

## Proactive Release

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<u>Section</u>	<u>Description of ground</u>
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6(c)	prejudice the maintenance of the law, including the prevention, investigation, and detection of offences, and the right to a fair trial
9(2)(a)	to protect the privacy of natural persons
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9(2)(ba)(i)	to protect information which is subject to an obligation of confidence or which any person has been or could be compelled to provide under the authority of any enactment, where the making available of the information would be likely to prejudice the supply of similar information, or information from the same source, and it is in the public
9(2)(ba)(ii)	to protect information which is subject to an obligation of confidence or which any person has been or could be compelled to provide under the authority of any enactment, where the making available of the information would be likely otherwise to damage the public interest
9(2)(f)(ii)	to maintain the constitutional conventions for the time being which protect collective and individual ministerial responsibility
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9(2)(h)	to maintain legal professional privilege
9(2)(i)	to enable a Minister of the Crown or any public service agency or organisation holding the information to carry out, without prejudice or disadvantage, commercial activities
9(2)(j)	to enable a Minister of the Crown or any public service agency or organisation holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)

## Monetised Impacts Summary

Appendix number: E-G

**WIP DRAFT**

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## Table of Contents

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<b>1.</b>	<b>Executice Summary</b> .....	Error! Bookmark not defined.
<b>2.</b>	<b>Delivery against the ILM Objectives</b> .....	<b>7</b>
<b>3.</b>	<b>Monetised impacts</b> .....	<b>8</b>
3.2	Social impact appraisal .....	10
3.3	Distributional impact appraisal.....	11
3.4	Non-monetised impacts .....	13
3.5	Key risks and uncertainties.....	14

## Tables

Table 1: Summary of impacts of ALR and IC on the ILM objectives by 2051.....	7
Table 2: Summary of Monetised Impacts (\$PV) .....	8
Table 3 Benefit-cost ratio summary information for ALR .....	8
Table 4 SIA Preliminary Findings.....	10
Table 5 DIA preliminary findings .....	11
Table 6: Assessment of non-monetised impacts .....	13
Table 7: Key ALR uncertainties and opportunities, and their associated sensitivity test .....	15
Table 8: ALR sensitivity analysis results .....	15
Table 9: IC sensitivity analysis results .....	15



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# 1. Introduction

The economic appraisal of ALR considers the monetised and non-monetised costs and benefits associated with this investment. The following document presents the complete findings of the economic appraisal undertaken in line with Waka Kotahi NZ Transport Agency's Monetising Benefits and Costs Manual and the principles of Better Business Case guidance.

The findings of the economic appraisal of ALR are presented relative to the Do Minimum (see Appendix E-A) as well as in relation to the Intermediate Comparator (See Appendix E-B). The document is structured as follows:

- **Section 2:** Summary of impacts in relation to the ILM objectives
- **Section 3:** Monetised impacts
- **Section 4:** Social impacts
- **Section 5:** Distributional impacts
- **Section 6:** Non-monetised impacts

Section 7 addresses key risks and uncertainties and presents the findings of the sensitivity analysis that was undertaken to ensure robustness of the economic appraisal.

A summary of findings for both ALR and the Intermediate Comparator is presented in Table 1 below:

Table 1 Summary of findings for the economic appraisal

	Auckland Light Rail	Intermediate Comparator
Jobs (2051)	85,000	83,600
Homes (2051)	50,000	47,500
Annual Journeys (2051)	36m	19.3m
Whole-of-life potential carbon saved <sup>1</sup> (TCO <sub>2e</sub> )	400kt	160kt
Connection with future Rapid Transit Network	Full integration with a future RTN possible with sufficient scalable capacity to support public transport growth	Full integration not possible
Support ILM Objective 1: Urban Growth & Density	Good	Limited
Support ILM Objective 2: Supporting Sustainability	Good	Limited
Support ILM Objective 3: Improving Accessibility & Public Transport Capacity	Good	Limited
Social Impact	Moderately Positive	Moderately Positive

<sup>1</sup> If the reasonable low carbon opportunities identified are pursued.



Total Economic Costs:	\$12.6B	\$9.0B
Total Economic Benefits: (Without WEBs)	\$16.4B	\$11.5B
Total Economic Benefits:	\$29.7B	\$21.9B
BCR <sub>N</sub>	<b>2.4</b>	<b>2.4</b>
Net Present Value	<b>\$17.2B</b>	<b>\$12.8B</b>
Economic payback year	<b>2050</b>	<b>2047</b>

## 2. Delivery against the ILM Objectives

Table 9 summarises the anticipated impacts of ALR and IC in relation to the ILM objectives, demonstrating that the transport investment alone will deliver substantial improvements across all objectives.

Table 2: Summary of impacts of ALR and IC on the ILM objectives by 2051

	KPI	Measure	ALR	IC
Objective 1: Urban	KPI 1.1: Increased residential & employment density	Population density (CC2M) people/ha (change from 2021)	36 (+44%)	39 (+55%)
		Employment density (CC2M) jobs/ha (change from 2021)	29 (+49%)	29 (+48%)
	KPI 1.2: Increased housing and employment growth	Household growth (CC2M)	50,300	47,500
		Jobs growth (CC2M)	85,300	83,600
	KPI 1.3: Improved quality of life	PT capacity for future growth	Long-term capacity for growth	No capacity for further growth
Objective 2: Sustainability	KPI 2.1: Reduced carbon emissions	Improved social connectedness	Moderate benefits anticipated	Moderate benefits anticipated
		Range <sup>2</sup> of likely whole of life (net) carbon emissions CO <sub>2e</sub>	+700kt to -400kt	-200kt to -300kt
	KPI 2.2: Improved health outcomes	Average annual road incidents (crashes) reduced	75	62
	KPI 2.2: Improved health outcomes	Active travel kilometres growth in 2051 (Auckland)	15m (+6%)	12m (+4%)
Objective 3: Transport	KPI 3.1: Improved access to employment, education & health services across Tāmaki Makaurau Auckland	Jobs within 45 mins by PT from origins	Mt. Roskill: 440k (+35%) Onehunga: 450k (+150%) Māngere: 430k (+305%)	430k (+33%) 400k (+120%) 310k (+190%)
		Homes within 45 mins by PT to destinations	City centre: 400k (+7%) Airport: 220k (+880%)	390k (+4%) 180k (+700%)
	KPI 3.2: Increased public transport capacity	Additional capacity (ALR)	Up to 19,800 passengers/hr	Maximum 6,990 passengers/hr
		Ability to connect and support demand from other RTN projects	Significant capacity to support long-term integration with RTN	Insufficient capacity to provide for interface with RTN
		Annual ALR trips in 2051	36 million	19 million
		Daily vehicle trips reduced in 2051 (Auckland)	93K	79K
	KPI 3.3: Reduced travel times	Key Corridor Public Transport Travel Times and Savings <sup>3</sup> (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)	30 minutes <sup>4</sup> (9 to 10-minute saving) 34 minutes (26 to 47-minute saving) 58 minutes (17 to 49-minute saving)

<sup>2</sup> Range spans baseline carbon scenario to scenario where carbon saving opportunities are pursued during project delivery. See Appendix E-I Carbon Methodology and Assessment Report for more details.

<sup>3</sup> Relative to current (peak) public transport travel times.

<sup>4</sup> Includes allowance of 11 mins walk time from Civic stop to University



## 3. Monetised impacts

### 3.1.1 Summary of monetised impacts

A summary of all monetised impacts for ALR and IC 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. The IC is estimated to generate costs of \$9.0B and benefits of \$21.9B over the appraisal period

Table 3: Summary of Monetised Impacts (\$PV)

	ALR		Intermediate Comparator	
<b>Costs</b>	<b>PV<sup>5</sup></b>	<b>% of Total</b>	<b>PV</b>	<b>% of Total</b>
Capital Expenditure (CapEx)	\$10.1B	80%	\$6.9B	77%
Operational Expenditure (OpEx)	\$2.0B	16%	\$1.7B	19%
Renewals	\$0.5B	4%	\$0.4B	4%
Revenue	\$0.3B		\$0.2B	
<b>Total Costs (excluding revenue)</b>	<b>\$12.6B</b>	<b>100%</b>	<b>\$9.0B</b>	<b>100%</b>
<b>Benefits</b>	<b>PV<sup>5</sup></b>	<b>% of Total</b>	<b>PV</b>	<b>% of Total</b>
Public transport time savings	\$4.0B	13%	\$2.8B	13%
Public transport reliability	\$2.9B	10%	\$1.8B	8%
Active travel	\$0.9B	3%	\$0.7B	3%
Public transport experience	\$0.7B	2%	\$0.6B	3%
Residual asset value	\$0.1B	<1%	<\$0.1B	<1%
<b>User benefits</b>	<b>\$8.6B</b>	<b>29%</b>	<b>\$5.9B</b>	<b>27%</b>
Traffic benefits	\$2.8B	10%	\$1.3B	6%
Road safety	\$0.9B	3%	\$0.8B	3%
Enabled emissions	\$0.5B	2%	\$0.4B	2%
Road reliability	\$0.1B	<1%	\$0.1B	<1%
Embodied emissions	-\$0.2B	<1%	-\$0.1B	<1%
<b>Non-user benefits</b>	<b>\$4.2B</b>	<b>14%</b>	<b>\$2.4B</b>	<b>11%</b>
Rezoning or other land use change	\$2.4B	8%	\$1.8B	5%
Option or non-use	\$1.0B	3%	\$1.2B	8%
Infrastructure cost savings	\$0.3B	1%	\$0.2B	1%
<b>Land value and land use impacts</b>	<b>\$3.7B</b>	<b>12%</b>	<b>\$3.2B</b>	<b>15%</b>
Agglomeration	\$7.3B	25%	\$5.5B	25%
Increased labour supply	\$3.9B	13%	\$2.9B	1%
Movement to more productive jobs	\$1.4B	6%	\$1.8B	13%
Imperfect competition	\$0.5B	2%	\$0.2B	8%
<b>Wider economic benefits</b>	<b>\$13.0B</b>	<b>45%</b>	<b>\$10.4B</b>	<b>47%</b>
<b>Total benefits</b>	<b>\$29.7B</b>	<b>100%</b>	<b>\$21.9B</b>	<b>100%</b>

### 3.1.1 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<sub>N</sub>) and government (BCR<sub>G</sub>).

Table 4 Benefit-cost ratio summary information for ALR

<sup>5</sup> Numbers may not sum due to rounding.

Value for money indicators	ALR \$ (PV)	IC \$ (PV)
Total Costs	\$12.6B	\$9.0B
Total Benefits (without WEBs)	\$16.4B	\$11.5B
Total Benefits (with WEBs)	\$29.7B	\$21.9B
Net Present Value (NPV)	\$17.2B	\$12.8B
National Benefit-Cost Ratio ( $BCR_N$ ) (without WEBs)	1.3	1.3
National Benefit-Cost Ratio ( $BCR_N$ ) (without WEBs and Land value & land use impacts)	<b>1.0</b>	<b>0.9</b>
<b>National Benefit-Cost Ratio (<math>BCR_N</math>) (with WEBs)</b>	<b>2.4</b>	<b>2.4</b>
Government Benefit-Cost Ratio ( $BCR_G$ )	2.4	2.4
First year rate of return	6.3%	14.5%

## 3.2 Social impact appraisal

A summary of preliminary findings for the SIA is presented below. The results are presented on a seven-point scale, ranging from beneficial through neutral to adverse, to differentiate the relative impacts of different indicators for each transport option.

Table 5 SIA Preliminary Findings

Impact	ALR	Intermediate Comparator
Community severance	This option will deliver a <b>slight to moderately positive benefit</b> . The effects of traffic flow changes are not anticipated to be significant, but proposed pedestrian infrastructure changes are expected to enhance pedestrian connectivity and reduce severance.	This option will deliver a <b>slight to moderately positive benefit</b> . The benefit is anticipated to be slightly lower than the separated option, given that the route does not include a university station, meaning any proposed infrastructure in the area will not be delivered.
Social connectedness	This option will have a <b>moderately beneficial impact</b> . 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).	There is assumed to be no variation in social connectedness compared to ALR, given that both schemes run through all key corridor sections that were assessed. The assessment of severance for the intermediate comparator is therefore <b>moderately beneficial</b> .
Personal safety and fear of crime	This option is likely to have a <b>moderately beneficial</b> influence on personal safety and fear of crime. Formal surveillance measures (e.g., CCTV monitoring) and informal surveillance instruments (e.g., design to encourage open visibility) are expected to enhance security for transport users.	It is assumed there will be no variation between options for those security indicators relating to station design and facilities. As a consequence, the security impact for this option is scored as <b>moderate beneficial</b> . However, this option is expected to perform slightly worse in terms of journey time improvements between boarding and alighting stops, given it has a longer end-to-end travel time which may increase passengers' exposure to safety risks and crime.
Journey quality	The overall journey quality impact for this option is likely to be <b>moderately beneficial</b> . 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.	The overall journey quality impact for this option is likely to be <b>moderately beneficial</b> . The intermediate comparator is expected to generate slightly lower travel stress reduction benefits than the separated option, given that this option provides a longer end-to-end journey time.
Health benefits arising from changes in levels of physical activity	This option is expected to generate a <b>slight positive health benefit</b> through a small increase in the anticipated total active distance travelled to and from public transportation.	This option is expected to generate a <b>slight positive health benefit</b> through a small increase in the anticipated total active distance travelled to and from public transportation. Benefits are anticipated to be marginally smaller under this option given that the intermediate comparator is expected to generate a less significant modal shift from vehicles to public transport.
Health benefits arising to active travel users arising from changes in the physical environment	This option is expected to generate a <b>slight positive benefit</b> through an increase in the total active kilometres travelled across the corridor.	This option is expected to generate a <b>slight positive benefit</b> through an increase in total active travel kilometres. The magnitude of impact is expected to be slightly lower due to anticipated land use changes facilitating the development of a slightly less dense urban form.

Prevention of road accidents and casualties	This option is expected to result in a <b>slight positive benefit</b> associated with a reduction in annual road crash rates.	This option is expected to result in a <b>slight positive benefit</b> associated with a reduction in annual road crash rates. The intermediate comparator option is expected to generate a slightly lower reduction in crashes due to a smaller anticipated modal shift resulting in higher overall driving levels than with ALR.
Changes in accessibility	The accessibility impact for this option will be <b>moderately beneficial</b> . This option provides improved access to a higher proportion of the population. Likewise, it provides enhanced job accessibility. The appraisal based on the key barriers impacting on accessibility also indicates higher positive net impacts on accessibility for this option.	The accessibility impact for this option is expected to be <b>slightly beneficial</b> . This option is likely to result in a positive net impact on accessibility. However, the extent of this benefit is anticipated to be less compared to ALR. This is because there is a smaller expected net increase in job accessibility by public transport, and station accessibility by foot is also lower.

## 3.3 Distributional impact appraisal

### 3.3.1 Outcomes

#### **Equity baseline analysis**

The equity baseline analysis includes the following activities:

- Identification of priority groups.
- Description of existing structural inequalities to tackle in the area.
- Analysis of travel behaviours and preferences among different demographic groups.
- Equity analysis of the ALR CC2M corridor.
- 

A comprehensive summary of findings is presented in Appendix E-H.

#### **Distributional analysis**

A summary of findings of the DIA is presented in the table below.

Table 6 DIA preliminary findings

Impact	ALR	Intermediate Comparator
<b>User benefits</b>	The overall impact of user benefits for this is assessed as <b>moderate to large beneficial</b> . Moderate benefits are anticipated for all income quintiles, except for income quintile 4 (the second-lowest income group). This group appears to be most favoured as they are experiencing a proportionally greater share of the total population benefit. A moderate positive effect is anticipated for Māori, while a large benefit is foreseen for the Pacific community.	The overall assessment of user benefits for the intermediate comparator is appraised as <b>slight to moderate beneficial</b> . Overall, moderate benefits are expected for Māori and the lowest 20% of income earners, as the share of benefits aligns with their representation in the impact area. The distribution of benefits appears to favour the 20-40% income quintile (income quintile 4) and Pacific peoples. In contrast, income quintiles 3, 2, and 1 (the highest income earners) are projected to receive only slight user benefits.
<b>Affordability</b>	The overall impact of affordability is assessed as <b>slight beneficial</b> . There are overall benefits resulting from a reduction in vehicle operating costs; however, these benefits are not evenly distributed across the income quintiles. The lowest income quintile (income quintile 5) receives disproportionately substantial benefits, while income quintiles 4 and 1 (comprising the highest income	The overall impact of affordability for the intermediate comparator is assessed as <b>slight adverse</b> as vehicle operating costs increase due to increase in congestion near the scheme. There are disbenefits across all income quintiles and they are not distributed proportionally among the income quintiles. Income quintile four (second lowest income group) and income quintile one (highest

	<p>earners) receive comparatively modest benefits (slight benefits). All other income quintiles receive benefits in proportion to their share of the population (moderate benefits).</p>	<p>income earners) experience disproportionately large share of disbenefits. Income quintile five (lowest income earners) are anticipated to experience the lowest share of disbenefits (slight adverse). The remaining income quintiles experience disbenefits in line with their share of the population and thus their impact has been appraised as moderate adverse.</p>
<b>Noise</b>	<p>This option will deliver <b>neutral</b> noise impacts for all priority groups.</p>	<p>This option will deliver <b>neutral</b> noise impacts. It is anticipated that the intermediate comparator will generate more significant noise impacts given the scale of street-running intervention that is required. However, this assumption requires confirmation by a thorough noise model which can accurately quantify noise emissions and their effect on the surrounding environment and sensitive receptors.</p>
<b>Air quality</b>	<p>The overall impact of air quality is assessed as <b>moderately beneficial</b> for this option. Children, young adults and high-income earners are expected to experience moderate benefits resulting from a reduction in exposure to PM<sub>2.5</sub> and NO<sub>x</sub>. The impact for low-income earners is expected to be slightly beneficial.</p>	<p>The overall impact of air quality is assessed as <b>slightly beneficial</b> for the intermediate comparator. The impact is expected to be slightly less significant than ALR, primarily because there are fewer net winners in the impact area. Young adults and low income earners are expected to experience moderate benefits from a reduction in exposure to PM<sub>2.5</sub> and NO<sub>x</sub>. The impact is expected to be slightly beneficial for high income earners and children.</p>
<b>Safety</b>	<p>This option is expected to have a <b>moderately beneficial</b> impact on all priority groups including cyclists, pedestrians and wheeled pedestrians.</p>	<p>The overall impact of safety under this option is <b>moderately beneficial</b>. The intermediate comparator option is expected to have a mixed impact on priority groups, ranging from large beneficial to slight beneficial. For Pacific peoples, there is larger proportional impact (large beneficial) and for cyclists there is a smaller proportional impact (slight beneficial).</p>
<b>Severance</b>	<p>A <b>moderate positive</b> severance impact is anticipated for this option. The analysis of changes in motorised traffic suggests this option will have a neutral severance impact across all priority groups. The station-based assessment indicates that this option will yield a positive outcome in terms of severance reduction, with moderate beneficial impacts.</p>	<p>A <b>moderate positive</b> severance impact is anticipated for this option. Based on the analysis of changes in motorised traffic, the intermediate comparator is expected to have a slight beneficial impact for all priority groups, except for households without car access which are assessed as neutral. Analysis based on additional infrastructure indicates this option will generate moderate beneficial impacts, but the impact is anticipated to be slightly lower compared to ALR, particularly in the University area.</p>
<b>Security</b>	<p><b>Moderate security benefits</b> are expected under the separated option. 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. The effect on young adults is also expected to be moderately beneficial. The impact is only slightly beneficial for older people, given the relatively low proportion of elderly individuals that fall within the security impact area.</p>	<p><b>Moderate security benefits</b> are expected under the intermediate comparator option. While the relative performance of each security indicator is nearly identical to the separated option, the magnitude of benefit is expected to be slightly lower under the intermediate comparator. This is because a lower proportion of priority individuals falls within the security impact area, and because the separated option generates a slightly superior overall security benefit through greater anticipated improvements in the PT</p>

		journey between boarding and alighting stops.
<b>Accessibility</b>	A <b>moderate positive</b> effect is anticipated for the separated option. Low-income earners, carers and people with disability are expected to experience large benefits, while high income earners, female and Māori people 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.	The intermediate comparator will generate <b>slight positive</b> accessibility benefits. This option is expected to perform slightly worse than the separated option, as it does not provide the same level of benefit in terms of reaching jobs and accessing key destinations. Large benefits are expected for low-income earners, carers and people with a disability, while moderate benefits are anticipated for the highest 20% of income earners and females. Slight benefits are expected for young adults, households without a car and the Māori community. The impact on the Pacific community is appraised as neutral.

### 3.4 Non-monetised impacts

The key anticipated non-monetised impacts are qualitatively assessed in Table 19 below for ALR and IC:

Table 7: Assessment of non-monetised impacts

Impact	ALR	Intermediate Comparator
<b>Disruption from construction</b>	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, 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.	Street-running light rail would involve substantial disruption during construction in comparison to ALR. Some of this disruption will endure through right-turn bans for unsignalized roads and into driveways, parking removal and other spatial reallocation. The construction of IC will be across the whole street environment from Wynyard to the SH20 end of Dominion Road, where much of the route is lined with commercial properties. However, for the southern portion from Dominion Road/SH20 to Airport the disruption would be very similar to ALR given the two are common for much of the length.
<b>Jobs during construction</b>	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 Indigenous businesses participation (supplier-use). Several design KPIs have also contractually committed to engaging with Māori business during delivery. <sup>6</sup>	The construction of ALR is expected to create approximately 1,660 jobs during design, planning and construction. During the peak month of construction, active ALR jobs are estimated to amount to approximately 1,030.
<b>Jobs during operation</b>	The operation of ALR is expected to support approximately 400 jobs on an ongoing basis.	The operation of ALR is expected to support approximately 500 jobs on an ongoing basis.

<sup>6</sup> Refer to the Commercial Case for more details.





<b>Tourism</b>	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. <sup>7</sup>	The IC will also most likely delivery benefits to the tourism sector as demonstrated by international case study evidence <sup>7</sup> linking positive tourism impact with light rail investment.
<b>Foreign / inward investment</b>	ALR is likely to unlock foreign and inward investment along the corridor through improvements in accessibility, travel capacity, and associated agglomeration benefits. Evidence from international case studies, shows a strong relationship between light rail and inward investment. <sup>8</sup>	Supported by the case studies showing a strong relationship between light rail and inward investment <sup>8</sup> , IC is also likely to unlock foreign and inward investment along the corridor through improvements in accessibility, travel capacity, and associated agglomeration benefits.
<b>Additional capacity / future proofing</b>	Given its ability to increase frequency and train length, ALR caters for its projected patronage without significant crowding. Surplus capacity provides flexibility for future projects —allowing ALR to connect, integrate and service other routes (e.g. Auckland's North Shore).	Street-running light rail does not have the sufficient capacity to fully meet projected passenger demand for the full CC2M line. Although there are options to operate higher frequencies to cater for projected demand, this would reduce the frequency possible on other lines, as the two lines are assumed to join. This would require early investment in efforts to provide additional capacity not yet costed or tested, a network reconfiguration (e.g. different modes on different lines or disconnecting one of the lines), or an acceptance that the urban growth outcomes sought cannot be fully achieved.
<b>Resilience</b>	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.	Being on the surface, there is also potential for the service to be interrupted by external events (e.g. accidents, storm events), so be a less reliable system for users.
<b>Wider environmental impacts</b>	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.	A comprehensive identification and assessment of anticipated environmental impacts has not been prepared for IC.

## 3.5 Key risks and uncertainties

### 3.5.1 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 6.6.1 and 6.6.2. Table 20 briefly describes the five key sensitivities tests that were undertaken, with results of the analysis presented in Table 21.

<sup>7</sup> [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 \(2020\)](#)

<sup>8</sup> [Leading Light: What Light Rail can do for City Regions \(2021\)](#)

Table 8: Key ALR uncertainties and opportunities, and their associated sensitivity test

Key Uncertainty / Opportunity	Sensitivity test	Description
Population and employment growth	<b>Delayed benefits ramp-up</b>	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	<b>High Cost (P95)</b>	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	<b>Benefit Reduction</b>	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	<b>Benefit Increase</b>	A 5% increase in benefits across all benefit areas due to population and economic growth in Auckland exceeding baseline expectations.
Green-focused delivery	<b>Increased cost of carbon and low-carbon delivery</b>	A higher value based on The Treasury's CBAX Guidance is attributed to carbon emitted and reduced through the whole-life assessment of ALR (approximately double the core assessment value). Realistic opportunities to deliver lower embodied carbon through delivery are incorporated.

Table 9: ALR sensitivity analysis results

	Sensitivity test						
	User	Non-user	Land value uplift	WEBs	Total Costs	BCR <sub>n</sub> (with WEBs)	Anticipated SIA & DIA Impact
<b>Delayed benefits ramp-up</b>	\$8.3B	\$4.0B	\$3.7B	\$13.0B	\$12.6B	<b>2.3</b>	Slight negative
<b>High Cost (P95)</b>	\$8.6B	\$4.2B	\$3.7B	\$13.3B	\$14.3B	<b>2.1</b>	Broadly equivalent
<b>Benefit Reduction</b>	\$7.6B	\$3.3B	\$2.9B	\$10.7B	\$12.6B	<b>1.9</b>	Moderate negative
<b>Benefit Increase</b>	\$8.8B	\$4.4B	\$3.8B	\$14.0B	\$12.6B	<b>2.5</b>	Slight positive
<b>Increased cost of carbon and low-carbon delivery</b>	\$8.6B	\$4.3B	\$3.7B	\$13.3B	\$12.6B	<b>2.4</b>	Broadly equivalent

Table 10: IC sensitivity analysis results



<i>Sensitivity test</i>							
	User	Non-user	Land value uplift	WEBs	Total Costs	BCR <sub>n</sub> (with WEBs)	Anticipated SIA & DIA Impact
<b>Delayed benefits ramp-up</b>	\$5.3B	\$2.1B	\$3.2B	\$9.6B	\$9.0B	<b>2.2</b>	Slight negative
<b>High Cost (P95)</b>	\$5.9B	\$2.4B	\$3.2B	\$10.4B	\$14.5B	<b>1.5</b>	Broadly equivalent
<b>Benefit Reduction</b>	\$5.2B	\$1.9B	\$2.6B	\$8.3B	\$9.0B	<b>2.0</b>	Moderate negative
<b>Benefit Increase</b>	\$6.0B	\$2.5B	\$3.4B	\$10.9B	\$9.0B	<b>2.5</b>	Slight positive
<b>Increased cost of carbon and low-carbon delivery</b>	\$5.9B	\$2.4B	\$3.2B	\$10.4B	\$9.0B	<b>2.4</b>	Broadly equivalent