	Pink	School places and community infrastructure
Urban Intervention Themes	**Planning & Policy**	Strategy, policy, and development control
	Physical	Catalysing development, improving the physical environment
	Co-ordination	Powers and mechanisms
	Financial	De-risking and direct funding

With the four Urban Response options defined, and capacity and investment categories established each of the station areas identified in the catchment phase was reviewed to confirm their role and function under each Urban Response Option. This analysis, which also considered the requirements under the Urban Response 'Do Minimum' (ALR as a standalone investment) also identified material opportunities or constraints, in the context of the wider corridor.

Metrics were developed for each of the infrastructure categories to determine the total development that could be supported with this existing level of urban enabling infrastructure in a catchment. This helped identify any capacity shortfall and what level of investment would be required for each option.

Step 3: Assessment of Urban Response Options and forming the shortlist.

Based on the options as defined in Step 1 as well as the catchment analysis (Step 2) and assessment of the Urban Response options was undertaken to identify an appropriate shortlist for inclusion in the economic appraisal.[106] Table 28 summarises the Urban Response options and their associated urban enabling infrastructure costs. Two Urban Response options were shortlisted and taken forward for economic appraisal: B2 and C2, henceforth referred to as the ALR + Incremental Investment option and the ALR + Active Investment option. It is important to note that B1 and C1 options have not been strictly discounted, rather the ALR + Incremental Investment and ALR + Active Investment options have been selected to achieve broader outcomes cross the corridor, so employment opportunities are spatially distributed throughout.

Table 28: Summary of Urban Response options and longlist assessment ($PV)

Growth Option	CC2M population growth	CC2M employment growth	Total urban enabling infrastructure cost ($M)	Cost per additional person	Summary	Outcome
Without ALR *'Do Minimum'*	84k	70k	$1,166	$13,932	Investment would be required, whether ALR is delivered or not	N/A for Urban Response appraisal
ALR standalone *Urban Response 'Do Minimum'*	119k	85k	$1,740	$14,582	Highlights that CC2M growth driven by ALR alone would lead to greater urban investment in the corridor	Taken forward as the 'Urban Response' Do Minimum
B1	146k	97k	$1,931	$13,272	The two options at this growth quantum have similar costs per additional person, however the B2 distribution better reflects the urban potential established in the CSF	Not taken forward
B2	146k	97k	$1,960	$13,469		Shortlisted as **ALR + Incremental Investment**
C1	193k	122k	$2,171	$11,278	Assessing the two options at this growth quantum show the urban informed distribution (C2) has potential cost-efficiencies per capita as well as better supporting urban potential	Not taken forward
C2	193k	122k	$2,216	$11,510		Shortlisted as **ALR + Active Investment**

[106] See Appendix E-B Optioneering Report for more detail.

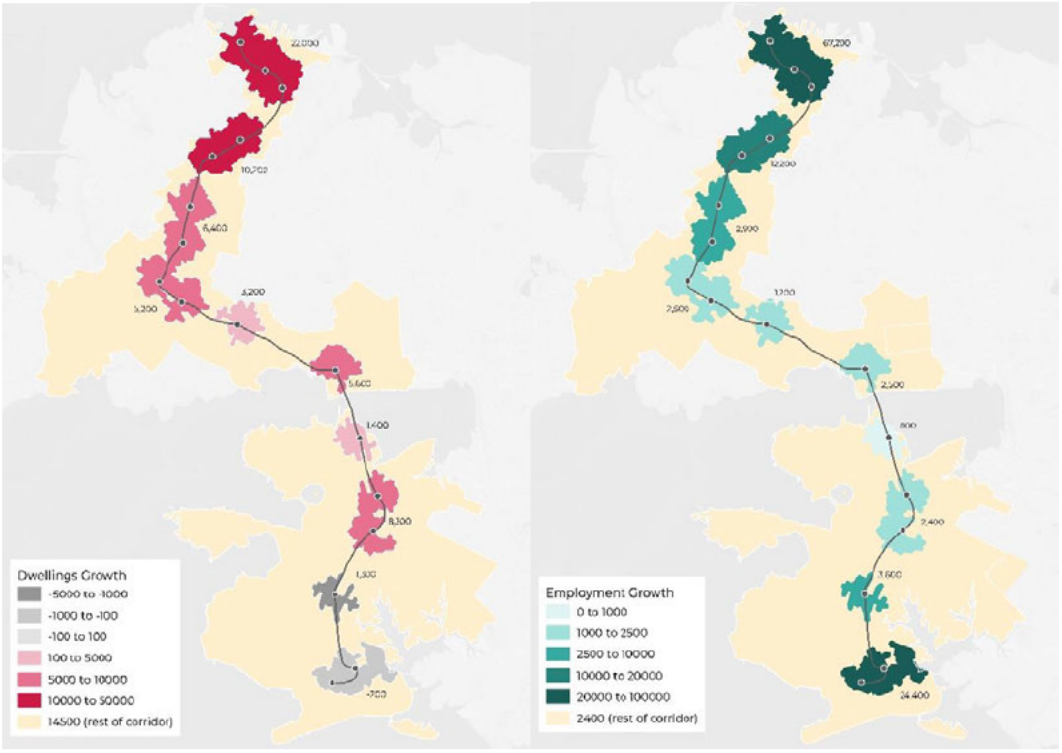
8.2 Urban Response shortlist options

The two shortlisted options carried forward for economic appraisal—ALR Incremental Investment and ALR + Active Investment —are shown in Table 29 alongside ALR as a transport investment on its own (Urban Response 'Do Minimum'). The ALR + Active Investment Growth option is also presented spatially in maps below.

Table 29: Expected growth from 2021 through 2051 under different Urban Response options[107]

Station Catchment	**ALR** Urban Response 'Do Minimum'		**ALR + Incremental Investment**		**ALR + Active Investment**	
	Jobs	Homes	Jobs	Homes	Jobs	Homes
Wynyard, Te Waihorotiu and Universities	53,400	16,200	53,500	17,400	67,200	22,000
Dominion Junction and Kingsland	5,300	5,900	9,700	7,600	12,200	10,200
Balmoral and Sandringham	-300	3,400	2,300	4,800	2,900	6,400
Wesley and Puketāpapa	700	3,100	2,000	3,500	2,500	5,200
Hayr Road	900	2,600	1,000	2,700	1,200	3,200
Onehunga	400	4,800	2,000	4,700	2,500	5,600
Māngere Bridge	400	1,500	600	1,300	800	1,400
Te Ararata and Māngere TC	-100	3,600	1,900	6,400	2,400	8,300
Airport Industrial	3,500	-1,800	2,900	-1,400	3,600	-1,300
Airport Stations	18,800	-300	19,500	-300	24,400	-200
Elsewhere in CC2M corridor[1]	2,300	11,300	1,900	12,400	2,400	14,500
CC2M corridor total	**85,300**	**50,300**	**97,300**	**58,900**	**122,100**	**75,300**
Rest of Auckland	*169,700*	*230,800*	*157,700*	*222,200*	*132,900*	*204,600*
Auckland total	**255,000**	**281,100**	**255,000**	**281,100**	**255,000**	**279,900**

Figure 41: ALR + Active Investment expected dwellings and employment growth (2021 through 2051)



[107] Aligned with the 'closed city' approach Auckland total population and employment numbers remain consistent across all growth options. There are small variations in the total household figures across growth options driven by variations in the household occupancy rate of different catchments driven by the expected resulting urban form.

8.2.1 Further development of the shortlisted options

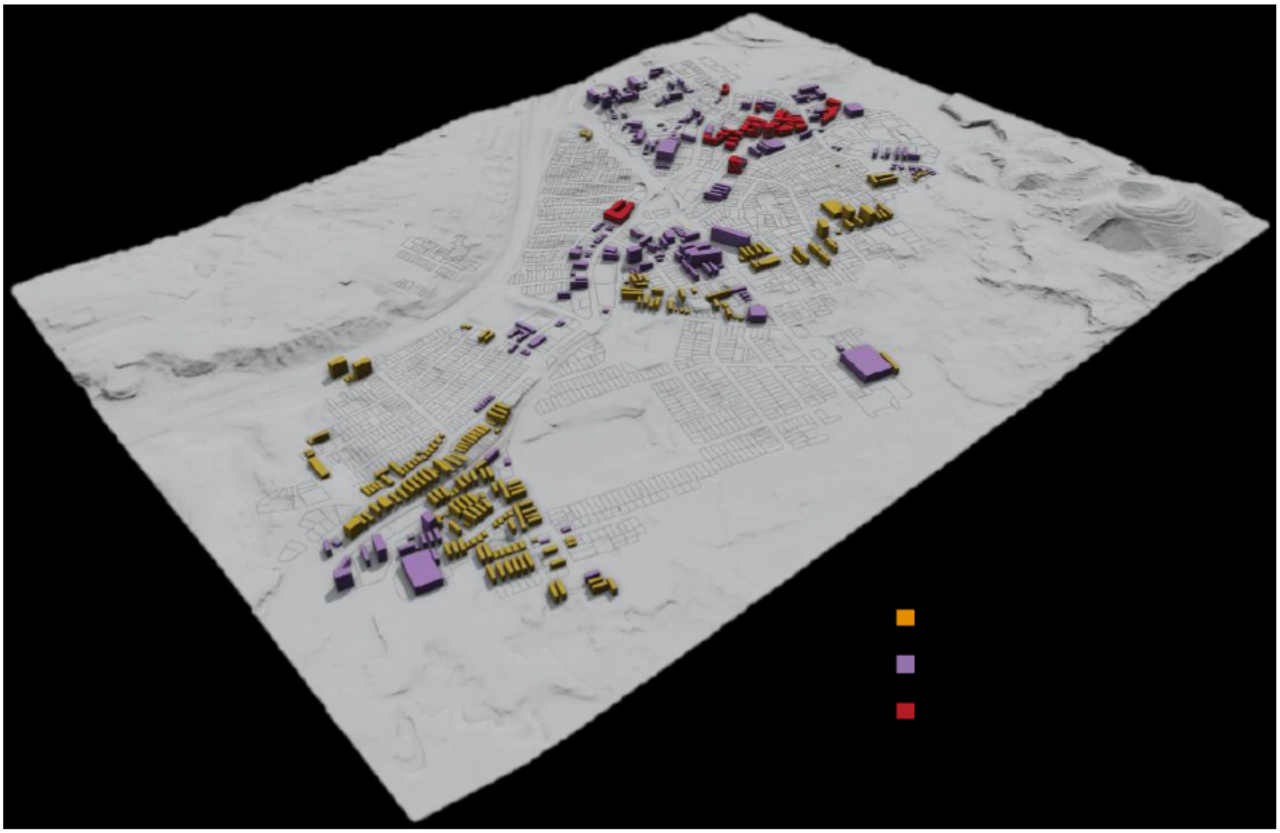
Once shortlisted further refinement took place on the two options to provide greater definition and cost analysis to inform the economic appraisal. Refinement included consideration, among other things, of:

- School places & community Infrastructure
- Growth quanta in the context of other transport projects
- Local transport infrastructure
- Engagement with the Development Project Office (DPO) to test urban enabling infrastructure assumptions

Testing of potential massing configurations and urban form within key growth catchments has also been completed to validate both the Urban Response 'Do Minimum' and the ALR + Active Investment option. This analysis informed the levels of direct intervention required and helped define the Gross Floor Areas (GFA) required for the number of homes and jobs expected within each catchment.

An example of the outputs from the testing of potential massing and capacity are visualised in Figure 42 below which represents the potential level of growth that could be achieved around two station catchments under the ALR + Active Investment option (Dominion Junction & Kingsland).

Figure 42: Indicative visualisation of capacity for growth in ALR + Active Investment option (Dominion Junction & Kingsland)



8.3 Urban interventions to support shortlist options

To support the CBC, urban interventions were considered at a high level, to understand what may be required to deliver the Urban Response options and the potential associated scale of investment.

ALR recognise the importance as an active partner with Mana Whenua to apply treaty principles and expectations. Any interventions should be developed in partnership with Mana Whenua and include opportunities for Mana Whenua investment and equitable participation by Māori communities.

There were two rationales considered for urban intervention:

1. To create conditions under which the quantum or distribution of development in each of the urban growth options could be delivered, by 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.

A longlist of 40 possible interventions which could be used to achieve urban outcomes alongside the transport investment were developed and grouped into four themes:

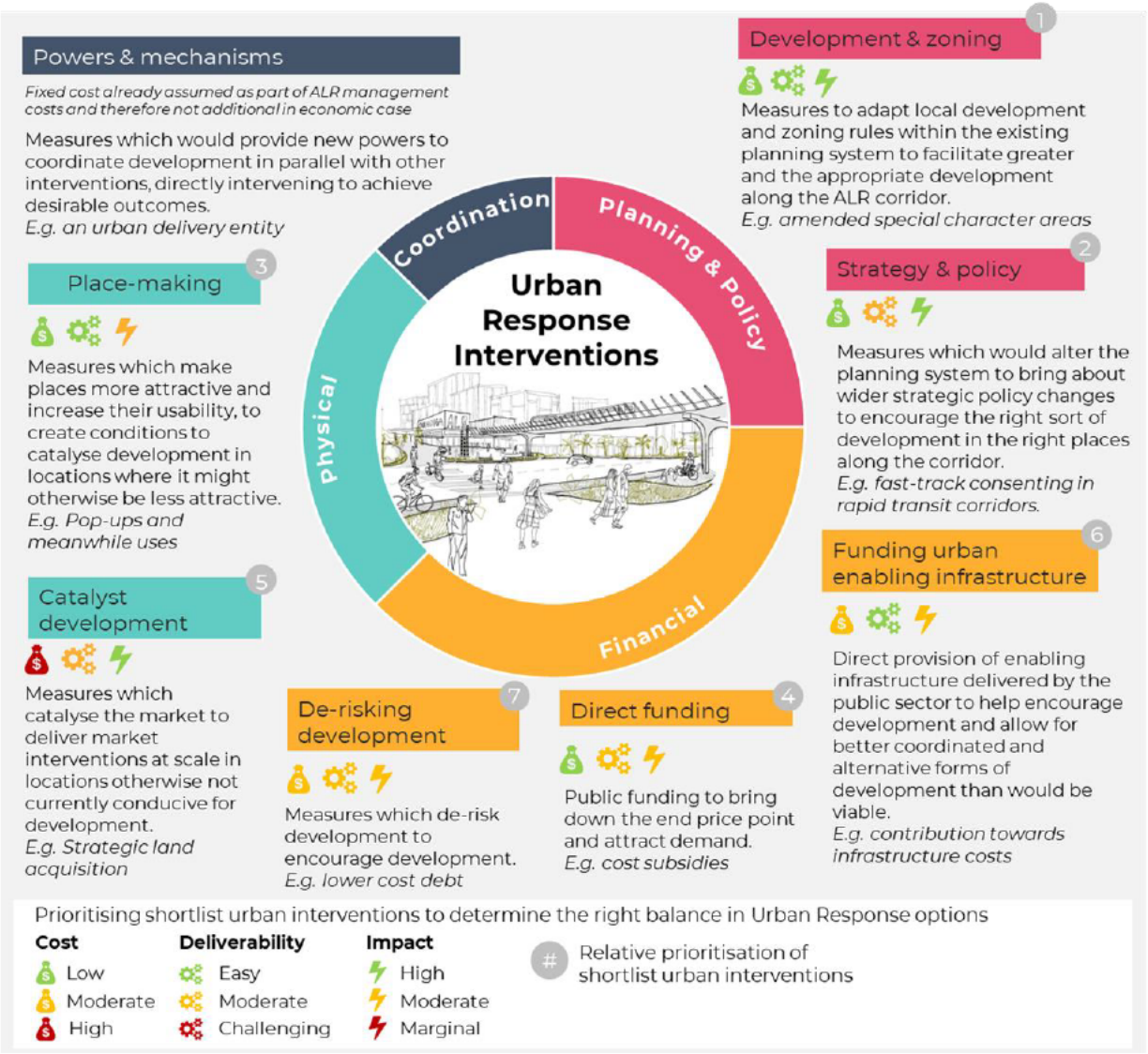
- **Physical –** interventions that involve works or on-the-ground actions by ALRL or other partner entities.
- **Financial –** interventions that reduce the cost and risk of development and make it more attractive to developers and/or occupiers.
- **Planning and Policy –** interventions that remove, 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.

The identified interventions were assessed based on the degree to which they aligned to the two rationales for intervention. Following the assessment, a total of eight interventions were shortlisted and subsequently prioritised to ensure that the Urban Response options were delivered in a way that:

- maximised the quality urban outcomes the project is seeking.
- appropriately balanced cost, deliverability, and overall impact.

A summary of the definitions and prioritisation of the eight shortlisted urban interventions identified to support the Urban Response options is shown in Figure 43.

Figure 43: Definition and prioritisation of interventions to support Urban Response options[108]



The prioritisation of the shortlisted urban interventions informed the appropriate 'amount' of each intervention to support the desired Urban Response outcome. The resulting costed amount of each intervention for the two Urban Response options is summarised in Table 30 below. These figures, alongside the growth quanta and distributions discussed in section 8.2, formed the complete Urban Response options which fed into the economic appraisal of ALR + Urban Response.

Table 30: Direct costs of urban interventions for ALR + Urban Response Options ($PV)

Urban interventions	*Theme*	ALR + Incremental Investment	ALR + Active Investment
Development & zoning	*Planning & Policy*	$6m	$8m
Strategy & Policy	*Planning & Policy*		
Place-making	*Physical*	$3m	$19m
Direct funding	*Financial*	$34m	$309m
Catalyst development	*Physical*	$133m	$287m
Enabling infrastructure	*Financial*	$140m	$214m
De-risking development	*Financial*	$114m	$361m
Total		**$431m**	**$1,199m**

[108] See Appendix E-B Optioneering Report for details on how interventions were prioritised and the level of intervention.

9. Enhancing ALR's delivery of the ILM Objectives through the Urban Response

As set out in chapter 2, the purpose of the Economic Case within the Corridor Business Case is to consider not only the ability for ALR as a single transport intervention to deliver on the objectives of the ILM (shown in chapter 5), but also how integrated investment in delivering urban outcomes could further the project's ability to deliver the ILM Objectives. The two shortlisted Urban Response options discussed in chapter 8, directly accelerate, and magnify the opportunity for ALR to deliver transformative impacts across the ILM Objectives and their KPIs.

Table 31: Summary of impacts of ALR + Urban Response Options on the ILM objectives by 2051

	KPI	Measure		ALR *Urban Response 'Do Minimum'*	ALR + Incremental Investment	ALR + Active Investment
Objective 1: Urban	KPI 1.1: Increased residential & employment density	Population density (CC2M) *people/ha (change from 2021)*		40 (+60%)	43 (+71%)	48 (+93%)
		Employment density (CC2M) *jobs/ha (change from 2021)*		29 (+49%)	31 (+55%)	34 (+69%)
	KPI 1.2: Increased housing and employment growth	Household growth (CC2M)		50,000	59,000	75,000
		Jobs growth (CC2M)		85,000	97,000	122,000
		Public transport capacity to accommodate growth		Significant long-term capacity for growth		
	KPI 1.3: Improved quality of life	Improved social connectedness		Anticipated to deliver moderate benefits.		
Objective 2: Sustainability	KPI 2.1: Reduced carbon emissions	Range[109] of likely whole of life (net) carbon emissions CO_2e		+700kt to -400kt	+200kt to -900kt	-500kt to -1,600kt
	KPI 2.2: Improved health outcomes	Average annual road incidents (crashes) reduced		75	73	95
		Annual active travel growth kilometres in 2051 (Auckland)[110]		15m (+6%)	17m (+6%)	20m (+8%)
Objective 3: Transport	KPI 3.1: Improved access to employment, education & health services across Tāmaki Makaurau Auckland	Jobs within 45 mins by PT from[111]	Mt. Roskill:	440k (+35%)	450k (+40%)	470k (+45%)
			Onehunga:	450k (+150%)	460k (155%)	480k (+165%)
			Māngere:	430k (+305%)	440k (+315%)	460k (+330%)
		Homes within 45 mins by PT to	City centre	400k (+7%)	400k (+8%)	410 (+10%)
			Airport	220k (+880%)	230k (900%)	230K (+900%)
	KPI 3.2: Increased public transport capacity	PT capacity (CC2M)		Up to 19,800 passengers per hour		
		Annual ALR trips in 2051		40m	44m	49m
		Daily vehicle person trips reduced in 2051 (Auckland)		93k	107k	160k
	KPI 3.3: Reduced travel times	Key Public Transport Travel Times and Savings[112] (Peak)	Mt. Roskill to University	10 minutes (29 to 30-minute saving)		
			Māngere to Te Waihorotiu	27 minutes (33 to 54-minute saving)		
			Airport to Wynyard	39 minutes (37 to 69-minute saving)		

[109] Range spans baseline scenario to carbon opportunities scenario. See Appendix E-I and Appendix E-J for more details.
[110] Overall growth and percentage growth is calculated relative to project Do Minimum in year 2051.
[111] % equals change relative to Do Minimum option in 2051.
[112] Relative to current (peak) public transport travel times.

The starkest difference in achieving the ILM objectives will be ensuring that the typology of homes and jobs that are provided are tailored to the local need, addressing issues such as affordability and encouraging sector growth and agglomeration in targeted areas that align with broader policy.

Secondly, through urban intervention there will be more certainty that urban intensification will occur, de-risking development for developers, leading to less sprawl and significantly less carbon emissions, meeting New Zealand's current net-zero targets.

Finally, through coordination, a more holistic and strategic approach can be taken to integrate other transport interventions. This will increase capacity across the network, allowing more equitable access to public transport and active travel, further reducing congestion, reducing travel times for more Aucklanders, and connecting more people with jobs and services.

9.1.1 Maximising the opportunity to accelerate and enable density and growth in the CC2M corridor while improving the affordability of public services

KPI 1.1	**Increased residential & employment density**
KPI 1.2	**Increased housing and employment growth**
KPI 1.3	**Improved quality of life**

Accelerating quality jobs and homes that meet the local and regional need.

With coordinated investment and planning of urban outcomes alongside the delivery of ALR the amount of growth unlocked could significantly increase in quantity and accelerate in timing.

Figure 44: Total new homes supported by ALR + Active Investment 2021-2051

Up to
75,000
homes supported with coordinated investment in ALR and urban change

Directly unlocked homes due to the joint investment in ALR and accelerated urban growth will more than triple (relative to ALR as an investment on its own) to 36,800 by 2051 under the Active Investment option. This amounts to a total growth (including background growth) of 75,300 homes in the CC2M corridor between 2021 and 2051—**27% of the expected total residential growth in Auckland.**

Figure 45: Total new jobs supported by ALR + Active Investment 2021-2051

Up to
122,000
jobs supported with coordinated investment in ALR and urban change

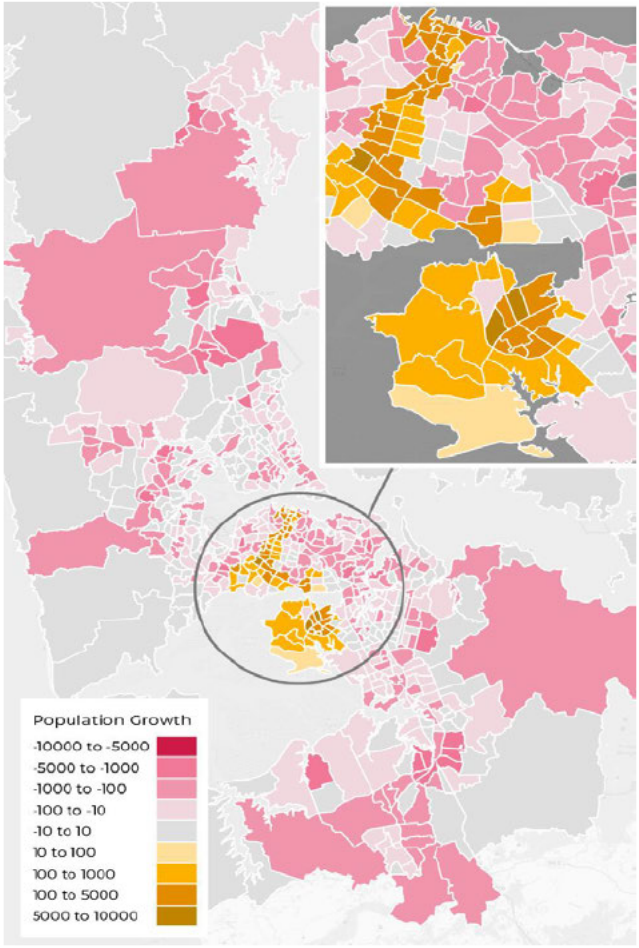
Similarly, coordinated investment in urban infrastructure alongside the delivery of ALR, under the Active Investment option, can **directly triple unlocked jobs in the CC2M corridor** growing to 52,000 jobs. Together with background growth the total of 122,100 jobs supported by ALR in the CC2M corridor represents 48% of total job growth in Auckland between 2021 and 2051.

Under the ALR + Active Investment option with coordinated transport and urban intervention, delivery of the growth in homes and jobs in the CC2M could be accelerated 14 years from, achieving levels of growth in 2051 that without supporting urban investment would not be achieved in the CC2M corridor until 2065.

A step-change in reducing sprawl, accelerating Auckland's transition to quality compact urban growth.

As shown in Figure 46: Population growth distribution change between Do Minimum and ALR + Active Investment 2021-2051, the impact of supporting and enabling up to the levels of population and job growth under the ALR + Active Investment option in the CC2M corridor is transformational across the Auckland Region. Increasing density in the CC2M corridor to 43 people per hectare, 71% above the average current density in the urbanised area of Auckland.[113]

Figure 46: Population growth distribution change between Do Minimum and ALR + Active Investment 2021-2051



This effect, combined with a similar transformational impact on supporting densification of employment growth not only supports a more accessible, sustainable, and more productive Auckland, but it also directly aligns with the policy ambition set out in the Auckland Plan 2050 and its Future Development Strategy.

Through leveraging broader quality and design excellence outcomes in the sale of residual land opportunities (over-station or integrated station development sites), ALR can directly impact the urban experience in the immediate station surrounds and facilitate economic and employment outcomes. Put simply, ALR can facilitate broader urban and economic outcomes by engaging with the market and leveraging the sale of residual assets to secure or accelerate development expectations.

Public infrastructure savings

Analysis and research demonstrate that compact urban growth leads to public savings on the delivery and maintenance of infrastructure as cost efficiency can be achieved through making efficient use of existing capacity, leveraging existing networks, and capitalising on existing investment in spatial priority areas.[114]

Figure 47: Public infrastructure savings ALR + Active Investment ($2022)

[113] Auckland Council, Measuring Auckland's Population Density.
[114] The Fiscal Footprint of Growth: Accounting for the infrastructure costs of suburban development (Arup), Cost of Growth, Background Paper (ALR, 2021).

The impact of supporting sustainable compact growth, particularly to the scale considered under the ALR + Active Investment option creates substantial opportunities to improve the efficiency (and therefore reduce costs) of public infrastructure and services, estimated to reach a $1.1B saving in the ALR + Active Investment option.[115]

Quality communities and design excellence

The coordinated and fully integrated urban and transport investment approach under the ALR + Incremental Investment and ALR + Active Investment options allows for a significantly greater ability to ensure delivery of quality, integrated communities along the CC2M corridor.

Through integrating urban planning and development with the delivery of the transport and enabling infrastructure, through policy and active coordination of the public sector, will provide greater certainty around the delivery of jobs and homes. Importantly, it will also improve the ability to ensure this growth truly responds to localised and city-wide social and economic needs, aligning to objectives set out in the Auckland Plan 2050.

For example, agglomeration could be better facilitated to create sectoral employment clusters that align to Auckland's broader economic objectives, including, policies to protect strategic industrial uses or to encourage and support the growth of 'knowledge sectors' through innovation programmes and affordable workspace policies.

Coordination, as well as enabling infrastructure, will also ensure ILM KPI1.3, improved quality of life, is achieved through a strategic view of urban development across the corridor which will allow for the conditions for better quality, integrated communities to be delivered. Furthermore, by undertaking initial investment in infrastructure, it has the potential to de-risk development, demonstrating public sector commitment to bringing forward urban development and is likely to attract best-in-class developers.

9.1.2 Delivering on Auckland's net zero 2050 commitment and supporting vision zero

KPI 2.1	**Reduced carbon emissions**
KPI 2.2	**Improved health outcomes**

Figure 48: Gross enabled carbon savings over the appraisal period

Enabling savings between **2.6** and **3.3** **megatonnes of carbon** over 60 years

Maximised carbon savings

Under both Urban Response options ALR can achieve net-zero as a project by 2050. Beyond achieving this target, crucially both Urban Response options present the opportunity to support significant net carbon savings over a whole of life assessment.

The ALR + Active Investment option will enable up to 3.3 megatonnes of carbon savings through reduced private vehicle use, reductions in urban enabling infrastructure and changes in lifestyle associated with more compact urban

[115] Value in $2022 undiscounted.

form (e.g., lower car ownership rates).[116] Equating to up to approximately 125% of Auckland's current total household carbon emissions each year.

After taking into consideration the initial carbon investment required to deliver ALR, the project can unlock **up to 1.6 megatonnes of net carbon savings** if low-carbon opportunities are pursued under the ALR + Active Investment Option. These net carbon savings equate to approximately 70% of Auckland's current total household carbon emissions each year.[117]

Figure 49: Whole of life carbon of ALR + Urban Response options

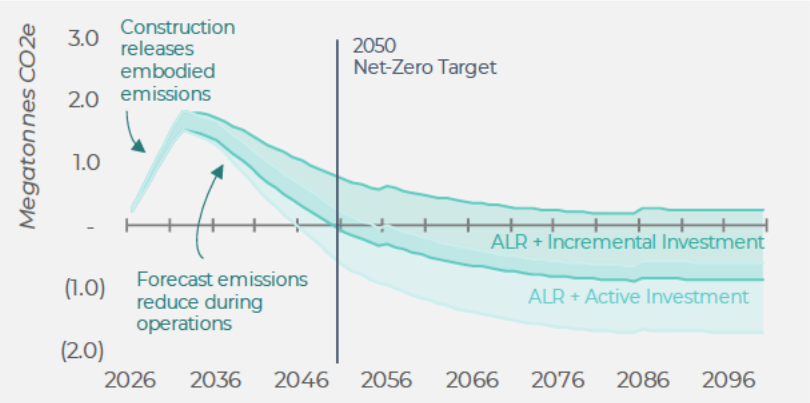


Figure 49 shows the whole of life carbon profile of the ALR + Incremental Investment and ALR + Active Investment options, demonstrating their ability to support carbon savings by 2050 and beyond.[118]

Creating safer streets in support of Auckland's Vision Zero.

The land-use change and increased density delivered through the Urban Response options can significantly support Auckland's Vision Zero ambitions. It is estimated that the reduction of crashes, up to 95 on average per year under the ALR + Active Investment option, can not only create safer communities but also save $0.9B in present economic value that would otherwise be lost due to lost productivity and the cost of first responders and other support services.

Protecting natural capital and increasing Auckland's climate resilience.

As well as exceeding current carbon emission targets, intervening to ultimately create a denser urban form and prevent greenfield development will support healthier neighbourhoods and improve health outcomes across the population. There is much evidence from research around the world demonstrating that urban density delivers health outcomes for citizens, as if designed and delivered well, they can encourage greener neighbourhoods, with improved air quality, energy reduction and more opportunities for active travel.

Figure 50: Change in incidents over appraisal period under ALR + Urban Response options

Delivering urban interventions and building on the opportunity of further growth will prevent further sprawl. It embeds and secures the principle of Kaitiakitanga by protecting Auckland's unique

[116] See Appendix E-I Carbon Methodology and Assessment Report.
[117] StatsNZ: GHG Emissions by Region (Industry and Household) 2022
[118] Monetised impacts have been calculated conservatively based on the baseline carbon assessment which is represented by the upper-bound line in Figure 49, the lower bound estimate is based on reasonable market available opportunities to reduce the carbon investment and improve the carbon emissions reduction potential of the scheme.

natural environment, ecology and biodiversity that is critical to the city's identity, wellbeing, and cultural heritage.

Finally, as the impacts of climate change have been increasingly felt within Auckland, facilitating the delivery of more compact urban growth will naturally increase Auckland's infrastructure resilience. It will ensure the city and the neighbourhoods within it are able to adapt and recover more efficiently and effectively to climate shocks and stresses.

9.1.3 Improving accessibility and journey times by transforming mode-share in Auckland

KPI 3.1	**Improved access to employment, education & health services across Tāmaki Makaurau Auckland**
KPI 3.2	**Increased public transport capacity**
KPI 3.3	**Reduced travel times**

Getting the most out of the ALR infrastructure

By supporting additional growth in the CC2M corridor through coordinated urban investment under the ALR + Urban Response options, ridership on ALR increases. In the ALR + Active Investment option annual journeys reach 43m by 2051 (a 20% increase above ALR delivered in isolation). As shown in section 5.1.1 there is capacity under the proposed separated ALR scheme to support this increase in patronage with the ability to increase service frequency as required during peak periods.

Figure 51: Annual ALR + Active Investment journeys in 2051

The increased patronage represents a mode-shift to public transport. Under the ALR + Active Investment option almost 2 in 5 peak hour trips in the CC2M corridor are made by public transport in 2051 — A 23% increase relative to current conditions.

Mode-shift and the resulting increase in patronage, has a major positive impact on remaining drivers across the region. Together drivers will receive improved travel times and reliability worth up to $3.3B ($PV) to the economy over the appraisal period.[119]

An enhanced active travel network

Investing in interventions and infrastructure integrated with ALR under the two Urban Response options includes investing in local movement networks and sustainable first-last mile journeys in local catchments around stations. These investments support transit-oriented-development and active travel connections into ALR. A corridor wide approach to supporting active travel infrastructure, can deliver a well-integrated public transport, walking, and cycling network that benefits local communities. Transport modelling estimates that relative to without the project, ALR + Active Investment will lead to an increase of 88 million annual active travel kilometres by 2051, equivalent to approximately 38 annual kilometres for every Aucklander living in the CC2M corridor.

[119] See non-user benefits in section 10.2.3.

Targeted delivery of social infrastructure and employment space

Through a coordinated CC2M corridor approach, enabling infrastructure and planning policy can be tailored to ensure that social infrastructure and employment space can be accessed by those who need them most. Services and employment can be better targeted, tailored and delivered in the areas which will have most impact. For example, delivering the appropriate education and health services, where existing services are at capacity. Similarly, delivering affordable workspace with complementary incubator or accelerator schemes for creatives and entrepreneurs that help stimulate the innovation economy in areas where there is existing growth in these sectors.

10. Economic appraisal of urban response options

This economic appraisal of urban options outlines the cumulative potential impacts (monetised, and non-monetised) of delivering ALR alongside integrated urban investment and the relative value for money of the two shortlisted urban options.

10.1 Approach

The economic appraisal of ALR + additional urban investment (the urban options) follows the same approach as used in the economic appraisal of the standalone ALR transport investment (presented in chapter 6). The shortlisted options are analysed relative to the Do Minimum (see chapter 3) across the following parameters:

- Section 10.2: **Monetised impacts** including detailed cost-benefit analysis to understand the overall **benefit-cost ratio** and **net-present value** of each urban option considering all impacts that can be feasibly monetised.
- Section 10.3.1: **Social impacts** considers how the urban investment may alter the social outcomes of the transport intervention.
- Section10.3.2 **Distributional impacts** examines how the distribution of benefits and costs of ALR may be affected by the urban response.
- Section 10.3.3: **Other impacts** discusses benefits that are expected to occur through urban investment but cannot be feasibly quantified or monetised through the other elements of the economic appraisal.

Together the economic appraisal provides a detailed understanding of the value for money of investing in integrated urban investment alongside ALR.

Reflecting the earlier stage of consideration—and the associated level of design and development of the proposed integrated urban investments—the economic appraisal of urban options is carried out at a level consistent with at minimum NZ Treasury's Indicative Business Case requirements. However, where information is available, benefits are calculated to the greatest detail feasible which in many instances exceeds baseline IBC requirements.

10.2 Monetised Impacts

10.2.1 Costs

The additional costs associated with the urban options are estimated to be $0.4B for the Incremental Investment option and $1.2B for the Active Investment option. This brings the total cost of the ALR + Incremental Investment option and ALR + Active Investment option to $13B and $13.8B respectively.

Table 32: Additional and total overall investment for ALR + Urban Response Options ($PV)[120]

	ALR	ALR + Incremental Investment	ALR + Active Investment
Additional investment	$0	$0.4B	$1.2B
Total investment	$12.6B	$13.0B	$13.8B

Fare revenue

The revenues associated with the urban options are broadly the same as investing in ALR alone, at approximately $0.3B in present value terms for both urban options.[121] There are marginal differences reflecting an increase in revenue associated with the additional patronage brought on by increased population and employment growth through urban intervention.

Table 33: Additional and total overall revenue for ALR + Urban Response options ($PV)

	ALR	ALR + Incremental Investment	ALR + Active Investment
Additional revenue	$0.0B	>$0.1B	>$0.1B
Total revenue	$0.3B	$0.3B	$0.3B

[120] Detail about what is included in these costs are provided in Table 30.
[121] Only considered as part of the calculation of the National Benefit Cost Ratio in section 10.2.7 as per MBCM guidance.

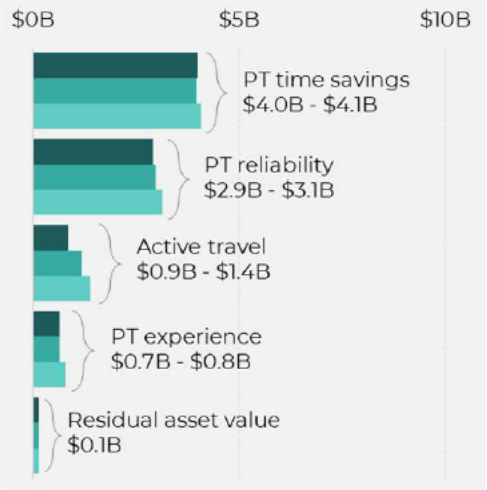
10.2.2 User benefits

Table 34: ALR + Urban Response options user benefits ($PV)

ALR	ALR + Incremental Investment	ALR + Active Investment
$8.6B	$8.9B	$9.5B

User benefits remain broadly consistent across all growth options (see Figure 52), with incremental increases as growth increases in the CC2M corridor. Active travel benefits see the greatest increase under the ALR + Incremental Investment and ALR + Active Investment options of 37% and 60% respectively.

Figure 52: Combined user benefits of ALR + Urban Response ($PV)



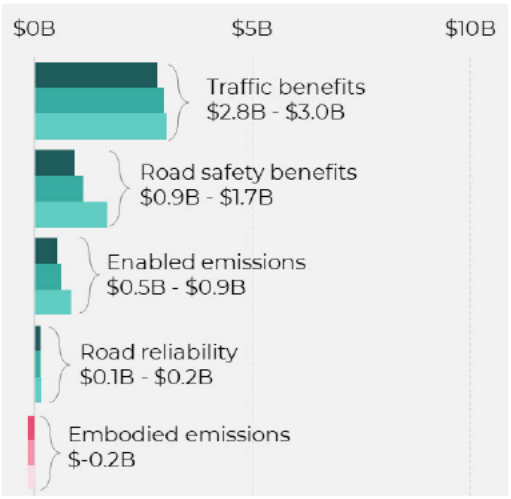
10.2.3 Non-user benefits

Table 35: ALR + Urban Response options non-user benefits ($PV)

ALR	ALR + Incremental Investment	ALR + Active Investment
$4.2B	$4.6B	$5.5B

Non-user benefits have been monetised and compared across ALR, the ALR + Investment Option and the ALR + Active Investment option (Figure 53).

Figure 53: Combined non-user benefits of ALR + Urban Response ($PV)



Traffic benefits, journey time reliability benefits and the disbenefits of carbon emissions associated with construction remain broadly consistent across all growth options.

Road safety and emissions reduction benefits increase significantly under both urban options. The monetised impact of road accident reduction increases by over 80% under the ALR + Active Investment option. Similarly, the monetised impact of a reduction in enabled emissions increases by over 60% in the ALR + Active Investment option.

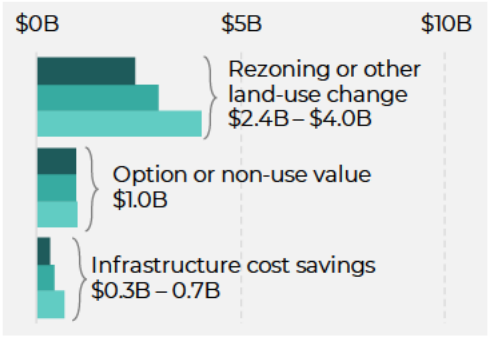
10.2.4 Land value and land use impacts

Table 36: ALR + Urban Response options land value and land use impacts ($PV)

ALR	ALR + Incremental Investment	ALR + Active Investment
$3.7B	$4.4B	$5.7B

The combined benefits associated with land value changes under the ALR + Urban Response options amount to an estimated $4.4B-$5.7B in present value terms (as shown in Figure 54).

Figure 54: Combined land value benefits of ALR + Urban Response ($PV)



Land value benefits resulting from rezoning or other land use changes increase by 24% under the Incremental Investment option and nearly 70% under the Active Investment option. Infrastructure cost savings more than double relative to ALR alone to $0.7B under the ALR + Active Investment option. The option value that individuals place on having a public transport option to travel by, even if they do not normally use it, remains broadly consistent across the three growth options.

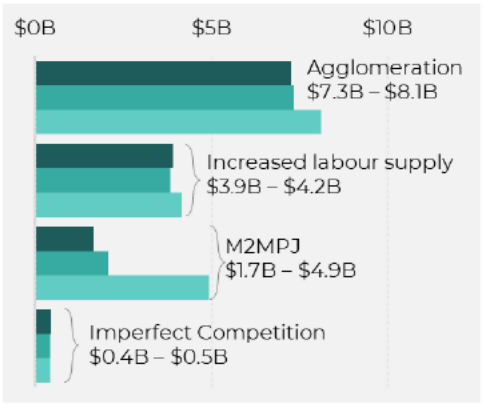
10.2.5 Wider economic benefits (WEBs)

Table 37: ALR + Urban Response options wider economic benefits ($PV)

ALR	ALR + Incremental Investment	ALR + Active Investment
$13.3B	$13.7B	$17.7B

As shown in Figure 55, some of the WEBs see significant increases under the ALR + Urban Response Options. In particular, agglomeration benefits increase by over 10% under the ALR + Active Investment option and benefits from the move to more productive jobs nearly triple, relative to ALR as a standalone investment—reaching $4.9B

Figure 55: Combined WEBs of ALR + Urban Response ($PV)



Labour supply benefits see modest increases with the increasing growth outcomes of the Urban Response options and imperfect competition benefits remain broadly consistent across the options.

10.2.6 Summary of monetised impacts

A summary of all monetised impacts for ALR is presented in Table 38. Impacts are presented relative to the Do Minimum option. In total, ALR combined with urban interventions is estimated to generate costs between $13.0B to $13.8B and benefits between $31.6B to $38.4B over the appraisal period.

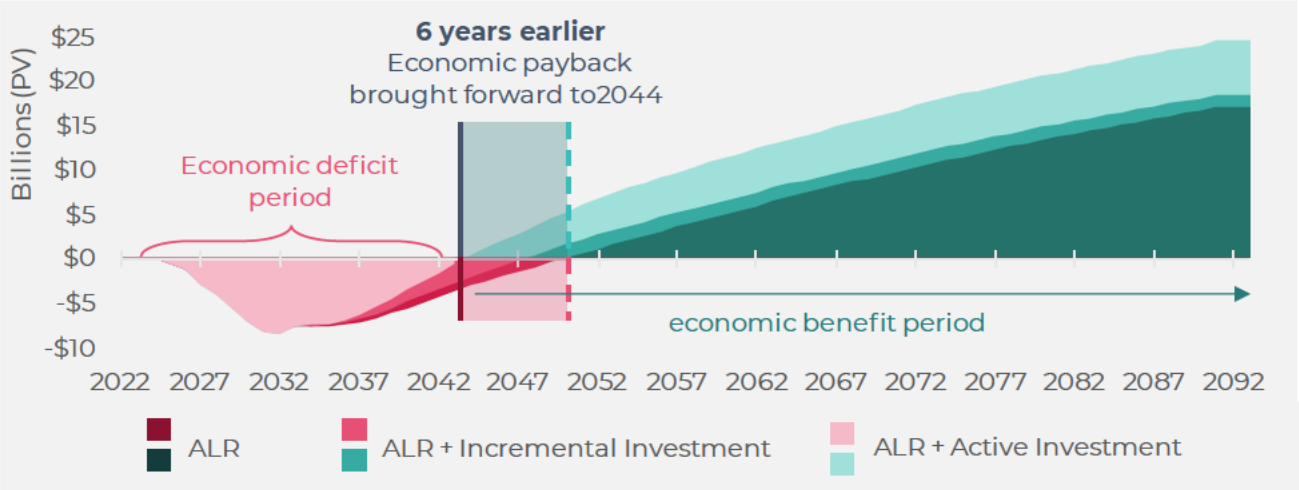
Table 38: Summary of monetised impacts of ALR + Urban Response options ($PV)

Costs	ALR + Incremental Investment	ALR + Active Investment
Capital Expenditure (CapEx)	$10.1B	$10.1B
Operational Expenditure (OpEx)	$2.0B	$2.0B
Renewals	$0.5B	$0.5B
Fare Revenue	$0.3B	$0.3B
Urban costs	$0.4B	$1.2B
Total Costs	**$13.0B**	**$13.8B**
Benefits	**ALR + Incremental Investment**	**ALR + Active Investment**
Public transport time savings	$4.0B	$4.1B
Public transport reliability	$3.0B	$3.1B
Active travel	$1.2B	$1.4B
Public transport experience	$0.7B	$0.8B
Residual asset value	$0.1B	$0.1B
User benefits	**$8.9B**	**$9.5B**
Traffic benefits	$3.0B	$3.0B
Road safety	$1.1B	$1.7B
Enabled emissions	$0.6B	$0.9B
Road reliability	$0.1B	$0.2B
Embodied emissions	-$0.2B	-$0.2B
Non-user benefits	**$4.6B**	**$5.5B**
Rezoning or other land use change	$3.0B	$4.0B
Option or non-use	$1.0B	$1.0B
Infrastructure cost savings	$0.4B	$0.7B
Land value and land use impacts	**$4.4B**	**$5.7B**
Agglomeration	$7.4B	$8.1B
Increased labour supply	$3.0B	$4.2B
Movement to more productive jobs	$2.1B	$4.9B
Imperfect competition	$0.4B	$0.4B
Wider economic benefits	**$13.7B**	**$17.7B**
Total benefits	**$31.6B**	**$38.4B**

The profile of economic impacts of ALR + Urban Response options

The profile of economic impacts over time, as shown in Figure 56 overleaf, demonstrates the opportunity to not only magnify the overall benefits of ALR with an integrated Urban Response but also to accelerate the point of economic payback, where the initial investment required to deliver ALR is economically recovered through the benefits it delivers. Under the ALR + Active Investment option estimates suggest this point is reached by 2044, 6 years earlier than if ALR is delivered as a standalone investment. **This means the investment will have economically 'paid for itself' within 12 years of opening**—a very strong economic performance for an investment of this scale.

Figure 56: Cumulative profile of monetised impacts of ALR + Urban Response options ($PV)[122]



10.2.7 ALR + Urban Response benefit-cost ratios

Based on the assessment of monetised impacts presented in this chapter, the benefit-cost ratios (BCR) of the two ALR + Urban Response options have been calculated in line with MBCM guidance and are presented in Table 39.

Table 39: Benefit-cost ratio summary information for ALR + Urban Response options ($PV)

Value for money indicators	ALR + Incremental Investment	ALR + Active Investment
Total Costs	$13.0B	$13.8B
Total Benefits (without WEBs)	$17.8B	$20.7B
Total Benefits (with WEBs)	$31.6B	$38.4B
Net Present Value (NPV)	$18.6B	$24.6B
National Benefit-Cost Ratio (BCR_N) (without WEBs and Land use impacts)	1.0	1.1
National Benefit-Cost Ratio (BCR_N) (without WEBs)	1.4	1.5
National Benefit-Cost Ratio (BCR_N) (with WEBs)	**2.4**	**2.8**
Urban Response-only Benefit-Cost Ratio (BCR_N)[123]	4.3	7.2
Government Benefit-Cost Ratio (BCR_G)	2.4	2.8
First year rate of return	2.2%	3.2%

[122] Economic payback refers to the time when the cumulative monetised impacts (costs and benefits) equal zero (in discounted, present value terms).
[123] Refers to the ratio of incremental costs and benefits associated with each Urban Response option.

10.3 Social, Distributional and Other impacts of Urban Response

10.3.1 Social impacts

While the transport option alone is expected to generate a range of social benefits, the urban response has the potential to alter the social impact of ALR based on its ability to enhance urban uplift and social amenities beyond the level which is achieved by the transport intervention. To account for changes brought on by the urban intervention, the findings of the SIA have been reviewed to identify the social impact categories that are likely to be affected by the urban intervention. The table below summarises anticipated changes resulting from the urban response and describes the consequence of this change on the initial SIA assessment.

Table 40: Relative social impact appraisal of ALR + Urban Response options

Social impact	Anticipated change	Consequence for assessment: ALR + Incremental Investment	Consequence for assessment: ALR + Active Investment
Community severance	Additional investments in transport infrastructure and network upgrades, and particularly improvements to walking and cycling infrastructure, are anticipated to deliver additional community severance benefits by facilitating better movement within and across communities.	The community severance assessment is expected to change from slight-moderately beneficial to **moderately beneficial.** Walking and cycling improvements are expected to enhance pedestrian connectivity and facilitate better social interactions and gatherings along the corridor and within key station areas.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Social connectedness	Plans to improve the environment, including through placemaking pop-ups, meanwhile uses, place branding and place marketing are expected to enhance the character of areas and neighbourhoods along the corridor. This enhancement will facilitate social connectedness by providing better spaces for individuals to connect.	Because urban interventions are expected to be concentrated in areas which already typically foster high levels of social interaction, the assessment for social connectedness remains **moderately beneficial** at the scheme-wide level.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Personal safety and fear of crime	No changes are anticipated.	No consequence for assessment.	No consequence for assessment.
Journey quality	No changes are anticipated.	No consequence for assessment.	No consequence for assessment.

Health benefits arising from changes in physical activity levels	Green infrastructure investments are anticipated to increase overall health benefits arising from changes in physical activity levels by incentivising more people to engage with active travel when travelling to and from stations. investments in active travel infrastructure are also expected to contribute to an increase in active travel uptake when accessing public transport.	The assessment is expected to increase from slightly beneficial to **moderately beneficial.** Investments that encourage higher engagement with active modes of travel will increase the overall level of physical activity across the population, alleviating the burden on public health facilities and services that are attributed to a sedentary lifestyle.	The assessment is expected to increase from slightly beneficial to **moderately beneficial.** The magnitude of change is expected to be slightly greater under this option, given that health benefits will be accrued to a larger overall population.
Health benefits to active travel users arising from changes in the physical environment	Improvements to green and open spaces and investment into active travel infrastructure is expected to increase the attractiveness of active travel as a form of transport. This change will deliver additional health benefits by enabling a higher overall uptake of cycling and walking in areas along the corridor.	The assessment is expected to increase from slightly beneficial to **moderately beneficial.** The delivery of additional active travel infrastructure is expected to significantly increase the overall mode share of active travel, thus generating additional health benefits through promoting an increase in the adoption of active travel methods.	The assessment is expected to increase from slightly beneficial to **moderately beneficial.** The magnitude of change is expected to be slightly greater under this option, given that health benefits will be accrued to a larger overall population
Prevention of road accidents and casualties	General network improvements and investment in transport-related infrastructure will improve safety on roads along the corridor and around stations. This may in turn contribute to the prevention of road accidents and casualties.	Benefits arising from the prevention of road accidents and casualties is expected to remain **slightly beneficial.** While general network improvements are likely to improve road safety to some extent, the urban transport intervention is not directly aimed at preventing road accidents and casualties and the impact is only expected to be marginal.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Changes in accessibility	The urban intervention is expected to deliver new social and enabling infrastructure which will provide new access to schools, places of leisure, community centres and employment opportunities.	The appraisal of benefits arising from changes in accessibility is expected to remain as **moderately beneficial.** While significant employment growth is forecast for this option, the urban intervention is not expected to significantly alter accessibility to essential services, social networks, or family because interventions will be delivered to satisfy future demand.	The assessment is expected to be identical to the ALR + Incremental Investment option.

10.3.2 Distributional impacts

Under the urban response, the concentration of growth in catchments considered to have the greatest potential for achieving urban outcomes has distributional implications for the overall costs and benefits of the project. As such, consideration must be given as to how the urban intervention may have altered the findings of the distributional analysis (see section 6.4). The following table summarises anticipated changes resulting from the urban response and describes the consequences of this change on the initial DIA assessment.

Table 41: Relative distributional impact appraisal of ALR + Urban Response options

Category	Anticipated change	Consequence for assessment: ALR + Incremental Investment	Consequence for assessment: ALR + Active Investment
User benefits	An increase in transit ridership resulting from the overall population increase could potentially generate additional public transport benefits. Benefits for private vehicles may also increase as more drivers and passengers are expected to benefit from the potential reduction in traffic congestion.	The overall assessment will remain **moderately to largely beneficial**. While the distribution of the benefits may shift slightly, it is not expected to be significant.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Affordability	Despite general network improvements and investments in transport-related infrastructure, certain areas may still witness an increase in traffic due to an increase in transit demand. A surge in traffic is likely to reduce cost-saving improvements, as congestion is not expected to be significantly alleviated.	An increase in traffic in response to higher transport demand is expected to generate fewer benefits and could potentially lead to disbenefits. Consequently, the assessment may shift to **neutral or slightly adverse.** The distribution of benefits may also change, but it remains unclear which priority groups will benefit.	The affordability impact may shift to **neutral or slightly adverse.** The magnitude of change is expected to be slightly greater under this option given that it is expected to generate a greater increase in traffic in response to a larger increase in transport demand.
Noise	General network improvements and investment in transport-related infrastructure will improve overall traffic flow, which may in turn generate noise reduction benefits for affected priority groups along the corridor.	Benefits arising from changes in noise levels are expected to remain **neutral** for all affected priority groups. While network improvements are likely to improve traffic to some extent, the impact is expected to be marginal and overall noise levels are not expected to change significantly.	The assessment is expected to be identical to the ALR + Incremental Investment option.

Air quality	In a scenario with increased population growth, there may be a smaller reduction in traffic congestion, decreasing the overall air quality improvement in areas where air quality is expected to improve most significantly	The assessment of air quality is expected to change from moderately beneficial to **slightly beneficial.** The distribution of impacts is likely to change, with priority groups in the city centre receiving fewer benefits, especially the highest 20% of income earners. In contrast, priority groups less concentrated in the city centre (such as children_ are anticipated to receive a larger share of benefits.	The assessment is expected to change from moderately beneficial to **slightly beneficial.** The magnitude of change is expected to be slightly larger under this option given it is expected to result in a larger overall increase in congestion.
Safety	Public realm improvements are anticipated to improve safety for priority road users by reducing the number of road accidents and casualties.	Benefits are expected to remain **slightly beneficial** for all affected priority groups, because the impact of public realm improvements on road safety is expected to be marginal.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Severance	An increase in population may generate a smaller reduction in traffic, thereby producing fewer severance improvements. Additional investments in transport infrastructure and network upgrades, particularly improvements to walking and cycling infrastructure, are anticipated to deliver additional community severance benefits by facilitating better movement within and across communities	The combined evaluation of severance is likely to remain **moderately beneficial.** The traffic-based severance assessment was assessed as neutral and will remain classified as neutral. The community severance assessment based on additional infrastructure (station-based assessment) may change from moderately positive to largely positive.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Security	Investments aimed at improving the environment around stations are expected to enhance security for priority groups by creating new informal surveillance mechanisms and enhancing landscaping and lighting features.	Security benefits are expected to remain **moderately beneficial** for all affected groups. The urban intervention is not explicitly aimed at improving security meaning changes across the corridor will be a marginal by-product of the various planned place-making and public realm interventions.	The assessment is expected to be identical to the ALR + Incremental Investment option.
Accessibility	Urban interventions will enhance access to the proposed stations and improve connectivity between stations and final destinations. The delivery of new social and enabling infrastructure will provide priority groups with new access to schools, places of leisure, community centres employment opportunities.	Accessibility benefits are expected to remain **moderately beneficial** for all priority groups. While the urban response will improve overall access to the ALR scheme, it is not expected to significantly alter accessibility to essential services, networks, or family because interventions will be delivered to satisfy future demand.	The assessment is expected to be identical to the ALR + Incremental Investment option.

10.3.3 Other non-monetised impacts

Impacts which are not monetised or otherwise captured in the SIA and DIA are qualitatively assessed in Table 42 below for the two Urban Response options assessed:

Table 42: Assessment of non-monetised impacts for ALR + Urban Response options

Impact	Assessment ALR + Incremental Investment	Assessment of ALR + Active Investment
Disruption from construction	The impact of disruption from the construction of ALR is expected to remain the same. With further investments in enabling infrastructure a marginal increase in disruption is expected.	The impact of disruption from the construction of ALR is expected to remain the same. With further investments in enabling infrastructure a marginal increase in disruption is expected. This is not expected to be materially greater than the Incremental Investment option.
Jobs created during construction	The construction of integrated urban solutions will generate new jobs in addition to construction jobs associated with ALR. It is expected that this will be greater in the Active Investment option rather than the Incremental option however, estimates have not been quantified at this stage.	
Jobs created during operation	The operation and maintenance of integrated urban solutions will generate new jobs in addition to the jobs associated with the operation of ALR. However, the estimated amount has not been quantified and not expected to significantly differ between options.	
Tourism	The impact on tourism may be further benefited due to the investments in urban realm and place-making. Improvement may make the city a more attractive place for the tourists to visit and stay in. The scale of intervention in the Active Investment option has greater capacity to influence tourism than the Incremental Investment option.	
Socio-Economic Impacts	Additional socio-economic benefits are anticipated for several of the social impacts identified in the SIA. A comprehensive assessment of the anticipated impact of the urban response on identified social impacts is presented in section 10.3.1. The scale of intervention in the Active Investment option has greater capacity to influence socio-economic outcomes than the Incremental Investment option.	
Foreign/inward investment	The ability to deliver higher levels of development along the corridor is expected to unlock additional foreign and inward investment along the corridor in the two urban options as a result of improvements in urban infrastructure/facilities and accessibility and associated agglomeration benefits. This includes new opportunities for Mana Whenua investment and commercial partnerships relating to urban uplift and intervention. The scale of intervention in the Active Investment option has greater capacity to attract foreign and inward investment relative to the Incremental Investment option.	
Additional capacity benefits/future proofing	The benefit of additional capacity benefits/future proofing is expected to remain the same in both options assessed as ALR alone without additional Urban Investment	
Wider environmental impacts	The densification and reduction in urban sprawl associated with the Incremental and Active Investment options may result in positive impact on the wider environment. The scale of intervention in the Active Investment option has greater capacity to influence wider environmental outcomes than the Incremental Investment option. The opportunity for Mana Whenua to work in partnership with ALR team in the urban response phase of the Project will help the project to deliver on a range of non-monetised benefits for the environment as a result of the urban intervention. Mana Whenua as kaitiaki see the Taiao (environment) as fundamentally important for its life-giving essence and spiritual values[124]. In recognition of their kaitiaki obligation, Mana Whenua have a bottom-line expectation that all cultural, social, environmental, and economic project outcomes should positively contribute to the restoration and enhancement of mauri at the project sites as well as the wider Tāmaki Makaurau region.	

[124] Auckland Light Rail – Mana whenua technical advisors – cultural expectations statement April 2023.

10.4 Scenario testing

10.4.1 Sensitivity analysis

To understand the impact of uncertainty on the cost-benefit analysis and overall value for money assessment, sensitivity tests have been undertaken in alignment with the key opportunities and uncertainties highlighted in section 6.6. Table 43 and Table 44 below sets out the results of the analysis for ALR + Incremental Investment and ALR + Active Investment options respectively.

Table 43: ALR sensitivity analysis results for ALR + Incremental Investment option

Sensitivity test	User ($PV)	Non-user ($PV)	Land value / Use ($PV)	WEBs ($PV)	Total Costs ($PV)	BCR_n (with WEBs)	Anticipated SIA Impact	Anticipated DIA Impact
Delayed benefits ramp-up	$8.6B	$4.4B	$4.4B	$13.4B	$13.0B	**2.4**	Slight negative	Slight negative
High Cost (P95)	$8.9B	$4.6B	$4.4B	$13.7B	$14.8B	**2.1**	Broadly equivalent	Broadly equivalent
Benefit Reduction	$7.9B	$3.6B	$3.5B	$11.0B	$13.0B	**2.0**	Moderate negative	Moderate negative
Benefit Increase	$8.9B	$4.7B	$4.4B	$13.7B	$13.0B	**2.4**	Slight positive	Slight positive
Increased cost of carbon and low-carbon delivery	$8.6B	$4.1B	$3.7B	$13.3B	$12.6B	**2.4**	Broadly equivalent	Broadly equivalent

Table 44: ALR sensitivity analysis results for ALR + Active Investment option

Sensitivity test	User ($PV)	Non-user ($PV)	Land value / Use ($PV)	WEBs ($PV)	Total Costs ($PV)	BCR_n (with WEBs)	Anticipated SIA Impact	Anticipated DIA Impact
Delayed benefits ramp-up	$9.2B	$5.3B	$5.7B	$17.3B	$13.8B	**2.7**	Slight negative	Slight negative
High Cost (P95)	$9.5B	$5.5B	$5.7B	$17.7B	$15.7B	**2.4**	Broadly equivalent	Broadly equivalent
Benefit Reduction	$8.4B	$4.3B	$4.6B	$14.1B	$13.8B	**2.3**	Moderate negative	Moderate negative
Benefit Increase	$9.8B	$5.8B	$6.0B	$18.5B	$13.8B	**2.9**	Slight positive	Slight positive
Increased cost of carbon and low-carbon delivery	$9.5B	$5.6B	$5.7B	$17.7B	$13.8B	**2.8**	Broadly equivalent	Broadly equivalent

As is shown in the sensitivity analysis results the economic benefits of ALR when integrated with Urban Response options remain robust to key potential uncertainties and opportunities. The BCR remains healthy under all sensitivity tests and although there are some impacts on the social and distributional impacts of the scheme, these are considered slight to moderate, and opportunities for mitigation could be explored.

11. The Corridor Business Case Outcome for Auckland Light Rail

11.1 Corridor Business Case Outcome

ALR represents a clear value for money investment with opportunities to enhance and magnify the scale of impact through integrated Urban and Transport investment.

Table 45: CBC outcomes summary

	Auckland Light Rail	Auckland Light Rail + Incremental Investment	Auckland Light Rail + Active Investment
Jobs (2051)	85,300	97,300	122,000
Homes (2051)	50,300	58,900	75,300
Annual Journeys (2051)	40m	44m	49m
Whole-of-life potential carbon saved[125] (t CO_2e)	400kt	900kt	1,600kt
Connection with future Rapid Transit Network	Full integration with a future RTN possible with sufficient scalable capacity to support public transport growth		
Support for Objective 1: Urban Growth & Density	Good	Very Good	Excellent
Support for Objective 2: Sustainability	Limited to Good	Very Good	Excellent
Support for Objective 3: Improving Accessibility & Public Transport Capacity	Very Good	Very Good	Excellent
Social Impact	Moderately Positive	Moderately Positive	Positive
Total Economic Costs:	$12.6B	$13.0B	$13.8B
Total Economic Benefits: (Without WEBs)	$16.4B	$17.8B	$20.7B
Total Economic Benefits:	$29.7B	$31.6B	$38.4B
BCR_N	**2.4**	**2.4**	**2.8**
BCR_N range under Sensitivity Analysis	1.9 - 2.5	2.0 - 2.4	2.3 - 2.9
Net Present Value	**$17.2B**	**$18.6B**	**$24.6B**
Economic payback year	**2050**	**2048**	**2044**

[125] If the reasonable low carbon opportunities identified are pursued. See Appendix E-I and Appendix E-J for further details.

11.2 Way forward and opportunities for further consideration

Given the strength of the Detailed Business Case level economic appraisal for ALR (as a standalone transport investment) there is clear economic rationale for the delivery of the project. The Commercial, Financial and Management cases will further discuss the affordability, the viability in the marketplace and the approach to ensuring successful delivery of ALR.

Based on the Indicative Business Case economic appraisal of potential Urban Response options for integrated investment alongside the delivery of ALR, the two shortlisted options assessed both present robust evidence that they can further secure, maximise and extend the potential benefits of ALR while maintaining or likely improving the overall benefit-cost ratio and value for money of the integrated project.

Based on the strong performance of the Urban Response options there is a clear economic rationale for proceeding to further investigate the delivery of the Urban Response options through one or multiple Detailed Business Cases. Identifying the appropriate quantum and distribution of additional Urban Response, while economically rationale, will require further and more detailed investigation.

Consideration of the Urban Response in the Commercial, Financial and Management cases will review and assess the market attractiveness, affordability, and deliverability of the proposed Urban Response interventions. This will also consider how the delivery of ALR could be supported by the delivery of integrated or over station development on residual land. These considerations are critical to provide the necessary certainty of the delivery of the identified additional economic benefits.

Opportunities for future consideration identified in the Economic Case

Given the findings of the economic case it is unreservedly concluded that ALR is an economically robust and rationale investment. However, as the ALR scheme progresses a series of opportunities for further exploration have been identified (discussed in section 6.6) which should be taken forward. The recommended opportunities will further enrich the understanding of the economics of ALR and how outcomes can be further enhanced during implementation. Opportunities include:

- The ability to realise increased population and economic change through attracting growth from outside the Auckland Region ('Open City').
- Pushing the boundaries of green delivery and coordinating with other government policy to further reduce the carbon investment required and increase the potential scale of net carbon emissions savings secured.
- Securing and supporting further urban growth, as a key source of benefits for ALR, both through the development of the Urban Response Detailed Business Case(s) and continued partnership with the Crown, Auckland Council, Mana Whenua, and key stakeholders.
- Assessment of how the investment in ALR can be enhanced by delivering additional urban benefits at specific locations. Place-based interventions to deliver improved urban outcomes (for example, the provision of amenity or green space) could be considered as part of future considerations.