AIRPORT TO BOTANY RAPID TRANSIT AND 20CONNECT

SINGLE STAGE BUSINESS CASE

SOUTHWEST GATEWAY PROGRAMME

Document control record

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Contents

Appendices

Appendix	Name
Appendix A	Investment Logic Map
Appendix B	Long List Assessment
Appendix B-1	A2B Long List Assessment
Appendix B-2	20Connect Long List Assessment
Appendix C	Short List Assessment
Appendix C-1	A2B Short List Assessment
Appendix C-2	20Connect Short List Assessment
Appendix D	SWGP Benefits Realisation Plan
Appendix E	SWGP Staging Strategy
Appendix F	Engagement Summary
Appendix G	Network Operating Plan and Concept of Operations
Appendix G-1	SWGP Network Operating Plan
Appendix G-2	Concept of Operations
Appendix H	SWGP Demand Management and Local Access Assessment
Appendix I	Risk Register
Appendix J	Costs
Appendix J-1	A2B Cost Estimates
Appendix J-2	20Connect Cost Estimates
Appendix J-3	Opex, Maintenance and Renewal Costs
Appendix K	Economics
Appendix L	Joint Consenting Strategy
Appendix M	Property Strategy
Appendix M-1	A2B Property Strategy
Appendix M-2	20Connect Property Strategy
Appendix N	Design Philosophy Statement
Appendix N-1	A2B Preliminary Design Philosophy Statement
Appendix N-2	20Connect Design Philosophy Statement

Appendix	Name
Appendix O	Drawings
Appendix O-1	A2B Design Drawings
Appendix O-2	20Connect Scheme Drawings
Appendix P	Corridor Strategy
Appendix Q	A2B Medium Term Strategy
Appendix R	Botany Interchange Assessment
Appendix S	Botany Integration Options
Appendix T	Heavy Rail Option Summary
Appendix U	Transit Oriented Development Land Use Study
Appendix V	Covid 19 Sensitivity Technical Note
Appendix W	Kantar TNS Auckland Transport Airport Access Research Report
Appendix X	Other Technical Notes and Reports
Appendix X-1	502334-7000-REP-KK-0028 - High Level Walking and Cycling Station Access Assessment
Appendix X-2	502334-7000-REP-KK-0029 - Detailed Walking and Cycling Station Access Assessment
Appendix X-3	502334-7000-TEC-KK-0004 - Station Locations
Appendix X-4	502334-7000-TEC-KK-0024 - Demands and Mode for the Airport to Botany RTN Corridor
Appendix X-5	502334-7000-TEC-KK-0026 - Vehicle Specification and Fleet Procurement for RTN Corridor
Appendix X-6	502334-7000-TEC-KK-0027 - Potential Changes to Local Bus Network and Supporting Infrastructure in Response to A2B
Appendix X-7	502334-7000-TEC-NN-0032 - Equity Assessment
Appendix X-8	502334-7000-TEC-RR-0046 - Station Passing Lanes Assessment
Appendix Y	Peer Review

Figures

Tables

Glossary of acronyms and abbreviations

Acronym / abbreviation	Full term
A2B	Airport to Botany
AADT	Annual average daily traffic
AAPI	Auckland Airport Precinct Improvements
AFC	Auckland Forecasting Centre
AIAL	Auckland International Airport Limited
ANNA	Aircraft noise notification area
ANOP	Auckland Network Operating Plan
AUT	Auckland University of Technology
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
ATOC	Auckland Transport Operations Centre
AUP	Auckland Unitary Plan Operative in part
BCR	Benefit cost ratio
BRT	Bus rapid transit
CAS	Crash analysis system
CCTV	Closed-circuit television
CVA	Cultural values assessment
DBC	Detailed business case
DSI	Deaths and serious injuries
FTN	Frequent transit network
GDP	Gross domestic product
GPS	Government Policy Statement on Land Transport
H(#)	Horizon (number)
HANA	High aircraft noise area
HCV	Heavy commercial vehicle
Heritage NZ	Heritage New Zealand Pouhere Taonga
HOV	High occupancy vehicle
HUD	Ministry of Housing and Urban Development

Acronym / abbreviation	Full term
IAF	Investment assessment framework
IBC	Indicative business case
ILM	Investment logic map
KPI	Key performance indicator
LRT	Light rail transit
MANA	Moderate aircraft noise area
MBCM	Monetised Benefits and Costs Manual
MCA	Multi-criteria analysis
MES	Mana Whenua engagement strategy
MIT	Manukau Institute of Technology
MOU	Memorandum of understanding
MRT	Mass rapid transit
MSM	Macro Strategic Model
NIMT	North Island Main Trunk
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
NoR	Notice of requirement
NOP	Network operating plan
NPS-UD	National Policy Statement on Urban Development 2020
PBC	Programme business case
RCA	Road controlling authority
RLTP	Regional Land Transport Plan
RMA	Resource Management Act 1991
RPTP	Regional Public Transport Plan
RTC	Rapid transit corridor
RTN	Rapid transit network
SH(#)	State Highway (number)
SSBC	Single-stage business case
SPBC	Supplementary programme business case

Acronym / abbreviation	Full term
SPV	Special purpose vehicle
STAAI	Short-Term Airport Access Improvements
SUP	Shared use path
SVL	Special vehicle lane
SWGP	Southwest Gateway Programme
TCQM	Transit Capacity and Quality Manual
TOD	Transit-oriented development
PTOM	Public Transport Operating Model
WK	Waka Kotahi NZ Transport Agency
WRR	Western Ring Route

EXECUTIVE SUMMARY
Airport to Botany Rapid Transit and 20Connect

A step change in mode choice and access, while supporting growth and urban regeneration across southern and eastern Auckland.

The Airport to Botany Rapid Transit (A2B) and 20Connect projects aim to greatly improve multi-modal access for South and East Auckland (which includes some of Auckland's most socio-economically deprived communities). The projects also intend to significantly enhance access to Auckland Airport and major employment areas, while supporting urban regeneration and whole-of-Government investment in jobs, housing and education in Manukau Central. A2B, led by Auckland Transport, and 20Connect, led by Waka Kotahi, are part of the wider multi-modal Southwest Gateway Programme (SWGP). Proposed improvements by Auckland Airport complete the SWGP and are not specifically covered by this business case.

The programme area covers the Puhinui Precinct which is of high cultural value to Mana Whenua, in particular Te Ākitai Waiohua. To reflect the significance of the area to Te Ākitai Waiohua, the SWGP is based on a strong strategic partnership between four Programme Partners: Te Ākitai Waiohua, AT, Waka Kotahi and Auckland Airport.

This business case presents an effective, staged strategy that takes full account of uncertainties, particularly those arising from COVID-19 relating both to demand and funding availability.

The recommendation is in four parts:

- A fast, high capacity, reliable and frequent Bus Rapid Transit (BRT) connection (part of the Rapid Transit Network, RTN) on a direct alignment between Auckland Airport and Botany via Manukau (A2B)
- SH20B widened from four lanes (two general traffic and two transit lanes) to a four-lane expressway and rapid transit connection, while retaining at-grade intersections (A2B and 20Connect)
  - Includes a new south-facing SH20B to SH20 ramp with widening of SH20 southbound, south of SH20B
- A series of state highway improvements in the longer-term (20Connect):
  - A new SH20A to SH20 southbound ramp, including the widening of SH20A in the northbound direction from Kirkbride Road
  - SH20 widened by one lane between SH20A and Manukau Harbour Crossing in both directions
  - SH20 widened from four lanes to six lanes between SH20A and SH20B
- Improvements for active modes across the programme, including high quality, dedicated walking and cycling facilities alongside the SH20 corridor and for 18km alongside the entire A2B corridor
  - Improvements for active modes are also recommended as part of the access strategy to new rapid transit stations.
  - This business case supports immediate and urgent actions, as well as the longer-term, staged investment. Urgent actions are:
- **Route protection** - If a rapid transit Notice of Requirement is not lodged s7(2)(b)(ii) Prejudice to [redacted] on the southern side of the SH20B designation will expire s7(2)(b)(ii) [redacted] potentially leading to commercial / industrial development within the A2B corridor. s7(2)(b)(ii) Prejudice to [redacted]
- **A premium pre-rapid transit bus service** - Public transport service and bus infrastructure improvements connecting South and East Auckland are urgent as the accessibility, unreliability and travel choice problems already exist. Not responding to the unmet demand for public transport would be a lost opportunity, given the strategic importance of achieving mode shift to reduce carbon emissions and reduce transport and socio-economic disadvantage.

In its publication 'Arataki', Waka Kotahi has stated that there will be an ongoing need to support the COVID-19 recovery by improving access to people who cannot work from home, essential services for vulnerable communities, and transport disadvantaged communities, such as those in South Auckland, who are more likely to feel the economic impacts of COVID-19.

The Arataki publication, and the A2B COVID-19 Sensitivity technical note (Appendix V), have suggested that the effects of COVID-19 will be felt in the short term, and that there is currently little evidence to suggest that the effects will persist materially beyond two to three years. Given the medium to long term nature of the SWGP and the system of key decision points and gateways, there is little immediate need to vary the A2B and 20Connect programmes.

Background

The A2B and 20Connect Single Stage Business Case (SSBC) is the product of a joint programme involving programme partners Te Ākitai Waiohua, Auckland Transport (AT), Waka Kotahi and Auckland Airport. In 2017 the three Road Controlling Authorities (RCA's) produced the Airport Access Supplementary Programme Business Case which identified a suite of measures to improve access to Auckland Airport and its surrounding employment zones. This strategy led to the establishment of the multi-modal, integrated SWGP.

The first phase of the SWGP, the Short Term Airport Access Improvements (STAAI) is in the implementation phase and includes new transit lanes on SH20B, Puhinui Road, and Lambie Drive, a new frequent bus service ('AirportLink') between Manukau and the Airport via SH20B, cycling improvements in Māngere, and a new bus-train interchange at Puhinui Station to allow access to the wider Auckland region via the rail network (see Figure 0-1). It is scheduled to be completed in 2021. Although it will provide relief for immediate problems identified with the Airport to Manukau corridor, evidence suggests that additional medium and long term investment will be required to satisfy future demands along the corridor and within the surrounding network.

The drivers behind this joint SSBC are now wider than access to the Airport. In 2018, the Auckland Transport Alignment Project (ATAP) recognised the need for improved public transport connections in the southern and eastern Auckland areas. It promoted a rapid transit service through the A2B corridor that "links together southern and eastern Auckland and will provide an important connection to the rail network at Puhinui."

The subsequent ATAP publication, Better Travel Choices[1], also specifically identifies Manukau and Māngere as "priority locations for mode shift" due to these locations having "important growth locations and the need to improve socio-economic outcomes". The document has a strong focus on changing the modal choice away from private vehicles.

ATAP has similarly recognised the need for improved strategic road connections in the southern Auckland area linking to the Airport, specifically upgrades to SH20B to "maximise the corridor's productivity and provide reliable travel for the most critical users". The most critical users referred to in this context are buses, freight, and high occupancy vehicles.

The A2B project originated from analysis that showed a deficit in public transport provision serving multiple desire lines in South and East Auckland, with three metro centres and four existing and proposed rapid transit lines along the potential route.

A future rapid transit network without A2B (left side image, Figure 0-1) leaves a significant gap in the network. Within this gap lie some of Auckland's most socio-economically disadvantaged areas.

[1] Better Travel Choices (The Ministry of Transport, December 2019)

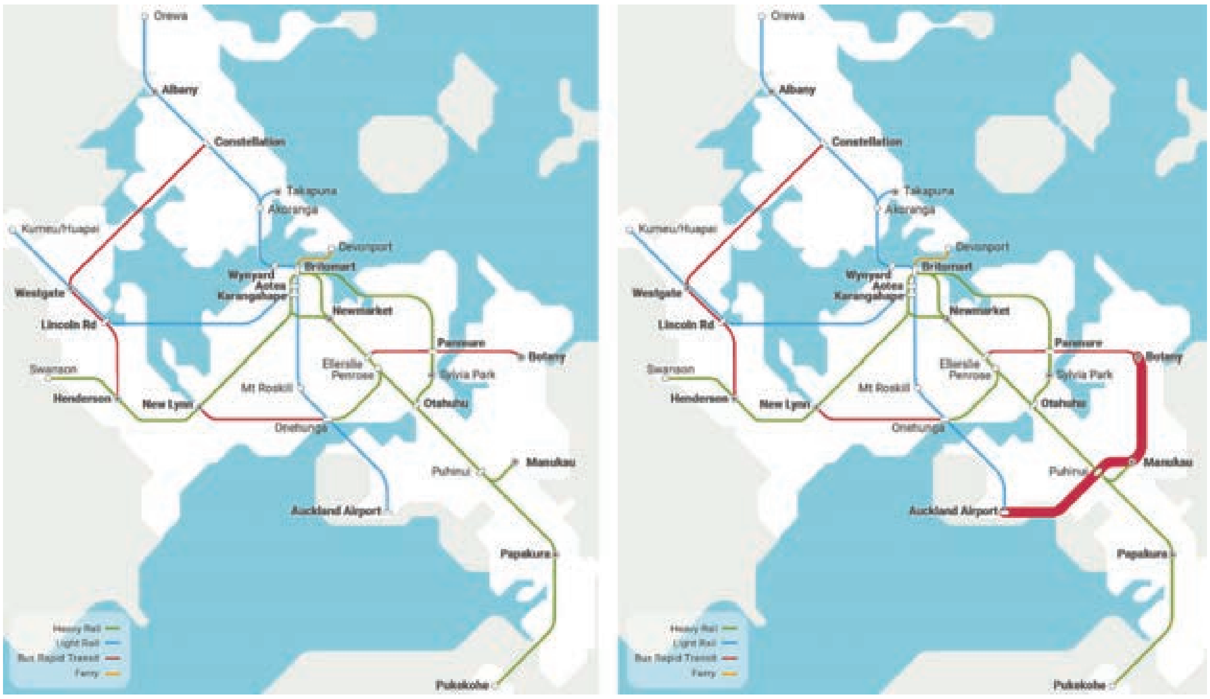

Figure 0-1: ATAP potential future RTN, excluding (left) and including (right, bold red line) the A2B corridor

Similarly, Waka Kotahi's network operating plan (NOP) identifies the need for investment in the SH20 road network over the next 30 years to achieve its desired network operational outcomes of improved safety, network resilience and overall network efficiency. The NOP promotes public transport and freight prioritisation on SH20B and protects the function of SH20 (to ensure network resilience with the Western Ring Route able to perform as an alternate route to SH1).

Strategic opportunities

The value of A2B and 20Connect is more than just as an important multi-modal transport investment. It has the opportunity to be an outstanding example of a combined land-use/transport project that can help uplift socio-economically deprived parts of southern and eastern Auckland for living, working, education and an improved quality of life; while also assisting wider government objectives, particularly in relation to climate change, housing and economic development.

There are four core opportunities:

- Filling a gap in the region's rapid transit network
- Improving access and travel choices in South and East Auckland
- Providing better access and travel choices to Auckland Airport, and the wider Airport precinct, to support Airport activities and economic growth
- Supporting affordable housing, growth and intensification - a whole-of-government opportunity.

In addition, the projects will be able to increase road safety on the network and reduce the risk of crashes.

Problem definition and objectives

The A2B and 20Connect projects respond to four broad problems that AT and Waka Kotahi have identified. The combined problem statements are:

- Costly, unreliable, long and complicated trips in South and East Auckland, including the Airport area, severely limiting accessible travel choices for people to meet daily needs for work, learning and socialising, reinforcing ongoing deprivation and resulting in unreliable movement of people and goods.
- Poor east-west travel choices as well as inadequate transport system capacity connections and management, to, from and within the study area constrain current and future growth, undermining economic growth and prosperity for Aucklanders.
- The current transport system in South and East Auckland has adverse environmental effects and does not recognise cultural identity and taonga, diminishing the Mauri of the area.
- Perceptions of poor personal safety limit uptake of public transport and active modes.

There is strong evidence to support these problem statements. The problems are shown to exist now, and with forecast growth in the southern growth areas, Manukau and the Airport area, they are expected to worsen over time.

The effects of COVID-19 have been considered. Assessments for Waka Kotahi and AT demonstrate that while demand may be curtailed, especially for Airport passengers, "no significant changes are expected in the nature, scale and location of transport demand over the medium to long-term. The 10-year outlook remains largely unchanged. "[2, 3]

The SSBC has adopted objectives and a suite of benefits that can be delivered by meeting these objectives as shown in Table 0-1. Refer to Appendix A for the Waka Kotahi SMART objectives.

Table 0-1: Investment objectives and benefits

Objective	Benefit
1) More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland, as well as the Airport area.	A2B/20Connect: More equitable access to jobs, learning, social activities.
2) Reliable, resilient and easy to use transport system in South and East Auckland that also forms a gateway to the region from Auckland Airport.	A2B: Travel is easier and more affordable. 20Connect: More reliable and resilient transport system.
3) To improve economic performance of the Airport area, Auckland and New Zealand	A2B: Economic potential and opportunity increased for all. 20Connect: A more prosperous Airport Precinct area, Auckland and New Zealand.
4) Transport network that enables the efficient movement of goods and people.	
5) Urban regeneration and improved built environment.	
6) Reduce impact of the transport system on the environment and taonga.	A2B: Local taonga enhanced. 20Connect: Local environment is protected and enhanced.
7) Safe and secure transport facilities in South and East Auckland.	A2B/20Connect: Healthier, safer people.

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[2] Arataki Version 2 - Potential Impacts of COVID-19 (Martin-Jenkins and Infometrics, May 2020)

[3] COVID-19 Sensitivity Technical Note (Appendix V)

Achieving these benefits is highly aligned with national and regional strategies and plans. Alignment with the Government Policy Statement on Land Transport[4] (GPS) is particularly strong with a focus on the following core areas:

- Access to economic and social opportunities
- Reducing the transport system's impact on the environment
- Improving safety in the transport system.

Options assessment

A comprehensive assessment was carried out and a range of potential options were tested on their ability to meet the objectives. Options were developed jointly between the two projects, as they are geographically and strategically interdependent.

Options included considerations across the intervention hierarchy:

- Integrated planning
- Demand management
- Making best use of existing network
- New infrastructure (new public transport routes, rapid transit, lanes, ramps etc).

The options assessment process included:

- An investigation into non-infrastructure strategic interventions, including various forms of travel demand management
- An initial sieve of candidate technologies for the rapid transit component
- An initial sieve of new infrastructure strategic interventions for the highway component
- Long list options assessments for both the rapid transit and highway component
- An integrated short list options assessment, looking at the rapid transit and highway components jointly, resulting in a recommended route for A2B and a set of highway improvements for 20Connect
- An assessment of local bus network options to integrate with future rapid transit
- Assessments of station locations, a Botany interchange and active mode provisions, including walking and cycling
- A detailed assessment of operating modes and vehicle technologies for the rapid transit.

A multi-criteria analysis (MCA) approach was used for the long list and short list assessments, which comprised three assessment groups:

1) Transport planning
2) Social, environmental and cultural effects
3) Engineering feasibility

A detailed assessment against key performance indicators (KPIs) was augmented with consideration of the needs of the specific customers in the study area which was supported by direct engagement with customers and communities by AT and Waka Kotahi prior to confirmation of the recommended option.

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[4] Government Policy Statement on Land Transport, Ministry of Transport, 2018

Recommended option

The recommended option (Figure 0-2) combines a bus rapid transit line between the Airport and Botany with infrastructure improvements to the state highway network (including SH20, SH20A and SH20B), connecting important economic hubs (Airport precinct, Manukau and Botany urban centres) as well as residential areas. The rapid transit line accommodates accessible stations which serve its communities, whilst the state highway improvements help to maintain acceptable access to the Airport precinct and safeguard the long-term role of the Western Ring Route. Together, alongside active mode improvements across the SWGP, the projects will provide significant benefit to locals and visitors to the area.

Figure 0-2: Recommended option summary diagram

The key features of the A2B recommended option are:

An **18 km rapid transit route** connecting the Airport and its employment areas with two major urban centres (Manukau and Botany). The route connects to four existing and proposed rapid transit lines and 24 local bus services, some of which intersect multiple times, resulting in more connections and increasing the variety of public transport opportunities for customers in South and East Auckland.

The preferred option for the rapid transit is a BRT system that can be scaled to meet demand as it grows and includes:

- Dedicated running ways, with at-grade intersections
- Twelve stations with off-board ticketing, level boarding and all-door boarding (all provided to reduce vehicle dwell times, and more reliable and accessible services)
- Connections to four existing and proposed rapid transit lines, including the proposed City Centre to Māngere (CC2M) LRT at the Airport.

- A single bi-directional service between the Airport and Botany (designed with flexibility to incorporate future additional services) with headways of as short as three minutes during peak times
- Fast, reliable journey times of 37-43 minutes (Airport to Botany) and 34-38 minutes (Botany to Airport)
- Potential to promote and support transit-oriented development at key centres

Figure 0-3 and Figure 0-4 illustrate the recommended mode of operation for the rapid transit component. The span of service is proposed to be as long as possible to meet the needs of shift workers and travelers.

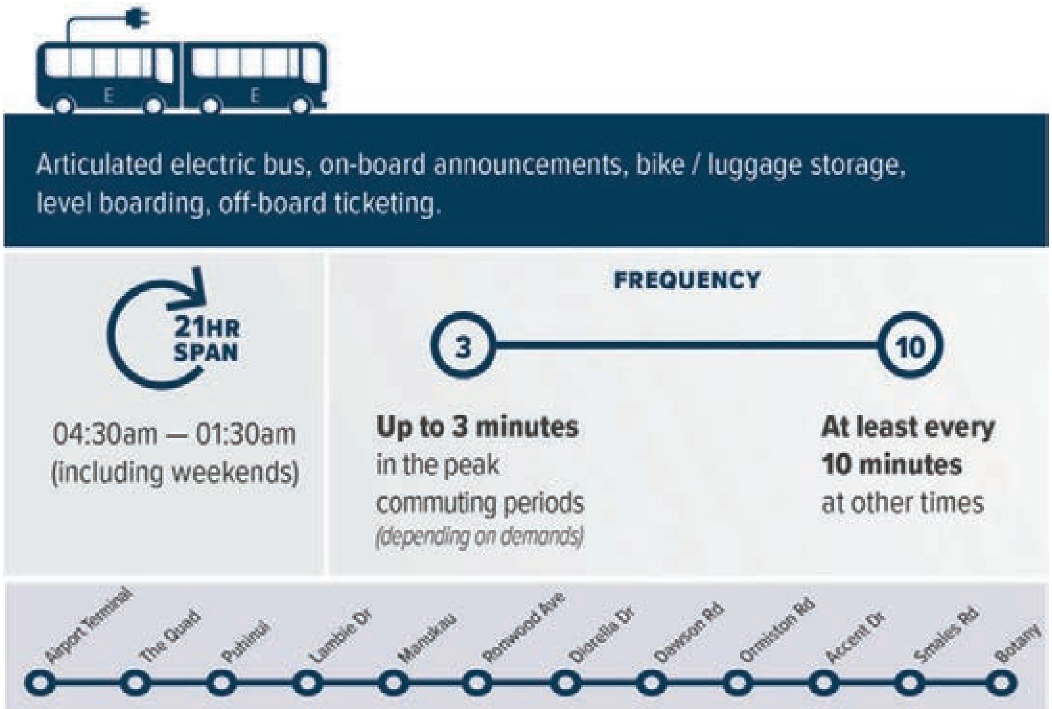
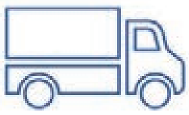


Figure 0-3: Summary of the A2B service

Figure 0-4: An example of a modern, low-floor BRT vehicle

The recommended A2B option comprises the following active mode elements:

- A **separated walking and cycling route** along the entire corridor, running parallel with all upgraded sections of the route.
- **Walking, cycling and multi-modal** interventions and opportunities, including bike storage facilities and footpath improvements, providing quality access to stations and potential expansion to further improve accessibility in the area.



State highway infrastructure improvements, which include improvements to SH20 (between Māngere Bridge and Manukau), SH20B and the northern section of SH20A. These improvements will provide for more general traffic and freight movements, including those traversing the strategically significant Western Ring Route, reduce the use of local roads and protect access to and around the Airport and Southwest Auckland.

The preferred option for the highway elements of the A2B and 20Connect includes the following treatments:

- Widening SH20B to 4 lanes expressway with at-grade intersections and operating on the existing alignment. In particular, the SH20B section includes:
  - The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge within the Airport RCA area, to cater for predicted growth and development in the southeast
  - Rapid transit corridor on the south side of SH20B, enabling the rapid transit route
- New SH20B to SH20 southbound ramp at Puhinui motorway Interchange (includes widening of SH20 south of SH20B southbound to Lambie Drive), removing a significant movement conflict point between general traffic and rapid transit – resulting in improved journey reliability
- New SH20A to SH20 southbound ramp (includes widening of SH20A northbound from Kirkbride Interchange) removing general traffic and freight from local roads in Māngere
- Widening SH20 north of SH20A to eight lanes, improving journey time reliability on the Western Ring Route
- Widening SH20 between SH20A and SH20B to six lanes, to better integrate the new SH20A to SH20 ramp and improve resilience of the network

A staged delivery strategy, enabling access and travel choice problems that exist now to be addressed early, investment to be aligned with related projects and capacity and performance to be matched with growth in demand.

The staged investment approach proposed is adaptive, allowing for ongoing assessment and consideration of any future unforeseen impacts arising from COVID-19.

The staged delivery strategy is split into five horizons, which each have indicative completion years, as summarised below:

- Horizon 1 (H1) (2021) – Short-term Airport Access Improvements (STAAI) and SH20B Early Improvements, including the Puhinui Interchange upgrades and early bus priority interventions on SH20B, Puhinui Road and Lambie Drive, Māngere cycling improvements, and the introduction of an ‘AirportLink’ bus service between the Airport and Manukau. These works are considered part of the do-minimum for this SSBC.

- Horizon 2 (H2) (2025) – A2B medium term premium bus service – a premium pre-rapid transit connection supported by relatively low capital-investment bus priority interventions, particularly between Manukau and Botany, to extend the 'AirportLink' bus service from Airport to Botany, with stations established at their long term locations prior to their upgrading and completion in Horizon 4.
- Horizon 3 (H3) (2030) – Opening of the A2B rapid transit service - targeted infrastructure upgrades on SH20B and SH20 south of SH20B to Manukau, including a four-lane expressway, a dedicated busway on SH20B, a shared path along SH20B, a new southbound SH20B to SH20 connection, a bridge for A2B over the rail lines at Puhinui, and ultimate A2B busway infrastructure and two stations in Manukau City Centre to support central and local government urban regeneration initiatives. Also includes Botany Station Stage 2 upgrade.
- Horizon 4 (H4) (2035) – Full A2B rapid transit service and infrastructure. Dedicated running way for BRT between SH20/SH20B interchange and Botany. Establishment of new A2B stations between Manukau and Botany and at Lambie Drive. Walking and cycling facilities extended to Botany.
- Horizon 5 (H5) (2040) – SWGP final implementation – completion of the SH20 and SH20A upgrades, which involves highway widening and a new southbound SH20A to SH20 connection. Shared path alongside SH20, between Māngere Bridge and SH20B.

Figure 0-5 and Figure 0-6 illustrate the interventions proposed as part of the recommended option, and the proposed staged delivery strategy.

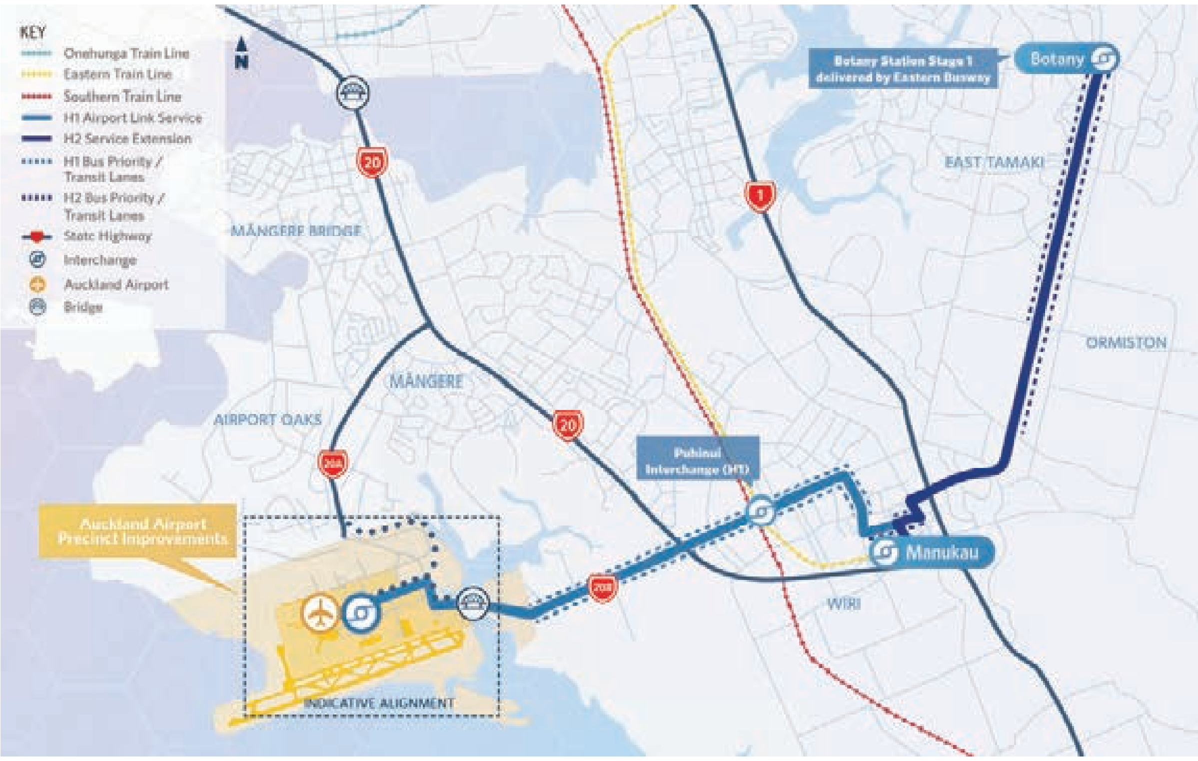


Figure 0-5: H1 and H2 service and infrastructure interventions

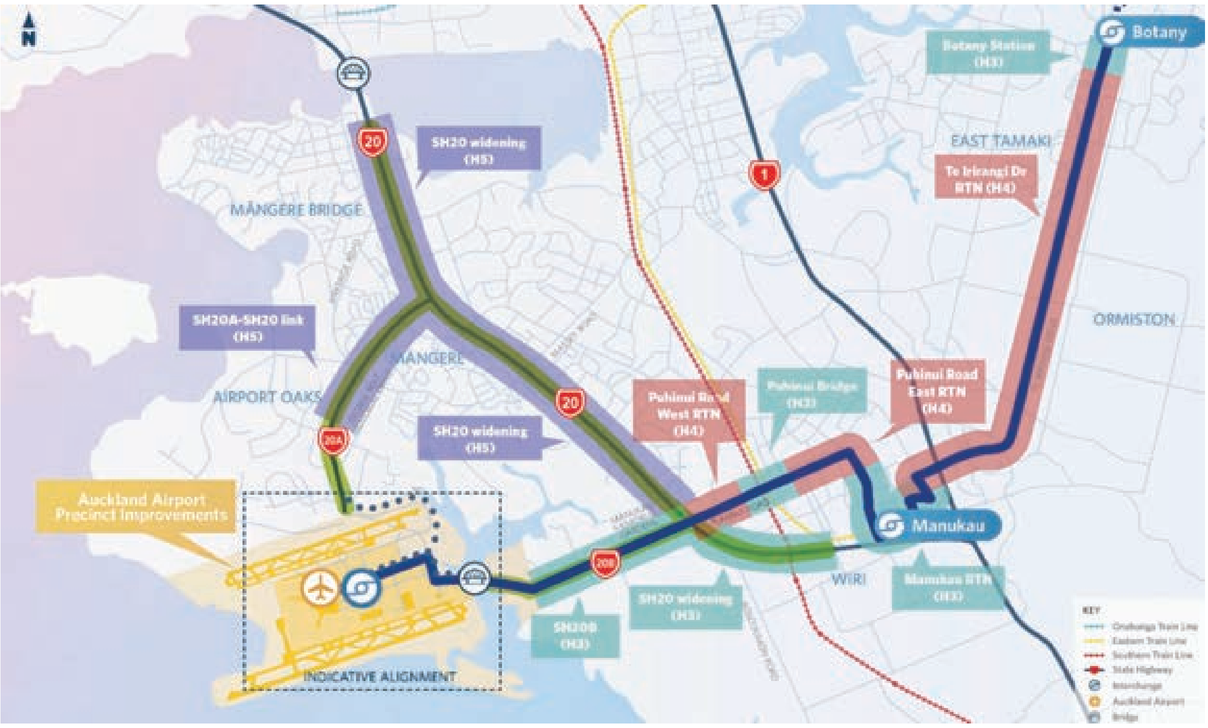


Figure 0-6: SWGP components and proposed horizons (labelled H3-H5)

Benefits of the recommended option

The recommended option is a staged, multi-faceted strategy that provides the following outcomes:

Figure 0-7: Outcomes delivered by the SWGP recommended option

A flexible strategy that can respond to changes in demand

- The strategy leads with rapid transit interventions, aiming to induce mode shift away from private vehicles and towards public transport
- BRT can be staged and delivered over time as demand and need for system performance grows
- 20Connect infrastructure and related strategic interventions can be staged and delivered over time as demand and need adapt to changes in the network
- 20Connect designs are resilient and future-proofed, considering the planned investment in the strategic road and rapid transit network in the area (including City Centre to Māngere, Supporting Growth, Connected Communities and Auckland Airport projects)
- The strategy can accommodate faster or slower than expected growth without over-investment and recognises the uncertainties in a post-COVID-19 environment
- The rapid transit system has enough spare capacity at the end of current forecasts in the late 2040s for 20% higher growth than forecast, as illustrated in Figure 0-8.

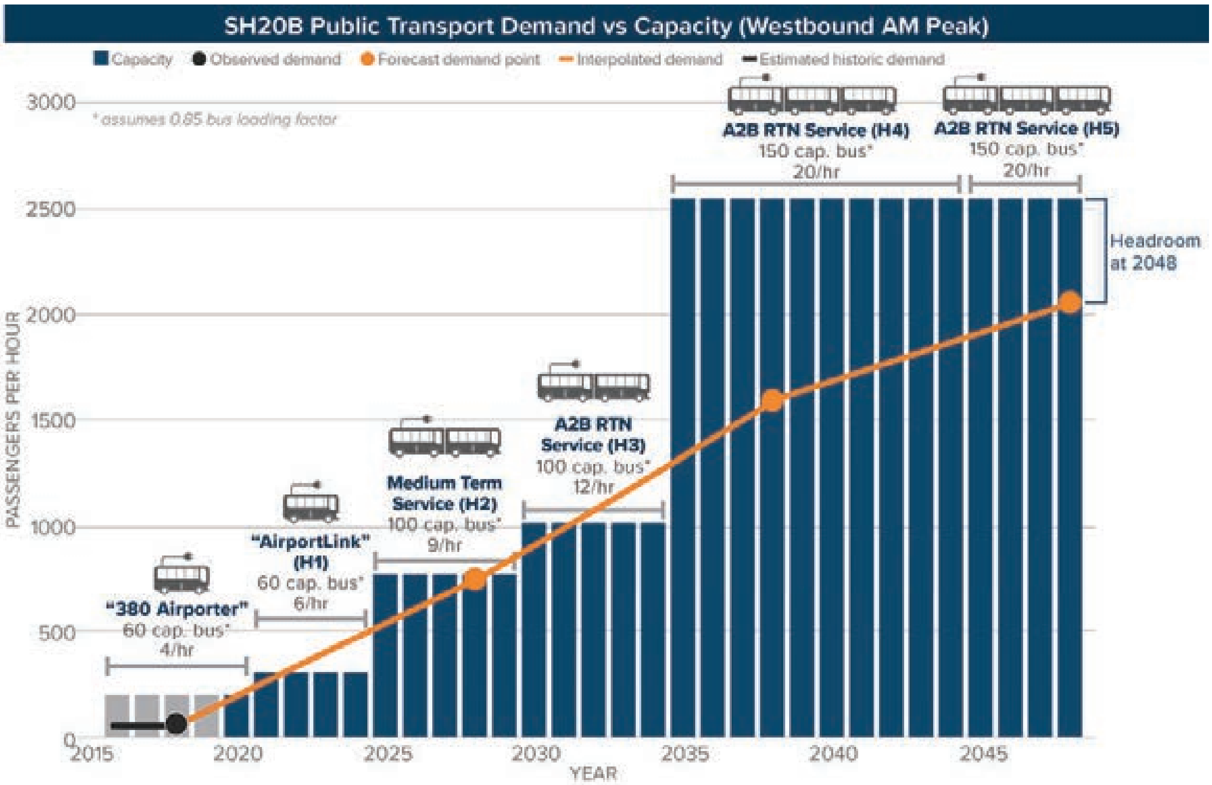


Figure 0-8: SH20B public transport demand vs capacity westbound AM peak (patronage: MSM i11.5)

- The design allows for the potential adaptation to light rail so that the rapid transit system can handle even higher growth in the long term
- Selected stations, where additional flexibility for future network scenarios may be required, have been designed with sufficient space to accommodate more than one vehicle, and for vehicles to pass each other.

A step change in access for Auckland Airport and its employment areas

Auckland Airport and its surrounding area is a nationally significant economic driver and regionally significant employment zone. In 2019, approximately 12,000 people were employed within the Auckland

Airport Precinct, and just under 29,000 were employed in the wider Auckland Airport industrial area.[5] By 2048, it is forecast that 16,600 people will be employed within the Airport precinct area.[6] In 2020, Auckland Airport was New Zealand's second largest import port by value behind the Port of Auckland, and New Zealand's second largest export port by value behind the Port of Tauranga.[7] The ability for employees, visitors and freight to travel efficiently to and from the area is an important consideration for economic productivity.

- A2B and 20Connect increases the volume of traffic able to access the Airport from approximately 8,000 to 10,000 in the peak 2-hour period, including 700 freight vehicles, enabling growth of the key Southwest Auckland commercial areas.
- A2B will bring an additional population of 269,000 to within 45 minutes public transport travel from the Airport in 2048. 20Connect will increase the population catchment within a 30-minute drive of the Airport in 2048 by 40,000.
- A2B will bring an additional 203,000 jobs to within 45 minutes public transport travel from the Airport in 2048. 20Connect will increases the number of jobs within a 30-minute drive of the Airport in 2048 by 40,000.
- A2B contributes to an estimated 2048 am peak public transport mode share to the Airport of around 40%, freeing up road space for critical users, including high value freight and high occupancy vehicles.
- A2B will significantly reduce travel times and the variability in times for bus journeys to and from key centres in South and East Auckland (including the Airport). In many cases, public transport will be competitive with, if not better than, comparative car journeys at peak times, as shown in Figure 0-9 below.

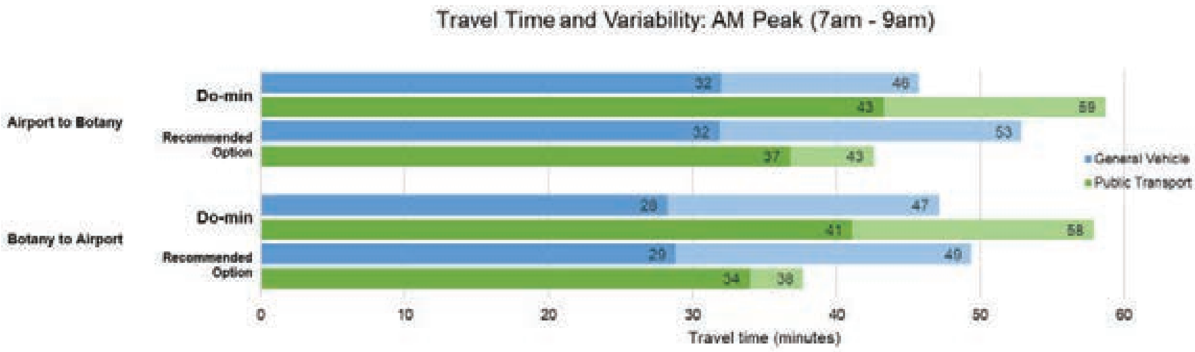


Figure 0-9: A2B travel time and variability

- 20Connect accommodates the A2B rapid transit project along SH20B, increasing travel choice along this key corridor. The SH20B to SH20 southbound ramp provides space and capacity within the interchange for the A2B rapid transit corridor.
- 20Connect is expected to significantly reduce journey times on SH20, SH20B and SH20A. In particular, the transit lanes along SH20B are predicted to result in travel time savings of 20 minutes

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[5] Statistics NZ Business Demographic Database

[6] Based on Auckland Council's Land Use Scenario i11.5

[7] Statistics NZ: Exports for Overseas Cargo (fob NZ$): New Zealand Port by Country of Destination, Commodity (HS2) and Period; and

Imports for Overseas Cargo (cif NZ$): New Zealand Port by Country of Origin, Commodity (HS2) and Period for the route between the Airport and south of Roscommon interchange via SH20B and SH20, in the evening peak period in 2048.

- A2B provides capacity for up to ~2,500 passengers per hour in each direction post 2045 (see Figure 0-8). With the maximum demand (ie patronage) forecast at approximately 2,000 passengers per hour in 2048, there is substantial room for further growth.
- New SH20A southbound ramp results in redistribution of 30% of traffic from Massey Road (proxy for local roads) onto the state highway network, including freight, improving safety for vulnerable users and reduced severance from traffic on local streets.
- Southbound freight movements from Airport Oaks area travel through three signalised intersections instead of eight, improving reliability for high value freight.
- High occupancy vehicle lanes can further support travel behaviour change within the southwest, by encouraging people to move more efficiently and thus increase people throughput on key corridors (such as SH20B).

Better access to jobs and education for South and East Auckland

- A2B creates a connection between four existing or proposed rapid transit lines, four frequent bus routes and multiple local routes, all at specifically designed interchanges, increasing travel choices.
- A2B will allow an additional 27,000 Aucklanders to be within a 10-minute walk of a rapid transit station by 2048, enabling them to make connected journeys across all of Auckland.
- The service will connect major catchments directly to metropolitan centres in Botany and in particular Manukau with its two tertiary education campuses, employment, social services, retail and cultural opportunities.
- A2B will significantly reduce travel time. With A2B, the 2048 AM peak travel time from Botany to the Airport via public transport is expected to improve from 41-58 minutes with the do-minimum to 34-38 minutes with the recommended option, resulting in a more reliable journey and a travel time saving between 7 and 20 minutes.
- The service will bring more jobs within easy public transport journeys for employees and customers and labour within easy reach of businesses. A2B will allow an additional 9,000 jobs to be within 1km of a rapid transit station by 2048.
- Figure 0-10 and Figure 0-11 show the considerable increase in 45-minute public transport catchments by 2048 for various stations with and without A2B and 20Connect. The most significant increases are projected to be observed by those stations not served by the do-minimum public transport route, including Lambie Drive Station, whose location is projected to be accessible to over double the amount of people and jobs within a 45-minute public transport trip with A2B and 20Connect (~370,000 population without A2B and 20Connect compared to ~810,000 with A2B and 20Connect, and ~210,000 jobs without A2B and 20Connect compared to ~460,000 with A2B and 20Connect).

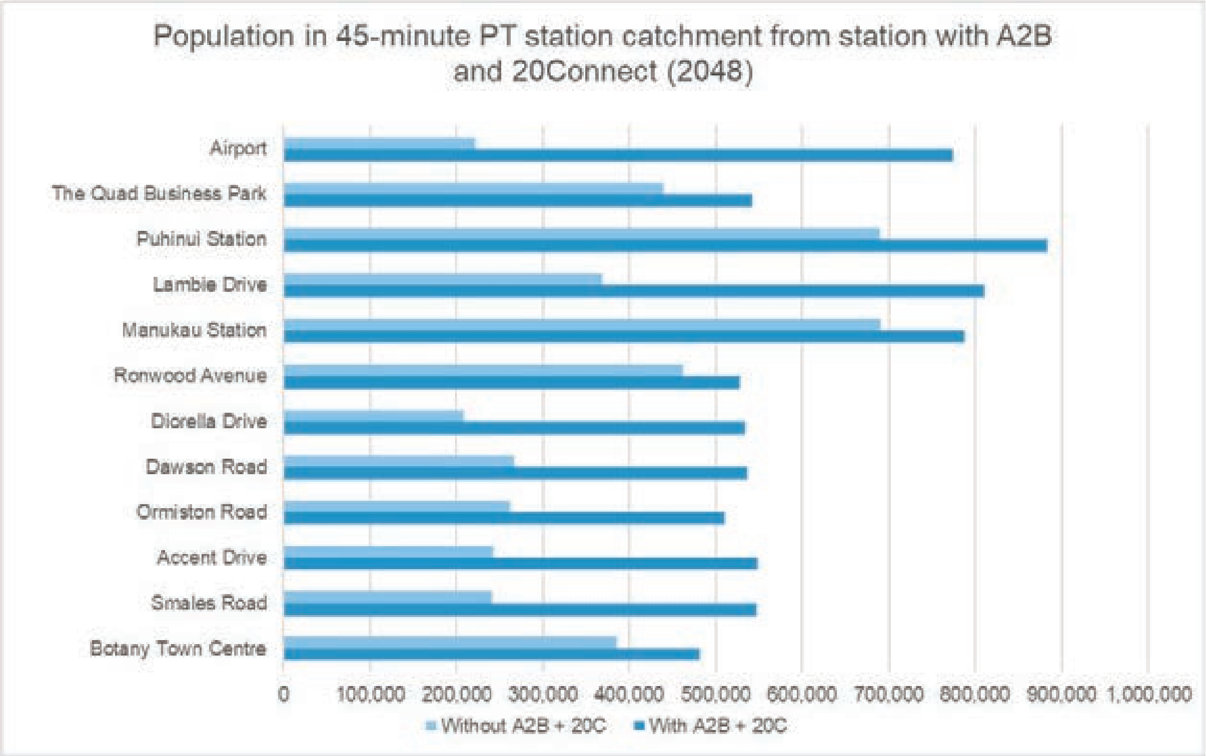


Figure 0-10: Difference in population in 45-minute public transport station catchment (i11.5)

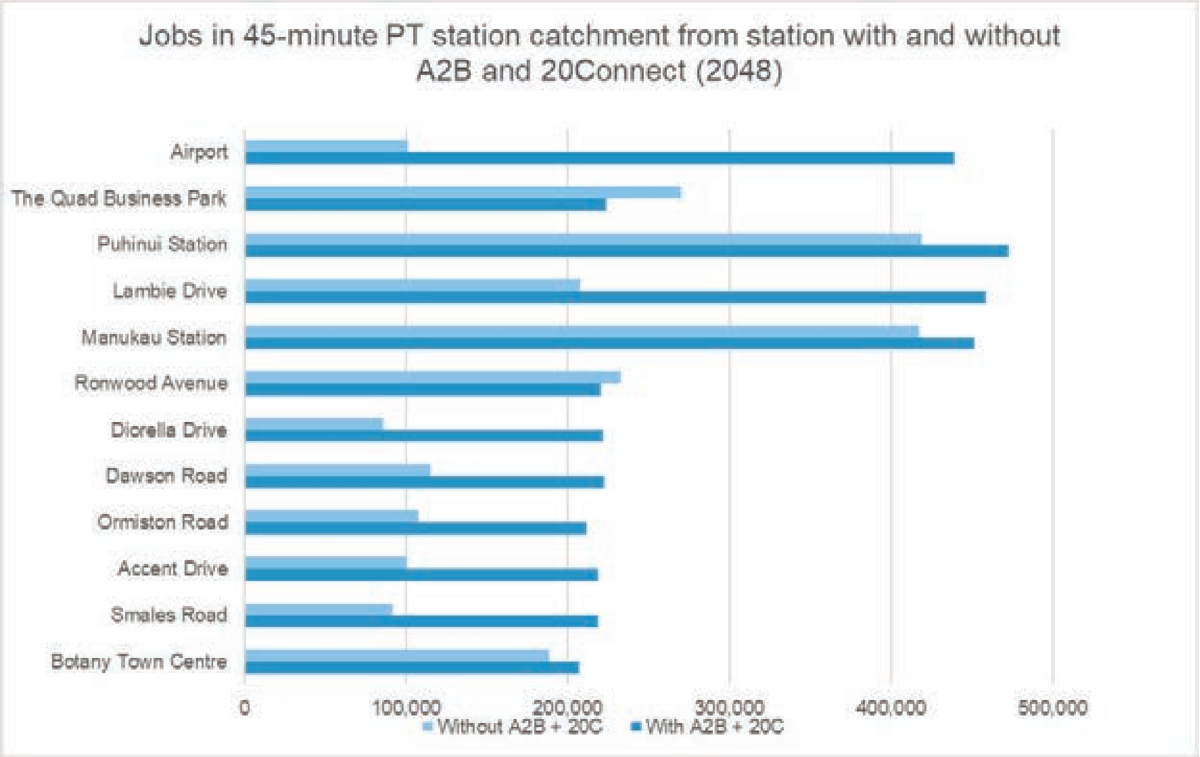


Figure 0-11: Difference in number of jobs in 45-minute public transport station catchment (i11.5)

- Figure 0-12 and Figure 0-13 illustrate the changes in 45-minute public transport catchments for the Airport, Botany, Manukau and Ormiston with the inclusion of A2B rapid transit. Manukau and Botany will be accessible to an additional 98,000 (18% increase) and 87,000 (19% increase) people within 45 minutes by public transport respectively.

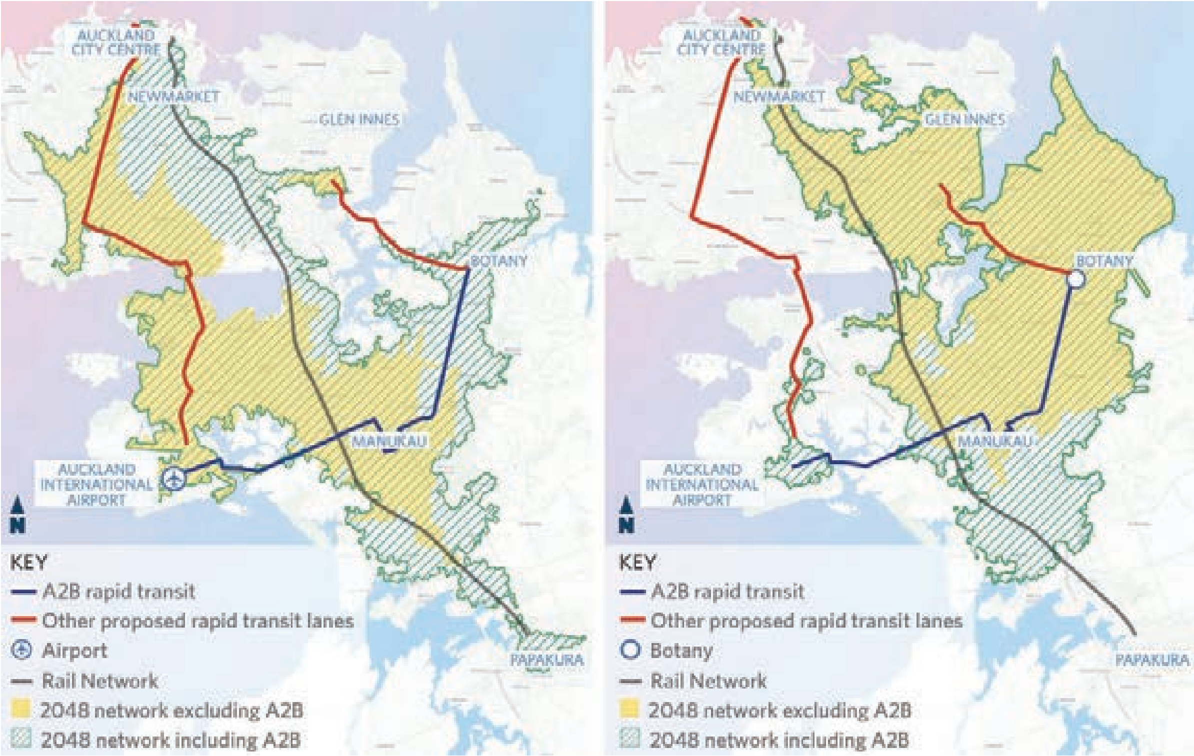


Figure 0-12: Change in 45 minute public transport catchment for Auckland Airport and Botany with and without A2B

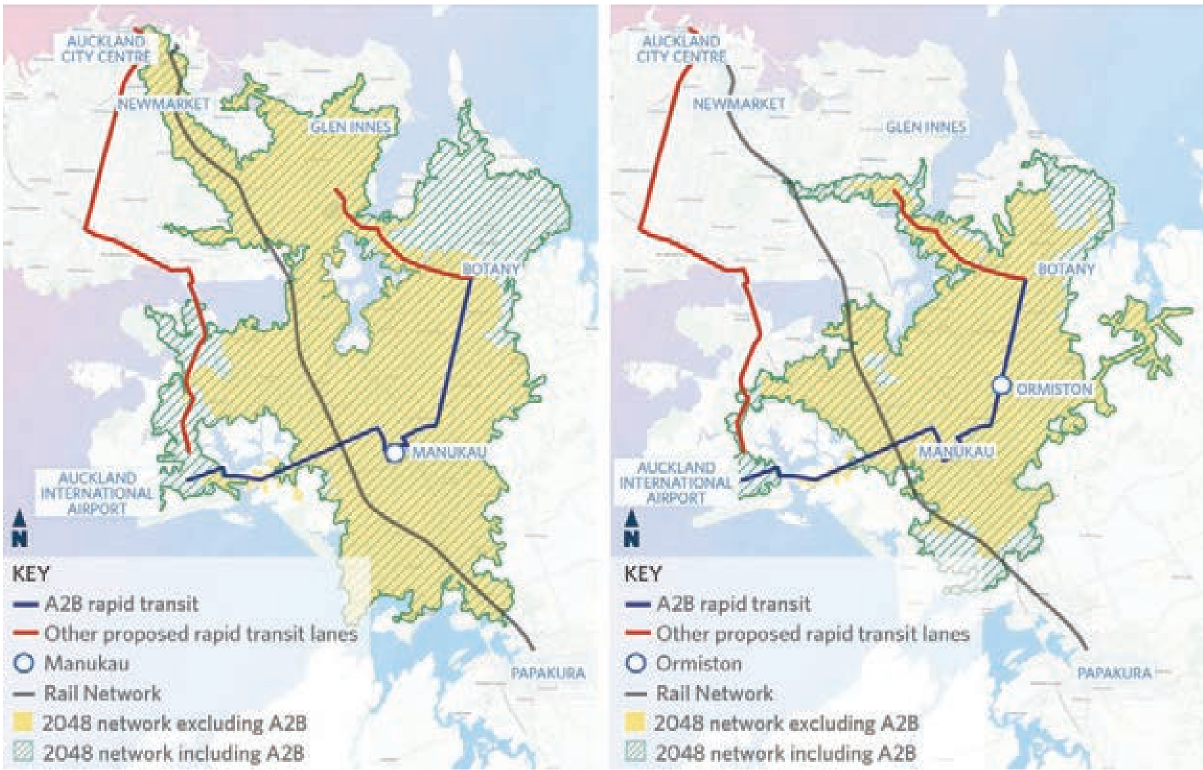


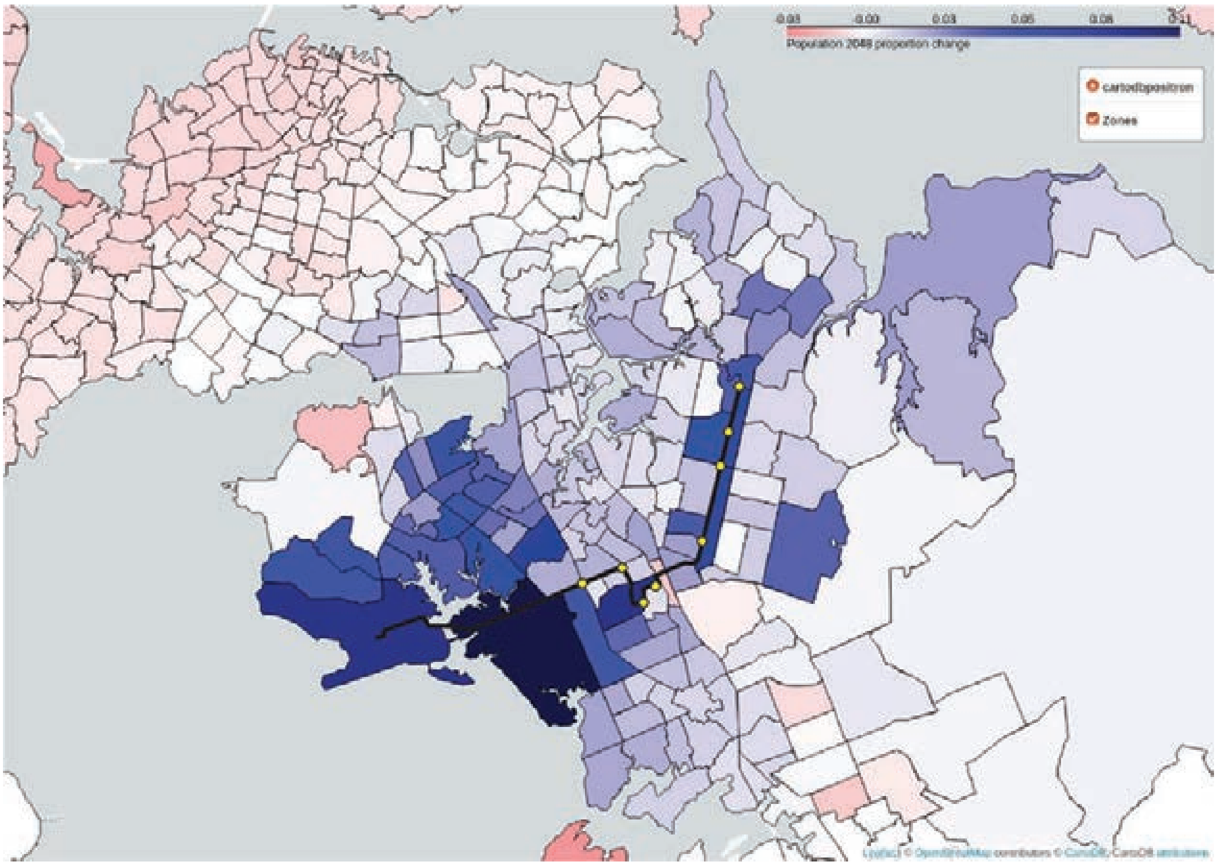
Figure 0-13: Change in 45 minute public transport catchment for Manukau and Ormiston with and without A2B

- Opportunities for urban regeneration and support for whole of Government investment

- A2B will provide access and urban realm improvements to support $3.6 billion[8] investment over the next 25 years in Manukau by Government agencies in housing, education and employment as well as the private sector in accommodation, retail and employment.
- Possible population increases of up to 11% near some stations by 2048, through opportunities for transit-oriented development, as illustrated in Figure 0-14.
- A2B and 20Connect will support growth, housing and intensification in South and East Auckland. As an example, Botany, the regional centre for East Auckland, is forecast to grow from 130,000 people (currently living there) to 160,000 by 2048.[9] Another example is Manukau, where the residential population is expected to increase from around 6000 households currently to 10,500 by 2048.

Safe, comfortable and more equitable travel and urban environments

- The service design will be simple, legible and easy to use for visitors from the Airport, new users and infrequent users
- The service will open up travel options for people of all ages and abilities through provision of level boarding, low-floor accessible vehicles and accessible stations
- The design considers all arrival modes at all stations to ensure that access, safety, customer experience and equity benefits can be realised.
- The design provides for safe station environments with CCTV, help points, passive surveillance and good lighting.



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[8] Figures provided by Kāinga Ora, April 2020

[9] Auckland Plan 2050 (Auckland Council, June 2018)

Figure 0-14: 2048 i11.5 + A2B and 20Connect projected proportional population change by MSM zone

Ensuring the Western Ring Route retains its strategic function

- The 20Connect design will support the intended function/objective of the Western Ring Route, by maintaining a reliable alternative to SH1
- The design will provide more direct connections and improved travel time reliability on the state highway network and greater network resilience

Reduced impacts on the environment and potential cultural benefits

- Forecasts suggest that the effects of A2B and 20Connect combined will result in a reduction of approximately 8 tonnes of CO_2 emissions annually in 2048, down to 2,893,305 tonnes (comparing the Horizon 5 and do-minimum model outputs).
- The A2B service will use efficient electric vehicles with signal pre-emption resulting in low energy consumption
- New shared use paths and fully separated dedicated cycling and walking facilities will further develop and connect the walking and cycling network in South and East Auckland.
- The design provides for treatment of stormwater runoff from all carriageways, including existing untreated carriageways, resulting in an improved overall water quality outcome.
- Potential opportunities for cultural benefits to be achieved, including through:
  - The incorporation of Māori design elements and cultural identity in rapid transit stations, and other new infrastructure
  - The provision of signage and information along shared use corridors and the rapid transit service regarding cultural identity and history
  - The treatment of all water runoff, which is an issue of particular importance to Iwi.

Costs

The P50 and P95 costs of the recommended option are summarised in Table 0-2 and Table 0-3 below.

Table 0-2: A2B / 20Connect costs by project phase and horizon, P50 Estimate ($M, undiscounted)

Phase / Horizon	Costs, P50 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Route Protection and Resource Consents	[redacted] s7(2)(b)(ii) Prejudice to commercial position			
Early Property Acquisition				
Property Acquisition (Horizon 3-5)				
Horizon 2 Construction				

Phase / Horizon	Costs, P50 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Horizon 3 Construction	[redacted]			
Horizon 4 Construction	[redacted]			
Horizon 5 Construction	[redacted]			
Sub Total AT (excl. 5.7% admin cost)	[redacted]			
Sub Total Waka Kotahi	[redacted]			
Total (excl. 5.7% admin costs)	[redacted]			
AT 5.7% admin cost	[redacted]			
Total (incl. 5.7% admin cost)	[redacted]			

s7(2)(b)(ii) Prejudice to commercial position

Table 0-3: A2B / 20Connect costs by project phase and horizon, P95 Estimate ($M, undiscounted)

Phase / Horizon	Costs, P95 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Route Protection and Resource Consents	[redacted]			
Early Property Acquisition	[redacted]			
Property Acquisition (Horizon 3-5)	[redacted]			
Horizon 2	[redacted]			
Horizon 3	[redacted]			
Horizon 4	[redacted]			
Horizon 5	[redacted]			

s7(2)(b)(ii) Prejudice to commercial position

Phase / Horizon	Costs, P95 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Sub Total AT (excl. 5.7% admin cost)	s7(2)(b)(ii) Prejudice to commercial position [redacted]			
Sub Total Waka Kotahi	[redacted]			
Total (excl. 5.7% admin costs)	[redacted]			
AT 5.7% admin cost	[redacted]			
Total (incl. 5.7% admin cost)	[redacted]			

The P50 and P95 total costs for A2B (up until Horizon 4), with AT and Waka Kotahi proportions, are shown in Table 0-4 and Table 0-5 below.

Table 0-4: A2B cumulative (up until Horizon 4) P50 costs

Organisation	Costs, P50 Estimate ($M pa, undiscounted)	
	Excl. AT 5.7% admin	Incl. AT 5.7% admin
AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]	[redacted]
Waka Kotahi	[redacted]	[redacted]
Total	[redacted]	[redacted]

Table 0-5: A2B cumulative (up until Horizon 4) P95 costs

Organisation	Costs, P95 Estimate ($M pa, undiscounted)	
	Excl. AT 5.7% admin	Incl. AT 5.7% admin
AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]	[redacted]
Waka Kotahi	[redacted]	[redacted]
Total	[redacted]	[redacted]

Cost effectiveness

The Benefit Cost Ratios (BCR) of A2B and 20Connect have been developed jointly as the two are inseparable from an implementation and benefit realisation perspective. The BCR is 2.5 for the A2B rapid transit and SH20B sections and 3.0 for the full programme, including the later state highway components (Horizon 5).

Assessment profile

The Investment Assessment Framework (IAF) for 2018-2021 considers that any rapid transit investment that “enables a substantial increase in access to social and economic opportunities for large numbers of people along dedicated key corridors and enables transit-oriented development” should be considered “very high” in its rating. A very high results alignment means that the rapid transit components are automatically ranked as Priority one.

While the SH20 and SH20A elements of the SWGP can apply to many of the criteria, the major justifications for the high ranking are “*addresses a significant resilience risk to continued operation of key corridors*” and *“makes best use of key corridors that prioritise multi-modal use and freight*”. With a high results alignment and a BCR for Horizon 5 of 3.0, the priority is 4/5.

Treaty partners

Mana Whenua are a Treaty Partner and have been engaged for the SWGP via the AT Southern Table hui throughout the development of the SSBC. The study area, particularly in the vicinity of SH20, SH20A and SH20B is particularly sensitive to Mana Whenua as there are archaeological sites, areas of cultural significance, land with Māori Reserve status, with the corridors intersected by freshwater watercourses and the Coastal Marine Area (that has been surveyed as extending further south of the Waokauri Creek Bridge than as depicted in Auckland Unitary Plan maps), and covered by extents of Significant Ecological Area – Marine and Sites of Significance to Mana Whenua.

Urgency

While there is a long term, staged implementation plan proposed, there are a series of reasons that urgent action is taken to advance elements of the SWGP. In a strategic sense, there is urgency as the problems identified have generally been shown to apply now and in fact, historically. Growth is shown likely to exacerbate the problems, but they exist now. There is also the need to protect the ability to deliver elements of the SWGP that are recommended to be delivered later. The two key elements of the programme that this SSBC recommends are progressed urgently are:

- **Route protection:** If the rapid transit NoR is not lodged s7(2)(b)(ii) Prejudice to commercial [redacted] on the southern side of the Waka Kotahi SH20B designation will expire s7(2)(b)(ii) [redacted], potentially leading to commercial and or industrial development within the A2B corridor, s7(2)(b)(ii) Prejudice [redacted]
- **Medium term premium bus service (Horizon 2):** The current unmet demand for public transport would be a lost opportunity if the medium term recommendation is not advanced, given the strategic importance of achieving mode shift.

Risks

A risk assessment has been carried out and cost estimates have been risk-adjusted to AT’s and Waka Kotahi’s standards.

While the project is a large undertaking, the complexity of construction is not considered high and the risk profile has been assessed accordingly. A number of properties will be impacted along the A2B corridor with full and partial acquisitions required. To manage and mitigate property acquisition risks, early engagement and consultation is planned, and in some cases detailed plans will be developed to prioritise specific acquisition risks and manage/mitigate these.

Being a multi-agency programme with many interdependencies, the risks rated highest are those in relation to project governance and organisational alignment in relation to funding and implementation readiness.

Implementation planning

The proposed strategy is staged over five "horizons" which is integrated with Auckland Airport's programme of improvements. The proposed implementation strategy (staging) allows:

- The investment to keep pace with demand and the need for improved performance
- Mode shift to public transport by delivering public transport elements of the SWGP ahead of road elements
- Support urban regeneration, particularly in Manukau.

AT and Waka Kotahi have developed a dynamic staging approach which can adapt the scale and speed of investment on the basis of project performance, changing external issues and dependencies and updated forecasts. This is supported by a governance structure and gateway review process to review investment decisions prior to commitment. The four programme partners are Te Ākitai Waiohua, Auckland Airport, Auckland Transport (AT) and Waka Kotahi NZ Transport Agency, and the proposed governance structure is summarised in Figure 0-15.

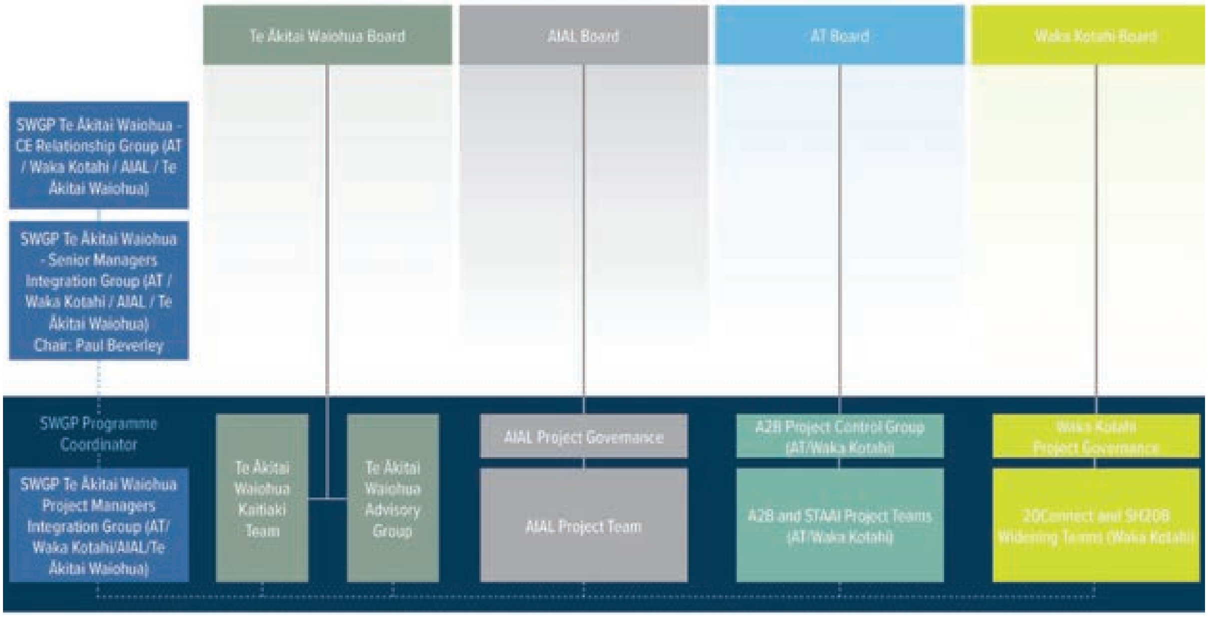

Figure 0-15: Proposed governance structure

Figure 0-16 outlines the details, performance and costs of the programme with regards to each horizon.

Figure 0-16: Staging, public transport performance and costs of the programme

The SSBC's Commercial and Management Cases address the delivery roles and goverrnance approach for the full SWGP. The Airport Access Precinct Improvements (AAPI), which is the responsibility of Auckland Airport, is also part of the programme and is addressed in the Management Case.

For the purposes of this business case, the Route Protection and Resource Consent Phase includes the activities required to prepare the programme for implementation. These are primarily the approvals (consenting, including notices of requirement), property acquisition and design to support these activities. As options for the implementation phases of the SWGP may include design and construct or alliance models, the Route Protection and Resource Consent Phase is defined as all activities prior to procurement of these implementation models.

- The preparation of the necessary Regional Consents and Notices of Requirement for A2B will be led by AT with support from Waka Kotahi and will be led by Auckland Airport for the sections within its Road Controlling Authority (RCA) area. The applications will be lodged at the same time and seek a joint hearing.
- Professional services to support the NOR and Regional consents applications will be engaged by AT, except those within Auckland Airport's RCA area, which will be engaged by Auckland Airport.
- The applications will be lodged by the appropriate Requiring Authority who will own and operate the facilities enabled by the designation or consents.
- Responsibility for stakeholder engagement will follow the consenting roles.
- Partner engagement with Mana Whenua will be with AT, Waka Kotahi (as Crown Treaty Partner), and Auckland Airport.
- Property acquisition will be led by AT with Waka Kotahi acquiring properties within its designation. The property acquisition teams will need to co-ordinate activities to achieve a consistent approach. All property required for 20Connect will be acquired by Waka Kotahi closer to the time of that project.
- Responsibility for all design and construction related to Botany Station Stage 1 and for lodging the required NOR and resource consent applications for the ultimate station footprint, including any Stage 2 upgrade as part of A2B will sit with AT's Eastern Busway project team.
- The lead agency for implementation delivery is likely to vary for each stage depending on the affected asset ownership and delivery focus. The Horizon 2 delivery (the most immediate after the A2B route protection and resource consent phase) is expected to be led by AT, reflecting the public transport services focus and relation to the Eastern Busway project.

Additionally, agreements between the programme partners have been made to support the governance arrangements and programme delivery through the Route Protection and Resource Consents Phase:

- Relationship Agreement between Te Ākitai Waiohua, AT, Waka Kotahi, and Auckland Airport
- Heads of Agreement (HoA) between AT, Waka Kotahi and Auckland Airport
- Route Protection and Resource Consent Agreement between AT, Waka Kotahi and Auckland Airport
- A Memorandum of Understanding (MOU) between AT and Waka Kotahi.

Other governance agreements may be required as the programme develops.

Benefits realisation

A Benefits Realisation Plan (BRP) has been prepared for the SWGP. The BRP includes the proposed methodology for performance measure capture, baseline data and expected results. The performance measures provide a framework for post-implementation monitoring. The BRP is a living document that will be reviewed and updated over time as required to remain current with the delivery of the programme, and will consider any relevant effects of COVID-19 on the transport system pre and post intervention implementation.

PART A – STRATEGIC CASE

1 Introduction

The A2B and 20Connect projects aim to address critical transport-related issues for Auckland's south-west, south and east. The area includes two metropolitan centres, New Zealand's main gateway to the world, major employment areas and large residential areas. It is also home to a population over-represented in deprivation indices. There is poor access across the study area for much of the population – especially by public transport, resulting in high car dependence – and there is a likelihood that important economic centres will fail to prosper as well as they could. A multi-modal programme of improvements will be able to achieve mode shift, and improve travel choice, while addressing major environmental issues, including climate change and ensuring that vital road use, such as high value freight, is efficient.

The full SWGP, of which A2B and 20Connect are major components, is a programme of investments aiming to deliver transformative transport improvements in Auckland's south-west, south and east. The programme is being delivered jointly by Auckland Transport (AT), Waka Kotahi NZ Transport Agency (Waka Kotahi) and Auckland Airport.

The programme to address the critical issues should be an outstanding example of a combined land-use/transport project that can help uplift socio-economically deprived parts of southern and eastern Auckland for living, working, education and generally having a better quality of life. It should also provide the accessibility changes to assist wider government objectives, particularly in relation to climate change, housing and economic development.

There are four core opportunities:

- Filling a clear gap in the region's rapid transit network (RTN)
- Improving access and travel choices in South West, South and East Auckland
- Providing better access and travel choices to Auckland Airport, and the wider Airport precinct, to support Airport activities and economic growth
- Supporting affordable housing, growth and intensification

In addition, the projects will be able to increase personal safety on the network and reduce the risk of crashes.

These opportunities are expanded on below:

- Filling a gap in the region's RTN:

There is a gap in Auckland's RTN with no connection between radial routes except in the city centre. There is an opportunity to provide an orbital link, bypassing the central area and connecting four of Auckland's existing or proposed city centre focused transit lines. This orbital route would enable efficient cross-city travel and more connections for people to get to more places without the need to own or use a car. For example, a connection at Botany to the Eastern Busway will help address a lack of quality access and travel choice for East Auckland providing more reliable, timely travel choices by integrated public transport serving multiple origins and destinations.

- Improving access and travel choices in South and East Auckland:

There are limited options for travel around South and East Auckland, including to and from the Airport. Government policy (eg the GPS[10]) directs that people need to have better transport choices. The project can address this significant access and travel choice deficiency for a large population, many of whom experience considerable disadvantage. This will provide better access to jobs, education, cultural and social opportunities.

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[10] Government Policy Statement on land Transport, 2018, Ministry of Transport

Safety issues for public transport and active mode users on the road network can be addressed. The project will also address issues relating to perceptions of personal safety for public transport and active mode users, including the first and last mile of public transport journeys and road safety concerns in the context of AT's commitment to Vision Zero and Government's Road to Zero.

- Providing better access and travel choices to Auckland Airport, and the wider Airport precinct, to support Airport activities, high value freight and economic growth:

Addressing a forecast substantial deficiency in capacity, acceptable travel times and reliability to access Auckland Airport, primarily by providing higher public transport capacity, will allow the Airport to continue to grow and perform its important role in the Auckland and New Zealand economy. The Airport area is one of the major employment hubs in South Auckland. It has a critical role regionally and nationally, but also locally. However, transport choices are currently limited and local residents struggle to get there easily, particularly for work.

The critical roles performed by the state highways in the area are also at risk. SH20 provides the main linkage into and through the south-west as well as linking to the Airport precinct via SH20A and SH20B. These state highways provide the vital links to the Airport precinct, not only for Airport passengers, employees and high value freight, but also to those accessing the surrounding commercial centre.

SH20 is part of the Western Ring Route connecting southern Auckland and areas further south and east with West Auckland and the North Shore via SH18. It is a critical strategic alternative to SH1 and the Harbour Bridge.

At present, some movements between the state highways are not provided for, or do not have a high-quality connection. As a result, there are too many freight vehicles using unsuitable local roads and there will be growing capacity issues affecting access in the south-west.

It is already difficult to quantify journey times to and from the Airport, and this unreliability will be a growing problem for people and goods, which both need confidence in travel times.

While aviation has drastically declined in 2020 with COVID-19, multiple scenarios see that decline reversing by around 2023-2024 and given the long-term nature of the SWGP, COVID-19 is predicted to have little effect on the programme. Even if it does, the flexible staging strategy provides opportunities to revisit the effects at future stages and make updates to the programme. For more detail on the effects of COVID-19 on the SWGP, see Section 2.4.3 and Appendix V.

- Supporting affordable housing, growth and intensification:

Assisting government objectives in relation to housing, by supporting non-car reliant access to more jobs in Manukau central, where there is easily developable, publicly owned land for affordable housing and related facilities is a major opportunity. The bus-train interchange at Puhinui Station will connect future residents of the southern growth areas to jobs in Manukau, East Tāmaki and the Airport – three of Auckland's largest employment zones. This facility can be the first step in improving access from the south.

At the same time, the extensive growth planned in South and East Auckland will increase the pressure on the state highways and other routes. The capacity, connections and management of the network need to be improved to support the planned growth, regardless of how people choose to travel.

A2B and 20Connect focus on trips (people and goods) travelling to, from and within South West, South and East Auckland, including the Airport and surrounding areas, identifying ways to improve journey reliability and provide more choices when travelling - whether it is walking, cycling, driving, catching public transport, or a combination, to complete a journey. Improvements on the state highway network will integrate with public transport, cater for freight and cyclists and improve access to growth areas.

Importantly, the A2B and 20Connect projects involve a series of interventions, over time, that not only plan for issues, but that also recognise uncertainty at each stage and include the relevant factors that may bring interventions forward or delay them. This includes an approach to managing the uncertainties generated by COVID-19. This form of 'dynamic management' approach to investment is a critical feature of the SWGP, which will allow appropriate responses to revealed demand, evolving policy, funding availability and capacity to deliver over time.

1.1 Purpose

This SSBC focuses on the public sector elements of the SWGP – improvements to the state highways under the control of Waka Kotahi, and public transport opportunities for AT. It examines the wider issues in the study area and identifies a preferred transport option that aligns with the GPS, stakeholder requirements and the project's investment objectives.

Therefore, this SSBC focuses on the A2B and 20Connect projects, rather than the whole SWGP.

It provides the basis for Waka Kotahi and AT to commit to fund the early stages of investment and a process for determining future funding and progression of the projects.

1.2 The study area and the SWGP projects

The study area encompasses the broad swathe of southern and eastern Auckland from the Airport and surrounds in the south-west to Botany in the east, as shown in Figure 1-1.

Figure 1-1: SWGP study area

Waka Kotahi, AT and Auckland Airport are working together to pursue the opportunities through the SWGP.

The SWGP was developed from the earlier Auckland Airport Access Supplementary Programme Business Case (SPBC) and comprises the following elements in a suite of multi-modal interventions:

- Rapid Transit between the Airport and Botany, via Manukau (A2B), led by AT
- State highway projects in the southwest largely connecting to the Airport and facilitating rapid transit (20Connect), led by Waka Kotahi
- Auckland Airport Precinct Improvements (AAPI), led by Auckland Airport.

Early stages of the SWGP are underway with SSBCs having been approved in 2019 with an enhanced interchange on the main rail line at Puhinui and priority along local roads and SH20B for enhanced bus services between Manukau and the Airport. Early stages of the SWGP also include the opening of a new frequent "AirportLink" service and a series of cycling improvements in Māngere.

Figure 1-2 depicts the SWGP projects, including A2B and 20Connect.

Figure 1-2: The Southwest Gateway Programme

1.3 Governance and partners

Partners and stakeholders for the SWGP are diverse. They include programme partners, investment partners, Treaty partners, stakeholders and customers and community groups. Table 1-1 lists the Southwest Gateway Programme partners, referred to throughout this SSBC as the programme partners.

Table 1-1: Programme partners

Programme partners	
Te Ākitai Waiohua	Te Ākitai Waiohua are the owners of Pūkaki and Waokauri Creeks (which includes areas of Māori Reservation). Those areas are highly significant to Te Ākitai Waiohua. Te Ākitai Waiohua also has a longstanding involvement in the area's development, including in the Puhinui Structure Plan and as a signatory party to the significant Eastern Access Agreement (1991).

Programme partners	
Waka Kotahi New Zealand Transport Agency (Waka Kotahi)	Waka Kotahi is the road controlling authority (RCA) for the state highways within the study area. Waka Kotahi is also an investment partner for the SWGP.
Auckland Transport (AT)	AT is the RCA for local roads, co-ordinates road safety and community transport initiatives such as school travel and plans and contracts for bus, train and ferry services across Auckland. AT is also an investment partner for the SWGP.
Auckland Airport	Auckland Airport is a RCA for its network and is responsible for strategic planning, ongoing operation and development of the transport network within the Airport Precinct. Auckland Airport is also an investment partner for the SWGP.

The full list of stakeholders is in Section 2 of the Supplementary Information. Further information on roles of programme partners, governance structure, and agreements required to support governance can be found in the Management Case.

1.4 History of work to date

A significant amount of work has been carried out into access issues associated with the wider South and East Auckland area. Most notable is the Auckland Airport Access Supplementary Programme Business Case (SPBC) which was approved by the Auckland Transport, Waka Kotahi and Auckland Airport boards in 2017. This business case was preceded by multiple studies and business cases, as listed in Table 1-2.

Table 1-2: A2B - previous studies

Study	Year	Organisation	Description
South-Western Airport Multi-Modal Corridor Project (SWAMMCP)	2010	AT and Waka Kotahi	Assessed multiple corridors across South Auckland, focussed on access to the Airport. Included various heavy and light rail as well as busway options.
South-Western Multi-Modal Airport Rapid Transit (SMART)	2013	AT and Waka Kotahi	Built on the 2010 report, considering rapid transit along the SH20 corridors, noting constrained access to the Airport and surrounds limits economic growth and productivity.
Rapid Transit Network (RTN) Review Study Report	2014, 2015 Update	AT	Examined the need for RTN services linking Auckland's major centres. Identified a gap between Botany, Manukau and the Airport.
Auckland Airport Access Supplementary PBC	2017	Waka Kotahi, AT and Auckland Airport	The SWGP was developed in this business case, and the proposed A2B and 20Connect projects listed as critical for the programme.
A2B Short Term Airport Access Improvements SSBC (STAAI)	2018	AT	A series of public transport upgrades including bus lanes a new bus service and upgraded Puhinui station with walking and cycling facilities to the north of the Airport.
20Connect Short Term Access Improvements SSBC	2018	Waka Kotahi	Includes upgrades along the SH20B corridor to facilitate the short-term A2B improvements.

1.5 Point of entry

The point of entry for this business case is as an SSBC, building on approval of the Auckland Airport Access SPBC.

1.5.1 Status of SPBC recommended interventions

The SPBC developed a mode-shift strategy which is led by behaviour change and strongly targeted at specific customer groups. Since its approval in 2017, progress has been made in delivering the recommended programme. Figure 1-3 depicts the interventions recommended in the SPBC initially planned to be complete by 2020, and their corresponding statuses.

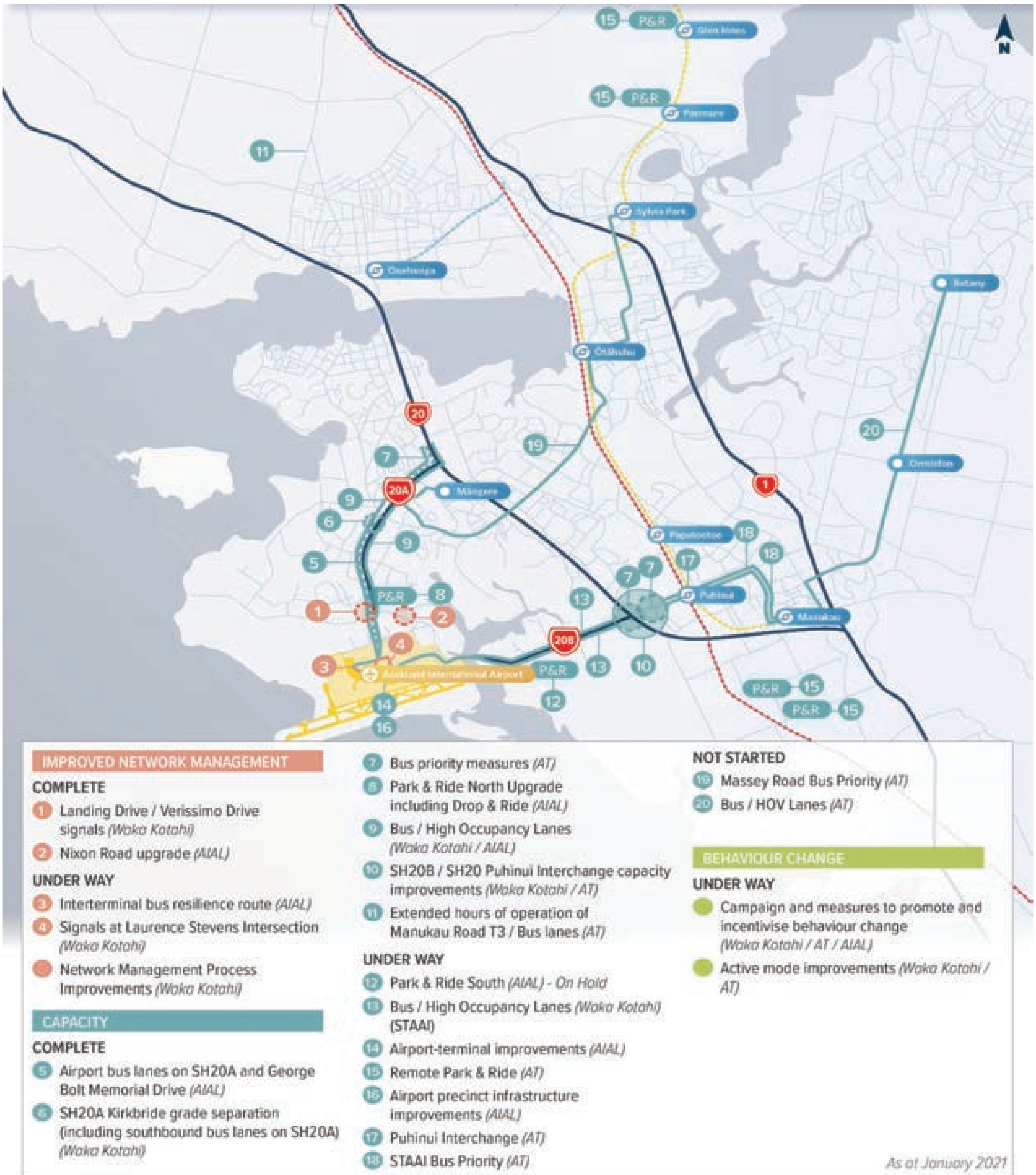

Figure 1-3: Auckland Airport Access Supplementary PBC – intervention programme update

1.6 COVID-19

Given the unfolding social and economic impacts of COVID-19, it is important to understand its potential effects on the A2B and 20Connect projects as part of the wider Southwest Gateway Programme. This includes the case for investment, benefits and timing of future project phase implementation. An assessment has been undertaken as part of this SSBC.[11]

This work considered impacts on air travel, Airport area trips and the timing of investment decisions. This has drawn upon the best available information at the time of writing – three reports prepared for Waka Kotahi, including Rapid Transport COVID-19 Recovery Scenarios (PwC and LEK, May 2020) which is based on Treasury's modelled scenarios, COVID-19's Effect on Industry and Regional Economic Outcomes (Infometrics, April 2020) and Arataki - Potential Impacts of COVID-19 (Martin-Jenkins and Infometrics, May 2020).

In summary, the A2B and 20Connect COVID-19 assessment has found:

- There is currently a short-term economic shock of significant magnitude with reductions in output, employment, population growth and transport demand for the next two to three years expected at the Airport, its surrounding area, the Auckland region and nationally. However, there is currently insufficient evidence to confidently predict whether the economic and social effects of COVID-19 will persist materially beyond two to three years.
- Due to the medium to long term nature of the SWGP, there is little immediate need to vary the A2B and 20Connect programmes, or the timing of future decisions in light of COVID-19.
- If the effects of COVID-19 persist beyond 2-3 years, the effects on transport demand are likely to be relatively small for the SWGP, equivalent to a delay of demand growth of around 1-2 years.
- Ultimately, the investment gateway approach to support future decision making for the SWGP is the ideal way to inform the decision-making process with respect to the lasting impacts (or not) of COVID-19.
- The 'Investment Management Approach' set out in the Management Case (Section 20) allows for adaptive and responsive investment decision-making at future investment 'Gateway Reviews'.
- This active management of decision-making allows for ongoing monitoring of 'Investment Drivers', including whether any underlying assumptions related to COVID-19 recovery have changed, which may influence timing.
- If the effects of COVID-19 are longer lasting, future programme decisions will be able to be made with updated information closer to each stage.

Furthermore, one of the key system insights in Waka Kotahi's Arataki Version 2 (which reflects initial findings of COVID-19's impacts) - a strategy which provides a 10-year view of what is needed to deliver on the government's priorities and long-term objectives for the land transport system – found the following [**emphasis added**]:

"Transport can support regional development by improving access to employment, education and essential services for transport disadvantaged communities in **South Auckland**, Tāmaki and parts of West Auckland. These communities face long-term high levels of social deprivation and have large concentrations of young people, Māori and Pasifika, **who are also vulnerable to the impacts of COVID-19**."

As noted in the Auckland Plan 2050, *'Improving access to employment is a key way of improving prosperity and lifting people out of poverty'*. **South Auckland** communities not only lack equitable

[11] COVID-19 Sensitivity Technical Note (Appendix V).

access to transport and employment opportunities, but due to existing socio-economic deprivation **are also more vulnerable to wider economic effects of COVID-19**.

Figure 1-4 illustrates the predicted overall trends in demand for all modes of transport based on the three Waka Kotahi COVID-19 recovery scenarios. Additionally, the adoption of work from home practices is likely to have a disproportionately larger effect on rapid transit patronage going forward[12].

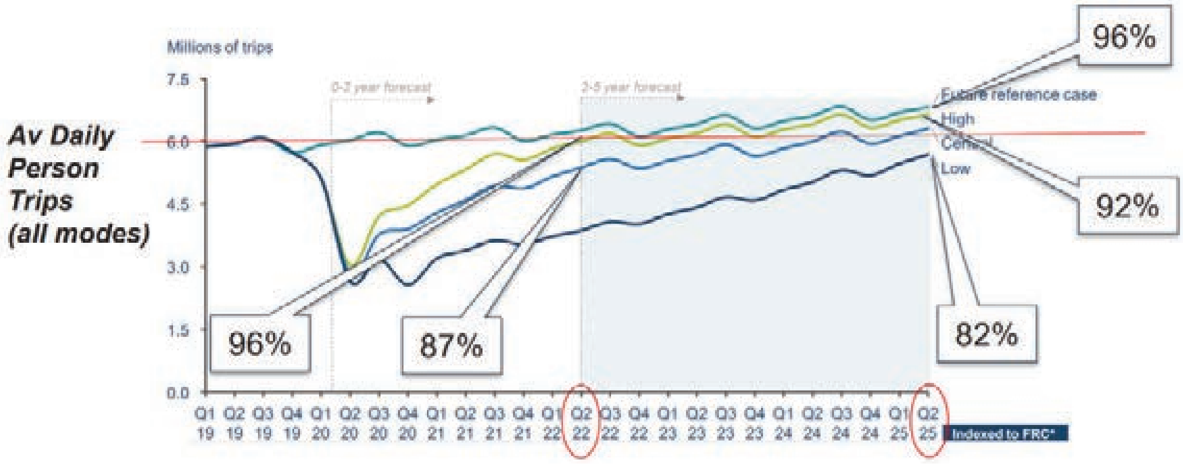

Figure 1-4: Average daily person trips (all modes). Source: LEK and PWC

Based on current circumstances it is considered that NZ is functioning between the central and high cases[13]. Notably, under the high scenario, demand is expected to recover to around 96% by Q4 2022.

In terms of population growth, the land-use scenario for the Auckland Strategic Planning model (ASP) and the Macro Strategic Model (MSM) has been updated to reflect the effects of COVID-19 and 'overcounting' by Statistics NZ through overestimating migration numbers. The scenario has been updated from i11v5 to i11v6. Figure 1-5 illustrates the annual growth estimates of each model and the effect of the overcount and overestimation of growth in i11v5 (particularly from 2019-2022), and how this has been corrected. To account for COVID-19, slightly lower growth is assumed between 2019 and 2025 before it starts to increase as border restrictions are presumably loosened.

Overall regional growth is still forecast to occur both in the short and long term, and the long-term population growth picture does not materially change. Economic and employment assumptions adopted for i11v6 are the same as i11v5 due to the delay of the 2018 Census data. Further work is planned in 2021.

[12] Rapid Transport COVID-19 Recovery Scenarios (PwC and LEK, May 2020)

[13] Covid-19 Sensivity Technical Note (Appendix V)

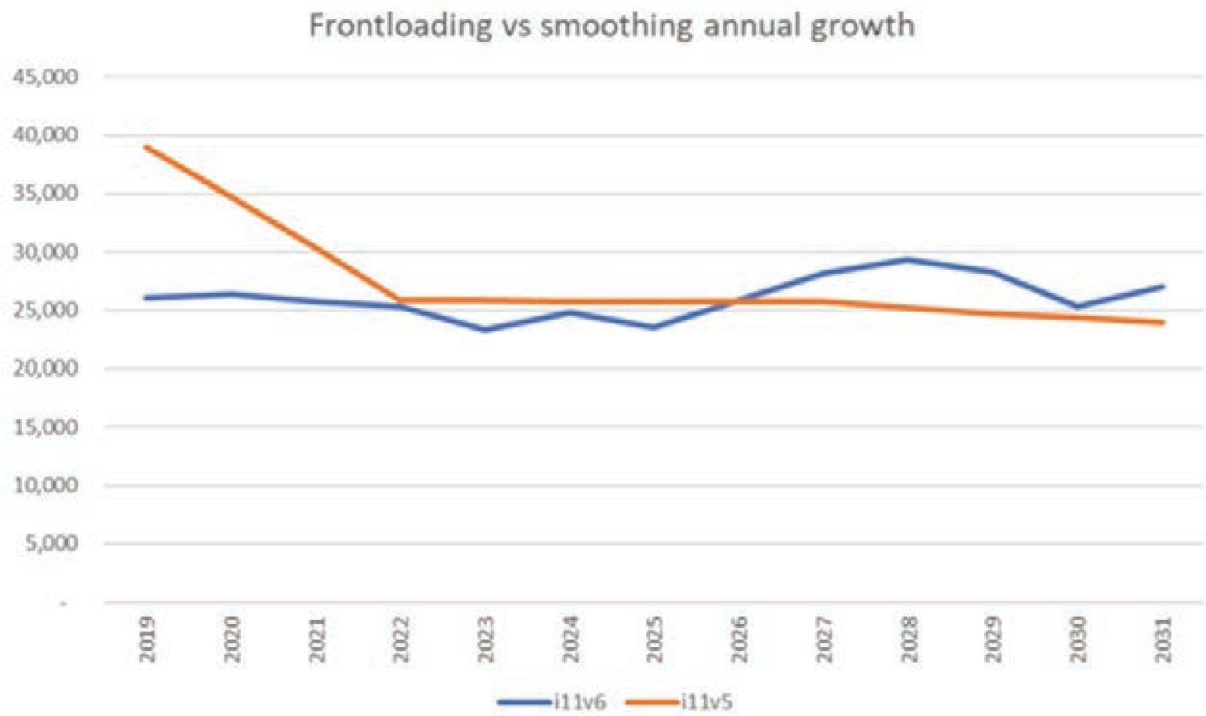

Figure 1-5: Annual growth rates, i11v5 vs i11v6, 2019-2031[14]

[14] Land-use scenario i11v6 – COVID-19 update memo (Auckland Council, August 2020)

2 Strategic overview

2.1 The issues

This section describes the four strategic issues – which are also opportunities - being addressed in the business case. As discussed in Section 1, they are:

- A large gap in the RTN resulting in a lack of rapid, efficient and reliable public transport and poor mode share in the south-west, south and east of Auckland
- Poor quality access for a growing, highly disadvantaged population
- Poor and worsening access to Auckland Airport and the Airport precinct development area
- The need to provide more affordable housing and higher quality urban development to a fast-growing population in South and East Auckland.

The issues are discussed now to provide the wider context before they are considered in depth in Section 4 looking at the problem statements and supporting evidence.

2.2 A large gap in the RTN

Issue 1: A large gap in the RTN resulting in a lack of rapid, efficient and reliable public transport and poor mode share in the south-west, south and east of Auckland

Public transport in the study area is currently provided by standard bus services, with no direct connection to Manukau or the Airport from East Auckland. Without a new rapid transit connection, large areas of southern and eastern Auckland will remain only partially served by the RTN leaving significant deficiencies in access.

East Auckland has few travel choices that are competitive with travelling by private vehicle, as reflected in the mode share statistics. The journey to work private vehicle mode share across eastern Auckland is among the highest in Auckland, at over 90%. As shown in Figure 2-1, public transport mode share across the study area in the morning peak is 3.5%, around half of the Auckland average of over 7%[15]. The lack of rapid transit in the study area is an important factor. Higher public transport mode share can be seen in the study area near the rail line in the south in the vicinity of Ōtāhuhu, Papatoetoe and Papakura while the area between Manukau and Botany has one of the lowest in the Auckland region. The effectiveness of rapid transit in growing mode share is evident on the North Shore, serviced by the Northern Busway and in West Auckland with its rail line: both areas being a comparable distance from the city centre.

[15] MSM 2016 base model

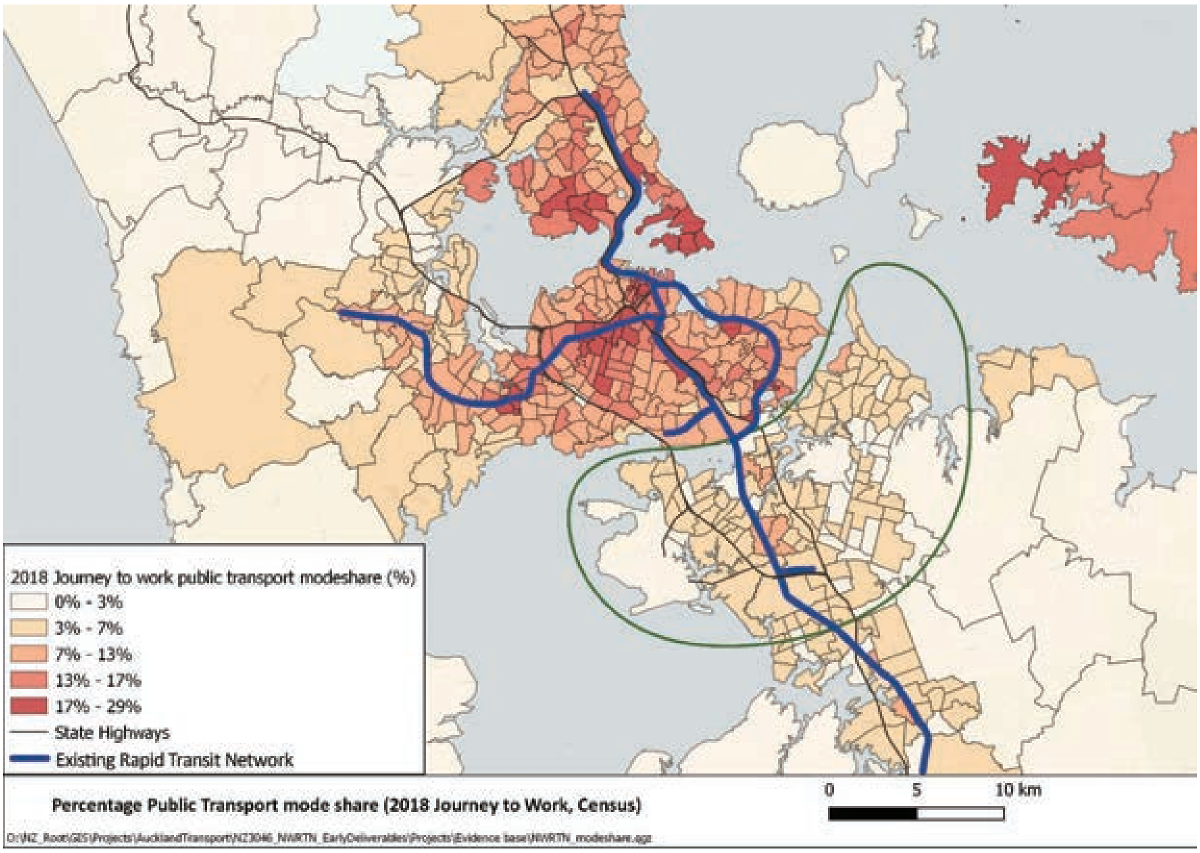

Figure 2-1: 2018 Journey to work mode share and SWGP study area (Census 2018)

Developing and accelerating Auckland's RTN is a priority of Auckland Council and the Government, "particularly to unlock housing and urban development opportunities" as stated in the Auckland Transport Alignment Project (ATAP)[16].

In the ATAP, Auckland's future RTN is conceptualised as a highly efficient and functional transport grid, with the Airport to Botany corridor recognised as an important orbital route. The ATAP includes an RTN service through the study area that "links together southern and eastern Auckland and will provide an important connection to the rail network at Puhinui"[17]. The ATAP publication, Better Travel Choices[18], has a strong focus on changing the modal choice away from private vehicles. It highlights the opportunity for:

"phasing the delivery of the Airport to Botany rapid transit corridor through early delivery of the Puhinui interchange, rapid transit like services and dedicated bus lanes" (p. 27).

The A2B rapid transit component traces its origins to analysis that showed a deficit in public transport provision serving an orbital desire line[19]. There are multiple centres along a potential route from the Airport in the south-west to Botany in the east, with central Manukau being the major node in between.

A future RTN without A2B rapid transit (left hand image, Figure 2-2) has a significant gap in the network.

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[16] Auckland Transport Alignment Project: NZ Government and Auckland Council 2018

[17] ATAP, 2019

[18] ATAP, Better Travel Choices, NZ Government and Auckland Council, December 2019

[19] Rapid Transit Network Review Study Report August 2014 and 2015 Update Final June 2015, Jacobs for AT

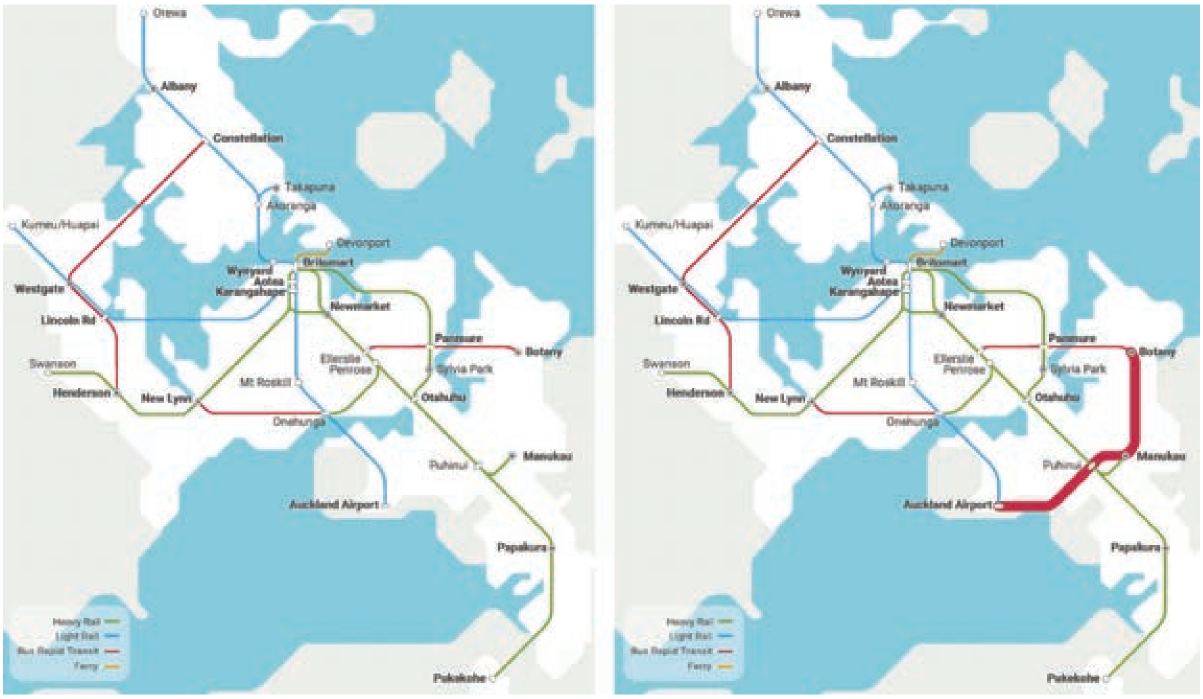

Figure 2-2: ATAP potential future RTN, excluding (left) and including (right, bold red line) A2B

A rapid transit route serving South and East Auckland would link four existing and proposed rapid transit corridors (Eastern Busway, the rail lines and City Centre to Māngere (CC2M) rapid transit) facilitating multi-leg movements and significantly improving access to opportunities without the need for a private car – providing travel choices.

The Auckland Plan 2050 notes that:

"The rapid transit network will need to play a central role in meeting the travel needs of a fast-growing region, as well as supporting and shaping Auckland's growth and urban form. In particular, only rapid transit can:

- efficiently move large numbers of people to intensely developed places like the city centre and other major centres
- dramatically increase the number of people able to travel between major parts of Auckland (north, central, west and south)
- provide a fast and reliable travel option that encourages people out of their cars for longer-distance journeys
- deliver long-lasting access improvements to areas near rapid transit stations, which improves their attractiveness for redevelopment."

2.3 Poor quality access

Issue 2: Poor quality access for a growing, highly disadvantaged population

This section provides an overview of the population characteristics of the study area which includes some of the most deprived[20] populations in Auckland, as depicted in Figure 2-3.

[20] NZ Deprivation is a socioeconomic measure of deprivation in an area-based format, ranging from 1 (low) to 10 (high). Go to http://www.ehinz.ac.nz/indicators/population-vulnerability/socioeconomic-deprivation-profile/ for more information

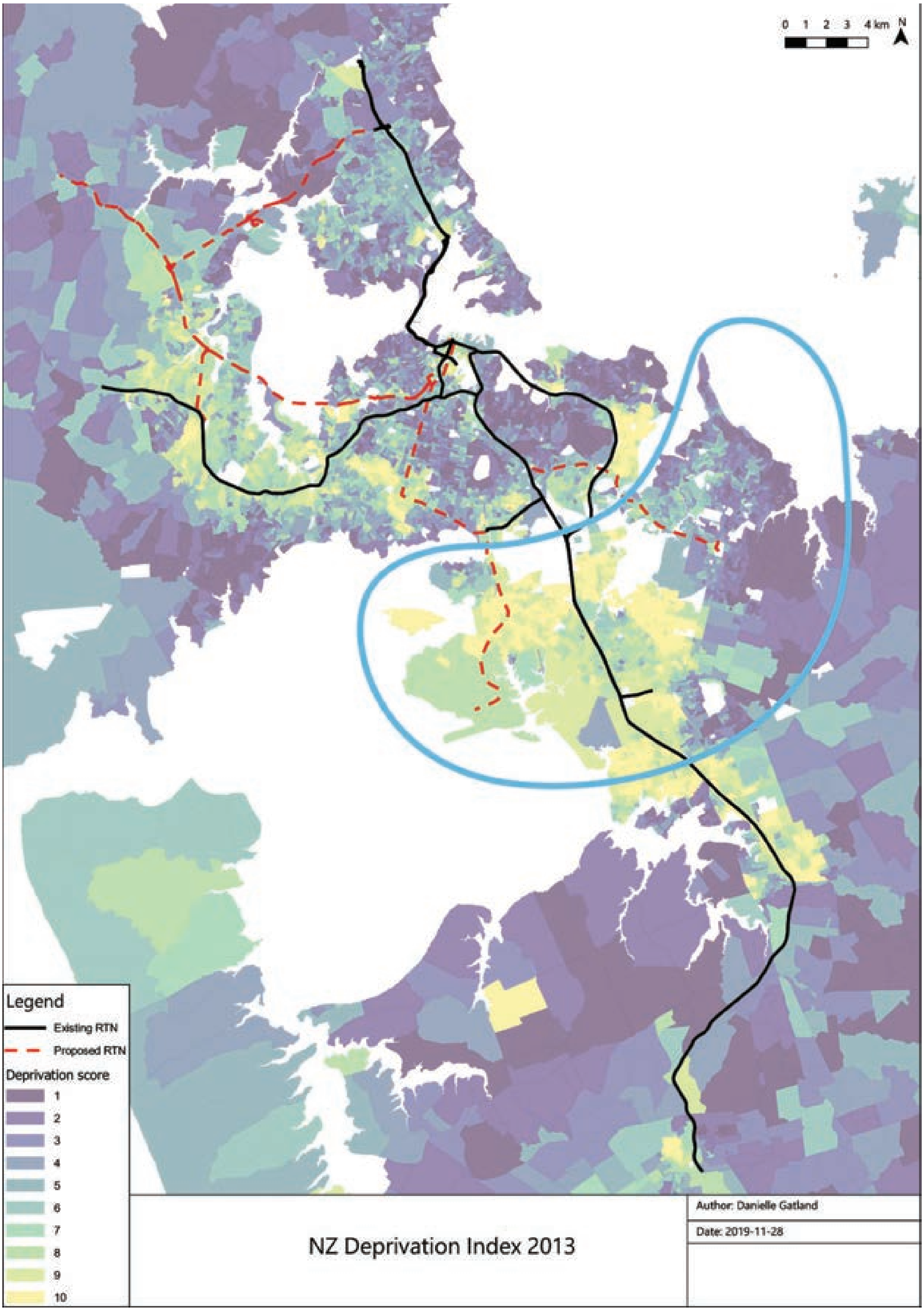

Figure 2-3: NZ Deprivation Index 2013 (Auckland), highlighting the existing (black) and proposed (red) RTN without A2B, and the study area

As per Arataki Version 2[21], "Some communities, particularly those in South Auckland, have high levels of deprivation and unemployment rates, above the national average."

Communities within the study area such as Manukau, Ōtara-Papatoetoe and Manurewa are noted as having areas with particularly high incidences of disadvantage. The *Transforming Manukau* business case[22] notes that Manukau central has a deprivation decile rating of 7 while the surrounding neighbourhoods of Wiri and Homai have a rating of 10 (the most deprived) putting these communities in the top 10% of deprived communities in the country. This means that many communities in and around the study area have lower incomes, fewer formal qualifications and less participation in the workforce, as well as lower rates of home ownership than residents in Auckland as a whole.

Research for Kāinga Ora[23] found that the population in the Manukau area was relatively young with half the residents under 30 (against 40% in New Zealand generally), had a high dependence on government support (25% of households receiving income support against 15% nationally) and with 19% living in Kāinga Ora properties against 3% nationally. This is despite the area being a centre for employment and education with tertiary education campuses in central Manukau and Ōtara.

The poor outcomes for people living in these communities are correlated with them being some of the most poorly served by public transport in Auckland, with a high proportion of the population having no easy access to the RTN with its higher levels of service - speed, frequency and reliability. When compared to the rest of the region, East and South Auckland have had relatively low investment in public transport, and people living in this area have few transport choices other than the private car. Figure 2-4 shows the disconnect between the existing and proposed RTN, without A2B, and areas needing fast, frequent and reliable public transport.

The Auckland Plan 2050[24] cites A2B as an important connection in Auckland's future public transport network, stating "Auckland's size and scale supports many economic, cultural, educational and recreational opportunities. These will increase as Auckland grows, but will only be realised if everyone can easily get to them when they need to".

The link between poor transport provision and disadvantage is cited in the Evidence Report for the Auckland Plan[25]:

"the areas in Auckland with higher rates of socio-economic deprivation are also areas that tend to have lower levels of transport choice. Communities in South Auckland, West Auckland, and the outlying parts of the Auckland isthmus are among the most socio-economically deprived".

Many residents of South and East Auckland (Māngere, Ōtāhuhu, Manukau, Manurewa, Ōtara) need to use private vehicles for much of their travel as public transport links aren't convenient and fares aren't affordable. However, many households are also unable to afford the costs of owning multiple vehicles. In these areas it is not uncommon to share a car between more than three adults. This creates a challenge for commuting and education trips, where family/friends must drop each other off at work or college, which takes a lot of time and increases vehicle running costs. Personal safety concerns can also contribute to higher car use.

Provision of better access to opportunities is an important element in the wider, more complex strategy to improve the lives of people in this area. Many parts of the study area are not well-served by high

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[21] Arataki Version 2, Auckland 2021-31 Regional Summary, Waka Kotahi

[22] Transforming Manukau business case - https://www.panuku.co.nz/manukau

[23] Manukau Project Area Population Profile, Kāinga Ora, undated

[24] Auckland Plan, op cit, Rapid Transit Network

[25] Transport and Access evidence report June 2018, pages 24, 30

quality public transport. Provision of direct, high quality connections to major employment zones such as Manukau and the Airport as well as high frequency links to the radial rapid transit links could open up most of the Auckland region for access without the need for a car.

The lack of access to an orbital rapid transit route on the Airport/Manukau/Botany arc is shown through the limited walkable catchments to current and proposed rapid transit routes (Figure 2-4).

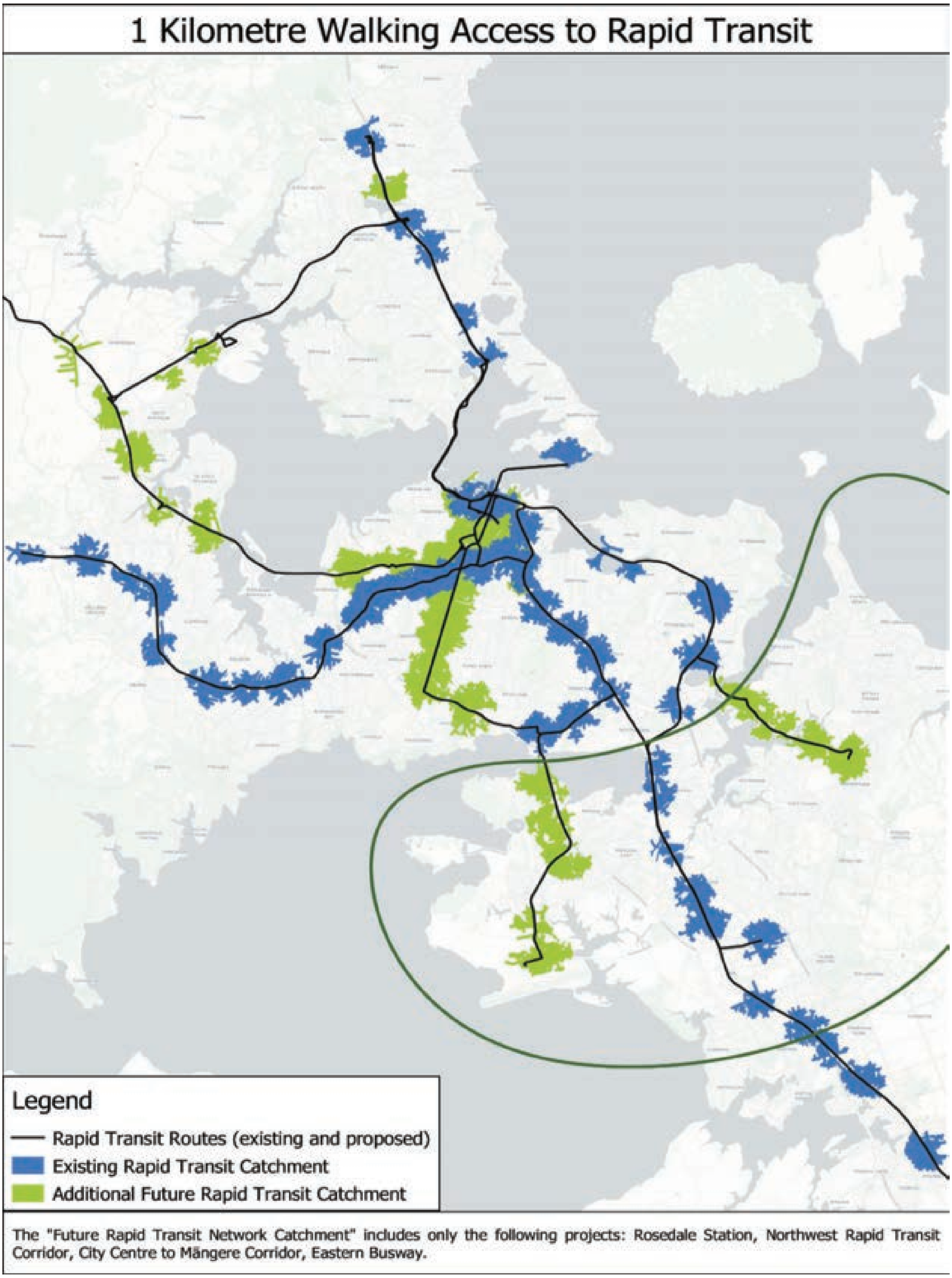

Figure 2-4: Accessibility to the RTN in the current and proposed Auckland network (study area shown in dark green)

Arataki, Version 2[26], identifies that locations in the study area have "high levels of deprivation and unemployment rates" and "these communities need improved access to employment, education and essential services".

Arataki also states that "communities of high social deprivation in South Auckland, as well as Tāmaki and parts of West Auckland, are looking for increased local employment and improved connections to centres where their young people can access education and employment, and for older residents to access physical and social activities, health and social services."

2.4 Poor and worsening access to the Airport

Issue 3: Poor and worsening access to Auckland Airport and the Airport precinct employment area.

In 2014, Auckland Airport released its 30-year vision for its future.[27] At the time, Auckland Airport was Australasia's second largest airport by international passenger movements, and New Zealand's second largest cargo port by value. Its aim is to be a global hub for air travel in Australasia and the Pacific rim. The forecasted growth of passenger and employment numbers will result in increasing pressure on the land transport network. Although the timing of this growth may now be delayed due to the effects of COVID-19, the expectation is it will resume in the future, as described in the following sections.

2.4.1 Passenger growth

In the year to 30 June 2018, there were 20.5 million international and domestic passenger movements[28]. While these numbers are pre-COVID-19, studies show a strong likelihood of recovery from the effects on passenger growth within three to four years[29].

The scale of forecast passenger growth is set out in Figure 2-5, trending from 20 million to a forecast 40 million passengers by the 2040's.

2.4.2 Employment growth around the Airport

It is forecast that there will be a growth in employment in South Auckland from 81,555 jobs in 2018, to 114,160 in 2048, a 40% increase (AFC i11.5 model). As a comparison, employment in East Auckland is forecast to increase from 54,978 jobs in 2018 to 63,598 in 2048, equivalent to a 16% increase.

Auckland Airport and its surrounding area is a nationally significant economic driver and regionally significant employment zone. In 2019, approximately 12,000 people were employed within the Auckland Airport Precinct, and just under 29,000 were employed in the wider Auckland Airport industrial area.[30] By 2048, it is forecast that 16,600 people will be employed within the Airport precinct area.[31]

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[26] Arataki Version 2, op cit.

[27] Auckland Airport, Airport of the future, op cit

[28] Auckland Airport Annual Report 2018

[29] Appendix V Covid 19 Sensitivity Technote

[30] Statistics NZ Business Demographic Database

[31] Based on Auckland Council's Land Use Scenario i11.5

Employment in the Airport precinct is anticipated to grow substantially over the next 30 years, as shown in Figure 2-6.

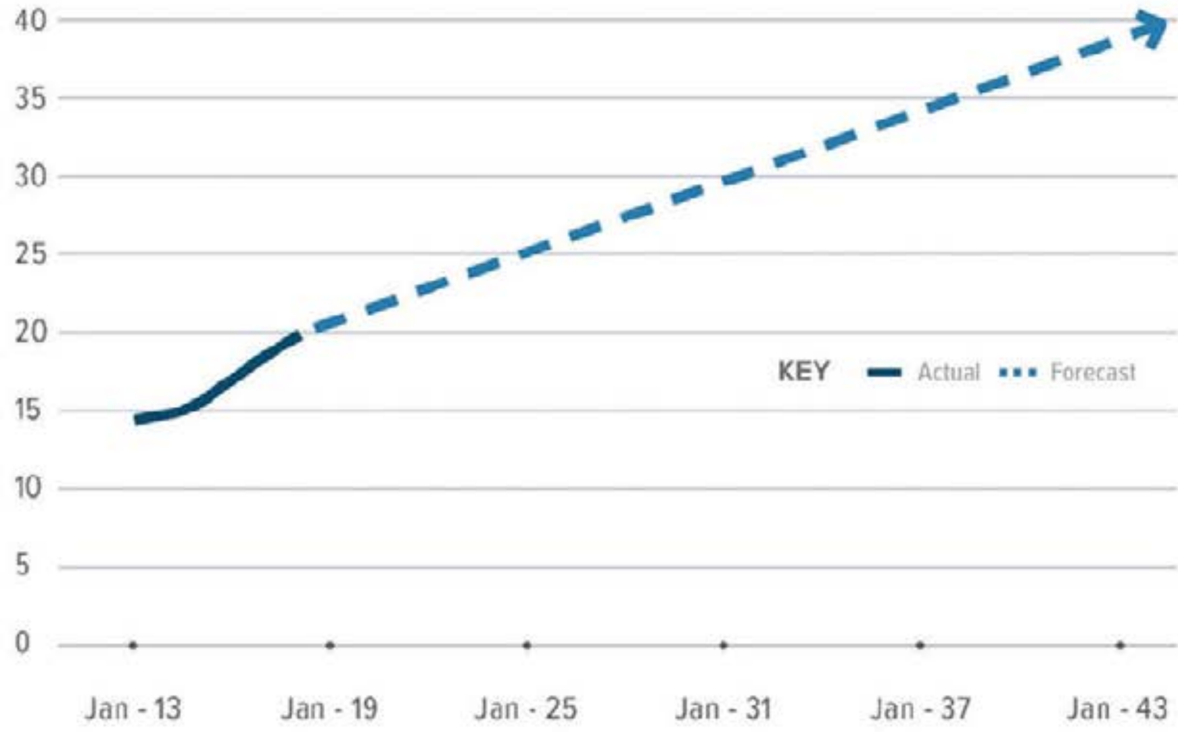

Figure 2-5: Rolling 12-month total passenger movements domestic and international (million), Auckland Airport (pre-COVID-19) Source: Auckland Airport published Monthly Traffic Updates

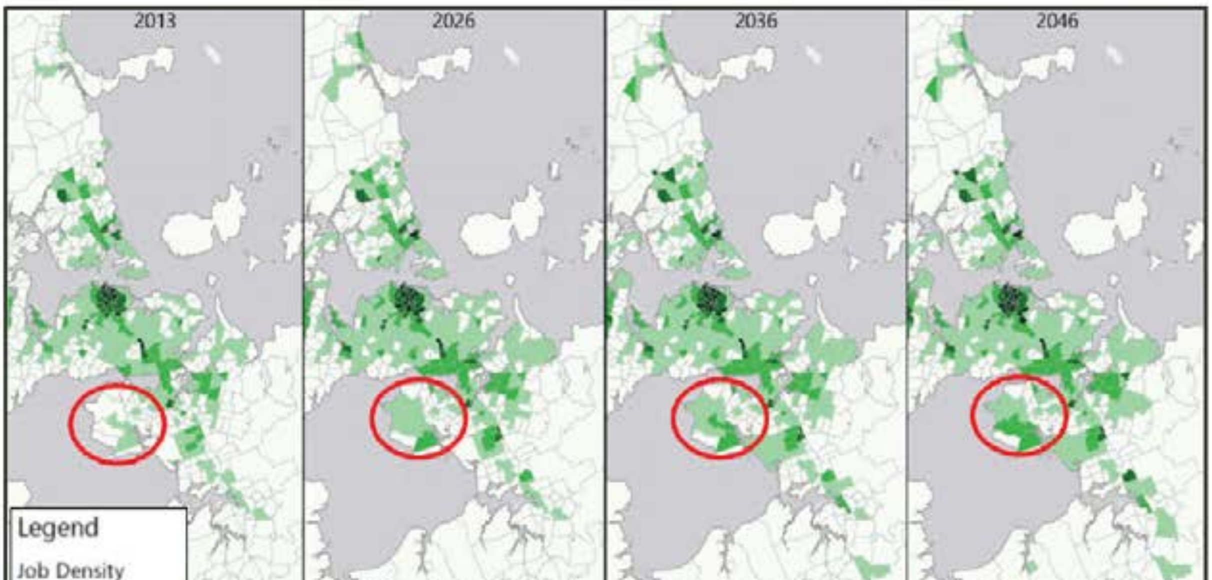

Figure 2-6: Auckland job density growth 2013-2046 - Auckland Airport precinct focus area shown in red (source: i11 land-use model)

2.4.3 Effects on state highways

As a result of the Airport passenger and employment growth described above, significant additional pressure is expected to be put on the state highway network surrounding the Airport and Airport precinct. This includes SH20, which serves as a critical alternative north/south road network link to SH1 – as part of the Western Ring Route (WRR). Figure 2-7 to Figure 2-9 show how on all three state highways surrounding the Airport area – SH20, SH20A, and SH20B - peak hour demand had been forecast to exceed capacity in the near future, or indeed it already had been. These figures and their network performance implications are explained in further detail in Section 4.4.4.

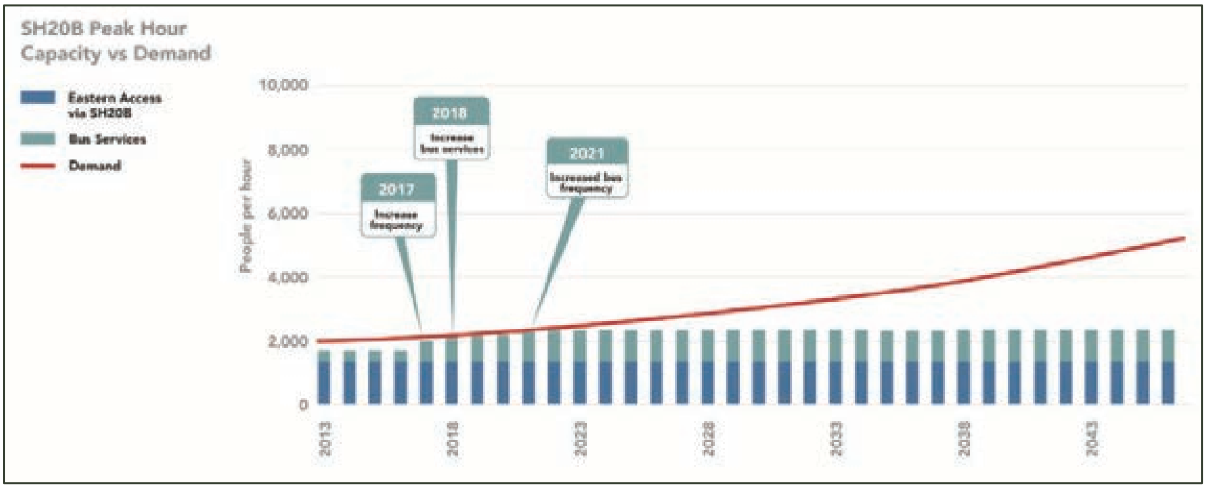

Figure 2-7: Peak hour capacity versus demand on SH20B[32]

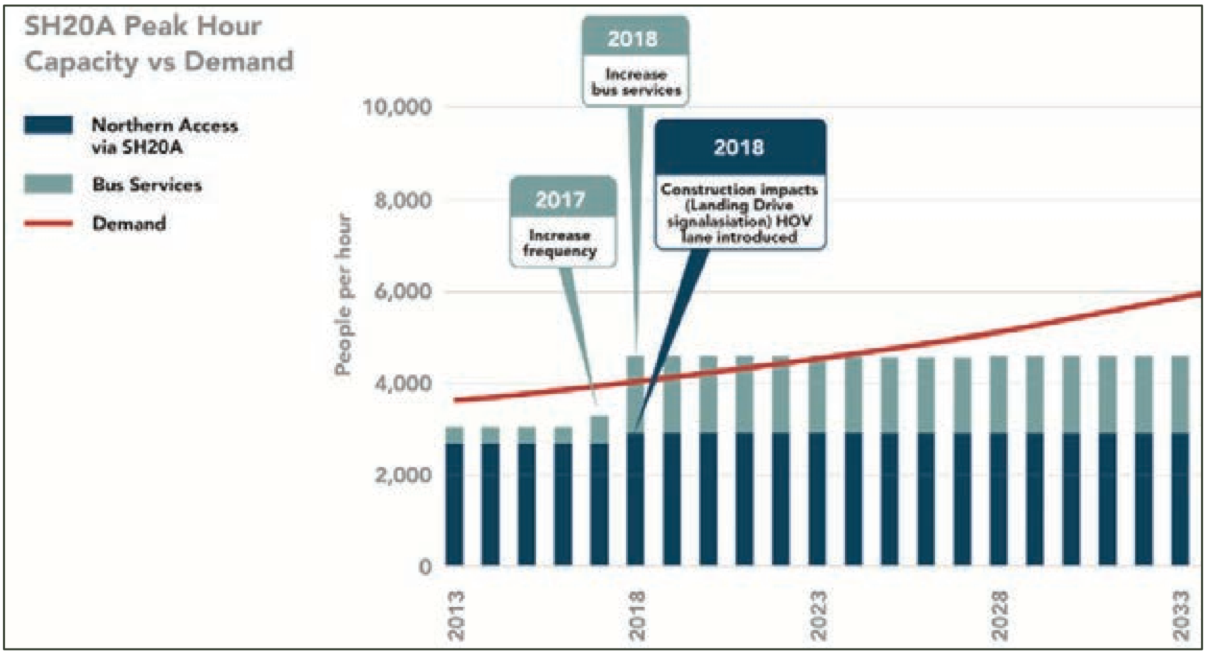

Figure 2-8: Peak hour capacity versus demand on SH20A

[32] Source: Airport Access Improvements Supplementary Business Case, Waka Kotahi

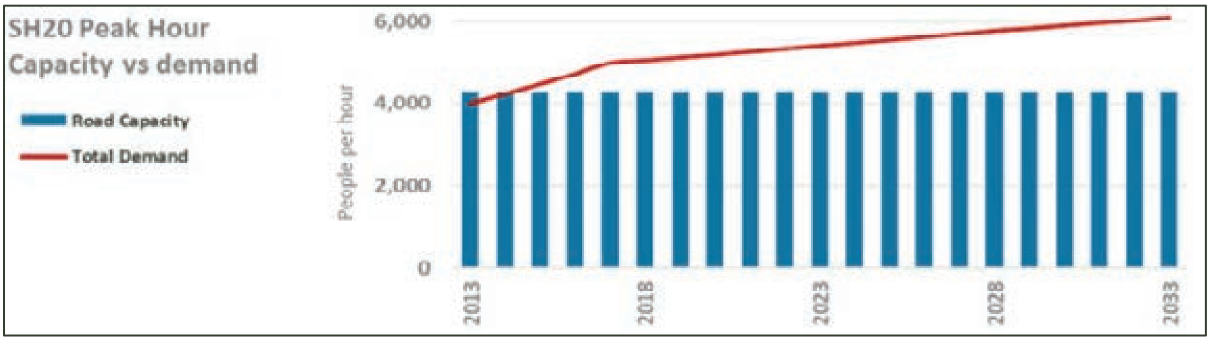

Figure 2-9: Peak hour capacity versus demand on SH20

Figure 2-10 further illustrates the effects of this growing demand on a network approaching and surpassing capacity in the peak hours. The 30-minute travel time catchment for trips from the Airport is forecast to severely reduce over the next 30 years, in both the morning and evening peak travel periods. Similar trends are expected to occur for trips towards the Airport precinct. Further travel time analysis is detailed in Section 4.3.6.

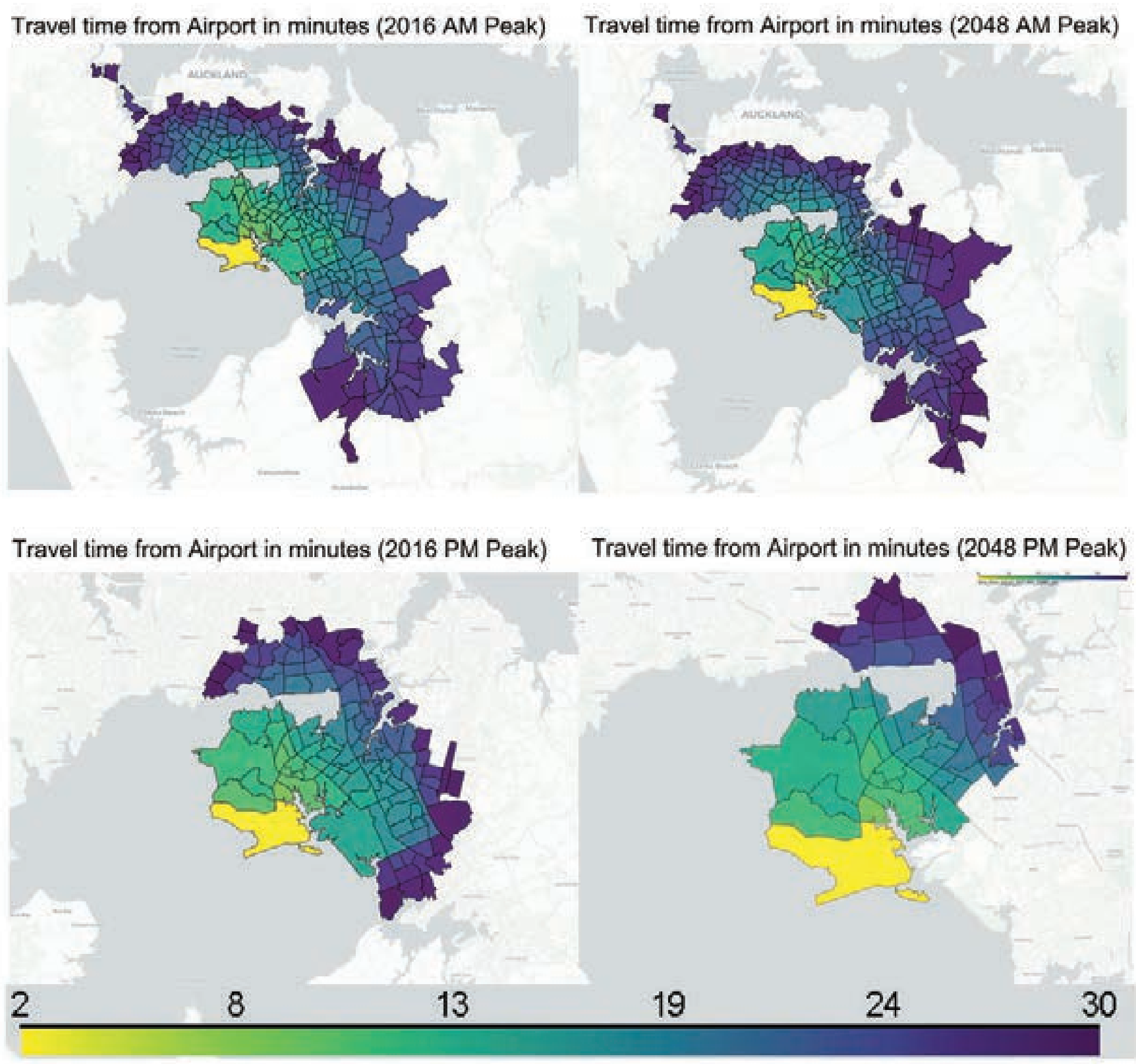

Figure 2-10: Historic and forecast 30-min AM peak travel time catchments from the Airport (source MSM)

As discussed in Section 4.3.2 there is also poor access to the Airport by public transport and active modes.

2.5 The need to provide more affordable housing and higher quality urban development

Issue 4: The need to provide more affordable housing and higher quality urban development to a fast-growing population in South and East Auckland.

South and East Auckland has previously experienced and continues to experience significant urban growth. As per Arataki Version 2, “Manukau to the south was the largest growth area between 2013 and 2018”. This growth across Auckland, and particularly across areas in Auckland’s south and east, is anticipated to continue in the future. The Manukau Centre’s population is anticipated to grow from 6,000 to 20,000 people in the next 20 years (an increase of 30 percent) , and the number of people employed within Manukau is anticipated to grow by over 22,500 jobs to around 56,000 (an increase of 40 percent) in the next 20 years. The nearby Wiri neighbourhood will see the replacement of 400 existing houses with 850 new public houses and the addition of 3,600 new homes.

The Auckland Plan 2050 identifies Manukau as the core growth node for southern Auckland, meaning that it is one of the four areas that forms the foundation for the Auckland region’s future growth. It also identifies Māngere and Māngere East, Papatoetoe and Hunters Corner, Ōtara, and Manurewa and Clendon as wider South Auckland development areas within the study area. Development areas have been introduced as a comprehensive approach to servicing expected growth across the existing urban area. The Auckland Plan also identifies Pakuranga, the Pakuranga Road corridor and Highland Park as East Auckland development areas within the study area. Pakuranga, the Pakuranga Road corridor and Highland Park are anticipated to grow by 1,700, 1,040, and 1,380 households respectively, between 2018 and 2048.

The Auckland Plan 2050 also states that 80% of all new dwellings consented in the last five years were ‘brownfields’ developments located within the existing urban area. In the next 30 years, around 62% of development is anticipated to be within the existing urban area, with the remaining development to occur in greenfields areas, including future urban areas (32%), and in rural areas (6%). Development across all land types must provide more affordable housing and higher quality urban development, particularly in the fast-growing South and East Auckland regions, which includes both brownfields and greenfields growth areas. Investment in improved transport access to serve these intensifying and newly developed areas needs to keep pace.

The ATAP 2018 confirms that the transport challenge for Auckland is not just one of congestion, but also of enabling and supporting a rapid acceleration in the rate of housing construction and building strong and healthy communities. Additionally, one of the Auckland Plan 2050’s transport and access focus areas, is to ‘better integrate land-use and transport’.

2.5.1 The opportunity at Manukau

There is a significant opportunity to align Crown and Council investment, taking a ‘whole-of-government’ approach to transform Manukau through transit-led development. This will help address existing transport disadvantage and socio-economic inequities in the area, while realising the substantial potential Manukau presents. Manukau Central and its surrounds provides a unique opportunity to deliver on both the Government’s and Council’s shared priorities for increased affordable housing, alongside high-quality urban development, increased employment opportunities and better social, cultural and environmental outcomes. Manukau has significant areas of publicly owned land with permissive zoning and few infrastructure or planning constraints, as well as a location close to major employment areas and the Airport, making it ideal for intensification.

The Auckland Plan 2050 identifies Manukau as a Metropolitan Centre, and a node which is critical to growth across the region. Manukau is intended to be an anchor for growth in southern Auckland and is intended to become second only to the Auckland City Centre in overall scale and intensity. There is an opportunity for Manukau to contribute significantly to reducing Auckland's housing shortage – estimated at around 82,000 over the long-term (11-30 years) in the Auckland Plan[33].

This opportunity is reflected in the Unitary Plan as Manukau has flexible zones permitting a broad range of commercial and residential activities, and high-rise development to 72.5m in the town centre. The centre is also intended to provide for a wide range of activities including commercial, leisure, high density residential, cultural, community and civic services.

Significant development has recently taken place or is planned for Manukau across a number of government agencies and private investors (see Table 2-1) giving confidence that investment in urban development projects is realistic and likely to achieve the intended outcomes.

Table 2-1: Investments in central Manukau

Recent and current investment	Planned investment
Manukau Train station (Access)	MBIE Manukau Service Centre - co-located government offices (Employment/social services)
Manukau Bus station (Access)	Westfield redevelopment (Employment/retail)
MIT (Education)	New Dental School (Education)
AUT extension / new buildings (Education)	Hayman Park destination playground and park redevelopment. (Leisure)
Puhinui Stream upgrade (Environmental)	Wiri Healthy Neighbourhood – Kāinga Ora homes replaced, 1000 homes at Manukau Super Clinic, Barrowcliffe (400 homes)
Public realm upgrades (Safety)	A range of Transform Manukau projects led by Panuku (refer to Figure 2-11 below)
Kotuitui Place (affordable housing development) (Housing)	**Potential new investment**
Kerrs Road (affordable housing development) (Housing)	New housing in Wiri, Inverell and Trevor Hoskins (Housing)
Pacific Gardens (market housing) (Housing)	Upgrade Homai and Wiri School (Education)
MIT – Techpark (Education)	New urban school in Manukau Central (Education)
Sebel Suites - Hotel in Manukau CBD (Employment/tourism)	Better connected streets and public spaces (Safety and Access)
Lakewood Plaza Apartments, 151 units (Housing)	Airport to Botany Rapid Transit (Access)
Manukau District Court extension	

[33] Source: Transform Manukau Programme Business Case

A coordinated regeneration programme for Manukau

The timing and co-ordination of a cross-agency programme of investment provides an opportunity to align investment in access, housing, education, employment and health and achieve better outcomes.

The regeneration programme for Manukau aligns with multiple strategic objectives for central and local government, including:

- Delivering affordable housing at a time of shortage in supply
- Supporting intensification and growth of the Manukau Centre to service Southern Auckland
- Improving the wellbeing of Manukau and Wiri public housing tenants and opportunities for educational and employment outcomes
- Improving amenities, connectivity in a way that benefits the wellbeing of all Manukau residents.

Agencies working together are the Ministry of Housing and Urban Development (HUD), Panuku Development Auckland (Panuku), Kāinga Ora, Ministry of Education, Waka Kotahi, AT, Counties Manukau District Health Board and Mana Whenua. AT is working particularly closely with Kāinga Ora and Panuku in Manukau.

The development of A2B has been co-ordinated with the Transform Manukau programme and wider investments, where an estimated $3.6 billion is proposed to be spent in Manukau by private and public sectors over the next 25 years[34].

Transform Manukau

To address housing and economic issues in the Southern Auckland area, the Panuku Board has approved the *Manukau Framework Plan (2017)* and the *Transform Manukau Programme Business Case (2019)* – a programme of investment and development aiming to create a thriving city centre, connected to healthy and sustainable neighbourhoods. They set out a shared vision and approach for how Panuku and its partners will work to achieve the regeneration of Manukau and Wiri over the next 20 years to 2040. It has an estimated $90m to $110m[35] programme delivery cost (excluding revenue from development and property sales which is forecast as $135m to $140m).

The overall Transform Manukau programme being led by Panuku is summarised on Figure 2-11 below.

[34] Data provided by Kāinga Ora

[35] Figures based on Transform Manukau Enhanced Business Case Programme Overview, 21 August 2019, pg 60 reported to Board.

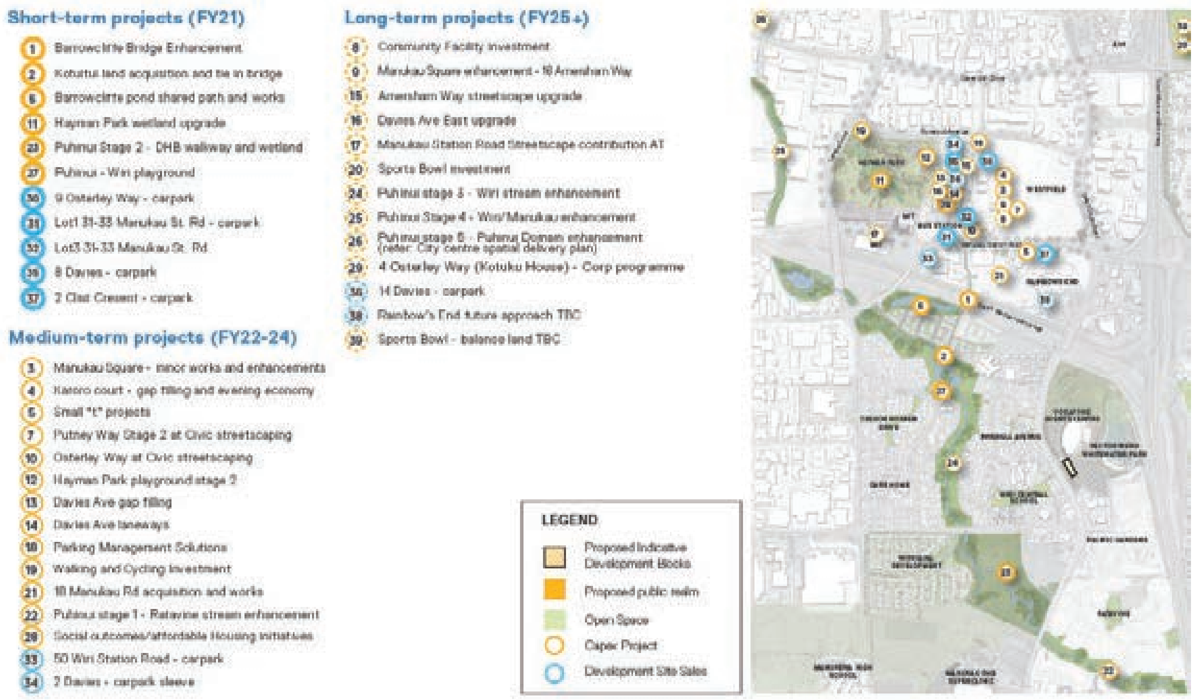

Figure 2-11: Transform Manukau – Overall Programme (Source: Panuku October 2020)

A summary of the Transform Manukau programme for urban regeneration in Manukau and Wiri is included in Section 5 of the Supplementary Information.

Manukau access deficiency

While Manukau is identified as an important economic, social and cultural hub for South Auckland, it suffers from existing access deficiencies which constrain its potential. There are limited fast, reliable, direct and high quality public transport services that connect the surrounding neighbourhoods to and from Manukau Centre. Although AT introduced the New Network for bus routes in 2016, it did not include new rapid transit routes. For future residents and employees in Manukau, the sole rapid transit link – the Eastern Rail Line – connects only to the north, with travel to the north and south via an interchange at Puhinui Station. The RTN at Manukau does not connect to major Southern and Eastern employment areas such as East Tāmaki / Highbrook and the Airport area, which are forecast to be major employment destinations for Manukau residents. Manukau is also disconnected from other proposed radial rapid transit lines such as the Eastern Busway and City Centre to Māngere Light Rail terminating at Botany and the Airport respectively. As a result, residents have unnecessarily long, complicated and unreliable journeys to and from work, education and other opportunities by public transport due to the inability to directly and easily interchange with existing and future rapid transit lines and local bus services across the network (Section 4.3).

There are almost no bus priority measures on local roads (refer to Figure 4-16), therefore buses are caught in the same congestion as other vehicles. As the routes are local services, frequencies are often low and routes are long and indirect. Manukau residents rely more on private transport than the rest of Auckland. Residents in the central Manukau area are more likely to drive to work than in the rest of Auckland (62.5% versus 54.4%).

Providing better access and travel choice through a higher quality, reliable and frequent public transport service linking to the wider RTN will not only provide fast links to major employment areas, but will also support opportunities for more intensive housing in Manukau Central - and its surrounding neighbourhoods such as Wiri. This could be realised with Transit Oriented Developments (TODs), which represent well-designed higher density neighbourhoods, with lower needs for car ownership.

3 Strategic context

3.1 Physical context

The study area covers a variety of urban and rural zones each of which present their own set of opportunities and challenges when developing the transport network. Figure 3-1 summarises the physical context of the study area.

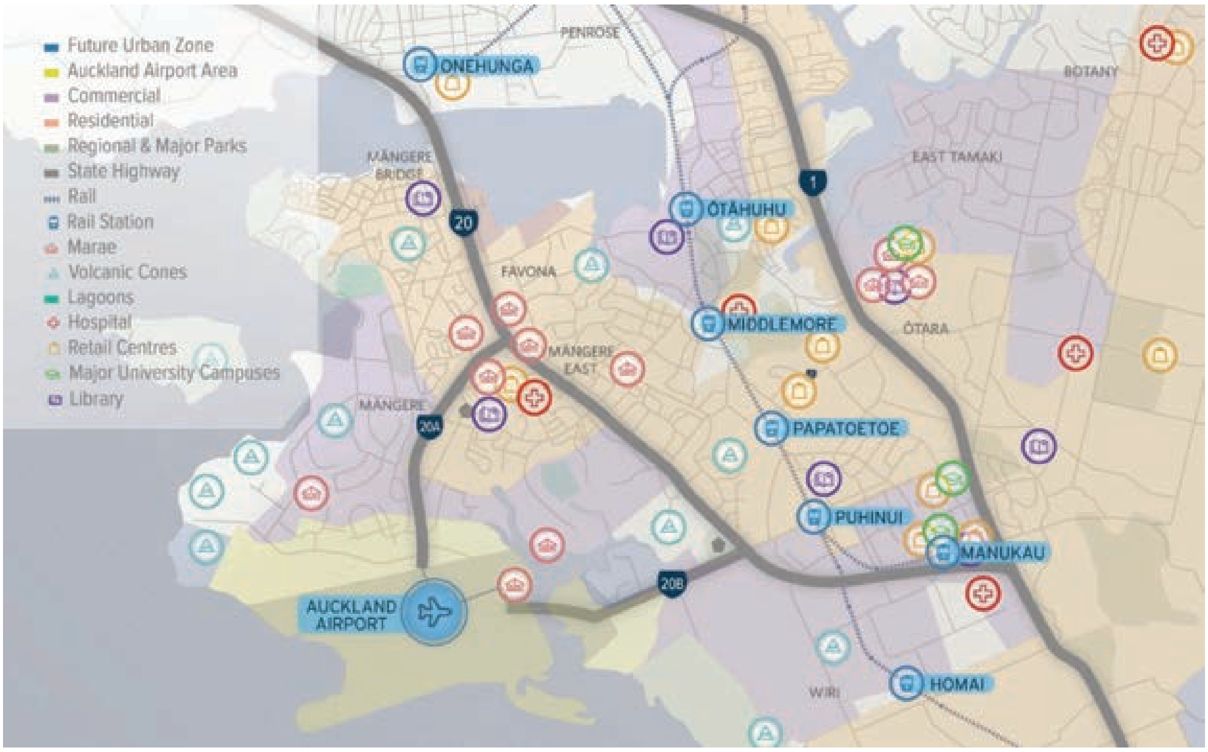

Figure 3-1: Physical context summary

3.2 Transport context

3.2.1 Transport customers

The study area has some of the most diverse populations in Auckland with regard to ethnicity, age and income. These factors influence the population's needs as customers of the transport system.

Socio-economic

Parts of the study area covered by the local board areas of Māngere-Ōtāhuhu, Ōtara-Papatoetoe, and Manurewa are among the more deprived areas in New Zealand, considering employment, income, crime rates, housing, health, education and access to services, such as healthcare, education and shopping. This level of deprivation is reflected in the relatively low median incomes of the population, which are likely to present travel affordability and access issues.

Other implications for customers are that they may have limited access to smart phone data, are less likely to have access to a car and have a higher dependency on public transport. There is also a higher likelihood of working shift hours or having early morning or late-night stops and starts. Customers may even be prone to penalties handed out by employers for being late to work.

Areas to the north-east have lower levels of deprivation index scores compared to the south and south-west. The Howick local board area, which includes Botany and East Tāmaki, compares favourably with the Auckland average having both a higher median household income ($8,000 above the Auckland average), and a higher percentage of residents with formal qualifications. Although residents in these areas are more likely to own private vehicles, public transport speed and reliability will still be a high priority, as it can outperform.

Age

The average age of people living in the study area is low compared to the Auckland region, with most parts of the study area having a low median age. There are relatively few areas where the median age is greater than 40. Many parts of the study area have more than a quarter of the population under 15. With younger people typically more likely to cycle and use public transport, this suggests an opportunity to increase the number of people using bikes and public transport.

This factor creates the need to enable good access to education and access for people who cannot drive. It also presents issues with affordability.

Ethnicity

The study area is ethnically diverse. Pasifika and Asian populations make up the largest population groups.

In some areas, particularly near Ōtara and East Tāmaki, Pasifika populations make up more than 80% of the total population. To the east and in the area around Manukau, more than 40% of the population identifies as Asian. In areas to the south, more than 20% of the population identifies as Māori.

3.2.2 International and domestic Airport customers

A greater than usual proportion of customers of Auckland Airport are likely to speak limited or no English and have limited or no knowledge of Auckland's place names, geography, and travel options.

The Airport is also likely to generate a higher than average proportion of one-off or infrequent transport users which has implications for their ease of use and access to fare products.

3.2.3 Strategic transport infrastructure

The strategic transport infrastructure in the study area includes state highways and the rail corridor.

State highways

- SH20 is a four-lane motorway, connecting Manukau with Māngere, the inner western suburbs and SH16 to the north. SH20 forms the southern-most section of the WRR, a critical strategic alternative road link to SH1
- SH20A is a four-lane expressway, of motorway standard, running from SH20 at Māngere to the Airport precinct
- SH20B is a two lane, undivided road with limited local access providing the southern access to the Airport.

Rail

- The North Island Main Trunk (NIMT) railway runs north-south through the study area with passenger and freight services
- The Manukau rail link connects Manukau directly with the stations to the north only
- Stations in the study area along the NIMT line are Homai, Puhinui, Papatoetoe, Middlemore, and Ōtāhuhu. The Manukau Station is located on the Manukau link
- The Onehunga line is located to the north of the study area and acts as a connection for passenger transport services.

3.2.4 Network Operating Plan

The latest version of the Auckland Network Operating Plan (ANOP)[36] provides important context for the way that the transport network is expected to operate. It outlines six strategic principles for managing Auckland's arterials:

- Support "places" and activity centres
- Promote walking in high pedestrian areas
- Promote cycling links to activity centres and designated routes, reduce conflict
- Provide high priority for public transport on designated routes
- Promote freight on the freight network
- Promote general traffic on preferred traffic routes.

The SWGP NOP[37] was prepared by Waka Kotahi with its network investment partners (AT and Auckland Airport) and its network operating partner, the Auckland Transport Operations Centre (ATOC), to define the desired operational outcomes for the transport network. This NOP is forward looking, focusing on outcomes for the year 2048. It provides a common vision and understanding as to how the SWGP investments will operate once completed. Its 30-year design horizon was used to help determine the preferred option under the SWGP.

The SWG network operating principles outlined below guide any changes to the operational environment should be governed to ensure the desired network outcomes are achieved.

SWGP Network Operating Principles

Overarching principles

- Improve safety for all users on the transport system
- Enhance the customer perception of safety
- Deliver the outcomes as defined by the ANOP and GPS
- Provide an agile network that can keep people and goods moving

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[36] Auckland Network Operating Plan; the latest version was published in 2016, and is currently being updated.

[37] Southwest Gateway Network Operating Plan, Waka Kotahi NZ Transport Agency, May 2020 (included in Appendix G)

- To enhance overall network efficiency

Southwest Gateway specific principles

- Maintain access along SH20 to ensure the WRR can perform its strategic function as an alternate route to SH1 during unplanned and planned events
- Provide priority on SH20, SH20A and SH20B for trips to inter-regional markets over local access
- Prioritise freight movements to / from the north and south industrial areas and Airport

Public Transport related principles

- Prioritise public transport on key routes by time of day
- Efficient and reliable public transport travel times to and from the northern and eastern Airport approaches

Airport related principles

- Improve trip reliability for time sensitive aeronautical traffic (passengers, crew, time sensitive freight) to and from the Airport
- Discourage non-Airport related traffic from travelling through the Airport precinct
- Improve local amenity and air quality by reducing 'rat running' commuter traffic and freight on local roads
- Provide resilient access to and from Auckland Airport to enable it to carry out its function as a lifeline utility

Active mode related principles

- Prioritise pedestrians within 400-800m of high activity pedestrian areas
- Support the amenity function around key activity centres by improving walking and cycling access
- Improve connectivity of walking and cycling network facilities with the wider Auckland network to provide a viable transport mode for local and medium distance trips for users of all ages and abilities, and support access to public transport

Of particular note is the strategic function of SH20 (to ensure the WRR can perform as an alternate route to SH1) ensuring network resilience. The WRR is shown in Figure 3-2.

Access to the Airport precinct is currently facilitated by the state highway network, with almost no direct local arterial access. The state highway network therefore serves competing uses. With the Airport being a significant port for people and goods, and a major employment hub, all user groups are important. However, where competing needs conflict, the NOP assigns mode priority, which is dynamic depending on time of day.

Figure 3-2: The Western Ring Route (WRR)

3.2.5 Freight

The study area includes some of Auckland's main industrial, warehousing and distribution areas. Multiple freight-related operations are located in the area due to the many competitive advantages that proximity affords, including shorter transit times to end destinations and improving overall supply chain efficiency.

SH20A and SH20B, alongside SH20 between Manukau and the SH20A intersection, are areas of high heavy commercial vehicle (HCV) use. Auckland Airport, Wiri / Manukau and their surrounds are international gateways and major freight generators and attractors. Airport access for freight is heavily reliant on the SH20A/B triangle. SH20 is an important link for HCVs that travel from the industrial area in Onehunga/Penrose to Wiri/Manukau (and vice versa).

Freight demand is growing. The growth of the overall national freight task since 2012 is around 18%, with road freight being the dominant mode (carrying about 93% of the total tonnes carried and 75% of the tonne-kms). In Auckland, there has been a growth heavy vehicles transportation, from 2.05 billion vehicle kilometres travelled in 2002, to 3.05 billion vehicle kilometres travelled in 2019. International trade in tonnage terms has grown more strongly with exports increasing by 35% and imports by 27%, highlighting the increasing importance of international markets and suppliers[38].

The importance of freight to the Airport and the surrounding area remains despite COVID-19. June 2020 statistics show that Auckland Airport international air freight demand declined by 16% year-on-year and is trending towards pre-COVID-19 levels, whilst available capacity declined by 25% for the same period, and by 38% year-on-year in October[39]. The trend in capacity is primarily due to the decline in international passenger flights into and out of New Zealand, on which typically 80% of air freight is held (in the belly-hold).

3.2.6 Road safety and Vision Zero

A particular aspect of the inadequacy of the current transport system is the safety record. Forty-six deaths and 561 serious injuries have occurred due to crashes within the study area over the last five years[40].

The Ministry of Transport, Waka Kotahi and AT have adopted the Vision Zero philosophy as part of the 'Road to Zero: New Zealand's Road Safety Strategy 2020-2030' and 'Vision Zero for Tāmaki Makaurau: A Transport Strategy and Action Plan to 2030'. These strategies were adopted during the course of the development of this SSBC.

The Vision Zero philosophy states that deaths and serious injuries (DSIs) are not acceptable on New Zealand roads and embraces a transformative mind set in making all roads safe. The strategy outlines how the transport system needs to be designed to be more forgiving and protect road users when human error inevitably occurs.

This flagship transport infrastructure programme presents a significant opportunity to integrate Vision Zero principles (as outlined below) in the planning, design and operation of public transport and state highway infrastructure within an existing high crash-risk area. If implemented according to Vision Zero principles, as outlined in the Urban Streets and Road Design Guide, it will result in significant road death and serious injury savings as well as related health, active travel, emissions, bus patronage, equity and liveability benefits.

Vision Zero Principles are:

- **Ethics**: People shouldn't die or be seriously injured in transport journeys.
- **Responsibility**: System designers are ultimately responsible for the safety level in the entire system – systems, design, maintenance and use. Everyone needs to show respect, good judgement and follow the rules. If injury still occurs because of lack of knowledge, acceptance or ability, then system designers must take further action to prevent people being killed or seriously injured.
- **People centred**: System designers must accept that people make mistakes and people are vulnerable.

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[38] Ministry of Transport, National Freight Demand Study, September 2018

[39] Auckland Airport Cargo Monitor: Impact of COVID-19 revealed in first half cargo capacity (Auckland Airport, August 2020)

Auckland Airport Cargo Monitor: Low air freight capacity set to continue as demand ramps up (Auckland Airport, December 2020)

[40] Waka Kotahi Crash Analysis System (CAS), as at 10th August 2020

- **System Response**: We need to look at the whole system and develop combinations of solutions and all work together to ensure safe outcomes.

Existing Transport Safety Risk on the possible A2B Route

To establish the baseline for existing road deaths and serious injuries, the possible A2B Rapid Transit route has been assessed at a high level using the AT Urban KiwiRAP (Road Assessment Programme) crash-risk mapping tool which quantifies and compares historical road deaths and serious injuries (DSI) as recorded by the Waka Kotahi Crash Analysis System crash data sets from 2014 to 2018. It identifies significant existing crash-risks as follows:

- Six High Collective crash-risk Intersections (including two of the top three High-risk intersections in the region)
- Three High Collective crash-risk Corridors
- Three Medium-High Collective crash-risk Corridors
- Seven High Crash-risk Active Road User Areas (people walking and cycling)

The majority of the existing route does not meet existing Waka Kotahi Safe and Appropriate Speed Limits for the Road Type ie higher than 50kph on urban arterials.

A large part of the existing route network also contains substantial kilometre lengths of un-safe non-separated and non-standard cycle-lanes.

The majority of the proposed route passes through the Ōtara-Papatoetoe Local Board Area which currently has the third highest road deaths and serious injuries rate among all urban local boards, and in particular for Māori and Pacific road users.

Urban KiwiRAP ratings for the existing corridors and intersections, along with existing speeds and cycle facilities are identified in Table 3-1 and Table 3-2 below and are based on crash data from 2014 to 2018.

Table 3-1: Urban KiwiRAP ratings for local intersections

Regional Ranking (out of 100)	High Crash-risk Intersections	Active Road User Crash-risk	Existing Posted Speed Limit from both approaches	Compliance with Waka Kotahi Safe and Appropriate Speed Limit
2	Cavendish/Gt South Road	High	50/60kph	Non-compliant
3	Botany/ Ti Rakau	High	60/60kph	Non-compliant
20	Cavendish/Lambie	High	60/60kph	Non-compliant
30	Te Irirangi/Smales		80/60kph	Non-compliant
34	Manukau Station Road/Lambie	High	60/60kph	Non-compliant
	Te Irirangi/Dawson		50/50kph	

Table 3-2: Urban KiwiRAP ratings for local corridors

Regional Ranking (out of 100)	High and Medium-High Crash-risk Corridors	Active Road User Crash-risk	Existing Posted Speed Limit and Cycle facility	Compliance with Waka Kotahi Safe and Appropriate Speed Limit
12	Cavendish Drive	High	60kph with unprotected cycle lane	Non-compliant
18	Great South Road		60kph with unprotected cycle lane	Non-compliant
41	Manukau Station Road	High	60/50kph with unprotected cycle lane	Non-compliant
Medium-High Crash-risk	Te Irirangi Drive		50kph with unprotected cycle-lanes, 80kph for the majority of its length	Non-compliant
Medium Crash-risk	Lambie Drive		60kph with unprotected cycle lane	Non-compliant
Medium-High Crash-risk	Puhinui Road	High	100/50kph with unprotected cycle lane	Non-compliant

Existing Transport Safety Risk on the 20Connect state highways and the surrounding local road network

Figure 3-3 is a map of the 20Connect state highway network, and the surrounding local road network. It highlights roads with high to medium collective risk levels, based on the number of fatal and serious crashes between 2012 and 2016 recorded in Waka Kotahi's Crash Analysis System (CAS). Figure 3-4 is a similar collective risk map of the A2B study area.

Figure 3-3: KiwiRAP RoadSafety collective risk map (20Connect study area)

Figure 3-4: KiwiRAP RoadSafety collective risk map (A2B study area)

The significant observations are listed below:

- Most of the SH20B corridor is classified as high-risk for road crashes. As per the Waka Kotahi CAS, there were four serious crashes (crashes where at least one person was seriously injured) between 2012 and 2016. The SH20B early improvements project is currently undertaking safety interventions such as reducing speed limits and introducing traffic light control at major intersections.
- All of SH20 within the study area is classified as a medium-high risk corridor for road crashes. Between 2012 and 2016, there were 18 serious crashes and one fatal crash on SH20 (between Māngere Bridge and SH1.
- Sections of the SH20A corridor are classified as medium to medium-high risk for road crashes.
- A number of local roads, including Massey Road and Kirkbride Road, are classified as medium to medium-high risk for road crashes. A major potential reason for this risk is significant HCV movement along these corridors, due in large part to the lack of a southbound SH20A/SH20 connection.
- Most of Puhinui Road and Te Irirangi Drive, identified as potential routes for the A2B corridor, are classified as medium-high risk. Sections of Great South Road are classified as high risk.

Figure 3-5 presents another KiwiRAP Road Safety Risk Map. It displays all crashes involving Vulnerable Road Users (VRUs) as a heatmap, which includes motorcyclists (including mopeds), cyclists and pedestrians (including persons on skateboards, roller-skates, foot scooters and using mobility aids such as powered wheelchairs). Figure 3-6 presents a similar risk map for the A2B study area.

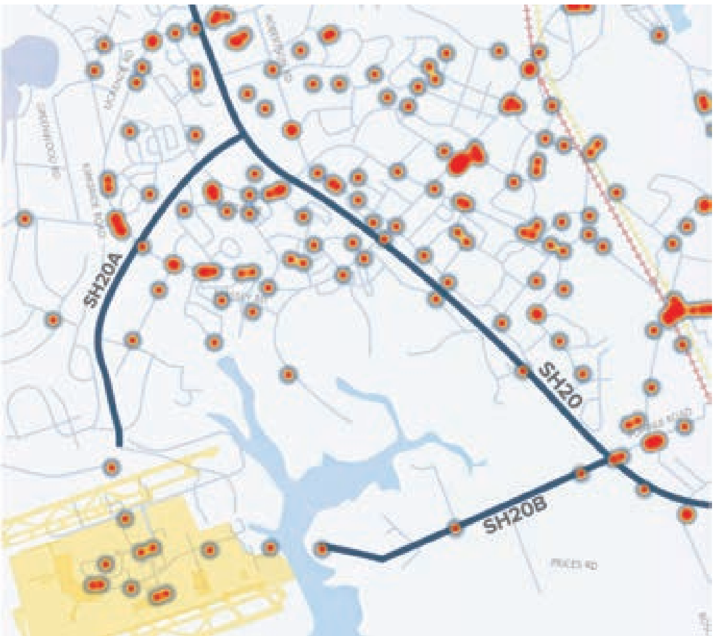


Figure 3-5: Vulnerable road-user crashes between 2012 and 2016, 20Connect study area (KiwiRAP RoadSafety Risk)

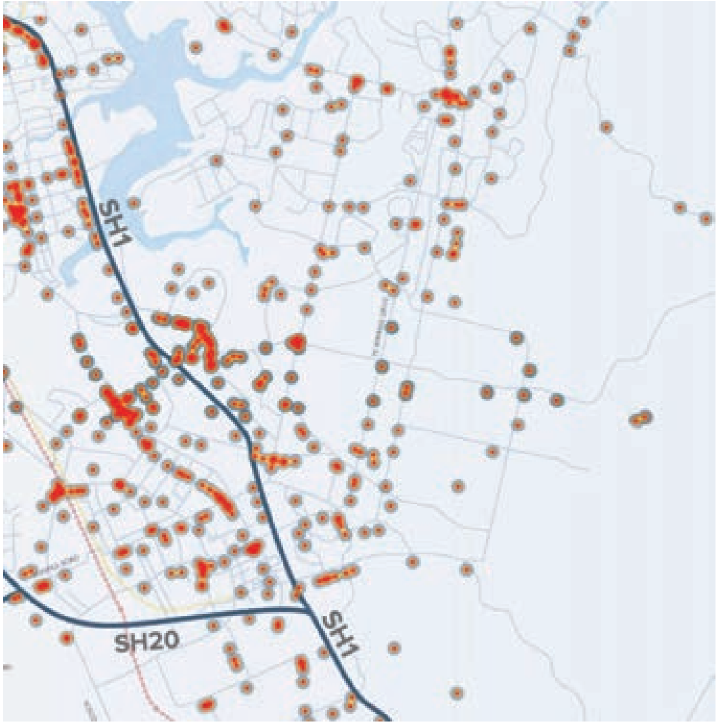


Figure 3-6: Vulnerable road-user crashes between 2012 and 2016, A2B study area (KiwiRAP RoadSafety Risk)

3.3 Demographic context

The study area is located within the Māngere-Ōtāhuhu, Ōtara-Papatoetoe, Manurewa, and Howick local board areas of Auckland Council. As noted in Section 2.3, in terms of the local transport customers, the study area has some of the most diverse and disadvantaged populations in Auckland.

The details of the composition of the population are discussed in Section 3.3 of the Supplementary Information.

3.4 Cultural context

The study area encompasses a wide range of sites and landscapes which hold special significance for Mana Whenua. These sites and landscapes have the potential to be affected by development either directly through physical interference (possible tunnelling, earthworks, piling etc) and through issues such as stormwater run-off into natural watercourses. The cultural context is particularly important for problem statement three (see Section 4.5).

The SH20B section of the corridor is within the Puhinui Peninsula and is identified as being significant to Mana Whenua as part of their cultural landscape including archaeological sites, areas of land with Māori Reserve status, the corridor is intersected by freshwater watercourses and the Coastal Marine Area identified as Significant Ecological Area – Marine, and Sites of Significance to Mana Whenua.

Over the course of the SWGP development, iwi representatives identified areas of interest which are specific to the various whanau, hapū, and iwi as Mana Whenua in their role as Kaitiaki.

The following are some of the main potential areas of interest:

- The Puhinui Māori Cultural landscape
- The Puhinui Peninsula to the east of the Airport is an important area in the history, stories, whakapapa and mythology of Te Ākitai Waiohua

- The significance of the Puhinui area is formally recognised in the Eastern Access Agreement (1991), which acknowledges that the construction of the proposed eastern access approach road and bridge to the Airport (Pūkaki Bridge) would impact the ancestral land and waters, and cultural traditions of the people of Te Ākitai Waiohua
- Pūkaki and Waokauri Creeks have Māori Reservation status, meaning they are held for the common use or benefit of Te Ākitai Waiohua. As a reservation, the land is afforded the protection of being "inalienable"[41] to the Crown. The Pūkaki marae is on the northern bank of the Waokauri Creek
- There are Mataawaka marae around Māngere Town Centre and Mana Whenua marae in the broader Māngere region
- There are many recorded archaeological sites and evidence of widespread occupation in the area. by Mana Whenua during pre-European times. While concentrated around Pūkaki Creek, Waokauri Creek, and Crater Hill (Ngā Kapua Kohuora), there are also multiple sites at the northern end of the study area around East Tāmaki
- Volcanic cones, such as Crater Hill (Ngā Kapua Kohuora), SH20 partly passes through
- Other significant sites (as identified in the Te Ākitai Waiohua CVA Addendum) include Papāhinau and Mimiti Te Arero historic settlements and the Manukau Harbour
- The current transport network (with a few recent exceptions) poorly reflects the cultural history of South Auckland
- The current transport network and the legacy of urban development have led to negative impacts on the cultural and spiritual health of Mana Whenua.

The above list is not meant to be exhaustive. It is anticipated that through continuing engagement with Mana Whenua further sites and issues will be identified.

Other sites

The Manukau Memorial Gardens are located at the intersection between Puhinui Road and SH20 and have cross-cultural significance. Figure 3-7 shows the places of heritage and cultural significance within the study area.

[41] Alienation includes a number of actions including acquiring land under the Public Works Act 1981 (PWA). Some flexibility is provided under the Te Ture Whenua Māori Act 1993. However, the activities that Māori reservation land can be used for is generally restricted to community facilities and developments of value to the Trustees.

LEGEND

Not to scale

- Volcanic Cones
- Sites and Places of Significance to Mana Whenua*
  (as identified in the Auckland Unitary Plan)
- Regional / Major Parks
- Marae
- Pūkaki Urupa
- Pūkaki Creek Reservation / Mana Whenua Management Area
- Puhinui Precinct Plan boundary (Auckland Unitary Plan (I432)
- Pūkaki Marae Matukutureia Cultural Viewshaft Protection
  (as identified in Puhinui Precinct Plan - Auckland Unitary Plan)

Cultural Heritage Inventory (Public)

- Archaeological Site
- Historical Botanical Site
- Historic Structure
- Maritime Site
- Reported Historic Site

EXISTING
- State Highway
- Rail

* Note that multiple iwi have interest in various areas and that the project team are working with Mana Whenua to better understand these values and how to protect them.

Figure 3-7: Heritage and culture context

4 Defining the problems

4.1 Problem statements

Two investment logic maps (ILMs) were developed for the A2B and 20Connect projects, in recognition of the different aspects of the programme and the different owners – AT and Waka Kotahi. These were developed in a co-ordinated manner by the Problem Owners, recognising the overlap in geographic and functional terms of the two projects, particularly in the western end of the study area in the vicinity of the Airport precinct. The projects also have differences in geographic scope and function with A2B including a wide area and set of needs east of Manukau as far as Botany.

While the original ILMs were prepared in parallel with representatives from each project team in attendance meaning they were highly aligned, for the purposes of this SSBC, combined problem statements were created. These seek to retain as much of the existing problem statement wording as possible to retain 'line of sight' to the original processes. This also seeks to acknowledge the input of other programme partners in the original ILM processes, Te Ākitai Waiohua and Auckland Airport. The original ILMs are attached in Appendix A, along with the combined ILM.

The combined problem statements are:

- Costly, unreliable, long and complicated trips in South and East Auckland, including the Airport area, severely limit accessible travel choices for people to meet daily needs for work, learning and socialising, reinforcing ongoing deprivation and resulting in unreliable movement of people and goods.
- Poor east-west travel choices as well as inadequate transport system capacity connections and management, to, from and within the study area constrain current and future growth, undermining economic growth and prosperity for Aucklanders.
- The current transport system in South and East Auckland has adverse environmental effects and does not recognise cultural identity and taonga, diminishing the Mauri of the area.
- Perceptions of poor personal safety limit uptake of public transport and active modes.

4.2 Patterns and scale of demand for access

Problems 1 and 2 deal with deficiencies in differing aspects of access. This section provides an overview and addresses the forecast movement patterns in the study area and the scale of the access deficit. It illustrates that there is a dominant demand for travel within South and East Auckland – not radially toward the city centre. This is important, particularly for public transport – and travel choices – as all of the current high-quality public transport connections are radial.

Congestion and poor reliability are major problems identified in the study area. Because of the time-critical nature of high-value air freight and air travel, the provision of reliable, effective corridors is particularly important to the aviation sector.

This analysis supports the evidence for Problems 1 and 2 showing that this demand is largely unmet and good travel choices not provided by the existing RTN and that the highways are also inadequate.

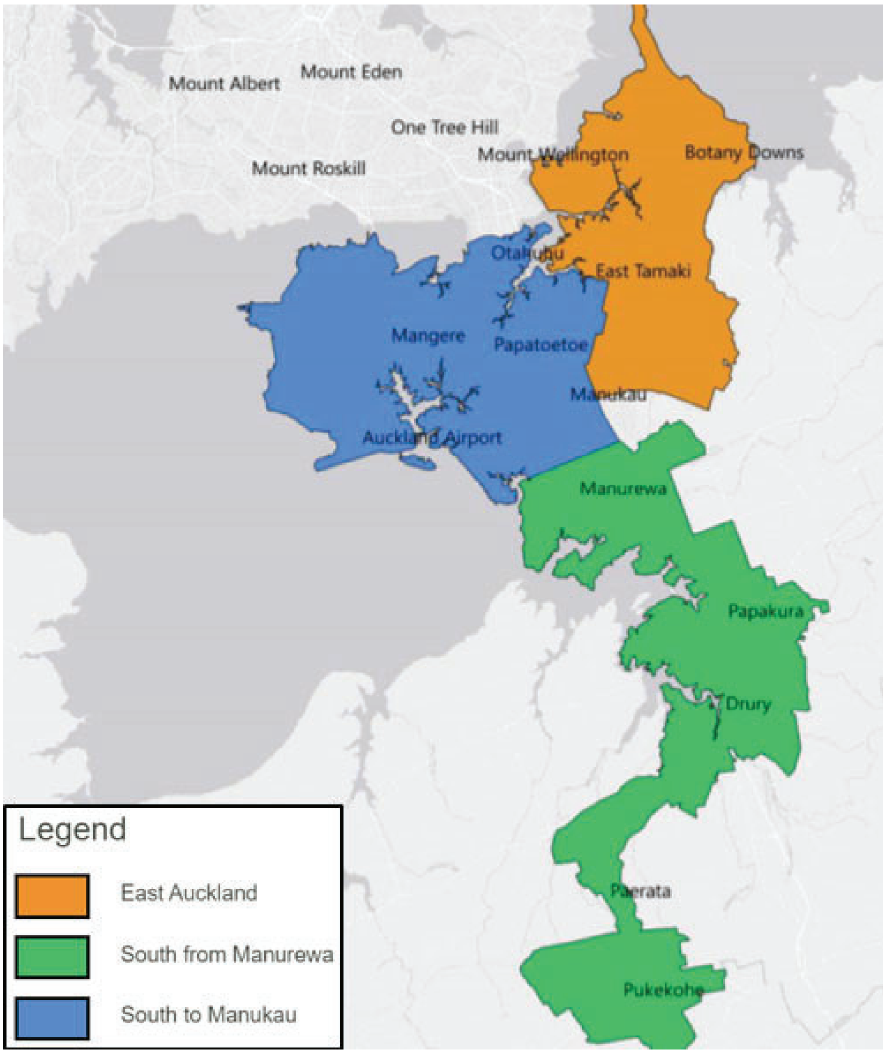
4.2.1 Land use growth

The study area contains a significant population of 360,000 and includes two of the seven metropolitan centres in Auckland, a substantial growth area at Ormiston and two of the largest employment areas in Auckland in the Airport precinct and East Tāmaki.

Of importance to this issue is the proposed growth in the southern growth areas. When combined with the wider south - Drury, Paerata and Pukekohe - the southern area of Auckland alone is forecast to accommodate an additional 114,800 people between 2016 and 2038, giving a forecast total population of 334,900 by 2038[42]. Between 2013 and 2018, Manukau grew the most of all areas in Auckland, and is anticipated to continue being an area of significant population and employment growth. Access to jobs for the people of South Auckland is heavily dependent on the Airport area and East Tāmaki – neither of which can be accessed easily with the existing public transport network - and on Manukau.

The likelihood of this growth occurring post-COVID-19 has been assessed as part of the Sensitivity Paper[43], drawing on the work of Treasury, and analysis commissioned by Waka Kotahi, among others. The general view from forecasters is that *"Auckland's population growth is likely to be curtailed for one to three years, primarily due to a reduction in new migration. After that, there is no compelling evidence to suggest that a pattern of growth will not return. Set against this, it appears that immigration for the 2019-20 period is currently running above expectations*".

Looking first at the macro level of growth within the study area, Figure 4-1 defines three areas for population and employment comparison.



[42] SH1 Papakura to Bombay, Stage 1B1 – NoR and Resource Consents, Draft Transport Assessment Report, Waka Kotahi NZ Transport Agency, 2020-05-21

[43] John Williamson, op cit, Appendix V

Figure 4-1: Defined areas for comparing demographics

Figure 4-2 illustrates the historical and future modelled population of the areas defined above. Significantly, the East Auckland and South to Manukau areas are anticipated to grow to almost 200,000 people, whilst the South from Manurewa area is anticipated to experience an even higher rate of growth.

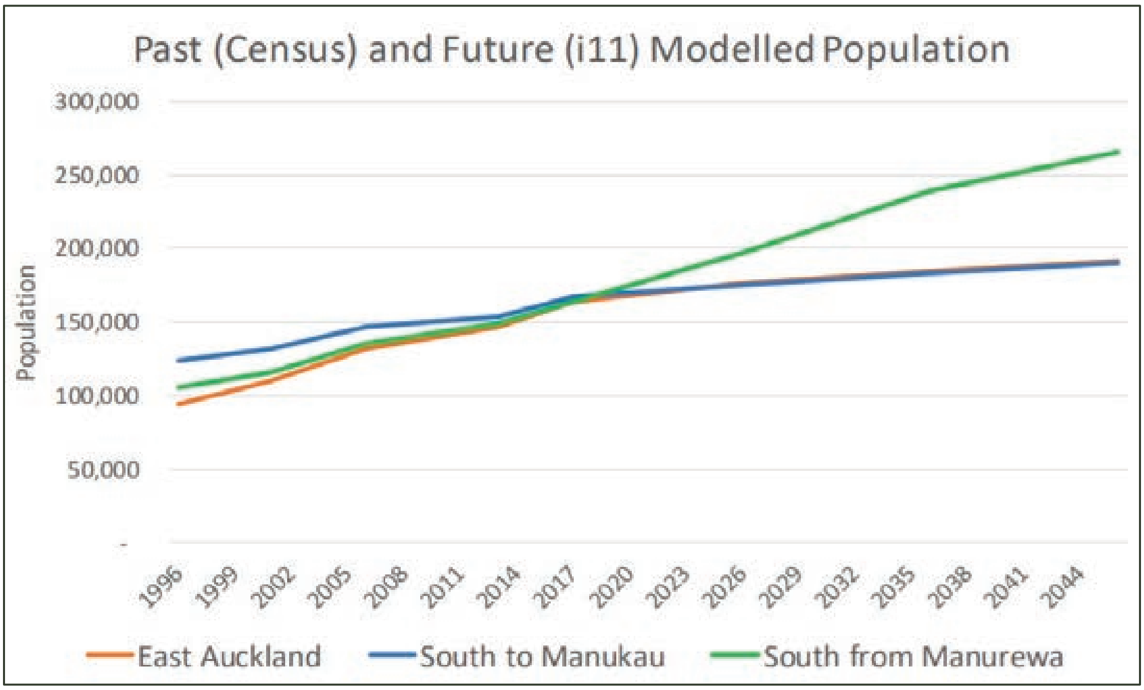


Figure 4-2: Historical and future population growth in the study area

Employment is anticipated to continue growing substantially, as seen in Figure 4-3. By 2046, it is forecast that around 60,000 people will be working in the East Auckland area, around 75,000 people will be working in the South to Manukau area, and around 110,000 people will be working in the South from Manurewa area.

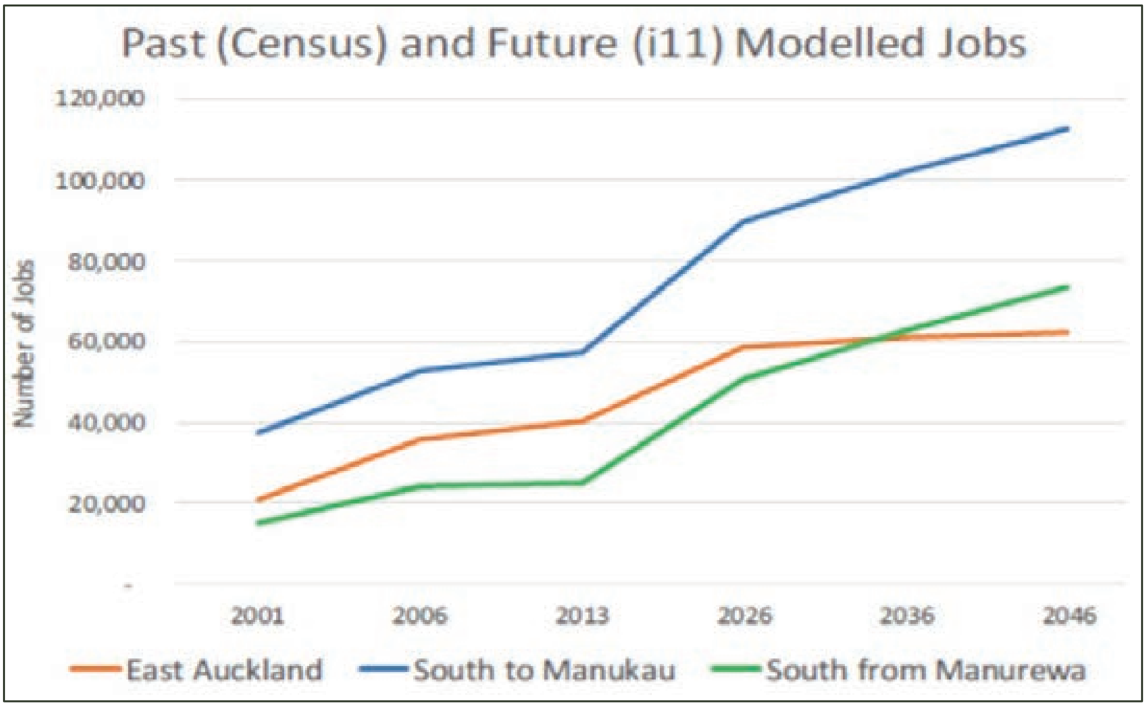


Figure 4-3: Historical and future job growth in the study area

Figure 4-2 illustrates Auckland's forecast population growth between 2016 and 2048 at a more granular level, based on Auckland Council's Land Use Scenario i11. Of note is the significant growth south of the study area, a large proportion of which is expected to rely on employment within the study area. Also, of note is the large growth area of Ormiston on the city's eastern edge which is not connected by good quality public transport.

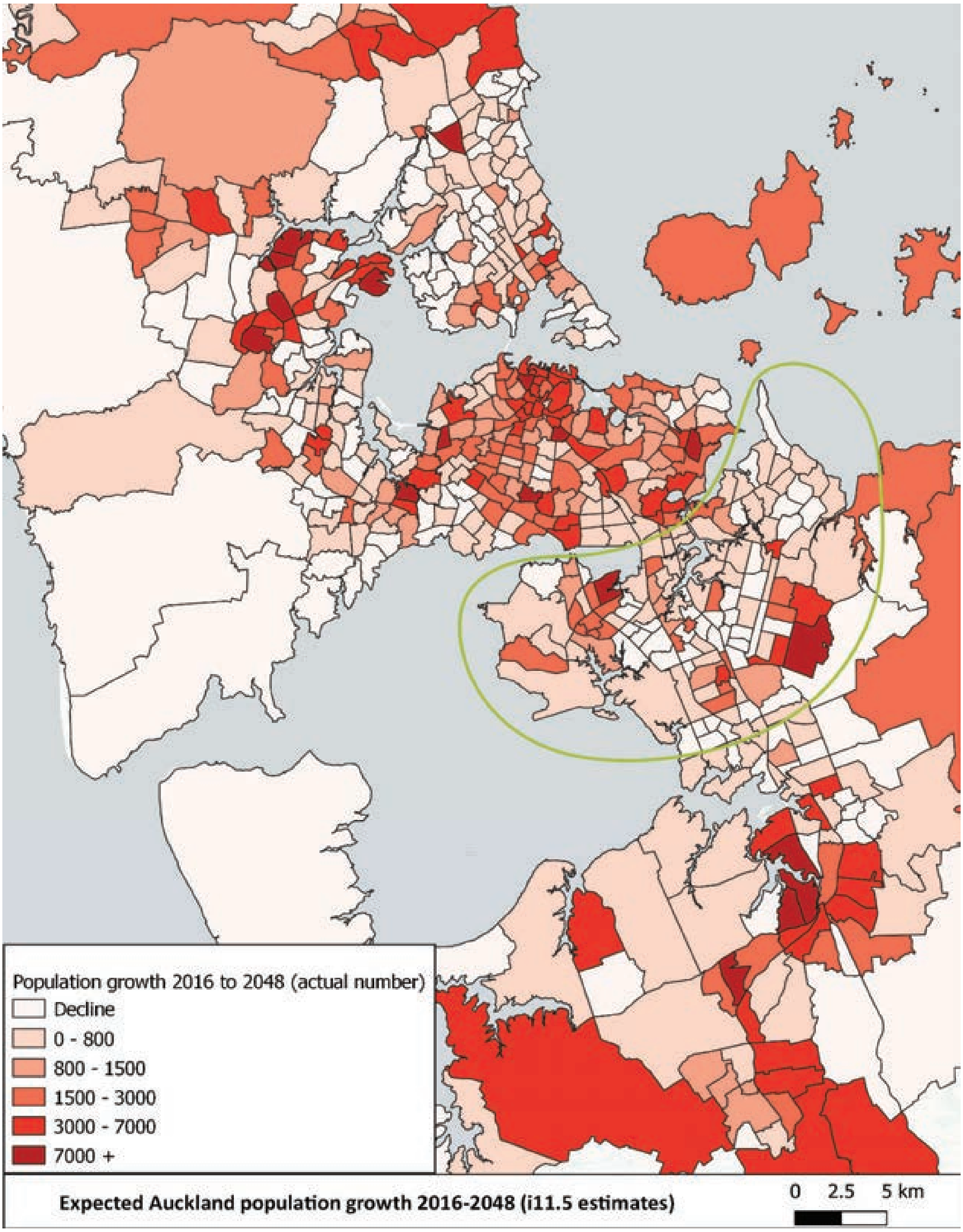


Figure 4-4: Forecast employment growth, study area shown in green

Figure 4-5 illustrates Auckland's forecast employment growth between 2016 and 2048 by area, also at a more granular level, based on Auckland Council's Land Use Scenario i11. Evident on this figure are major employment growth areas around the Airport, Manukau, East Tāmaki, Botany, Flatbush and Ormiston.

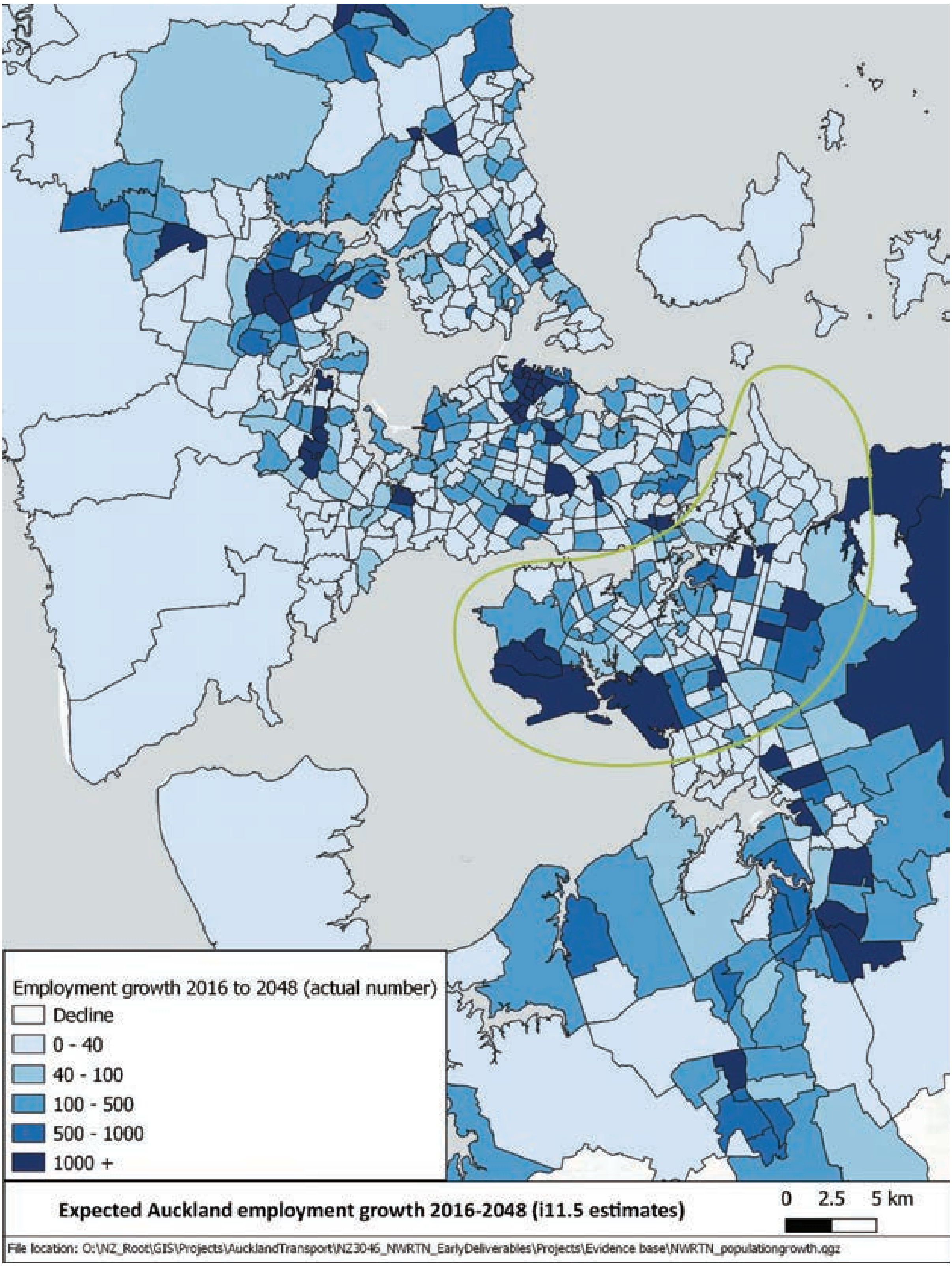


Figure 4-5: Forecast employment growth, study area shown in green

Looking at employment more closely, there is a significant growth in employment in the Airport and Auckland CBD, as shown in Table 4-1 below.

Table 4-1: Jobs at Airport, CBD growth compared to population[44]

Year	Airport Precinct Jobs	CBD Jobs
2018	12,000	97,500
2048	16,600	156,300
% growth	38%	60%

Auckland Airport and its surrounding area is a nationally significant economic driver and regionally significant employment zone. In 2020, Auckland Airport was New Zealand's second largest import port by value behind the Port of Auckland, and New Zealand's second largest export port by value behind the Port of Tauranga.[45] The ability for employees, visitors and freight to travel efficiently to and from the area is an important consideration for economic productivity.

4.2.2 Travel patterns

The existing and proposed RTN is largely radial, presenting good opportunities for people to travel from the south and parts of the east to the Isthmus and Auckland city centre. This provision does not, however, align well with travel demands in this area. With its significant employment areas, trips internal to the study area are dominant, with most trips being within the study area or to and from the significant growth areas to the south.

Figure 4-6 to Figure 4-9 show forecast travel demand patterns for the Auckland region, and specifically relate to travel within and around the study area. This data suggests demand for a strong east-west orbital link providing connections to the major employment and educational locations and to the radial rapid transit links to enable trips to other parts of Auckland. Of note:

- **From the strategic Southern Growth Area**, while 13% of trips are expected to travel through the study area to central Auckland, twice this volume at 26% of trips, are expected to end in the study area. (60% of all trips are expected to start and finish in the existing and growth areas south of the study area.)
- Of trips from the Manukau Metropolitan Centre, 62% are expected to end in the study area
- Of trips from the major growth areas at Ormiston and East Tāmaki, 79% are expected to end in the study area.

Making these trips by public transport with the current and committed network means transfers between services and relying on non-RTN quality services which have low frequencies, low speeds and poor reliability. It is generally accepted that making connected journeys using services of this nature is not acceptable to people and does not provide a realistic transport choice.

Figure 4-6 shows that the Airport area, East Tāmaki, Manukau and Papatoetoe/Māngere are collectively more significant than the rest of Auckland for AM peak destinations for travellers coming from the South.

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[44] 2018 statistics from 2018 Census, whilst 2048 statistics from Auckland Council's Land Use Scenario i11.5

[45] Statistics NZ: Exports for Overseas Cargo (fob NZ$): New Zealand Port by Country of Destination, Commodity (HS2) and Period; and

Imports for Overseas Cargo (cif NZ$): New Zealand Port by Country of Origin, Commodity (HS2) and Period

This would suggest a connection between the rail line and an east-west route, allowing connections to these destinations.

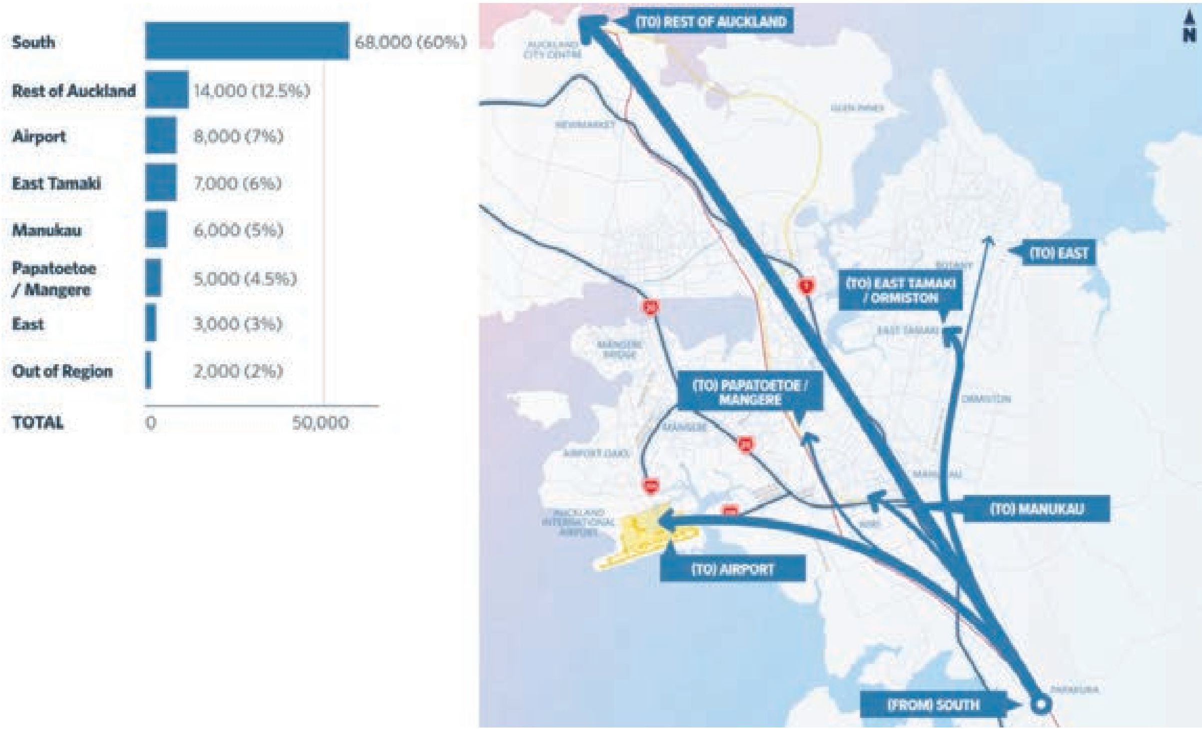

Figure 4-6: Destinations for trips from the South (AM peak 2048, source MSM)

Figure 4-7 shows that trips from Manukau predominantly end in the south and east of Auckland, within the study area. A connection between Manukau and East Tāmaki is critical as well as an ability to access the rail line to the south – a connection not currently enabled by the RTN.

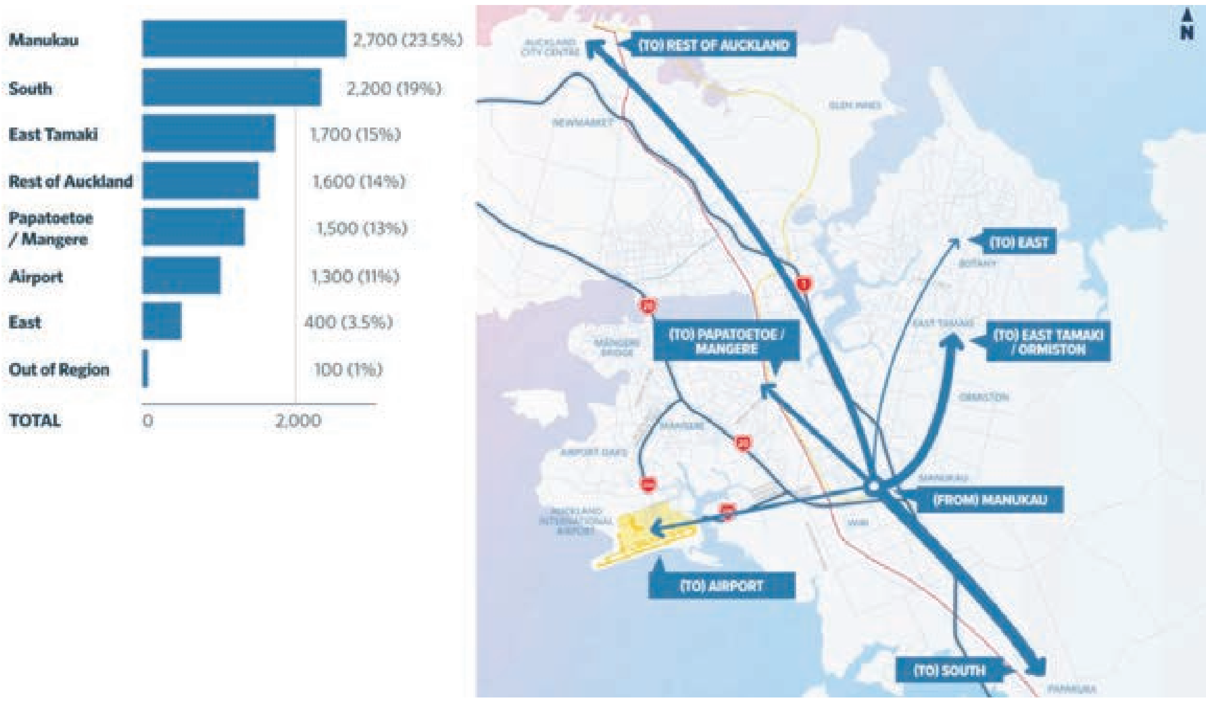

Figure 4-7: Destinations for trips from Manukau (AM peak 2048, source MSM)

Figure 4-8 indicates that the emerging residential areas in Ormiston require a strong connection to radial rapid transit routes to allow the dominant flow of trips to the rest of Auckland for which the connections are at Botany and Manukau. Ormiston is currently not well connected to these locations by public transport.

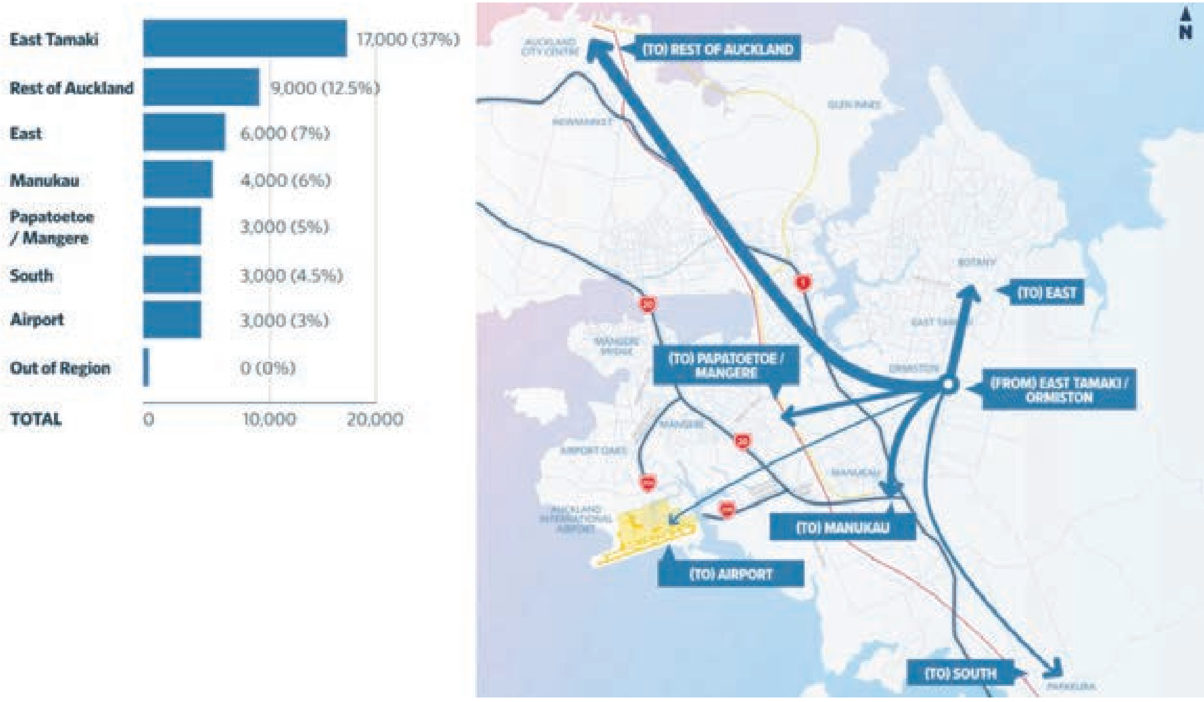

Figure 4-8: Destinations for trips from East Tāmaki/Ormiston (AM peak 2048, source MSM)

A significant proportion of AM peak trips to the Airport area come from the south and east of Auckland (Figure 4-9). Collectively there are more forecast trips from the south and east to the Airport area in the AM peak than the rest of Auckland with 23% of these trips coming from the strategic Southern Growth Area. The dominant origins are located on an east-west corridor and to the south which, given the Airport's geographic location, would be best served by an east-west rapid transit connection to the rail line.

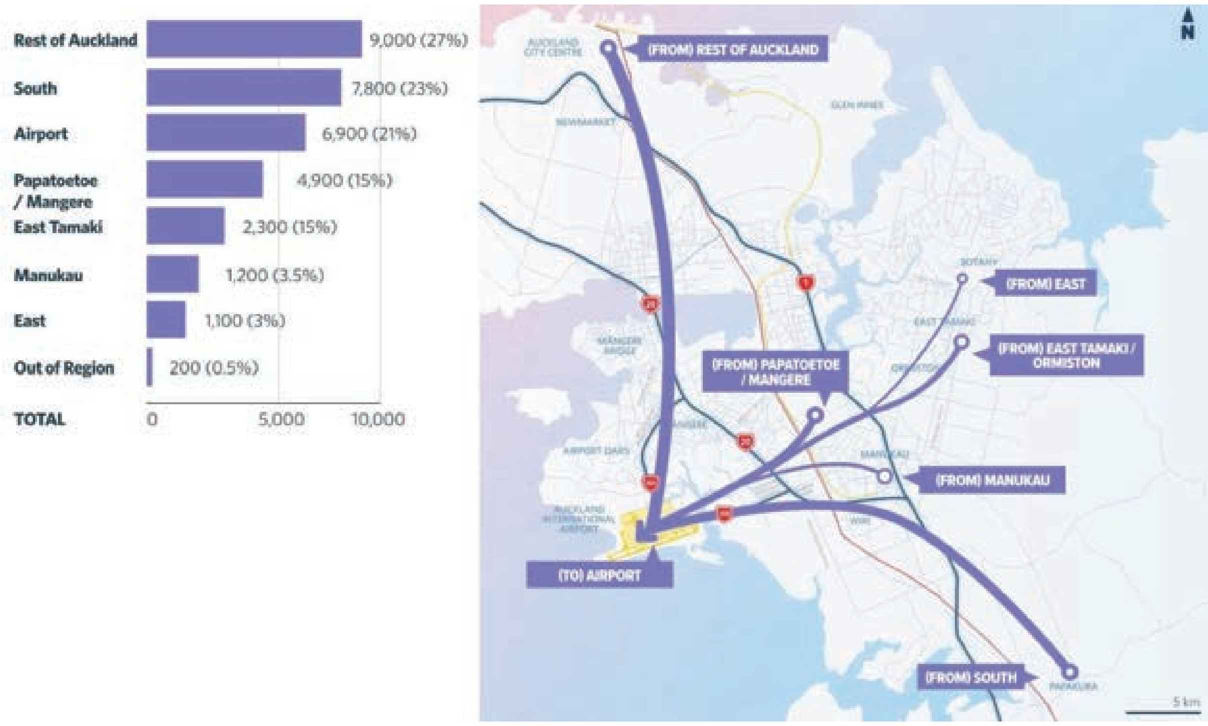

Figure 4-9: Origins for trips to the Airport area (AM peak 2048, source MSM)

4.2.3 Scale of the access need

These total travel demands clearly indicate a need, as specified in ATAP, for an orbital public transport connection, as no such connection exists and demand for travel is strong. To identify the potential scale of public transport demand on an orbital route, Macro Strategic Model (MSM) outputs of a high-quality public transport link were used. They show demand would peak around 2,000 people per hour in 2048[46].

This is a significant public transport demand. It would require 24 double deck buses per hour or one every two and a half minutes[47].

By way of comparison, the forecast demand is greater than that expected on the Eastern Busway on Ti Rakau Drive, just east of Pakuranga Road, which will be an urban, at-grade rapid transit corridor, recently committed to implementation (Figure 4-10 and Figure 4-11).

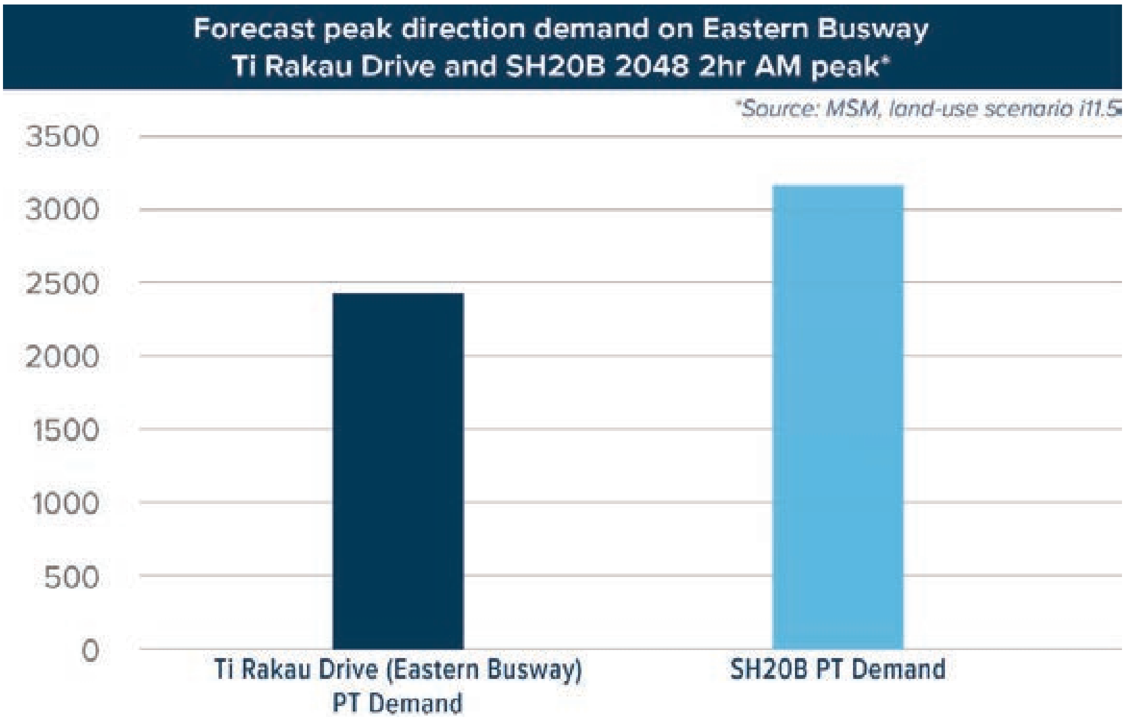

Figure 4-10: Eastern Busway and SH20B public transport demand forecasts

[46] Using 60% of the peak 2hr figure from MSM

[47] Assuming 100-person capacity double deck buses at average 85% occupancy

Figure 4-11: Visualisation of the recently committed Eastern Busway on Ti Rakau Drive (source: AT)

The scale of Airport passenger growth, freight growth and employment growth in the Airport precinct, combined with the fact that the surrounding state highway network is already experiencing severe capacity issues, also clearly indicates a significant scale of access need via the SH20, SH20A, and SH20B road corridors. Significant capacity improvements on these highways will be vital. The evidence supporting this issue is outlined in Section 2.4.3 and Section 4.4.4.

4.3 Problem Statement 1

Costly, unreliable, long and complicated trips in South and East Auckland, including the Airport area, severely limit accessible travel choices for people to meet daily needs for work, learning and socialising, reinforcing ongoing deprivation and resulting in unreliable movement of people and goods.

4.3.1 High cost of travel

The difficulty of journeys across the study area by public transport and active modes create significant reliance on private vehicles. This car dependence may lead to higher car ownership than the household may prefer, which can be disproportionately costly for lower income populations.

The average cost of operating a private vehicle in New Zealand, which is between $7,000 and $11,000 pa[48], equates to almost 20% of the median income in the study area. These figures exclude capital and financing costs, which can be considerable, especially for lower income households that may need to access more expensive financing options. While there is a strong probability that lower household income earners are likely to purchase used vehicles that are less costly than the average, older vehicles are typically less fuel efficient and more expensive to maintain than newer models[49].

Comparing costs of private vehicle use and public transport for typical trips (further considered for *complexity* in the following section) shows that if the latter were more viable, costs would be substantially reduced.

Table 4-2: Comparative travel costs

Trip	Car cost (including two-way travel and parking)	HOP card cost on public transport (two-way)
A shift worker at the Airport living in Manurewa	$12.00	$7.10
An office worker employed at the Airport and living in Howick	$16.30	$4.00
A student living in Flat Bush and attending MIT Manukau	$7.80	$3.10

48 AA's Running Costs Report for 2018 - https://www.aa.co.nz/cars/owning-a-car/fuel-prices-and-types/vehicle-running-cost/

49 Vehicle Fuel Efficiency Standard Preliminary Social Impact Assessment, Ministry of Transport, July 2019

4.3.2 Unreliable public transport trips restrict travel choices

Research with customers conducted by AT[50] found that reliability in the public transport system is a top concern for current non-users, and a major factor in 70% of potential users "rejecting" public transport as an option. Manukau is an important destination for almost all trip purposes. However, access both locally and to wider regional destinations via rail and bus takes a long time and is unreliable.

Route 35 is the most direct bus route from Botany to Manukau (Figure 4-12) and as a result, the most relevant comparator for this business case. A journey of 8km, it has the following performance characteristics:

- Variances as high as 35% from the average trip time at any given time
- Almost 100% variance between the longest and shortest 80th percentile journey time
- In the evening peak, 80% of journey times vary between 35 and 60 minutes.
- Other local routes are as variable.

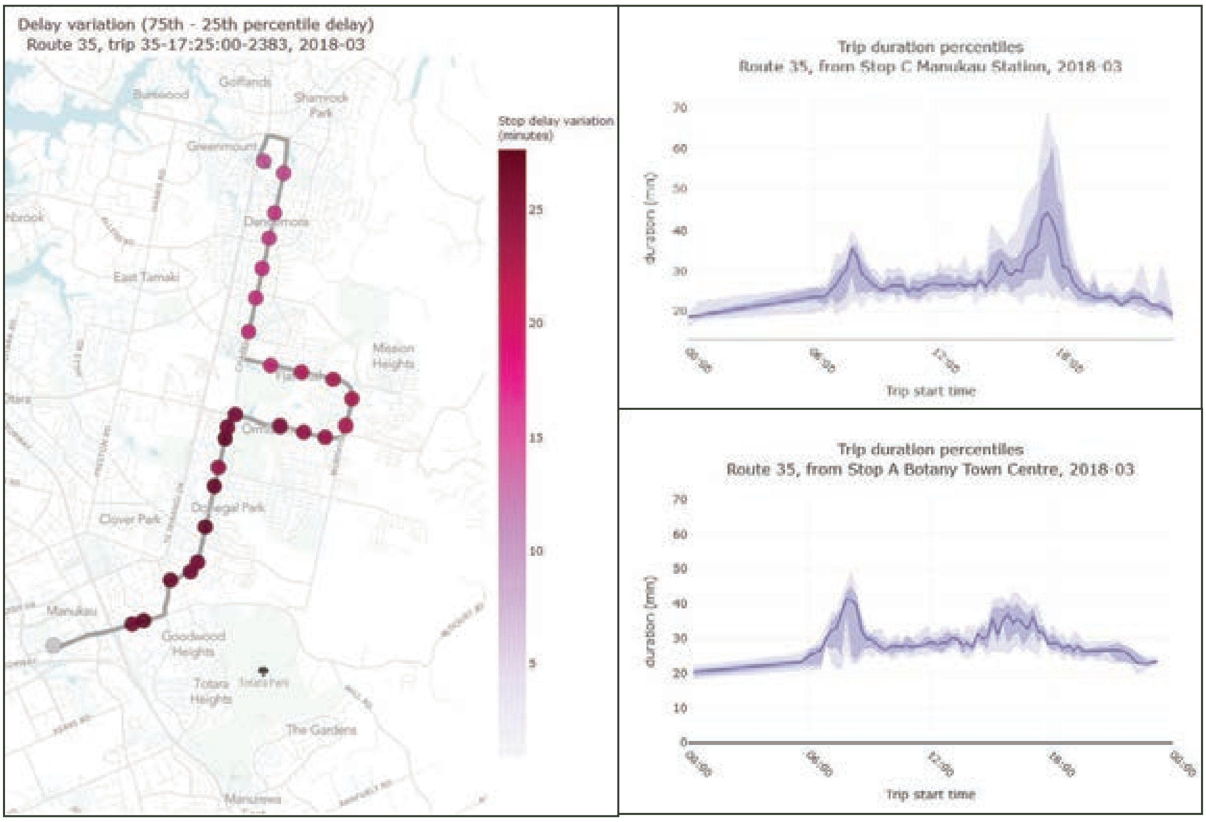

Figure 4-12: Examples of bus unreliability in the study area, Route 35 (source: AT real-time data)

In practical terms, if a person has to be at work or study at a certain time, or home in time for childcare or family commitments, this level of variation is unlikely to provide a viable choice which is a key requirement of the GPS. This is borne out in the AT customer surveys.

The Northern Busway (Figure 4-13) is a benchmark as to what "good" looks like for public transport speed and reliability in Auckland. Travel time variation between Albany and the city centre (a trip of 20km – slightly longer than Airport to Botany) is between 25 and 35 minutes compared to an expected

[50] KTNS Customer Insights Report, 2018

50 to 67 minutes for the Airport to Botany journey with using the soon to be implemented Airport Access Short Term route (AirportLink) and Route 35 described above.

This high level of reliability must contribute to mode share for public transport between the North Shore and the city centre being around 50%[51] compared to around 4% for this study area

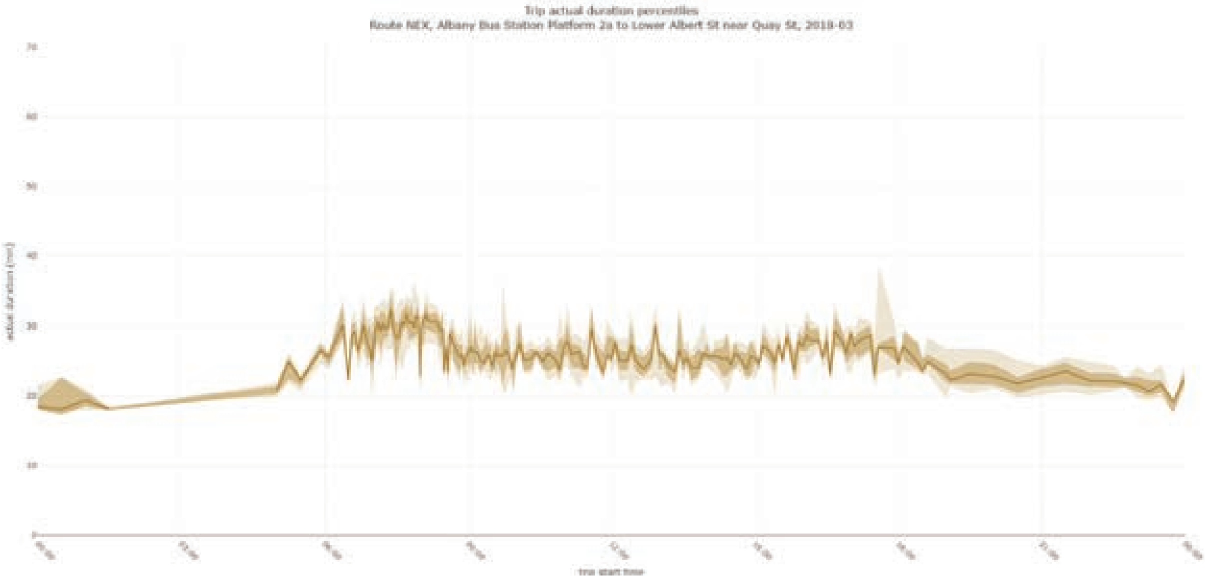

Figure 4-13: Examples of bus reliability - Northern Express, southbound (source: AT)

4.3.3 Long journeys

Public transport trips in the study area take significantly longer (and are more variable) than travelling by private vehicle and are longer than comparable journeys in other parts of Auckland. Figure 4-14 and Figure 4-15 depict do-minimum travel times for various trips along the A2B route by car and bus in the peak periods. The figures show total daily variability (minimum and maximum travel times) in either direction. The bus services assumed for the do-minimum bus travel times are the proposed “AirportLink” between the Airport and Manukau, and Route 35 between Manukau and Botany.

This shows several key points:

- Journeys by car are highly unreliable in the study area, but in most cases provide better outcomes than public transport
- Do-minimum public transport trips are long and very unreliable

A current trip from the Airport to Botany, around 18km, can vary from 50 to 67 minutes via public transport.

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[51] Australasian Transport Research Forum. 2017. Auckland Northern Busway Retrospective: Updated Review of Impacts. Auckland: Transport Futures Limited & Ian Wallis Associates.

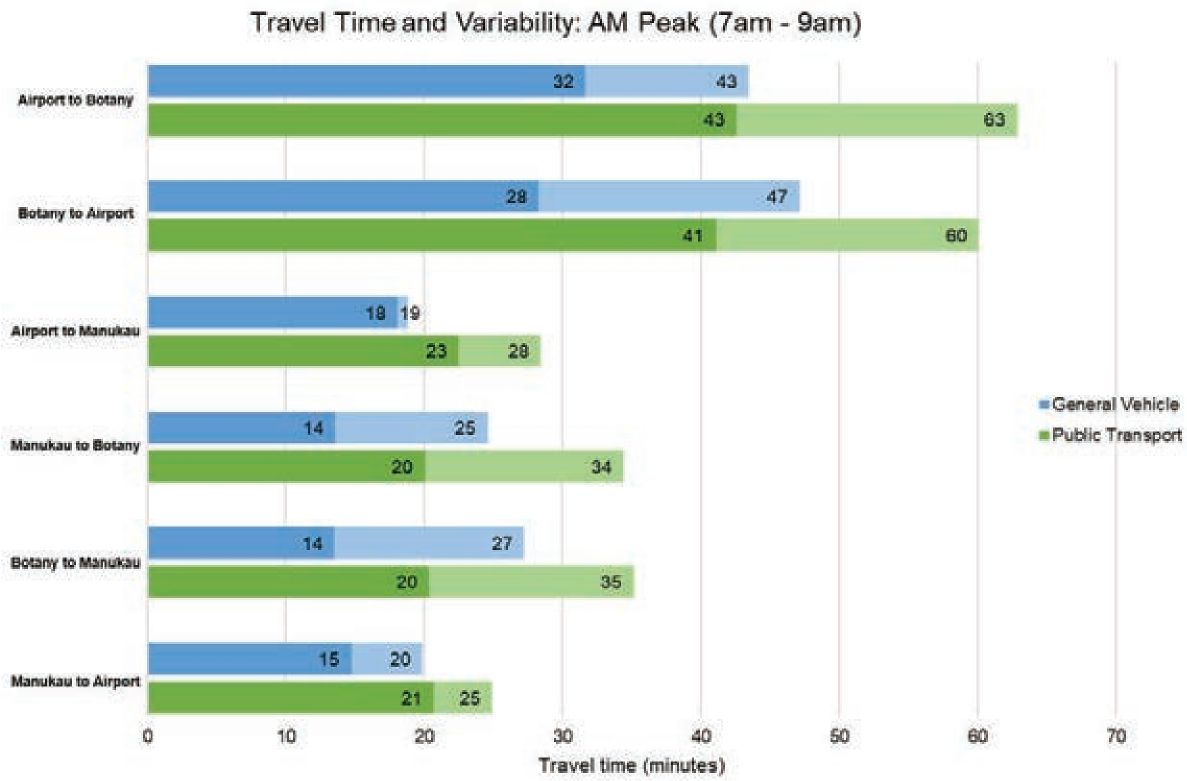
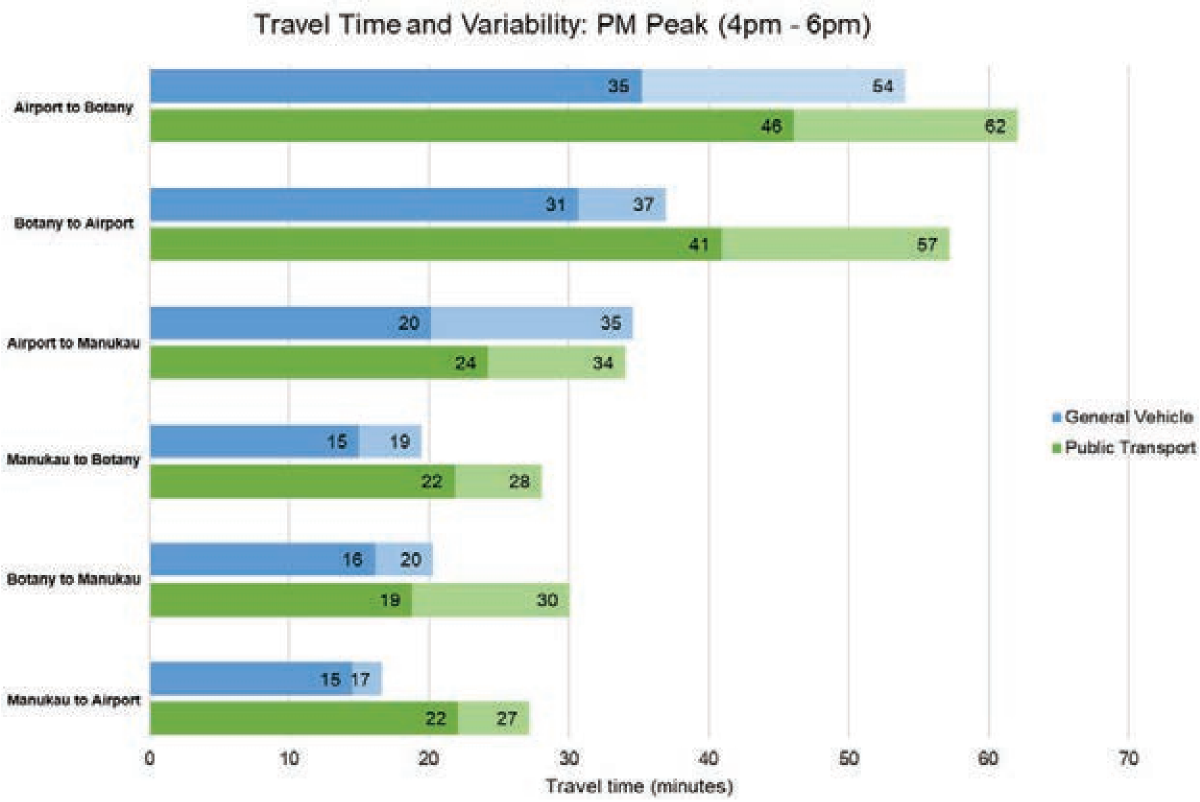


Figure 4-14: Do-minimum AM peak travel times and variabilities[52] (minimum – maximum, time in minutes)



[52] Source: AIMSUN model outputs for do-min scenario

Figure 4-15: Do-minimum PM peak travel times and variabilities (minimum – maximum, time in minutes)

The reason for the long and unreliable journey times by public transport are clear in Figure 4-16 which depicts the current bus priority network in Auckland, showing little to no bus prioritisation in the South and East Auckland area. This results in the poor travel conditions noted in the earlier sections which provide little incentive to people to use the bus services. This represents an historic under-investment in public transport in the study area, reflected in mode share statistics.

Figure 4-16: Bus priority in the study area compared to greater Auckland

4.3.4 Complicated journeys

Public transport trips in the study area are complicated as well as long. The prevalence of cross-town journeys, a dispersed land use pattern and the only rapid transit link being a north-south rail line means journeys for people in South and East Auckland often require transfers between low frequency local services which introduces a layer of time and risk into a journey.

The examples below (Figure 4-17) show some of the challenges for people in South and East Auckland. Some journeys require significant wait times for low frequency services that operate with high levels of unreliability. These factors combined means the relatively high likelihood of a later-running service can mean a long wait for the connecting service, or the need to build in considerable "buffer time" into a journey. The more likely outcome based on mode share statistics is that people will use private cars for journeys. The prevalence of shift workers in key employment areas in South and East Auckland like the Airport area and East Tāmaki exacerbates this issue as frequencies decline outside of peak hours and some places of interchange, for example Botany and Papatoetoe are not well designed for this purpose.

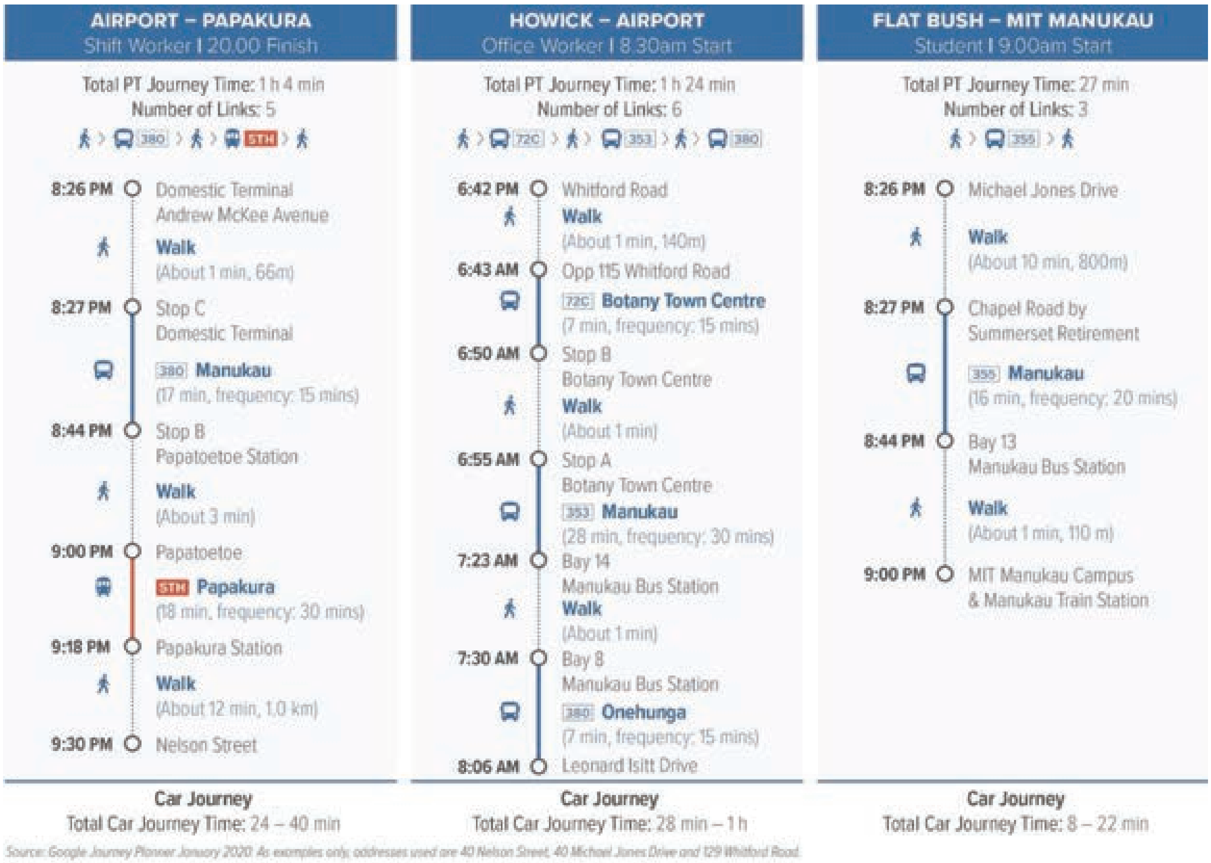


Figure 4-17: Example journeys in South and East Auckland

Normally, around 13,500 people travel to work in the Airport and its surrounding employment areas in the AM peak[53]. Of these, 6,000 come from the study area and 4,000 from the south of the Auckland region. None of these areas has a direct public transport connection to the Airport area and most connections are to and from local bus routes with little priority. By 2048 the forecast AM peak travel to the Airport and surrounding area is expected to be around 33,500 trips[54] with 16,000 from the study area and around 8,000 from the south of the Auckland region.

While transfers are necessary in a connected network, the quality of the transfer in terms of facilities and frequency of the services as well as the time taken and reliability on journey legs contribute to the

[53] MSM Model 2016 Base Year

[54] MSM Model 2048 Forecast Year

feasibility of the journey. These journeys as with many others in the system, currently rely on transfers between services that are slow with little priority, are unreliable and low frequency.

Such factors make these and many similar public transport trips complex, requiring extra planning and allowing more time.

Where private vehicles are used, journeys may also be unnecessarily complex. With over 45% of households in South and East Auckland owning one or no cars, on average, a car is shared between more than three people, often leading to friends or family needing to drop each other off at work, education or recreation, further increasing complexity and reducing opportunities which can affect quality of life[55].

4.3.5 Reinforcing deprivation

Limiting people's access to opportunities reinforces deprivation with strong causal links between:

- Difficulty in securing and retaining employment
- Difficult access to education leading to a lack of qualifications
- Low income
- Limited access to transport[56].

The Auckland Plan provides insight into these issues. It aims to achieve equitable access across the city.

Improving access to employment is a key way of improving prosperity and lifting people out of poverty. Therefore, it is particularly concerning that the areas facing the greatest challenges in accessing employment are also some of the most economically deprived communities in Auckland.

Addressing this challenge will need to be an ongoing focus of transport and growth planning in Auckland.

We need to focus on both improving the transport system and shaping the way Auckland grows[57].

In the section "Sharing prosperity with all Aucklanders"[58] it states:

"Auckland's success is dependent on how well Auckland's prosperity is shared. Many Aucklanders are prosperous and have high living standards, yet there are significant levels of socioeconomic deprivation, often in distinct geographic areas."

This is a major issue. Income, employment, health and education outcomes are different in various parts of Auckland, and there are distinct patterns across broad ethnic and age groups.

4.3.6 A lack of reliable and readily accessible travel choices along state highway corridors and in the Airport area

There are very limited walking and cycling facilities provided along the state highway corridors or in the areas adjacent to the Airport. These state highway corridors and heavily trafficked arterial routes cause severance to communities and active mode users. Furthermore, vehicle speeds and volumes on SH20B (ie more than 80kph and 1,300 vehicles per hour per lane per direction during peak times) are not

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[55] MRC Evidence Base Report, 2019, and 2013 Census Data

[56] See for example Chapter 3 of Auckland Plan 2050 Evidence Report Transport and Access June 2018

[57] Ibid, Transport and Access

[58] Auckland Plan 2050, Auckland Council, June 2018, Auckland's key challenges

considered appropriate for safe walking and cycling (although these activities are permitted), given the current lack of protection for vulnerable users on the road.

In addition, travel along the state highway network to, from and around the Airport, is known to be unreliable. Evidence gathered from November 2019 shows that pre-COVID-19 weekday peak travel times along the state highway corridors were poor and subject to wide variability. The following routes were analysed, and are shown in Figure 4-18:

- **Route A** – Along SH20 and SH20A, between Māngere Bridge and Auckland Airport
- **Route B** – Along SH20B and SH20, between SH20 south of Roscommon Road interchange and Auckland Airport, both for general traffic and transit lanes
- **Route C** – Along SH20, between south of Roscommon Interchange and Māngere Bridge.

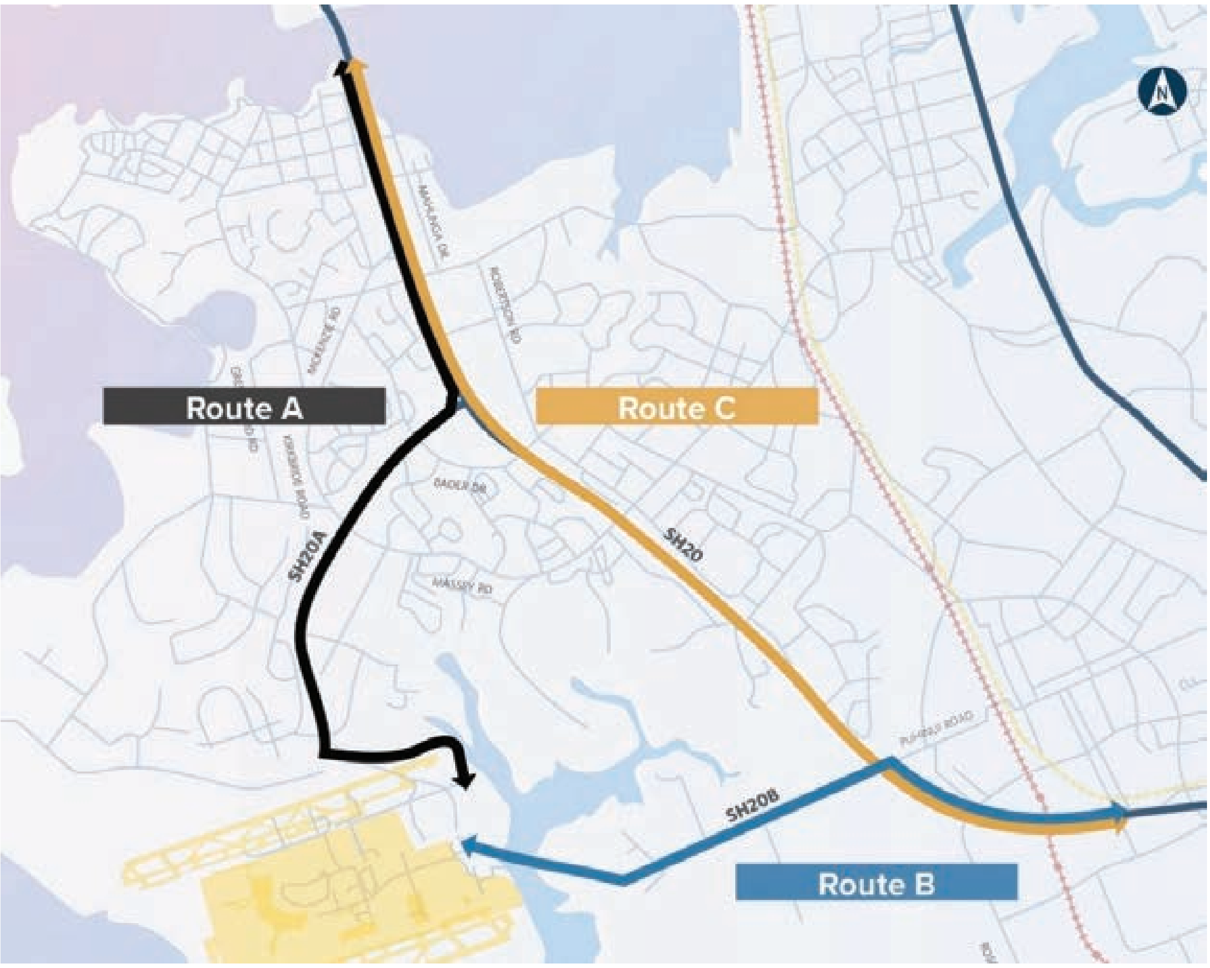

Figure 4-18: Routes for 20Connect travel time analysis

Table 4-3 summarises peak morning (AM) and evening (PM) travel times analysed, for each of the three routes described above[59]. Of the sample of travel time data analysed, 5th and 95th percentiles, and calculated ranges, have been used as metrics for travel time variability (reliability).

[59] Travel time data from weekdays in November 2019 collected using TomTom Traffic Stats Viewer (Waka Kotahi)

Table 4-3: November 2019 weekday travel time data

	Route	Direction	5th Percentile	Average	95th Percentile	Range
AM peak (7am - 9am)	Route A	Northbound	4:51	6:25	8:46	3:55
		Southbound	5:11	7:56	12:24	7:13
	Route B	Eastbound	5:23	7:32	11:29	6:06
		Westbound	6:05	11:20	23:18	17:13
	Route C	Northbound	6:18	10:17	17:47	11:29
		Southbound	5:48	7:04	9:17	3:29
PM peak (4pm - 6pm)	Route A	Northbound	5:31	11:46	18:42	13:11
		Southbound	5:04	8:36	13:43	8:39
	Route B	Eastbound	6:09	13:40	31:28	25:19
		Westbound	5:42	9:23	17:32	11:50
	Route C	Northbound	6:29	19:57	43:06	36:37
		Southbound	6:05	12:35	27:00	20:55

The most significant findings from the travel time data analysed and presented above (indicated in red) are outlined below:

- Road users on SH20 generally experience high travel times with large variabilities in the evening peak period, particularly in the northbound direction
- Road users travelling eastbound on SH20B, away from the Airport, in the evening peak experience a high degree of travel time variability and comparatively longer travel times
- Road users travelling westbound on SH20B, towards the Airport, in the morning peak experience comparatively longer travel times which vary significantly.

Forecast travel time outputs from a Simulation and Assignment of Traffic to Urban Road Networks (SATURN) traffic model of the area broadly covering SH20, SH20A and SH20B - with the do-minimum scenario were compared to the historic travel times summarised above. Significantly, if no action is taken to address transport capacity deficiencies (outlined earlier in this business case[60]):

- Route B westbound travel times are forecast to average around 18 minutes in the morning peak in 2048, up seven minutes from the November 2019 average 11 minutes
- Route B eastbound travel times are forecast to average around 25 minutes in the evening peak in 2048, which is a 12-minute increase from the November 2019 average 13 minutes
- Route A northbound travel times are anticipated to average around 16 minutes in the evening peak in 2048, which is a five-minute increase from the November 2019 average of 11 minutes for the do-minimum.

[60] Airport Access Study SATURN model outputs summary, Flow Transportation Specialists, August 2020

This poor level of reliability has an impact on all transport user groups accessing the Airport area, some of whom are particularly time sensitive, including travellers. Freight to the Airport area is discussed in more detail under Problem 2, and it is of note that freight to and from the Airport is of significantly higher value than average, more time sensitive and has been less affected by COVID-19 than international passenger travel.

4.4 Problem Statement 2

Poor east-west travel choices as well as inadequate transport system capacity connections and management, to, from and within the study area constrain current and future growth, undermining economic growth and prosperity for Aucklanders.

4.4.1 Poor East-West travel choices

East-west travel by public transport is much slower than by car. This difference can be seen by comparing the public transport and car catchments of the three major centres in the study area, the Airport, Manukau and Botany. The area that can be accessed in 45 minutes by public transport is far smaller than the area accessible in 45 minutes by car, making public transport a less desirable choice.

Figure 4-19 and Figure 4-20 show the 2048 forecast 45-minute public transport catchments from the Airport, Botany, Manukau and Ormiston respectively, for the do-minimum scenario, which includes the AirportLink bus service proposed in 2021. The Airport catchment excludes all of Auckland's east and south and only includes parts of the central Isthmus and the immediate suburbs around the Airport such as Māngere and parts of Papatoetoe.

The situation is similar for the metropolitan centres at Manukau and Botany and the emerging centre at Ormiston. Manukau is directly served by a rail line, so it has good access to north and south rail catchments. However, its 45-minute public transport catchments to the west, isthmus and east are limited.

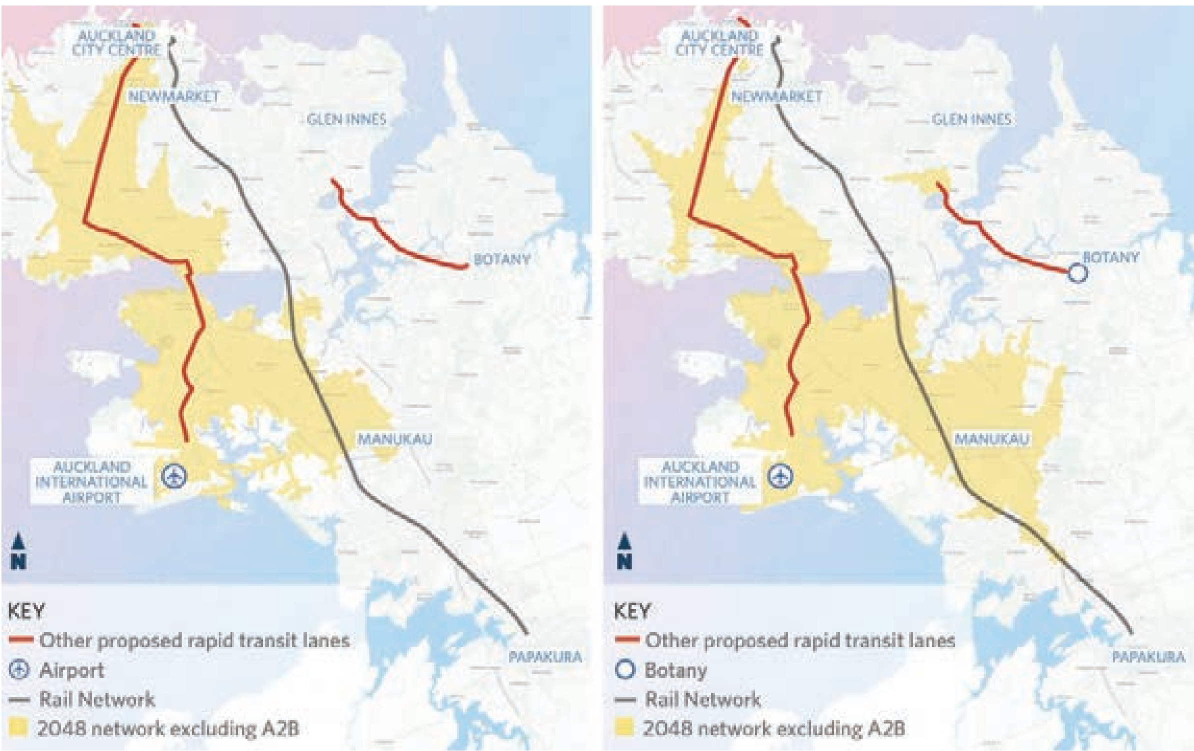

Figure 4-19: 45 minute public transport catchment from Airport and Botany, 2048 do-minimum network

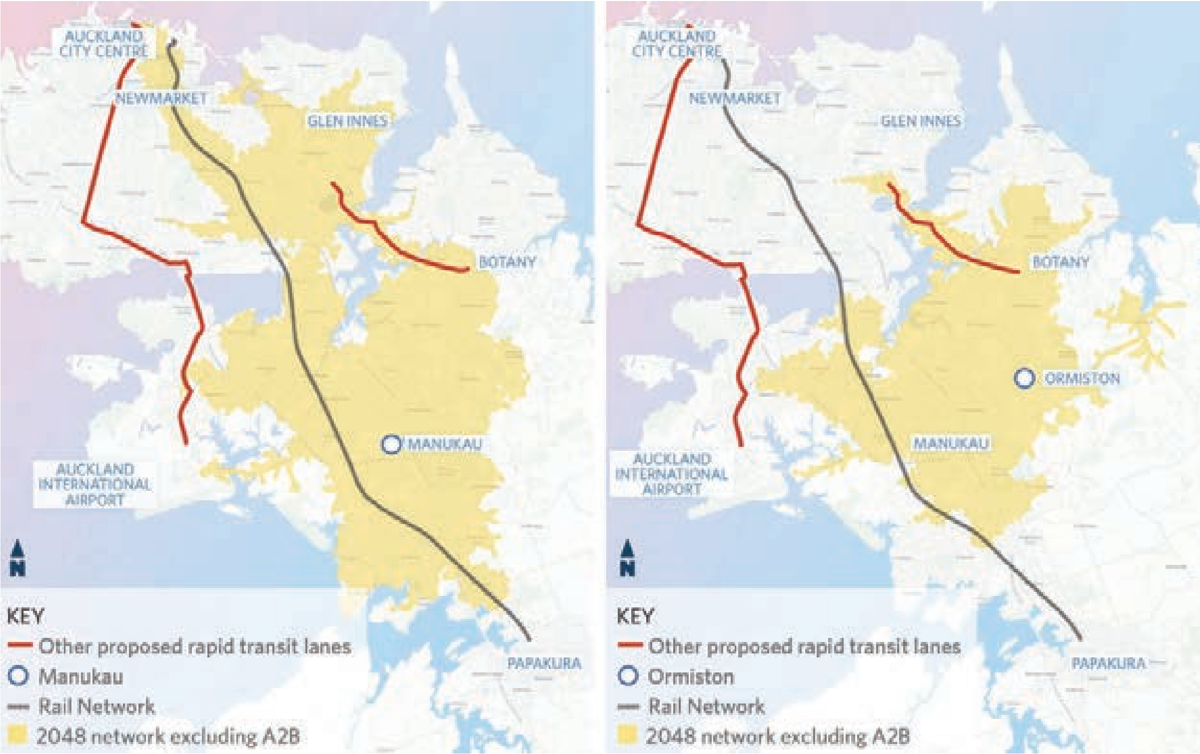

Figure 4-20: 45 minute public transport catchment from Manukau and Ormiston, 2048 do-minimum network

Around 50% of AM peak trips to the Airport area in 2048 are expected to originate in the south, Papateotoe, East Tāmaki, Manukau and the east of Auckland (Figure 4-21). Most of these areas are outside the 45-minute public transport catchment, while large parts of the “rest of Auckland” are also outside the public transport catchment. This means that only a small proportion of the travel demand is within 45 minutes public transport journey to the Airport at peak times.

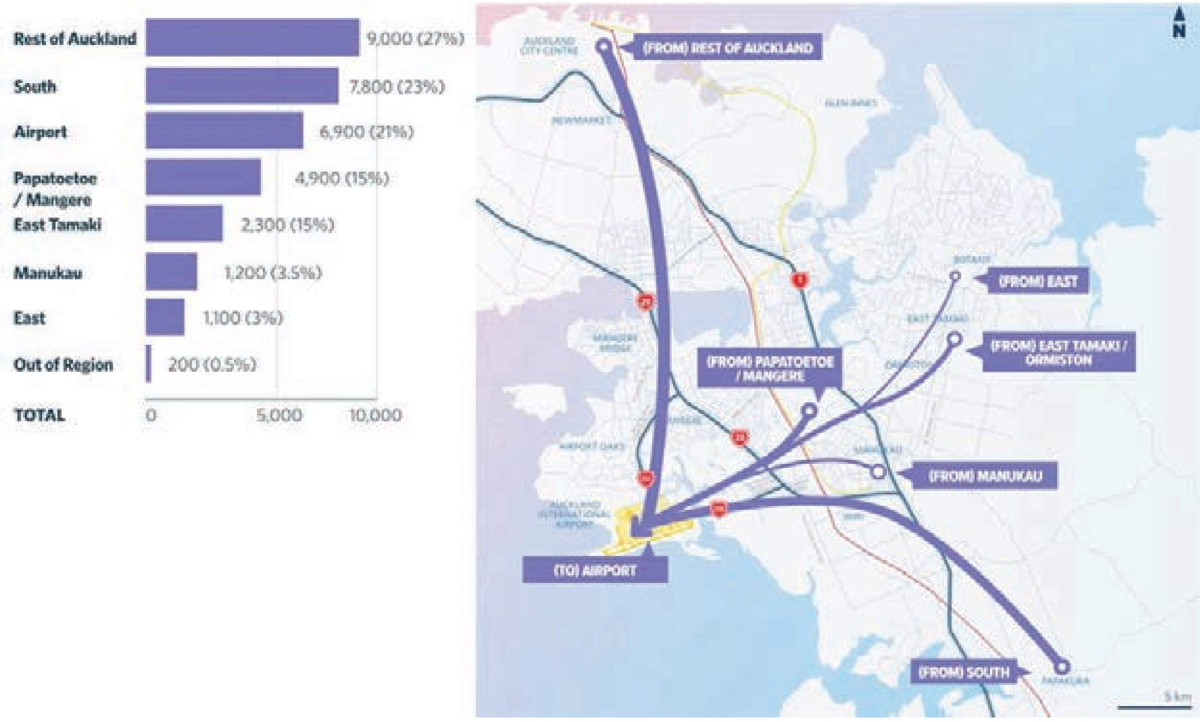

Figure 4-21: Trips to Airport and surrounding area am peak 2048 (source - MSM Model)

4.4.2 Low mode share and consequential impacts

While likely contributed to by a range of factors, including existing urban form and the effects of Problem 3 discussed below, the results of Problems 1 and 2 are clearly evident in the public transport mode share in the study area. The public transport mode share is the lowest in the Auckland Region. The effects are likely to be felt in a number of ways, including:

- A high-carbon emission transport system and consequential environmental outcomes
- High car dependence
- Low density urban form.

The mode share in the study area, compared to Auckland as a whole is shown in Figure 4-22. There is a stark difference in the mode share in the study area compared to the remainder of the Auckland region. This map also illustrates the potential for rapid transit to improve mode share. There is a clear correlation between the city's rapid transit lines (providing a quality transport choice) and mode share. Note even within the study area there are pockets of higher mode share near train stations in Ōtāhuhu and Papatoetoe. As noted in Section 4.2 the travel demands in the study area support lateral or orbital routes.

Low mode share proportions are an Auckland region problem as well. According to the 2018 Census Journey to Work Study[61], the public transport mode share was 10.7% for the Auckland region as a whole. By comparison, the 2018 Wellington region public transport mode share was 18%.

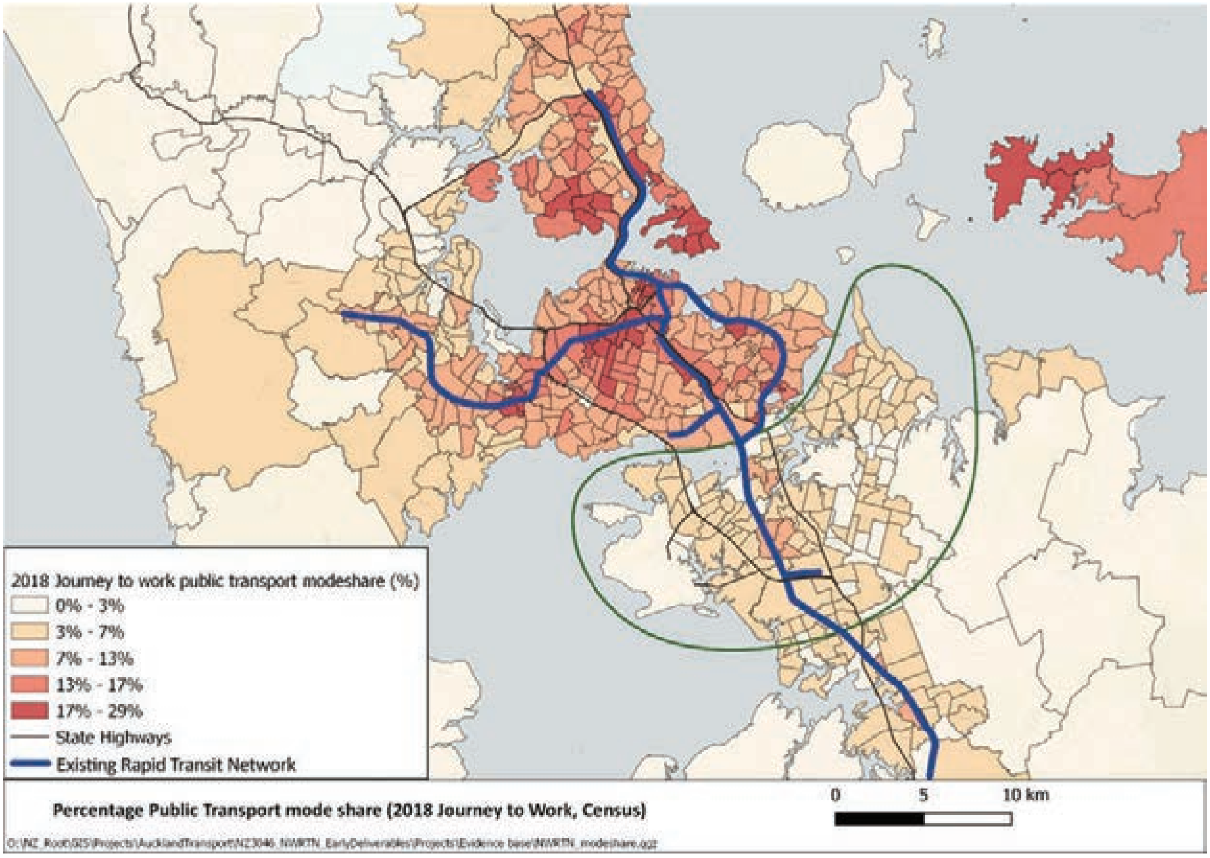

Figure 4-22: 2018 Journey to Work Mode Share showing the study area (Census 2018), study area shown in green

[61] 2018 Census Travel to Work results, Greater Auckland, March 2020

4.4.3 Constraining growth

South and East Auckland have experienced significant growth in population and jobs in the past two decades, increasing at a rate faster than Auckland as a whole. While the plan is for growth to continue, particularly with increases in employment, as described in Section 4.2, the poor east-west travel conditions could act as a constraint on the growth, without investment, for example if employers cannot attract sufficient labour or potential residents cannot find access to employment. Accessibility is a known influencer of potential density and growth.

Without constraints, employment and population growth in East Auckland and the Manukau / Wiri areas could grow by more than 51% and 17% respectively by 2026[62].

Manukau is expecting high growth in population, housing and jobs backed by government investment in the education, residential, commercial sectors and in the public realm.[63] Specifically, between 2018 and 2048, it is forecast that 4,750 new houses will be built in Manukau, whilst population and employment growth will increase by 14,000 and 23,000 respectively.[64] This employment growth will correspond to the total number of jobs in the area doubling. For comparison, employment across the whole A2B and 20Connect study area is expected to grow by around 40%, demonstrating that Manukau is a key employment growth area.

Without coordinated government investment in transport, however, future strategic centres and high growth communities (Manukau, East Tāmaki, Papatoetoe, Manurewa to Drury) will be hindered by poor access and limited travel options, placing at risk broader Government outcomes, for example housing supply and affordability.

Limiting efficient access for east-west connections to two of the largest economic hubs in New Zealand[65] may deprive a large community of Aucklanders of their ability to prosper and hinders projected growth in access to and employment at the Airport and in central Manukau.

Arataki[66], notes that “Effectively integrating land-use and transport remains critical to ensure growth areas are serviced with active mode and public transport infrastructure and services”. It is considered that this direction from Arataki is highly relevant to Manukau, the southern growth areas (and their travel demands discussed in Section 4.2) and the potential employment growth around the Airport and East Tāmaki.

4.4.4 Inadequate transport system capacity to, from and within the Airport precinct area

Table 4-4 shows historic (2017) and future (2048) forecast peak hour traffic volumes on SH20A and SH20B, and the difference in terms of volume and percentage change. Traffic volumes are predicted to increase in both directions on both corridors in all three peak times, with the largest increases forecast in the Southbound direction on SH20A and the Eastbound direction on SH20B. The interpeak period is anticipated to see the largest growth in traffic demand out of all the peak periods.

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[62] Auckland Plan, op cit

[63] Transform Manukau Strategic Case

[64] Auckland Plan, op cit

[65] Auckland Plan, op cit, Opportunity and Prosperity

[66] Waka Kotahi, op cit

Table 4-4: 2017 vs 2048 approximate peak hour volumes on SH20A and SH20B[67]

Corridor	Direction	Time	Base (2017)	Future (2048)	Difference	% Difference
SH20A **Between Nixon Road and Landing Drive (arrival flows)**	Northbound	AM Peak	1,300	2,400	1,100	89%
		PM Peak	2,300	3,300	970	42%
		Inter-peak	1,900	2,900	1,100	58%
	Southbound	AM Peak	1,700	3,100	1,400	80%
		PM Peak	1,400	2,500	1,200	82%
		Inter-peak	1,300	3,100	1,800	137%
SH20B **At Pūkaki Creek Crossing (arrival flows)**	Eastbound	AM Peak	850	1,200	330	39%
		PM Peak	1,200	2,100	940	81%
		Inter-peak	800	1,900	1,100	144%
	Westbound	AM Peak	1,300	1,700	440	33%
		PM Peak	700	810	110	16%
		Inter-peak	900	1,500	570	63%

Default forecasts show that by about 2023, overall demand on SH20A will exceed capacity, as it has done in the past, even with improved bus services and the introduction of HOV lanes. This is illustrated by Figure 4-23.

67 FLOW traffic modelling

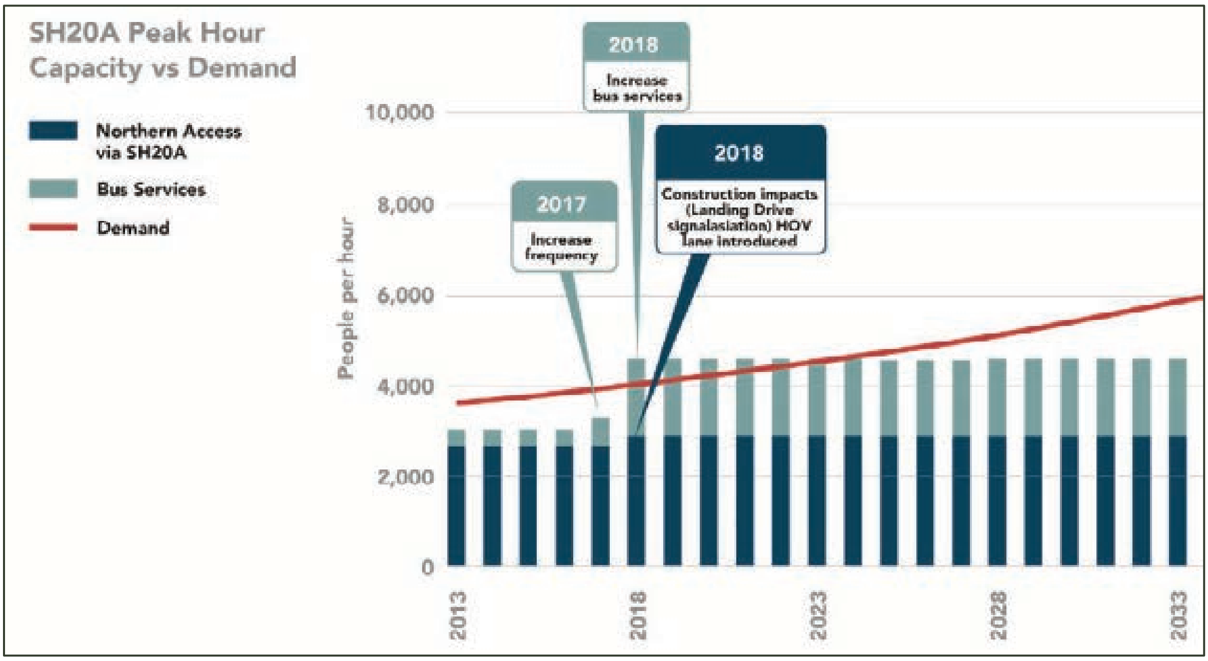

Figure 4-23: Peak hour capacity versus demand on SH20A[68]

Figure 4-24 shows that SH20B has already reached its theoretical vehicular capacity at peak times. SH20B has a single traffic lane in each direction for all traffic. No priority for buses, freight or high occupancy vehicles is provided at this time. Additional transit lanes are currently being constructed as part of STAAI, although these terminate prior to Pūkaki Bridge east of the Airport, which will retain a single lane in each direction. These interventions are predicted to slightly improve capacity but increasing demand will continue and it is anticipated to quickly exceed capacity.

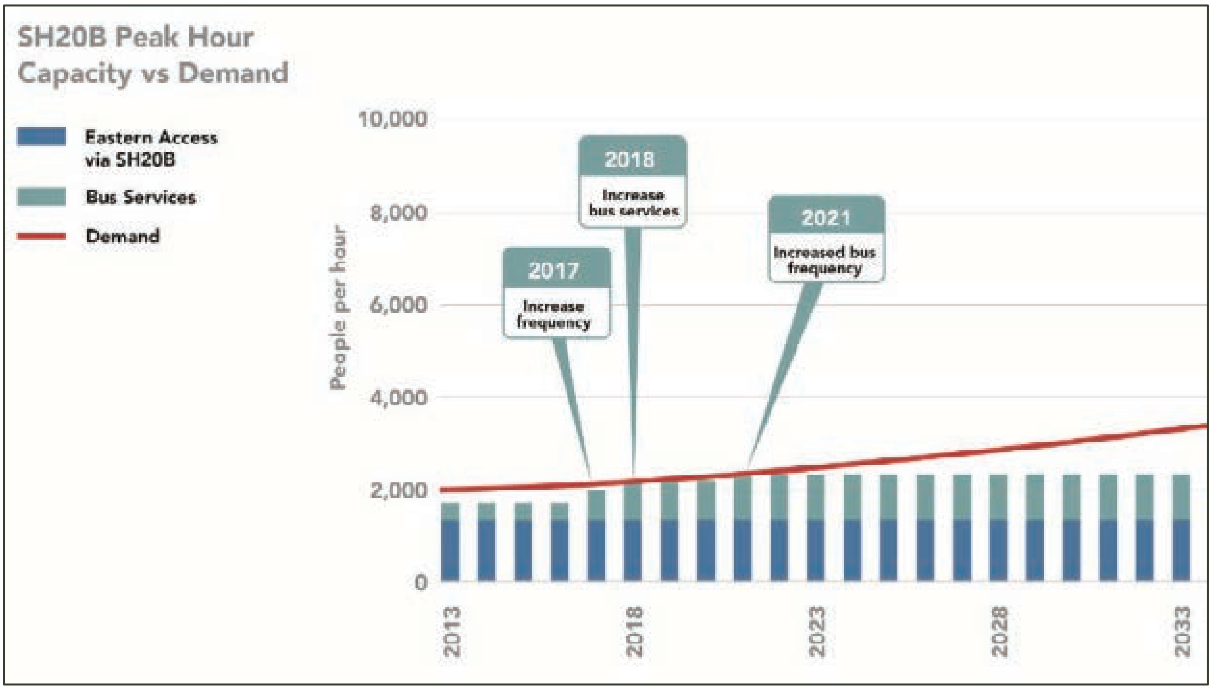

Figure 4-24: Peak hour capacity versus demand on SH20B

[68] Source: Airport Access Improvements Supplementary Business Case, Waka Kotahi

Local roads and private properties have access directly from SH20B in the form of uncontrolled (priority) intersections. The uncontrolled nature of these access points contributes to travel time variability and congestion, emphasising the need for a long-term alternative along this corridor.

Adding to this issue is the proposed development of land south of SH20B which will gain its access to SH20B at Orrs Road. This development, which is enabled in the Unitary Plan is expected to accommodate a large business area with a significant number of employees and generate additional vehicle trips (cars and trucks) on SH20B.

Figure 4-25 illustrates that total demand on SH20 is already exceeding capacity, and this is expected to get worse in the future.

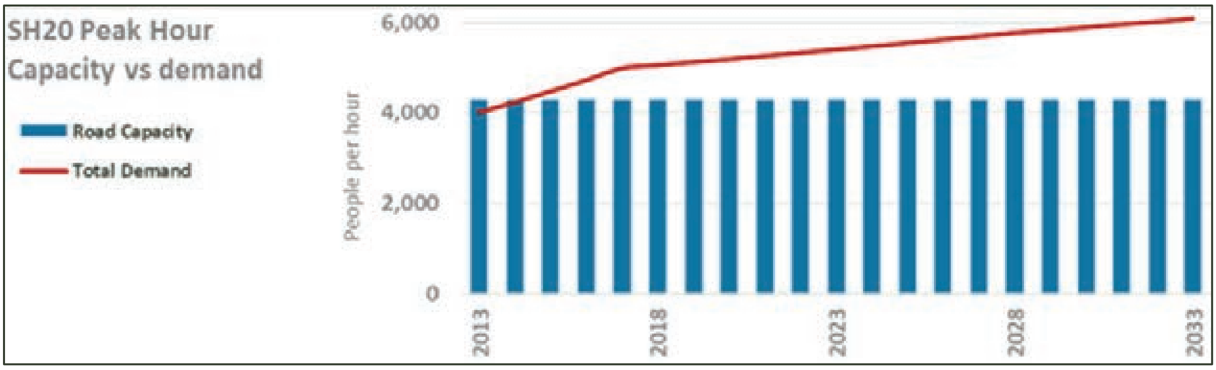

Figure 4-25: Peak hour capacity versus demand on SH20

Figure 4-26 below shows the known network capacity constraints on the 20Connect state highway network. The primary aspect that restricts capacities include merges on parts of SH20 and SH20A, signalised intersections on SH20A, at interchanges and at ramp signals.

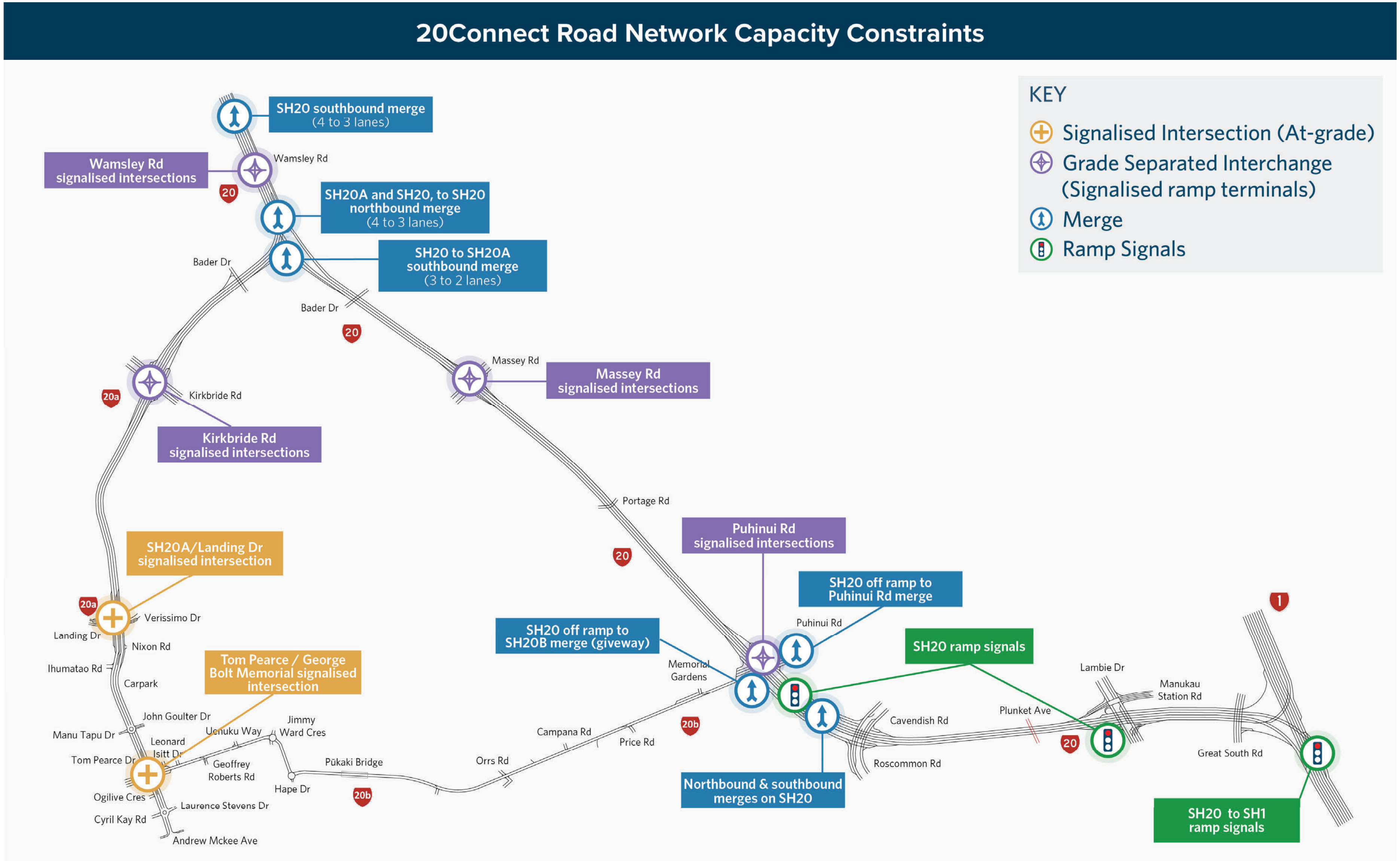

Figure 4-26: 20Connect network capacity constraints

Figure 4-27 below shows the 2048 forecast peak period congestion plots, created using a SATURN model of the 20Connect study area with the do-min scenario (which incorporates the full complement of STAAI programme interventions). These figures show the sections of SH20, SH20B and SH20A, and the surrounding road network that will be most affected by congestion if no further action is taken to increase capacity. All three state highways contain road links that are forecast to be over capacity during at least one of the three peak periods. Additionally, further road links are forecast to be approaching or at capacity during these peak periods.

The 2048 forecast congestion within the state highway network highlights the urgent need to intervene so that access to the Auckland Airport precinct and surrounding employment areas does not continue to worsen. Although these graphics illustrate congestion forecasts for 2048, based on the earlier ‘capacity versus demand’ graphics, and travel time analysis outlined in Section 4.3.6, it is likely that sections of these state highways are operating at or above capacity already, or will be in the near future.

The uncertainty relating to demand is addressed in this SSBC by developing a programme of interventions ramping-up capacity over time for both public transport and highway use (refer to Appendix E Staging Strategy). Each stage of the programme has associated demand estimates and investment drivers to be monitored, allowing interventions to be brought forward or delayed accordingly. Refer to the Management Case for further details around the dynamic Investment Management Approach.

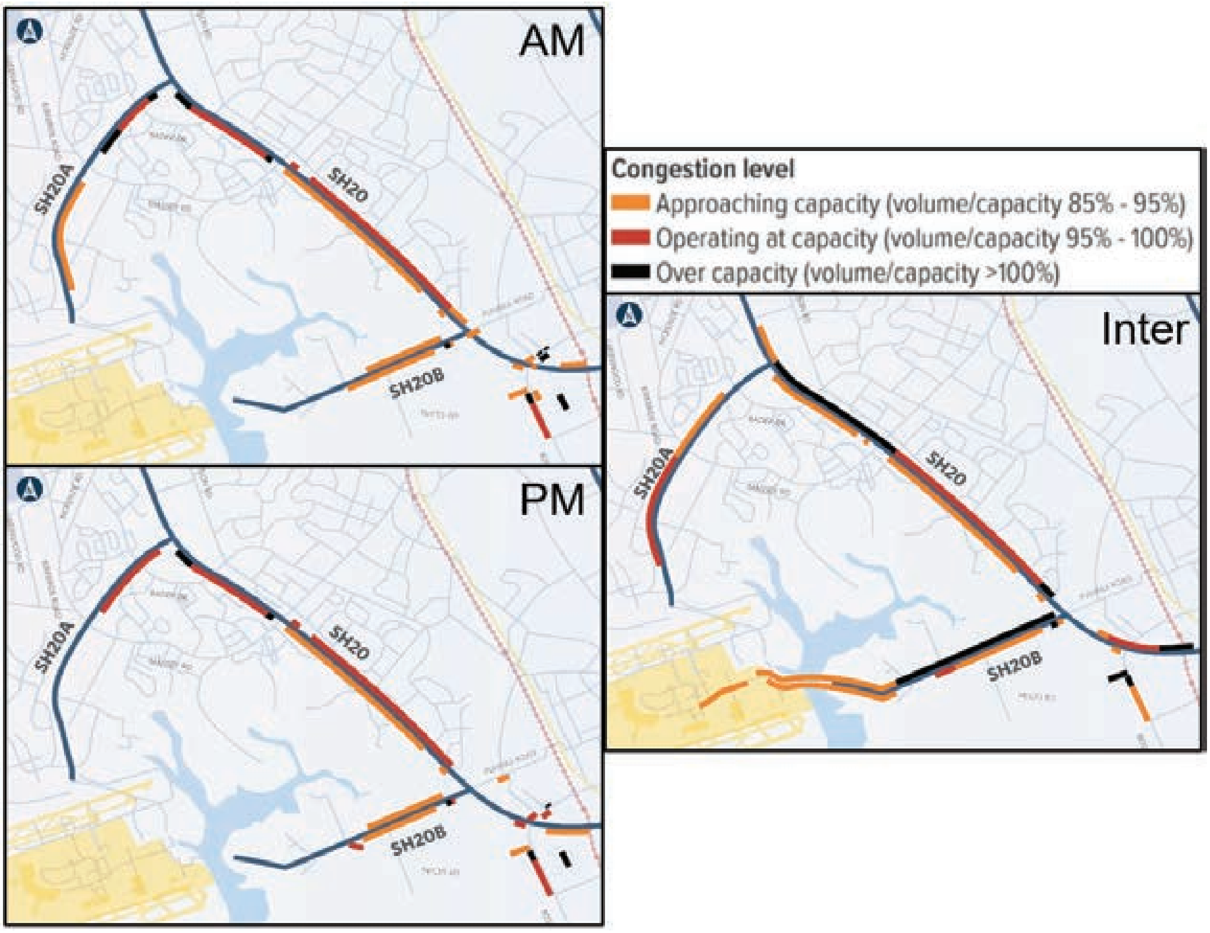

Figure 4-27: 2048 peak period do-minimum congestion profiles[69]

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[69] Airport Access Study SATURN model outputs summary, Flow Transportation Specialists, August 2020

Figure 4-28, Figure 4-29, and Figure 4-30 illustrate the increase in hourly traffic volumes and growing peak period spread along SH20, SH20A and SH20B between 2013 and 2018. The occurrence of peak spreading suggests a growth in travel demand and subsequent congestion along these corridors, resulting in longer travel times and reduced travel reliability.

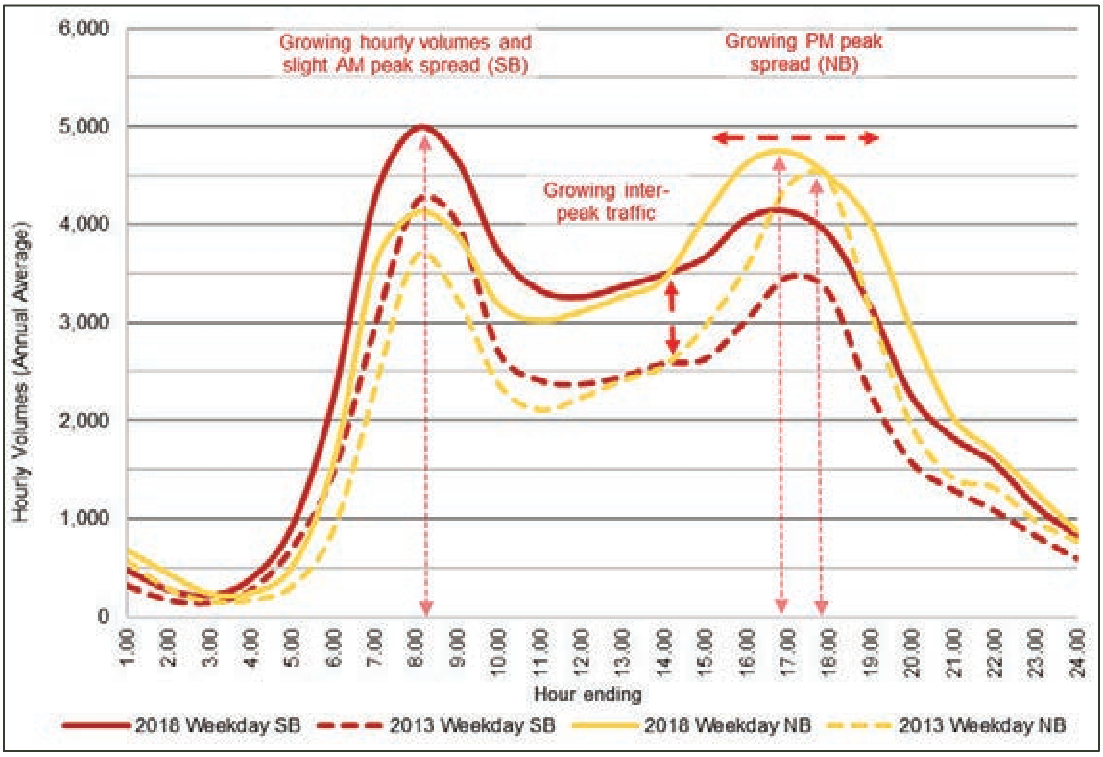


Figure 4-28: Hourly vehicle volumes for SH20 (Between Coronation Road and Rimu Road) 2013 vs 2018

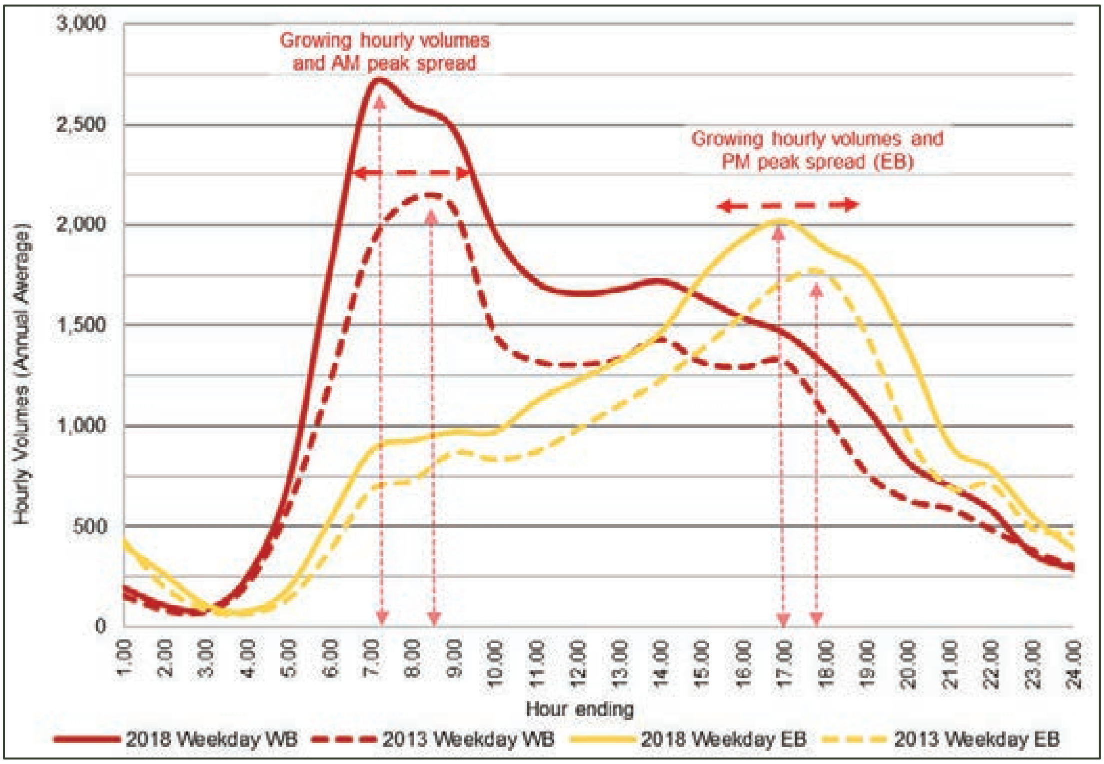


Figure 4-29: Hourly vehicle volumes for SH20A (Between Bader Drive and SH20) 2013 vs 2018 (TMS)

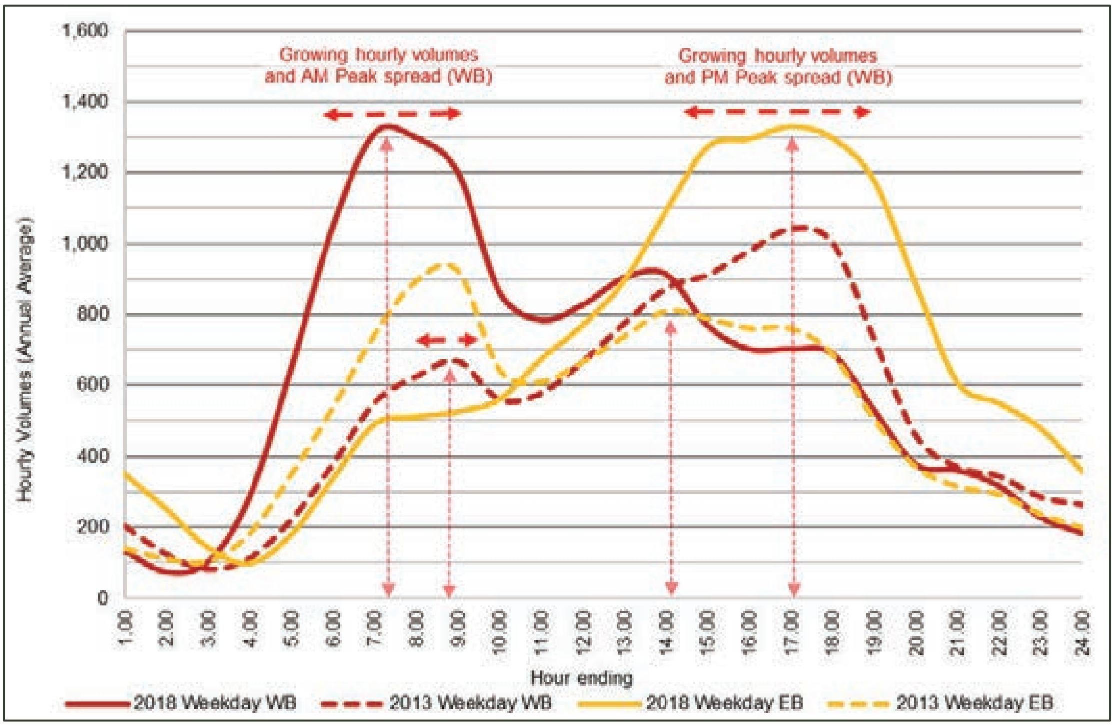


Figure 4-30: Hourly vehicle volumes for SH20B (East of Price Road) 2013 vs 2018

Although future modelling has not been carried out, this peak-spreading trend is anticipated to continue without any capacity-increasing interventions.

4.4.5 Inadequate transport system connections for high value freight

The freight task in the wider Airport area and on the section of the state highway network in the study area is nationally significant. There is a large agglomeration of distribution and manufacturing activities surrounding the Airport which has a critical need to reliable access to the WRR and markets, within and outside Auckland.

The Airport itself is one of New Zealand's most important ports for freight movement. Prior to COVID-19, approximately 86% of New Zealand's air freight came through Auckland Airport (by weight)[70]. This equates to around $15 billion worth of freight per year. Freight through Auckland Airport is time-critical and is worth 50 times the average value of freight per tonne. Auckland Airport handles 12% of New Zealand's exports and imports by value, making it New Zealand's second largest import and third largest export port by value.

Imports and exports through Auckland Airport include industrial parts and machinery, medical and photographic parts and machinery, audio-visual parts and machinery as well as pharmaceuticals, gems and other high value items. The Airport also handles fresh and live produce including plants, fish and dairy.

[70] "Air cargo connections continue in COVID-19 lock-down", 13th April 2020, Auckland Airport website

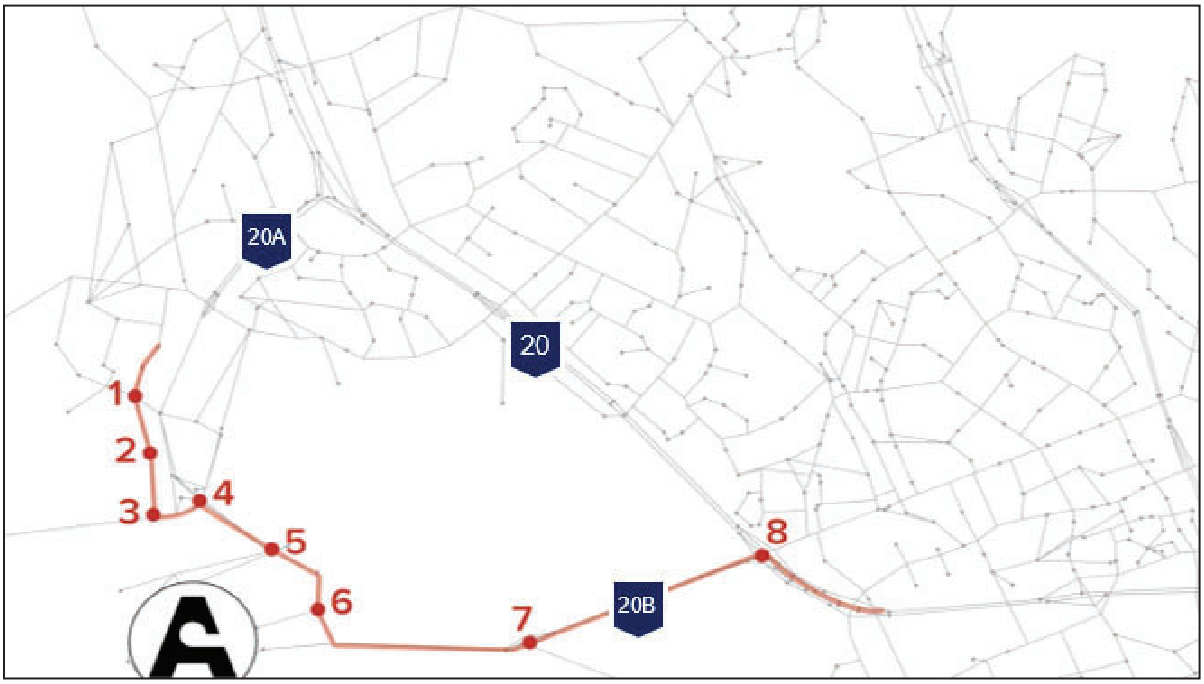
COVID-19 saw an approximate 16% reduction in New Zealand's air freight demand in the first half of 2020[71]. However, although the data isn't immediately available, it is predicted that air freight demand is trending back to pre-COVID-19 levels, if it has not already reached these levels. Freight continues to be critical to the Auckland region and New Zealand as a whole despite COVID-19.

Whilst demand has dropped slightly and is predicted to be returning to normal, available capacity for air freight has dropped even further as a result of COVID-19, by 38% year-on-year (October 2020). This is primarily because around 80% of New Zealand's air freight arrives and departs in the belly-hold of passenger aircraft.

Measures such as the re-purposing of passenger aircraft for cargo and government intervention have been taken to minimise the adverse impacts on air freight capacity for imports and exports. As an example, in September 2020 it was reported that Air New Zealand cargo revenue had increased from around 10% of the total business revenue to 50%.[72] Additionally, in March 2020 the NZ government set up a COVID-19 support package, and more specifically an aviation relief package, which initially included $320 million to the International Air Freight Capacity (IAFC) scheme. This scheme has been extended to March 2021 with an additional allocation of $52 million.

A lack of key system connection is further exacerbating the issues created by increasing demand. The SH20A/SH20 interchange does not currently have a southbound ramp linking SH20A and SH20. The large volume of freight and general traffic travelling southbound from the Airport Oaks Precinct has limited choice which results in rat-running on local roads which are not on the strategic freight network. The most likely routes are:

- A combination of local roads and SH20B in order to reach SH20 to continue the journey south, which can require travelling through eight potentially-delaying intersections, as shown in Figure 4-31.



[71] "Auckland Airport Cargo Monitor: Impact of COVID-19 revealed in first half cargo capacity", 5th August 2020, Auckland Airport website

[72] Covid cargo surge brings Air New Zealand respite in one of its worst years (The Loadstar, September 2020)

Figure 4-31: Intersections for southbound freight vehicles leaving Airport Oaks Precinct via SH20B

- Local roads such as Kirkbride Road, McKenzie Road, Walmsley Road and Massey Road to reach SH20, which also requires travelling through up to eight potentially-delaying intersections as shown in Figure 4-32 and Figure 4-33.

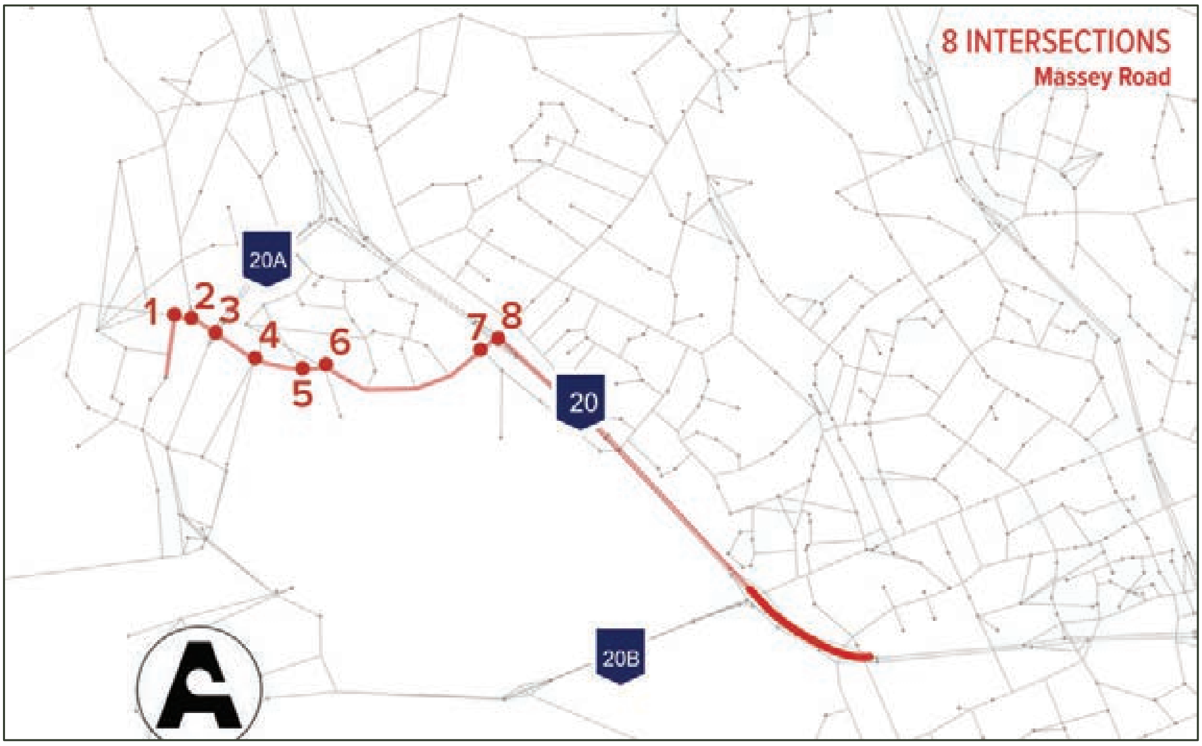


Figure 4-32: Intersections for southbound freight vehicles leaving Airport Oaks Precinct via Massey Road

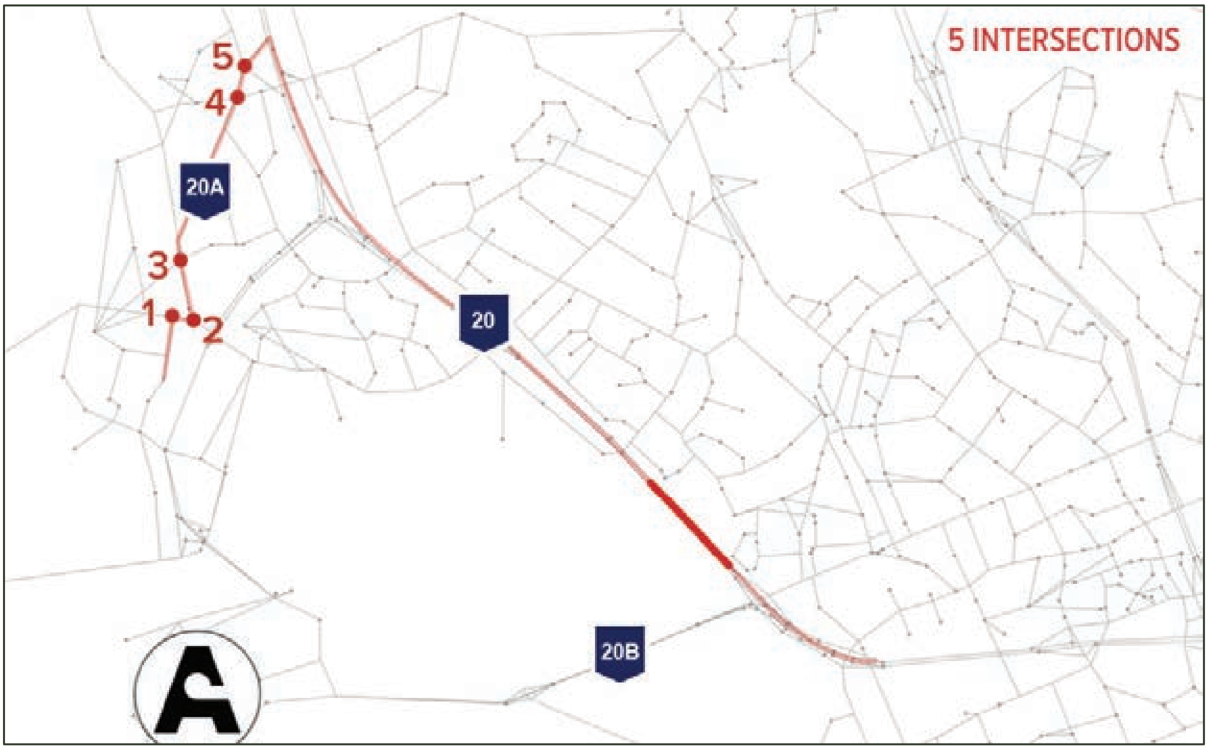


Figure 4-33: Intersections for southbound freight vehicles leaving Airport Oaks Precinct via local roads

Currently, turning right from SH20B onto SH20 southbound requires passing under SH20 through a connected pair of signalised intersections, then merging via an on-ramp which is shared with an exit onto Cavendish Drive, following which the road drops from two down to one lane immediately prior to connecting with SH20. The demand for this movement is significantly high, currently at around 1,000 vehicles per hour for an extended evening peak period[73].

It is evident from the analysis above, and further analysis described in later sections of the SSBC, that traffic in the area would benefit greatly from an improved SH20B to SH20 southbound connection, which will allow vehicles exercising this movement to do so uninterrupted.

Overall traffic volumes are expected to increase significantly on the SH20A and SH20B corridors for both directions across all three daily time periods. It can be expected that travel time reliability will decrease as travel time increases.

The state highway corridors in the study area serve strategic inter- and intra-regional freight movements and have high HCV use on and around the strategic freight network.

SH20 is an important link for HCVs that travel between the industrial area in Onehunga/Penrose and Wiri/Manukau. The state highways in the study area carry significant overall volumes and substantial HCV volumes:

- 2018 two-way daily traffic volumes on SH20 (between the Massey Road and Puhinui Road ramps) were around 84,000 vehicles per day (AADT, 2018)[74], with approximately 7% HCVs
- 2018 AADT two-way daily traffic volumes on SH20A were around 49,000 vehicles per day with approximately 9% HCVs
- Two-way 2018 daily traffic volumes on SH20B were around 29,000 vehicles per day, with 4.5% HCVs.

The National Freight Demand Study 2014 estimated an overall 78% increase in freight demand for Auckland from 2012 to 2042 (Figure 4-34).

[73] Based on SCATS data collected at the Puhinui Road / SH20 on-ramp intersection, for weekdays in November 2019

[74] Waka Kotahi. TMS data (Downloaded 25 March 2019).

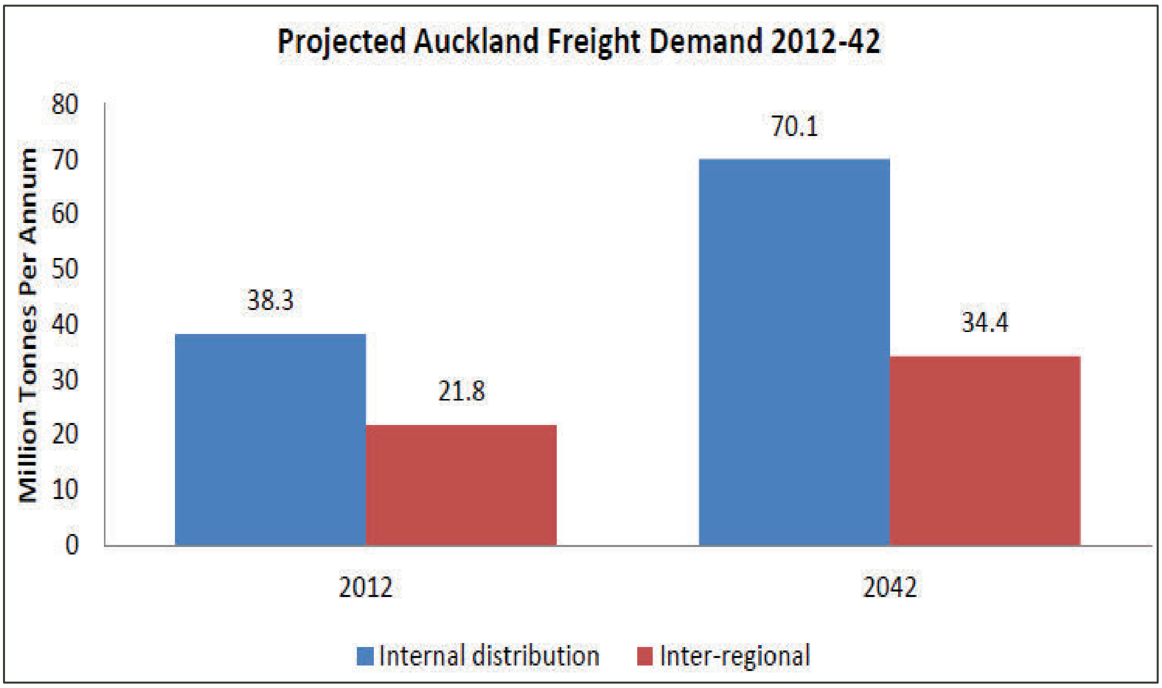


Figure 4-34: Projected Auckland freight demand, 2012-2042[75]

Land transport access to and from Auckland Airport and the surrounding area, a nationally strategic infrastructure asset and area, is critical for economic growth. Projected economic growth and associated prosperity for the region are significant and will be put at risk if improved land transport accessibility and transport choices are not provided in a timely manner that meets forecast demand.

Meeting future transport needs to and from Auckland Airport and within the surrounding area, and ensuring greater resilience of access, is essential. This SSBC has been prompted by sooner-than-anticipated levels of growth in Airport passengers and land use development within the surrounding area. Although COVID-19 has affected transport demand in the Airport area in the short term, Waka Kotahi's modelled predictions show this demand is expected to recover in the medium to long term.[76]

4.5 Problem Statement 3

The current transport system in South and East Auckland has adverse environmental effects and does not recognise cultural identity and taonga, diminishing the Mauri of the area.

4.5.1 Background to Problem Statement 3

In developing the SWGP, programme partners Te Ākitai Waiohua, Waka Kotahi, AT, and Auckland Airport recognised the cultural significance of large areas of the study area to Te Ākitai Waiohua, which was reflected in the development of Problem Statement 3.

[75] Ministry of Transport (2012). National Freight Demand Study 2012.

[76] Rapid Transport COVID-19 Recovery Scenarios (PwC and LEK, May 2020)

COVID-19's Effect on Industry and Regional Economic Outcomes (Infometrics, April 2020)

Arataki - Potential Impacts of COVID-19 (Martin-Jenkins and Infometrics, May 2020)

Typically, in a business case context the protection of taonga and Māori cultural values / identity are captured alongside environmental and feasibility issues in the options development and assessment process and do not form part of the "core" problem. However, several notable SWGP and study area specific reasons led to the elevation of cultural matters into the problem statement, including:

- Pūkaki and Waokauri Creeks, are subject to Māori Reservation status, meaning they are held for the common use or benefit of Te Ākitai Waiohua. As a reservation, the land is afforded the protection of being "inalienable" to the Crown. The existing Pūkaki Bridge southwest of SH20B traverses Pūkaki Creek, presently providing one lane in each direction to and from the Airport.
- The AUP Puhinui Precinct identifies Te Ākitai Waiohua's Māori cultural landscape values both within and surrounding the Puhinui Precinct (Precinct Plan I432.10.1, Puhinui: Precinct plan 1). Wide-ranging Mana Whenua values, including Mauri, are outlined within the AUP Puhinui Precinct objectives, policies and rules. For example, policy I432.3(2)(f) in the AUP Puhinui Precinct – states:

2) Recognise, protect and enhance the cultural, spiritual and historical values and relationships associated with the Māori cultural landscape at Puhinui. These values include but are not limited to:

a) Pūkaki Marae and its connections within the Māori cultural landscape
b) important sites, places and areas, wāhi tapu and other taonga
c) views and connections between existing or historical cultural sites, places and areas
d) coastal edge and waterways
e) fresh water quality
f) Mauri, particularly in relation to freshwater and coastal resources.

It is noted that the ILM was developed with Te Ākitai Waiohua and incorporates their feedback. It is consistent with their prior input on the development of the AUP Puhinui Precinct provisions.

As such, the programme partners decided to include improved recognition of cultural identity in the transport system and the need to protect taonga as a desired outcome within the ILM. Related to this is existing and future potential impacts on the environment as a result of the transport system.

It is important to note that other Mana Whenua groups in the wider region also hold significant cultural values and associations with the study area. Their role as Treaty Partners has been recognised through ongoing engagement during the SWGP's development (Section 7).

Key sources of evidence include the AUP Puhinui Precinct and CVA prepared by Te Ākitai Waiohua in its development and an addendum CVA prepared for the SWGP (refer to Section 7.3). This problem statement also reflects feedback from Te Ākitai Waiohua and other Mana Whenua via the Southern Table Hui on the importance of cultural identity, historical and spiritual values of the area and places being recognised in the transport system, including place names, stories, and a sense of pride. The Auckland Plan 2050 highlights the importance of engagement with Treaty Partners and overviews opportunities to reflect taonga and cultural identity in the transport network.

4.5.2 Cultural identity and taonga

The SWGP has identified a need to redress a current lack of cultural identity represented in the transport system and recognition of taonga within the programme study area.

The Puhinui area is part of the cultural landscape which is considered a taonga by the people of Te Ākitai Waiohua. The cultural associations Te Ākitai Waiohua maintains with the land and waterways of Puhinui reflect the history, whakapapa (genealogy), values and significance of the area to the iwi. Development of infrastructure will negatively impact on the relationship of Te Ākitai Waiohua with this cultural landscape through visual, physical and spiritual changes potentially eroding these important connections to Te Ākitai Waiohua's whakapapa. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners to ensure taonga are protected throughout the project area.

The AUP Puhinui Precinct sets out Te Ākitai Waiohua's Māori cultural landscape values both within and surrounding the Puhinui Precinct and also identifies elements that are specific to the transport system. Refer to Figure 4-35.

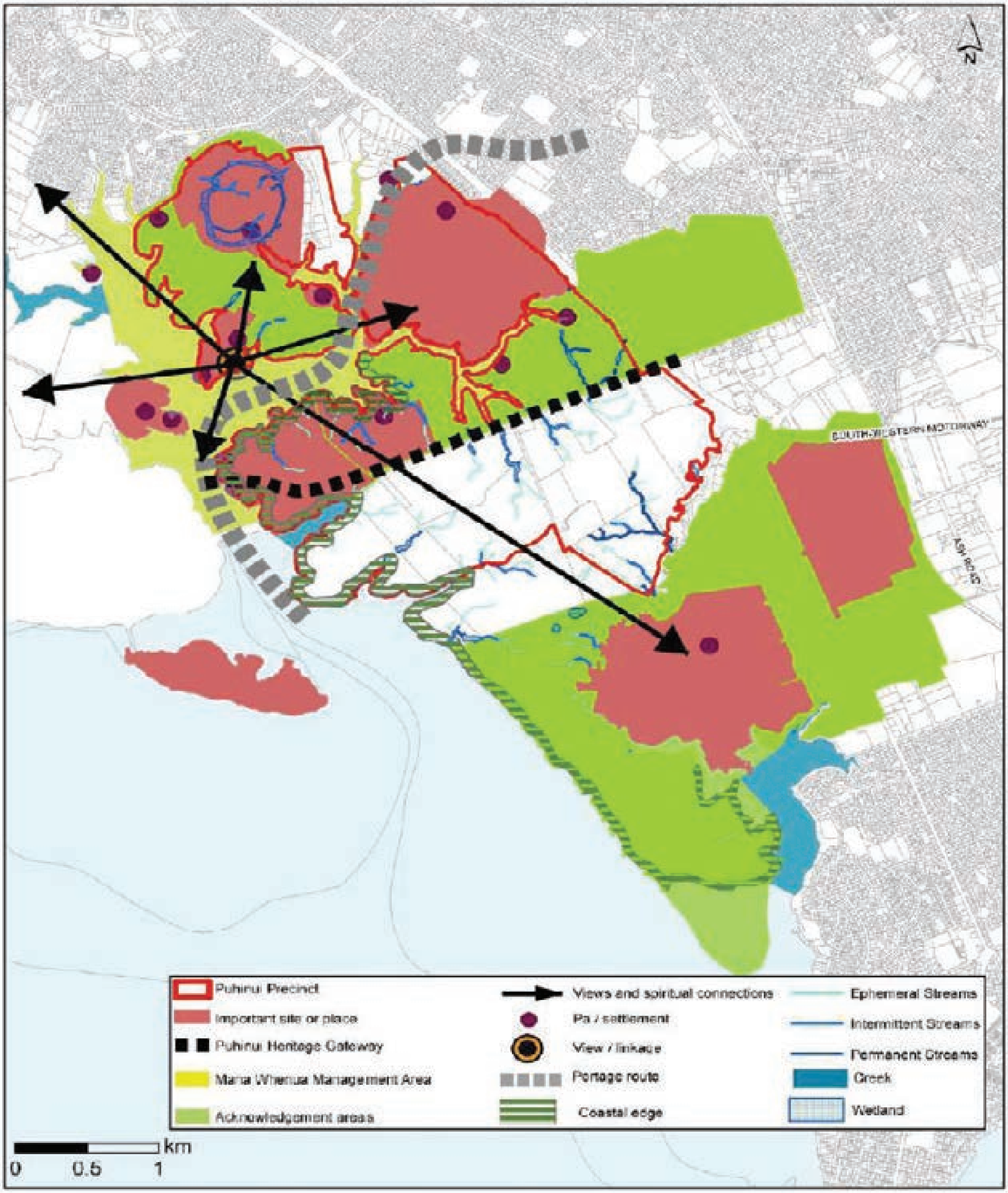


Figure 4-35: Auckland Unitary Plan, I432.10.1. Puhinui: Precinct plan 1 – Māori cultural landscape values

The Puhinui Precinct description, objectives, policies, rules, standards and assessment criteria provide specific guidance on a number of cultural identity matters, taonga and values that Te Ākitai Waiohua hold in the study area. The provisions also address a wide range of development and transport matters while also seeking to ensure '*that an integrated approach is taken to managing the adverse effects on the Māori cultural landscape values*' and the recognition of these.

Some key extracts are as follows, including the central importance of Te Ākitai Waiohua's cultural, spiritual and historical values within the Puhinui Precinct's purpose and the management of natural and physical resources:

"The primary purpose of the Puhinui Precinct is to enable a transition from rural to urban development, while recognising the cultural, spiritual and historical values and relationships that Te Ākitai Waiohua have with the land and sea in Puhinui as part of the Māori cultural landscape. The precinct also recognises the relationship which exists between Māori cultural landscape values and the management of natural and physical resources." – AUP I432. Puhinui Precinct, pg 1

The Mana Whenua cultural landscape described in the Puhinui Precinct describes the special relationship and values Te Ākitai Waiohua hold with the area, and identifies a large number of taonga that should be taken into consideration throughout the SWG programme's development:

"The Puhinui peninsula is notable for its continued occupation by Te Ākitai Waiohua since pre-European times due to its proximity and access to the coast (Manukau Harbour and tributaries) for collecting kaimoana, fertile soils for food growing, and maunga for defence purposes. Puhinui is inextricably linked to the history, stories, whakapapa and mythology of Te Ākitai Waiohua. Te Ākitai Waiohua have a strong spiritual (Taha wairua) association with Puhinui which gives its people a sense of meaning and purpose.

…The Puhinui Precinct is bisected by the Waokauri Creek, a Mana Whenua Management Precinct, which recognises the Māori Reservation status of the Creek under the Te Ture Whenua Māori Act 1993…

Cultural values to be protected encompass the geological, the coastal, archaeological, and ecological features within the precinct. The Pūkaki Crater and lagoon (Te Pūkakitapu o Poutukeka) is ancestral Māori land of particular spiritual value to tangata whenua, and ownership is held by the Pūkaki Māori Marae Committee. The Portage Road Reserve at the centre of Ngā Kapua Kohuora (Crater Hill) is vested in Council as reserve land. Pūkaki Crater and Portage Road reserve are zoned Open Space – Conservation." – AUP I432. Puhinui Precinct, pgs 2 - 3

However, specifically relevant to the SWGP and the transport system is the concept of a Puhinui Heritage Gateway and its link to future multi-modal transport infrastructure along Puhinui Road / SH20B, which is identified in the cultural values of the Puhinui Precinct (also refer to black dashed line in Figure 4-35 above):

"Puhinui Road is recognised not only as a transport corridor, being a main entry and exit point for tourists and visitors to the country and an important freight route, but for its importance as a cultural heritage gateway. The precinct identifies the 'Puhinui Heritage Gateway, which includes the State Highway 20B designation, a 40m strip on the southern side of the designation, and 40m strip on the northern side of the designation. The entire route runs the length from the State Highway 20 interchange through to Auckland Airport." – AUP I432. Puhinui Precinct, pg 2

One of the Puhinui Precinct Objectives (precinct-wide) I432.2(2) also broadly identifies taonga for Mana Whenua and Te Ākitai Waiohua, seeking that:

"Mana Whenua cultural, spiritual and historical values and their relationship associated with the Māori cultural landscape, including ancestral lands, water, sites, waahi tapu, and other taonga, in the Puhinui Precinct are identified, recognised, protected, and enhanced".

Furthermore, a number of policies (precinct-wide), including for example I432.3(2) – (4) and (9) set out further specific provisions that identify a large number of cultural values and taonga in the area.

It is also noted that only Te Ākitai Waiohua and other Mana Whenua can advise as to any cultural values and taonga that are held in relation to the programme area. With programme partner Te Ākitai Waiohua, continual advice will be provided to the other programme partners via governance arrangements (refer to Section 7.1). Ongoing engagement with wider Mana Whenua Treaty Partners, who also hold values and associations with the area, will continue to occur throughout the programme's phases going forward (refer to Section 7.2).

4.5.3 Opportunities to reflect cultural identity and taonga in the SWGP transport system

The SWGP also presents an opportunity to recognise the area's cultural identity within the transport system in the programme study area. In addition, given that the Airport is New Zealand's principal gateway for international travellers, there is an opportunity to represent the nation's unique cultural identity.

Focus Area 7 in the Auckland Plan 2018 is to "Reflect Mana Whenua mātauranga and Māori design principles throughout Auckland."

The Auckland Plan 2050 notes that "Since 1840, Māori identity and culture has been minimised in the Auckland landscape."

Engagement activities with Mana Whenua recognised that while historical investment and engineering practices in transport were practical, they lacked urban design elements that provided a sense of place and uniqueness to the area. Expression of identity and history through design is important to iwi as evidenced through Council's adoption of the Te Aranga design guide which seeks to embed Māori values in design of public assets and urban form.

The Auckland Plan 2050 further references this as an issue to be addressed in Auckland's ongoing development:

"Through Māori design mātauranga Māori can be placed at the centre of planning, design and development. This offers a holistic approach that creates places and spaces that are welcoming to all, from tāmariki and young whānau to kaumātua.

Mana Whenua opportunities to influence placemaking can reinforce a sense of belonging for generations to come through the expression of their mātauranga and pūrakau in urban design.

Te Aranga Māori design principles provide a way to instil Māori cultural identity in the built landscape, bringing Mana Whenua to the centre of Auckland's design."

Projects such as the City Rail Link[77], and local station designs such as Ōtāhuhu (see Figure 4-36) and Manukau Bus Interchange have followed these principles and recognised the significance of the local area to iwi, in contrast with current designs in the study area that have no such cultural elements. These examples represent the opportunity that exists for the SWGP.

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[77] See **https://www.cityraillink.co.nz/crl-design** or **https://at.govt.nz/projects-roadworks/train-station-improvements/manukau-station/#heritage** for more information.

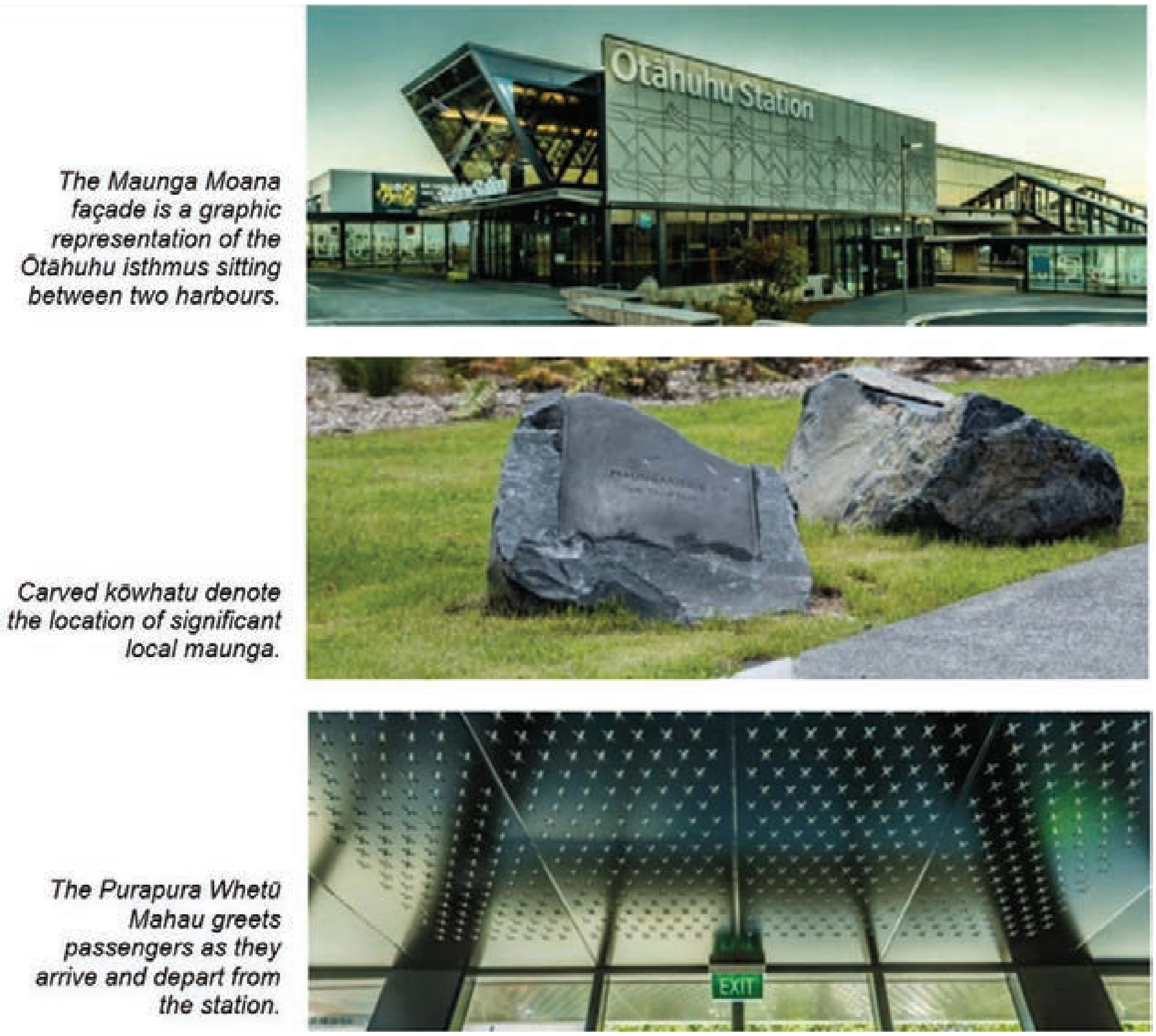

Figure 4-36: Ōtāhuhu Station's Māori design elements (Auckland Design Manual)

Stage 1 of Puhinui Station, which forms one of the early deliverables of the A2B project has already sought to reflect cultural values and identity of Mana Whenua, through the station's design narrative and artwork. The Puhinui Station Interchange design framework and cultural narrative is being developed with Mana Whenua through the Southern Table. It includes themes focussed on Puhinui Stream, including movement and tuna, and integration of traditional construction forms. Refer to Figure 4-37.

In the CVA Addendum[78], programme partner Te Ākitai Waiohua have expressed support for the seven Te Aranga principles to the SWGP in the design and development of an iwi based cultural landscape. Te Ākitai Waiohua and Treaty Partner feedback will continue to be incorporated in future stages of the SWGP. The project is an opportunity to better represent cultural identity in the transport network through a range of avenues, including the application of Māori cultural values through all phases of the project's design and operation.

[78] Te Ākitai Waiohua, Cultural Values Assessment Addendum for Southwest Gateway Programme, 2018

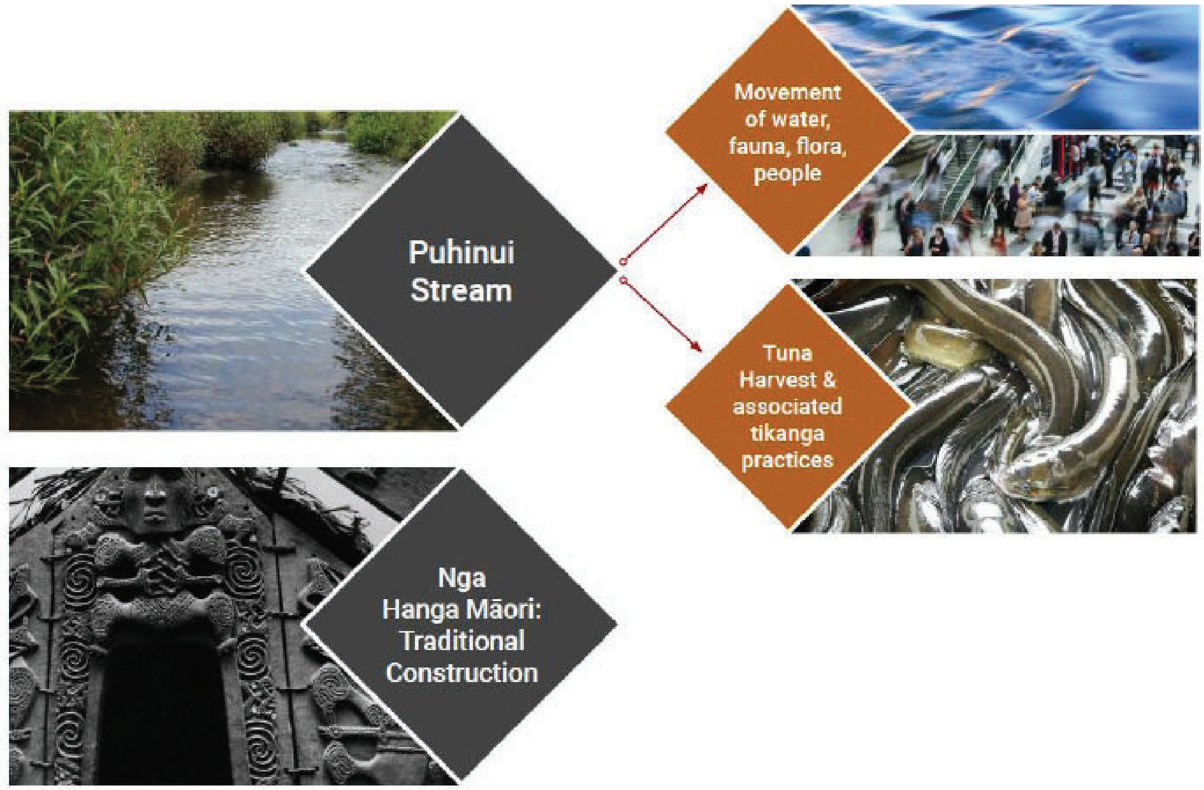

Figure 4-37: Puhinui Station design framework and narratives

4.5.4 Protection of taonga and adverse effects on the environment

Water is a taonga - it is the lifeforce of everything. The transport industry including the construction and operation of infrastructure generates potentially adverse effects on waterways. As identified in the Auckland Plan 2050[79], much of Auckland's (and New Zealand's) appeal is its natural environment, particularly harbours, beaches, lakes, rivers and coastlines. These areas are of particular importance to Māori.

Specifically, the Pūkaki and Waokauri Creeks are viewed as a taonga of great cultural and spiritual significance to Te Ākitai Waiohua. Various waterways will be potentially affected by the 20Connect and A2B projects, including the Waokauri Creek which feeds into Pūkaki Creek, resulting in potential impacts on the Manukau Harbour.

Historically, untreated road surfaces have been implemented for their cost effectiveness and longevity, at the cost of allowing polluted run-off to enter local waterways.

In recognition of this threat, recent projects across Auckland have enabled further recognition of water as a taonga – for example, upgrades to Puhinui Station Interchange, which is an early deliverable of the A2B project, will have fully treated surfaces to limit run-off impact.

The road network in the wider study area also does not generally treat stormwater runoff. The study area has a large number of streams and includes sensitive marine environments of significant value to Mana Whenua. The SWGP represents an opportunity to improve water quality in the study area through the provision greater levels of treatment than currently provided.

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[79] Auckland Plan op cit Māori Identity and Wellbeing

As evidenced in Section 4.5.2 above, there are a large number of taonga within the SWGP study area, of which water is only one. Ongoing collaboration with programme partner Te Ākitai Waiohua and other Mana Whenua (Treaty Partners) is required to ensure taonga are protected and adverse effects on the environment are minimised and reduced throughout the project area.

4.5.5 Adverse environmental effects

There are a number of areas where the operation of the study area's existing transport system causes adverse effects on the environment. These include private vehicle emissions and associated climate change impacts, stormwater and ecology.

Carbon emissions, climate change and human health

The strategic need to reduce carbon emissions resulting from the transport system, including using mode shift to low carbon emission modes such as public transport, walking and cycling to achieve these aims has been clearly identified in a large number of national and local strategic documents including the GPS, Zero Carbon Bill, Resource Management Act, Climate Change Response Act, ATAP Better Travel Choices Mode Shift Plan 2019, and Auckland Plan 2050.

Further, on 11 June 2019 Auckland Council declared a Climate Emergency, which signalled the Council's intention to put climate change at the forefront of decision making. Supporting this is Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan (July 2020). This provides greenhouse gas emissions reduction targets for the region, including halving emissions by 2030 and reaching net zero emissions by 2050. Transport activities generate the vast majority of Auckland's greenhouse gas emissions, alongside burning fossil fuels for electricity generation and other uses (Auckland Plan 2050, pg 167).

As outlined in Section 4.3 and Section 4.4, there is a high prevalence of private, single occupant, vehicle use through the study area, with low public transport mode share compared to the rest of the region, largely due to a lack of alternative transport choices. On the state highway network and within the SH20, SH20A and SH20B corridors, there are increasing travel times due to congestion, leading to high volumes of vehicle emissions affecting both the global environment (CO_2) and the health of local communities (CO, NOX).

The prevalence of rat-running by commuter traffic and freight on local roads surrounding the state highway corridors is also contributing to the high level of vehicle emissions for local communities in the area.

Stormwater and ecology

There is currently little to no stormwater treatment in place along the local road network in the wider South and East Auckland study area, or along sections of SH20 and SH20B (refer to Section 4.5.4 above). Without treatment, the water quality of stormwater runoff is likely affecting waterways and the Manukau Harbour. For example, the following sections of state highway do not currently receive stormwater treatment:

- SH20B (however some treatment will be provided via the SH20B early improvements project currently under construction)
- Section of SH20 between SH20A and SH20B
- SH20 / SH20A interchange.

In terms of terrestrial and aquatic ecology, there is a lack of fish passage and riparian planting along various transport corridors in the study area, both local roads and state highway, as well as degraded water course banks. There are opportunities for the SWGP to further consider reducing the existing impacts the transport system has on the environment.

4.6 Problem Statement 4

Perceptions of poor personal safety limit uptake of public transport and active modes.

4.6.1 Perceptions of poor personal safety limit uptake of public transport

There are two key facts that underpin this problem. Firstly, public transport journeys are inevitably journeys that involve walking or cycling and waiting in a public place. Often these journeys take place in the hours of darkness, particularly in this study area where there is a higher than normal proportion of shift workers and a key destination at the Airport that operates 24 hours. Secondly, the existing mode share in this study area is low which means that most potential users have not or do not regularly interact with the public transport system.

Auckland-wide research

Nearly half of Aucklanders (49%) consider it unsafe to use public transport in Auckland, and only 26% of Aucklanders consider it to be safe to walk alone in their neighbourhood after dark (see Figure 4-38).[80] This directly and clearly supports the assertion that there is a poor perception of personal safety. Left unresolved, the prevailing attitudes displayed by transport customers indicate that there is little chance of improving public transport uptake and as a result mode shift.

Figure 4-38: Personal safety perceptions survey results

Most safety concerns described above are related to the walk to and from commuter stops - particularly for women commuters, who according to the perceptions survey are around half as likely to feel safe using public transport at night compared to men. This is a significant concern for equity in access to opportunities. Of note:

- Less than half of women (48%) are not concerned about personal safety on public transport.
- Over one third of women will not use public transport at night. This effectively eliminates the potential for public transport use for shift workers and for most workers in the winter months.

[80] Auckland Transport Market Perceptions Survey, December 2018

Perceptions of safety after dark (see Figure 4-39) are worse for women compared to men, although proportions of both women and men reported feeling unsafe. Safety after dark is particularly important for shift-workers.

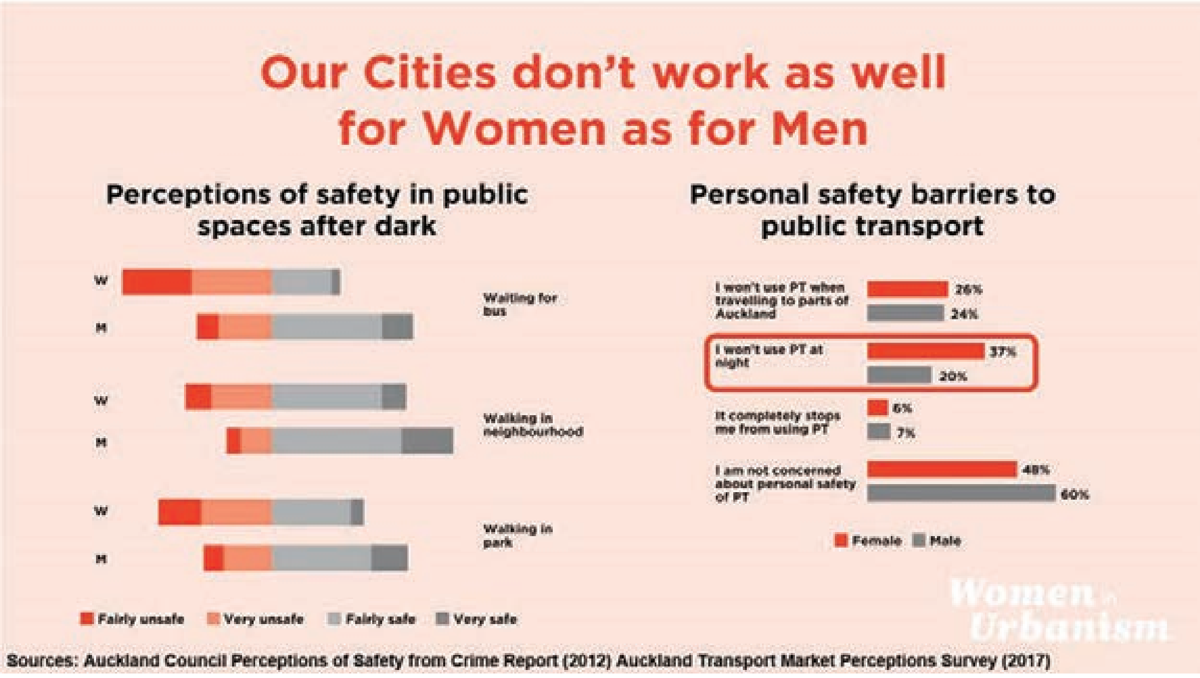

Figure 4-39: Commuter safety perceptions in Auckland, women compared to men

Study area specific research

Unsafe perceptions affect those currently commuting in the study area, according to the Waka Kotahi report *Understanding attitudes and perceptions of cycling & walking*.

"[the] Last time I took a train in South Auckland it was creepy, even at midday. Isolated, no real information. No facilities, was not clean, no security." – observations from a Wellington commuter[81].

During the development of the Auckland Airport Access SPBC, and subsequent Short-Term Airport Access Improvement (STAAI) SSBC, surveys were conducted to understand safety perceptions of commuters in the study area, and how safety impacts their uptake of public transport. These observations included reference to stations and their design:

"That station is one of the most unsafe in Auckland." - South Aucklander observations regarding Puhinui Station.

There were also comments as to what would be required to increase uptake of public transport:

"[utilise more] Cameras on buses, security people." – survey observations.

Research completed by Auckland Council investigated the way in which access to transport impacts upon the lives of people aged 15-24 in The Southern Initiative (TSI) area of Auckland (the Māngere-Ōtāhuhu, Ōtara-Papatoetoe, Manurewa, and Papakura local board areas)[82]. The participant

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[81] This observation was a finding as part of the Auckland Airport Access Survey, a qualitative research report developed by Kantar TNS in February 2018, see Appendix W.

[82] Youth Mobilities in the Southern Initiative, Auckland: Transport Practices and Experiences of 15-24 Year Olds (April 2016, Auckland Council)

perceptions and experiences of different modes of transport (in particular public transport) were some of the key issues explored.

The research found that participants had negative perceptions and experience of safety both onboard public transport and at and around public transport stops. Qualitative data was collected through one-on-one interviews, and some key findings are listed below:

- Although none of the participants mentioned being personally harmed, they thought that other passengers occasionally present a threat through drunken and aggressive behaviour.
- Participants perceive that the installation of the new ticketing system has been accompanied by a reduction of staff at train stations and on trains, leaving more room for people to misbehave.
- Some participants had experienced times when bus drivers had presented a threat to their safety through reckless driving. Reported instances of reckless bus driving behaviour include speeding, driving up on curbs and taking off before boarding passengers have had time to sit down or hold onto something for balance.
- Participants also reported experiences of buses being too full at peak times, with bus drivers allowing too many people to board.
- Public transport stops in South Auckland are less developed than in more central areas of Auckland and less frequented by other passengers, particularly at night.
- Participants reported often feeling unsafe waiting at stops for extended periods of time, and in some cases walking home or calling someone to pick them up because of late or ‘no-show’ buses.
- A lack of leniency on the part of train ticket controllers had occasionally left participants or people witnessed by participants stranded at train stations at night.

Further study area specific evidence of perceptions of poor personal safety limiting the uptake of public transport came from the public engagement outlined in Section 6, and detailed in the Engagement Summary report (Appendix F).

Based on the study findings summarised above, it is clear that perceptions of poor personal safety limit the uptake of public transport across the Auckland region. Specifically, concern for personal safety completely stops approximately 8% of Aucklanders from using public transport, and approximately a quarter of Aucklanders from using public transport at night.

4.6.2 Perceptions of poor personal safety limit uptake of active modes

New Zealand wide research

Waka Kotahi begun a research programme in 2016 focussed on understanding attitudes towards and perceptions of cycling and walking across New Zealand, with surveys repeated in 2016, 2018 and 2019.[83] Safety was consistently found to be the key barrier to overcome to get more people walking and cycling, and to get people who already walk and cycle to do so more often.

Figure 4-40 outlines the top 5 drivers and barriers for walking and cycling, as identified by the research programme.

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[83] Understanding attitudes and perceptions of cycling & walking (September 2019, Waka Kotahi NZ Transport Agency)

Figure 4-40: Overall drivers and barriers to walking and cycling in New Zealand[84]

Another relevant finding of the Waka Kotahi research programme was how safe people feel (or would feel) riding a bicycle in different environments (see Figure 4-41). 24% of participants gave a ranking of 6-10 out of 10 for riding on public roads with no cycle lanes, whilst 68% gave a similar ranking for riding on a shared path or cycle path. Overall, perceptions of cycling safety improved between 2018 and 2019.

Figure 4-41: Perceptions of cycle safety in NZ (In general, how safe are you/would you be, riding a bicycle…? [NET Safe; 6-10 out of 10], 2019 statistics)[85]

Study area specific research

The "Understanding attitudes and perceptions of cycling and walking" study found that the barriers to increased walking and cycling: "I do not feel safe walking in the dark" and "I do not feel safe cycling in the dark" were high in Auckland at 34% and 47%, respectively, compared to 29% and 40% averaged across all New Zealand's six largest cities. In each case Auckland had the highest levels of these negative concerns. These concerns would be expected to apply equally to accessing public transport (first leg/last leg) and are therefore addressed as part of the recommended option section (Section 15.2.10).

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[84] Understanding attitudes and perceptions of cycling & walking, op cit

[85] Understanding attitudes and perceptions of cycling & walking, op cit

Further, within Auckland the lowest perceptions of safety are in Auckland south / east, with only 22% (net, positives – negatives) considering cycling safe against the average across Auckland of 32%.

Te Ara Mua – Future Streets (Future Streets) was a transport project in Māngere Central where streets, footpaths, and recreational areas were changed to make it safer and easier for people to get around the neighbourhood, especially by walking or cycling, and to reflect cultural identity. Although the project included multi-million-dollar award-winning cycleways, there has not been a significant increase in ridership[86]. The University of Auckland conducted a study into community experiences of Future Streets[87] and identified the findings summarised in Figure 4-42.

Community experiences of walking, cycling, and Te Ara Mua – Future Streets

How comfortable and safe people feel getting around the neighbourhood

Road safety
- Walking is safer and easier, especially for children, older people and mobility device users
- Biking is still unsafe, including in the bike lanes
- Driving is harder and some drivers have crashed on the bike lane separators

Personal safety (safety from crime and attack)
- The parks and alleyways around Windrush Close are nicer but not much safer than before
- Reckless youth, gangs, and aggressive dogs make walking and cycling unsafe
- Children and women are most vulnerable
- Bike theft puts people off biking

How easily available walking and biking are to locals

Social and cultural norms
- Walking and cycling for transport is associated with poverty
- Driving is the normal way to get around
- Cycling is childish, or sporty and culturally unfamiliar
- Bike lanes are for sports and commuter cycling

Practicality
- Large family sizes make walking and cycling difficult
- Overcrowded housing worsens loss of parking
- Biking is cheap, but locals can't afford bikes
- Residents are short on time
- Health issues make walking and cycling harder
- Many common destinations are far away

How well the project involved the community and understood their needs

Community involvement
- Local transport habits were under-researched or misunderstood, *or* the project was a big change and the community will take time to adjust
- Community engagement insufficient; some residents left out

Figure 4-42: Community experiences of walking, cycling, and Te Ara Mua - Future Streets

Relating to road safety, although participants reported walking as having become safer, especially for vulnerable road users, biking had not become much safer as a result of the new cycleways, and the cycleways had also made driving harder and some drivers had crashed on the cycleway separators. Relating to personal safety, the project has done a lot to make the area look nicer, but participants do not feel much safer than before, particularly at night. Additionally, children and women are the most vulnerable in the area, and bike theft deters people from biking.

A range of other factors also contribute to the lack of active mode uptake. These include social and cultural norms, for example how in Māngere, walking and cycling for transport is commonly associated with poverty and cycling is culturally unfamiliar for adults and more of a sports-related activity. The practicality of active modes is also often a barrier, for example with large family sizes making walking and cycling difficult and locals not being able to afford bikes. Participants also felt like the project did

[86] Beyond the hype: Why is no one riding Māngere's award-winning cycleways? (The Spinoff, June 2020)

[87] Walking and cycling in Māngere: Community experiences of Te Ara Mua – Future Streets (Rebekah Thorne, The University of Auckland, July 2018)

not involve the community and understand the local transport habits and needs as much as it should have.

Based on the study findings summarised above, many of the key barriers to active mode uptake relate directly to safety and perceptions of poor personal safety, both across New Zealand as a whole and specifically within the study area.

Gaps in the active mode network

There is a lack of walking and cycling facilities for all ages and abilities within the study area, as shown in Figure 4-43. In addition, the SH20B and Airport precinct are part of the Te Araroa and national cycle trails.

The lack of safe, separated cycle facilities, means cyclists will need to share road space with general vehicles and buses, which can lead to perceptions of poor personal safety, preventing the uptake of active modes to complete journeys.

Figure 4-43: SWGP Walking and cycling short-term network

4.7 Urgency

A trend common to all of the evidence presented in support of the problems is the timing, as while growth is forecast and is shown to exacerbate the problems significantly, the issues are primarily current or historic.

- There has been significant growth in the study area in the last twenty years and this has not been supported by transport investment, particularly in public transport
- The public transport options are unreliable now and are not merely forecast to become unreliable in the future. They are likely to become increasingly unreliable from a poor present condition

- The deprivation issues in the study area exist today and have done for a long time. The lack of access is current and likely to play a role in reinforcing this
- State highway congestion is already showing signs of peak spreading and unreliable journey times
- The mode share for public transport in the study area is low now and considerably lower than comparable areas in the rest of Auckland
- The Government plans to invest in affordable housing, education and employment in Manukau over the next 25 years, requiring access improvements and transport choices
- Issues identified with the poor recognition of cultural identity, taonga and the significance of parts of the study area have been confirmed by Mana Whenua, particularly programme partner Te Ākitai Waiohua
- AT's customer surveys have shown that people have strong perceptions that walking, cycling and using public transport now is unsafe.

It is noted that COVID-19 may have an impact on the growth in demands in the study area in the short term, particularly in relation to the Airport area. However, many of the problems described are current, long term structural problems with the transport network, its relationship with land use, the environment and its people.

4.8 Opportunities

Opportunities for further investigation with the investment and programme partners and stakeholders are:

- Behaviour change: there are opportunities to promote and incentivise behaviour change at an accelerated rate to aid mode shift
- Walking and cycling facilities: the provision of safe walking and cycling facilities to increase connectivity to, from and within the study area will complement the investment in higher standard public transport. Opportunities include connections to future RTN stations, kiss and rides, and for direct access to the Airport
- The opening of Botany Station will trigger recommended changes to the local bus network providing the opportunity for additional patronage through effective coordination
- Provision of improved access via stations presents an opportunity to allow for intensified development and growth. The recent National Policy Statement on Urban Development 2020 (NPS-UD) is highly applicable to the A2B project and is expected to further enable intensification around stations. Recognising Auckland Council's leading role in this area, AT will work with Auckland Council on opportunities to understand the NPS-UD further and to implement policy and zoning changes along the corridor to better support TOD
- Sustainability across different stages of the project: there are opportunities to explore a greater sustainability focus in the options development and assessment process, which may consider broad environmental outcomes, climate change, transport carbon emission reduction, sustainable transport and technologies.

4.9 Issues and constraints

Issues are uncertainties / risks that may not be resolved during the business case development stage, while constraints are limiting factors such as time, cost, and resources.

4.9.1 Issues

The full risk assessment for the projects is in Appendix I. Table 4-5 describes some key issues and uncertainties that may influence the outcomes of this SSBC. The uncertainty log aims to address risk and demonstrates the need for close monitoring and management. Standard constraints such as funding, property acquisitions and so on also apply and are addressed in the Management Case.

Table 4-5: Issues / uncertainty log

Factor	Timing	Uncertainty	Impact	Comments
Factors affecting demand				
Pace and pattern of growth at Auckland Airport and the surrounding areas	Ongoing	Certain	Significant	The pace of activity and development at the Airport and the surrounding area, including from citywide net migration requires careful monitoring of planning and construction timeframes to ensure the projected demand on the transport network is met by sufficient, but not excessive, capacity.
Modelled demand forecasts are significantly incorrect	Ongoing	Unlikely	Significant	It is possible that the forecast demands are significantly different – over or under – to those forecast either from land use changes (note below), travel behaviours, new technology or other unexpected eventualities. While this has a benefit realisation and value for money risk if actual demand is lower than forecast, it has a capacity operability consequence.
Urban development timing, scale and distribution	Ongoing	Likely	Significant	A number of assumptions have been made with respect to timing and distribution of growth and how the design will integrate. There is a threat that these assumptions may prove to be incorrect. This may change the requirements for any transport response.
Degree of travel time reliability across all modes	Ongoing	More than likely	Significant	Impacts the level of confidence customers have in the reliability of the transport network which will impact the uptake of public transport services.
COVID-19	Ongoing	More than likely	TBC	The COVID-19 pandemic has reduced international travel significantly. With a route serving the Airport, this may affect demand profiles. Responses to this issue are provided in Appendix W and Management Case via the Investment Gateway Approach.
Factors affecting supply				
New legislation and policy direction enforce the pace of travel behaviour change	Political timeframes – ongoing	Reasonably foreseeable	High	Central or local government policy may cause changes in infrastructure investment. This may impact assumptions made about the strategic approaches investigated within the options assessment.

Factor	Timing	Uncertainty	Impact	Comments
Assumed interactions with dependent projects and developments	Ongoing	Possible	Significant	Third party developers may disrupt plans adding cost or reducing effectiveness of interventions. This could exist at Botany Interchange or in relation of the commercial development south of SH20B
Ability to confirm an agreed way forward with Mana Whenua for any potential options	Ongoing	More than likely	Significant	Ongoing engagement, participation and collaboration with Treaty Partners will be undertaken throughout different phases of the project. Mana Whenua engagement is further discussed in Section 7.
Land cannot be acquired and/or consents not obtained.	2024-2030	Unlikely	Significant	If land cannot be acquired and consents not acquired to the extent required, this will require re-scoping of the project.
Alignment and agreement between programme partners is not maintained.	Ongoing	Possible	Significant	The SWGP is based on a strong strategic partnership between four programme partners. A range of matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.

With the rapid scale and pace of growth in southern and eastern Auckland (including expected growth in air passenger numbers, housing and urban development, and potential shifts in government transport priorities), there remain many uncertainties that should be monitored over the progression of this business case.

4.9.2 Constraints

There is the potential for misalignment of the direction and timing of this SSBC and other projects in the study area (eg the Auckland Airport transport projects, CC2M, Transforming Manukau, KiwiRail Third and Fourth Main) led by the other investment partners. Interface issues may arise if the timing and staging of any proposed works do not integrate with the planning for the other projects, for example the delivery of Botany Station by the Eastern Busway project. There is currently a high level of uncertainty around the timing for various investigations, funding and delivery of projects led by the investment partners. The investment partners are aware of the challenges and are working together to minimise them, eg through staging (see Section 15.6, and Appendix E) and the Investment Gateway Approach (Section 20.5). The governance arrangements are set out in the Management Case (Section 20).

This business case describes some of these challenges, as well as mitigation measures. A series of technical constraints is listed in Section 3.6 of the Supplementary Information.

4.10 Benefits of investment (outcomes)

4.10.1 Strategic outcomes alignment

Section 4 of the Supplementary Information contains detail of the strong alignment between the SWGP intended outcomes and central and local government and Auckland Airport adopted policies and strategies.

4.10.2 Development of investment objectives and KPIs

The programme problems, investment objectives and benefits were developed and linked to the GPS priorities, as in Figure 4-44. The full investment logic map is included in Appendix A.

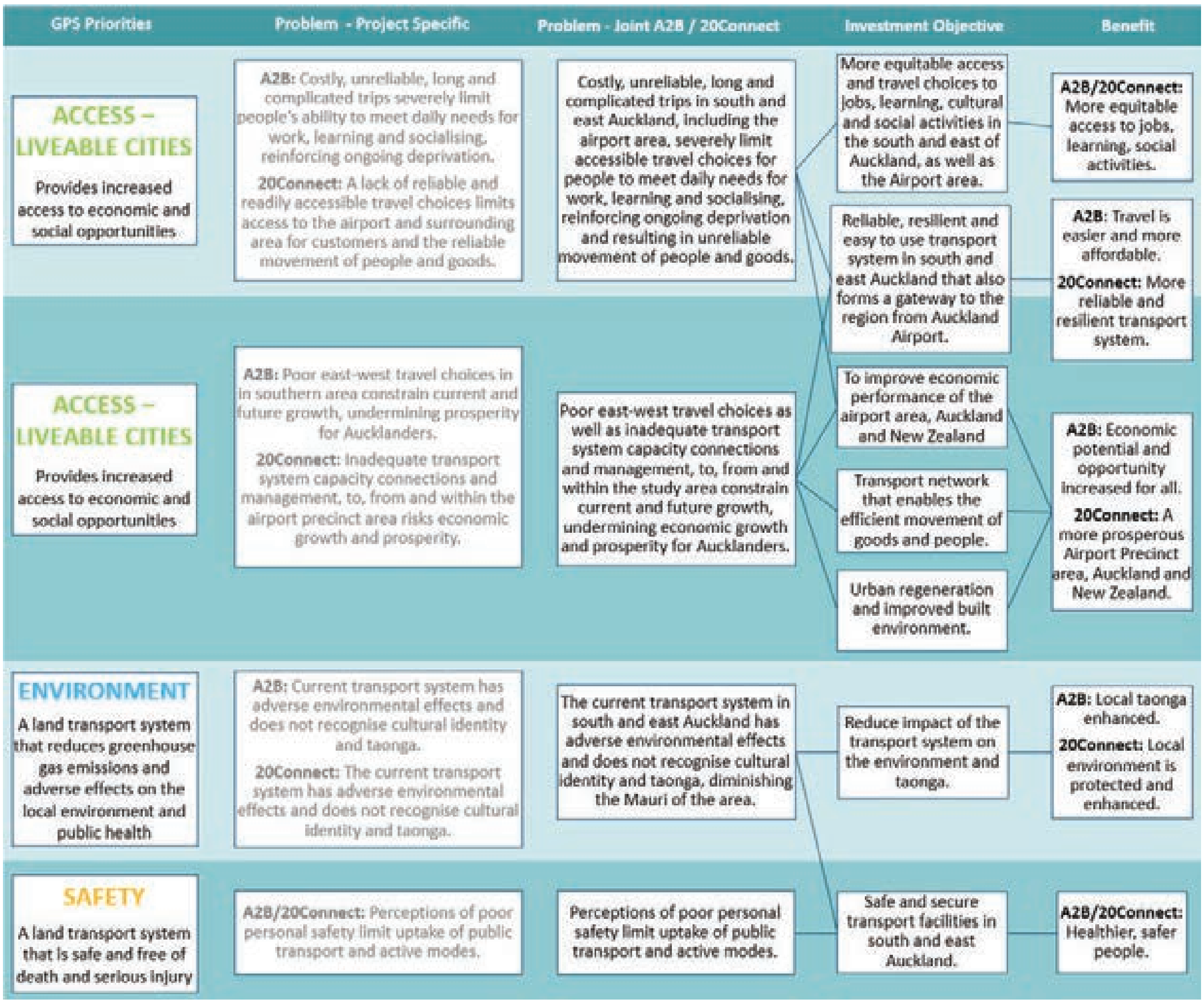

Figure 4-44: SWGP A2B/20Connect investment logic map - linked to the GPS priorities[88]

[88] Government Policy Statement on Land Transport, 2018/19 – 2027/28

5 Assessment profile, benefits realisation and monitoring

5.1 Alignment to investment partner organisational direction

The SWGP is either a key initiative or an enabler within various government strategies / plans, as described in Section 4 of the Supplementary Information.

5.2 Assessment profile

The assessment profile considers how addressing problems identified in the strategic case with the preferred option aligns with the results sought under the GPS in terms of safety, access and environment. Value for money is demonstrated in Part C where the economic assessment shows a benefit-cost ratio.

The Investment Assessment Framework (IAF) for 2018-2021 considers that any rapid transit investment that "enables a substantial increase in access to social and economic opportunities for large numbers of people along dedicated key corridors and enables transit-oriented development" should be considered "very high" in its rating.

This Strategic Case has presented evidence that:

- Scale of population, employment and travel demands is large
- Opportunities exist to influence high density development at metropolitan centres (linked to the Auckland Plan 2050)
- There are significant issues with travel choice and potential for improvement in access to social and economic opportunities.

Against the IAF criteria for results alignment for public transport improvement activities, the problem being addressed is **very high** for results alignment. The evidence confirms that the improvement activity enables a substantial increase in access to social and economic opportunities for large numbers of people along a dedicated key corridor and enables transit-oriented development.

The activity also directly links to specific priority results sought in the GPS, as follows.

5.2.1 Access – Liveable Cities

Benefits of investment are expected to:

- Address a significant gap in level of service in accessing social or economic opportunities for a highly deprived population (including all A2B stations projected to have, as a minimum, 200,000 or more jobs in their 45-minute public transport catchment by 2048[89]), and against forecast deficiencies in access to one of Auckland's largest economic hubs – the international Airport
- Address a significant gap in access to new housing in high growth urban areas through a whole-of-government investment approach including transit-oriented development in areas of high need and expected growth. This benefit will particularly apply in Manukau

[89] Transit Oriented Development Land Use Study, Auckland Transport, March 2020 (Appendix U)

- Support ATAP directly by delivering short- and long-term priorities in line with the proposed plan, as well as the RLTP
- Improve intermodal connectivity between heavy rail, local bus connections, as well as future projects such as CC2M and the Eastern Busway
- Make best use of the public transport service operations and connection to other services through detailed local network integration planning and system design
- Support technology to enhance public transport user experiences through vehicle procurement and customer experience enhancements (off-board ticketing, on-board announcements, information boards, dedicated apps etc).

5.2.2 Safety

Benefits of the investment project are expected to:

- Enhance actual and perceived safe use of and access to public transport through targeted design in stations and their access (active mode station access and shared use paths) and reliable services
- Move towards Vision Zero by providing more attractive public transport options to change modes used towards those with a better safety record and by addressing particular areas of the road network that have notably poor crash histories
- Reduce DSIs for vulnerable road users as a result of adding safe separated walking and cycling facilities and upgrading pedestrian crossings along the route.

5.2.3 Environment

Investment in the A2B and 20Connect projects is expected to:

- Enable reductions in harm to the environment and people, particularly arising from land transport-related air pollution and noise through the greater use of public transport (which may be electric vehicles) and reduction of private vehicle mode share.

5.2.4 Priorities for state highway improvements

The IAF also provides guidance on priorities, for the "*Regional, local road and state highway improvements*" activity class (p. 24).

Under this guidance, *high* priority goes to a project that:

- supports high priority elements in agreed integrated land use and multi-modal plans
- addresses significant gap in access to new housing in high growth urban areas
- addresses a significant resilience risk to continued operation of key corridors
- makes best use of key corridors that prioritise multi-modal use and freight
- provides significant operational efficiencies to reduce the costs of meeting appropriate levels of service without impacting benefits adversely.

Given that even 20Connect, which is less-directly connected to the RTN will address resilience on the SH20 corridor and its delivery will be staged to promote multi-modal use and behaviour change, it could be expected that the proposed interventions on SH20 and SH20A will meet the high priority threshold (on the first, third and fourth criteria for high priority). The NOP requirement to: "*Maintain access along SH20 to ensure the WRR can perform its strategic function as an alternate route to SH1 during unplanned and planned events*" further enhances the high priority of the SH20 elements.

5.3 Benefits realisation and monitoring

The SWGP A2B and 20Connect investment logic map showing the problems investment objectives and benefits, KPIs and measures is provided in Section 4.10.2. The Management Case (Section 20) provides a suite of measures that will be used to assess the performance of the projects and to inform future decision making.

6 Stakeholder engagement

6.1 Engagement to date

Community and stakeholder engagement for the SWGP was undertaken in two stages; the first from November 2017 to December 2018 and the second from January 2019 to December 2019. This approach enabled the community and project teams to build an understanding of the SWGP and provide informed views. The corresponding engagement summary reports are included in Appendix F.

The first round of engagement focussed on what stakeholders and members of the community want to see come from the A2B and 20Connect projects, and involved stakeholder workshops, hui, a SWG Integration Group and socialisation sessions, among other activities. The engagement occurred prior to the recommended option had been selected, in parallel with the problem definition and options assessment phases of the SSBC.

The second round of engagement was an opportunity for the project teams to provide an update to the community on the A2B and 20Connect preferred options and rapid transit route and ask for feedback on these updates. It was also an opportunity to provide the community with details on how feedback from the previous round of engagement had influenced the projects. Similar activities to the first round were organised and implemented.

6.2 Feedback

Overall, partners, stakeholders and the community have been supportive of improvements within the SWGP study area. They recognise the need for the investments and the inter-relationship with other transport infrastructure in the study area.

There were major similarities across the feedback received in the two rounds of engagement. The feedback was summarised into the following key points:

- Safety
- Connectivity and integration of projects with other infrastructure (current and proposed future) in Southwest and East Auckland
- Customer centric public transport
- Potential environmental and social opportunities and effects
- Growth and development.

An example of feedback given during the first round of engagement was that the A2B Rapid Transit service needs to be frequent, reliable, meet timetables and operate for extended hours.

6.3 Next steps

Feedback received during prior and future engagement will help to refine the recommended option design during the route protection and resource consent phase. The project teams will continue to work closely with partners, Mana Whenua and stakeholders during the project's ongoing development in future phases.

7 Māori engagement

7.1 Mana Whenua engagement strategy

7.1.1 Preparing a strategy

AT and Waka Kotahi worked together to prepare a (draft) combined Southwest Gateway Mana Whenua Engagement Strategy (MES). AT and Waka Kotahi saw this as an opportunity to strengthen their collective approach to working with Mana Whenua in Auckland. The MES recognises Mana Whenua as Treaty Partners and committed the agencies to an engagement approach underpinned by the principles of collaboration, openness and transparency.

The purpose of the MES was to provide guidance around a collaborative approach to engagement with Mana Whenua in relation to the SWGP (specifically the A2B and 20Connect SSBC projects). The engagement strategy highlights existing relationships between AT, Waka Kotahi and Mana Whenua with a view to building and developing further engagement opportunities.

A Mana Whenua Engagement Strategy working group consisting of representatives from AT and Waka Kotahi discussed approaches to Mana Whenua engagement informing the basis of advice provided in the document.

The basis of initial discussions focused on existing relationships, what has occurred in terms of Mana Whenua engagement to date, the methods used, who the key personnel are and how best to move forward in engaging with Mana Whenua on the project.

The way Mana Whenua engagement and matters concerning iwi and tangata whenua are captured and integrated were considered in light of the whole project and work programme.

The key outcomes of the Mana Whenua engagement strategy include:

- Kaitiakitanga: the exercise and expression of kaitiakitanga
- Relationship building: to build on and strengthen existing relationships with iwi in Tāmaki Makaurau
- Participation and increased awareness: increased awareness of values of significance to Mana Whenua and appropriate consideration in programme planning and development work
- Enhanced understanding: all parties gaining an enhanced understanding of all aspects of the project including rationale and background
- Agreed methodologies: all parties providing an agreed methodology of engagement on project matters.

7.1.2 Iwi

The MES recognised Mana Whenua interests for the Southwest Gateway to include the following iwi:

- Te Ākitai Waiohua
- Ngāti Te Ata
- Ngāti Tamaoho
- Ngāi Tai ki Tāmaki
- Waikato Tainui
- Ngāti Whātua Ōrākei

- Te Kawerau ā Maki
- Marutūāhu collective x5.

7.1.3 Principles of engagement

The MES noted any engagement with iwi would need to be conducted in a manner which is respectful to tīkanga Māori and appropriate cultural considerations. The principles which should be considered necessary in a strategy include:

- Rangatira ki te Rangatira: particular respect and regard is acknowledged in the appropriate manner in formal meetings and ceremonies
- Kanohi ki te kanohi: where possible, face to face engagement, is held
- Tikanga and kawa: an acknowledgement, understanding and adherence to kawa (protocols), tīkanga (customs)
- Whakawhitiwhiti kōrero: opportunities for both formal and informal discussion and exchange.

The parties agreed that Mana Whenua (kaitiaki) engagement would be through AT's Mana Whenua Table with the following principles:

- AT Transport Table (southern) – facilitated by AT Senior Māori Policy and Engagement Advisor, attended by AT GM Māori)
- Forum members would identify representatives to attend long-list and short-list workshops
- Project working group establish and manage the process to prepare the detailed strategy for engagement through the business case approach to design and implementation
- Provide opportunity for individual Mana Whenua hui if required.

7.2 Mana Whenua engagement to inform business case development and next stages

The MES set out a process where Mana Whenua aspirations will be captured in multiple documents during the business case and future project stages including Māori values assessments (MVAs), submissions, CVAs and environmental strategies. Project specific CVAs would need to be completed ahead of project delivery and should be advanced to ensure project decision making is appropriately informed by cultural values and relationships. Mana Whenua engagement would continue throughout the design and delivery phases.

The first Mana Whenua engagement was a project briefing and overview at AT's Mana Whenua Table (southern) on 31 May 2018.

This was followed by ongoing monthly hui as required over the course of the SSBC to update Mana Whenua and seek feedback on project progress and seek feedback on key decisions being made. These monthly hui were supported by project specific hui in order to seek input into key decisions.

In addition to hui, Mana Whenua representatives were also invited to project workshops where wider stakeholder groups were present to discuss and agree key decisions on the projects. This presence was important to ensure that cultural values were understood by all when decisions were being made.

The processes seeking feedback on short-term and longer-term A2B and 20Connect improvements were run in parallel.In the various meetings, Mana Whenua took the opportunity to raise multiple issues, for example, increasing the presence of the name Puhinui as having significance for multiple iwi and taking the opportunity to agree high level themes to be reflected in appropriate artwork, for example in Puhinui Interchange.

Iwi kaitiaki representatives focussed on practical issues of interest to the general public in addition to specific Mana Whenua concerns. Some of the feedback for the SWGP received over the course of various Southern Table hui included:

Stormwater and water quality

- A "treatment train" approach is preferred, taking into account the whole lifecycle of water and green infrastructure
- Mitigation of potential effects on waterways, de-weeding and National Policy Statement for Freshwater Management 2020 considerations
- Taking a holistic view of mitigation in the wider study area, rather than minor localised mitigations on the corridor, including working with Auckland Council on their projects such as the regeneration of Puhinui Stream
- Manukau Bus Station and the approach to stormwater treatment applied is seen as an example of a positive outcome of Mana Whenua engagement.

Landscape, vegetation and planting

- Retaining and planting natives on the corridor, removal of non-native species and invasive weeds.
- Avoiding unnecessary pruning of overhanging trees conflicting with buses within the road reserve
- Te Irirangi west corridor and weeds - the historic presence of watercress and puha.

Design

- Applying Te Aranga Design Principles, or other principles as agreed with Mana Whenua
- Mana Whenua to have the opportunity to contribute to design / narrative along the corridor
- Supportive of separated walking and cycling facilities
- Further consideration of pick up / drop off facilities provided at the Manukau bus and train stations as the current stations do not allow for this
- Safe crossings provided at regular spacings for pedestrians, elderly and those with luggage.

Property / community / social

- Property acquisition and potential effects on communities - ensuring that people who have to relocate, including whanau Māori, receive good outcomes.

Feedback received to date from the Southern Table Hui largely relates to the future Notice of Requirement and Resource Consents Phase and associated design refinement. This feedback will continue to be considered and incorporated going forward, with ongoing engagement with Mana Whenua Treaty Partners during future programme phases.

7.3 Te Ākitai Waiohua Cultural Values Assessment

A SWGP addendum CVA[90] was provided by programme partner Te Ākitai Waiohua, which forms an addendum to the CVA prepared for the Puhinui Precinct Plan Change for the Auckland Unitary Plan (Operative in part). It provides valuable insight into the interests and concerns of Te Ākitai Waiohua. The main interests of Te Ākitai Waiohua include (but are not limited to):

- The recognition and acknowledgement of Te Ākitai Waiohua and its history in Tāmaki Makaurau (Auckland)
- The opportunity for Te Ākitai Waiohua to exercise its role as Kaitiaki in Tāmaki Makaurau
- The ability for Te Ākitai Waiohua to protect and preserve its interests, resources and taonga in Tāmaki Makaurau.

The CVA addendum identifies traditional sites, areas and waterways of significance including:

- The former settlements at Papāhinau and Mimiti Te Arero
- Pūkaki Creek, Tararata Creek and Waokauri Creek
- Ngā Kapua Kohuora (Crater Hill) and Te Hopua a Rangi (Geddes Basin and Gloucester Park).

The CVA addendum indicates the SWGP has an impact on these sites, areas and waterways of significance, particularly the crossing of Pūkaki Creek (including Papāhinau) and any excavation of Ngā Kapua Kohuora.

Te Ākitai Waiohua are the owners of Pūkaki and Waokauri Creeks (which includes areas of Māori Reservation). Those areas are highly significant to Te Ākitai Waiohua. Te Ākitai Waiohua also has a longstanding involvement in the area's development, including in the Puhinui Structure Plan and as a signatory party to the significant Eastern Access Agreement (1991), which agreed that the form of the Pūkaki Creek Bridge would remain as a two-lane bridge in perpetuity. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.

In addition, strong mitigation measures are required to avoid damage to or remedy the spiritual and cultural relationship of Te Ākitai Waiohua with the area.

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[90] Te Ākitai Waiohua, Cultural Values Assessment Addendum for Southwest Gateway Programme, 2018

PART B – OPTIONS ASSESSMENT

8 Summary

8.1 Overall approach

The A2B and 20Connect projects options assessment approach is shown in Figure 8-1 along with the corresponding sections/appendices where each assessment is detailed in this SSBC.

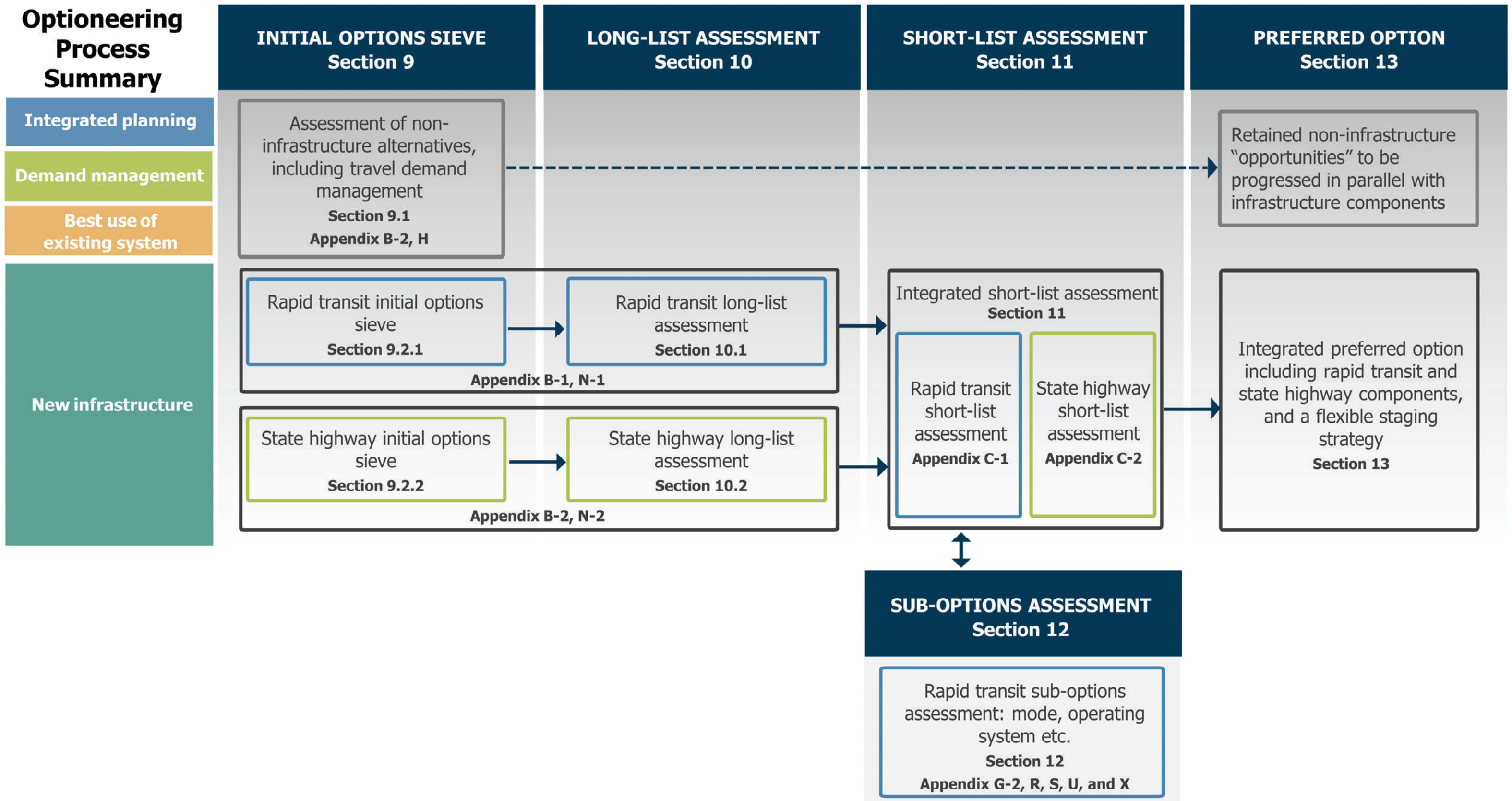

Figure 8-1: Options assessment approach

The A2B and 20Connect projects options assessment considers Waka Kotahi's National Land Transport Fund (NLTF) intervention hierarchy.[91] The intervention hierarchy is shown in Figure 8-2.

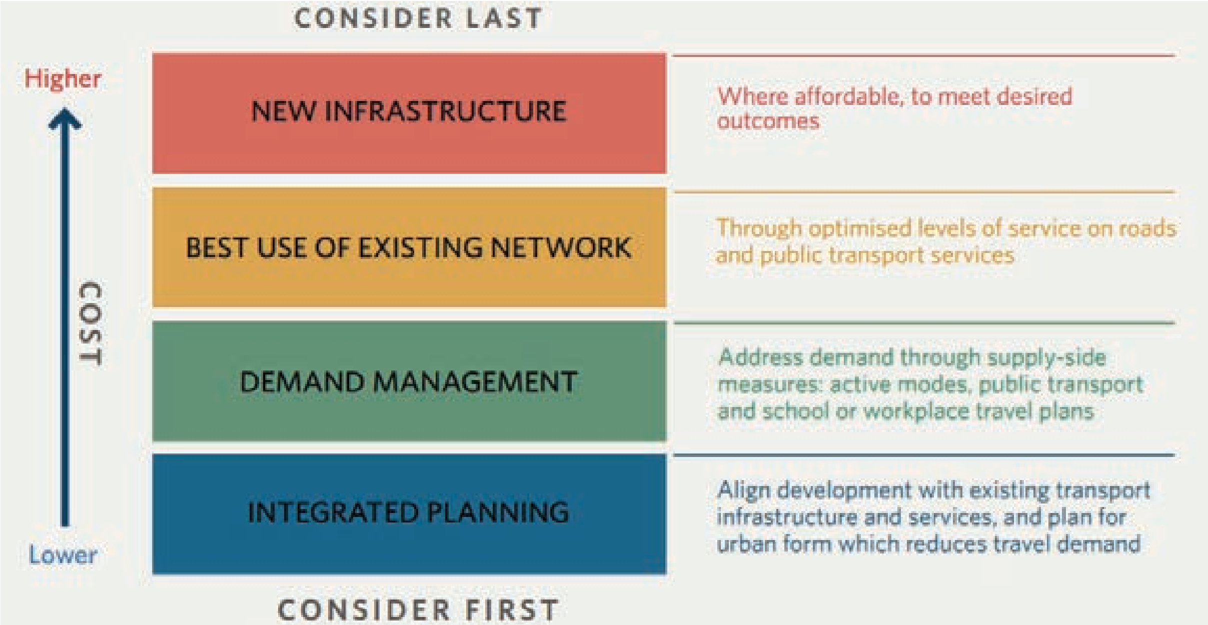

Figure 8-2: PBC Intervention Hierarchy

Following the hierarchy, integrated planning and non-infrastructure interventions such as different forms of travel demand management (TDM) were explored first and recommended at the initial options sieve stage and revisited regularly throughout the options assessment method. However, as discussed in SPBC, these interventions alone will not provide the capacity to meet growing demand and will be more effective as complements to infrastructure interventions. For the purposes of this SSBC, non-infrastructure interventions are retained as 'opportunities' to be explored in the future.

As such, the options assessment mainly focused on options for new infrastructure, in the form of rapid transit between the Airport and Botany, and highway improvements on SH20, SH20A and SH20B, as well as active mode improvements. Options for new infrastructure were generated and passed through three stages of filtering, until the preferred option was left. Throughout this iterative process, the options increased in detail, and the level of assessment also increased. For example, the initial options sieve applied a coarse filter by qualitatively assessing alternatives/options, whilst the long list and short list assessments uses Multi Criteria Analysis (MCA) and compared metrics like population and employment catchments across options.

For the **initial options sieve**, a wide range of non-infrastructure, rapid transit and state highway improvements were considered. Analysis of the Auckland NOP, requirements to achieve mode-shift and likely future public transport demands were used to inform the type and scale of intervention taken to the long and short-list assessments.

For the **long-list assessment**, options for the Rapid Transit Corridor (RTC) and state highway components were assessed separately in higher detail than the initial options sieve using MCA.

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[91] Waka Kotahi, Business Case Approach information sheet | Programme business case: intervention hierarchy, August 2017.

The **integrated short-list assessment** recognised the overlap of the RTC with the SH20, SH20A and SH20B corridors and the need for integrated investment to achieve the programme's mode-shift objectives and ensure all modes were catered for.

Once the preferred route for the RTC had been decided, the **RTC sub-options assessment** assessed other crucial elements of the RTC service which would form part of the recommended option.

In line with the strategy adopted in the SPBC, prioritising public transport and active mode infrastructure improvements over highway infrastructure improvements is important to encourage mode-shift and move people more efficiently. Without substantial mode shift from private vehicles to other forms of transport, the network will reach capacity in the near future. Due to the interdependent public transport and local road opportunity focus of the SWGP, the state highway elements will complement public transport interventions and connect to the local network. State highway infrastructure improvements are also important to allow for efficient high-value movements (particularly freight) and provide resilience in the transport system. Therefore, the assessment is multi-modal. Based on these levels of priority, elements of the RTC options assessment process come before their corresponding highway component elements. The investment in road capacity is intended to be in stages (see Section 15.6 and *Appendix E Southwest Gateway Staging Technical Note*) - lead with public transport interventions before following with state highway upgrades.

8.2 Outcomes

The outcomes for each step of the options assessment are summarised in Figure 8-3.

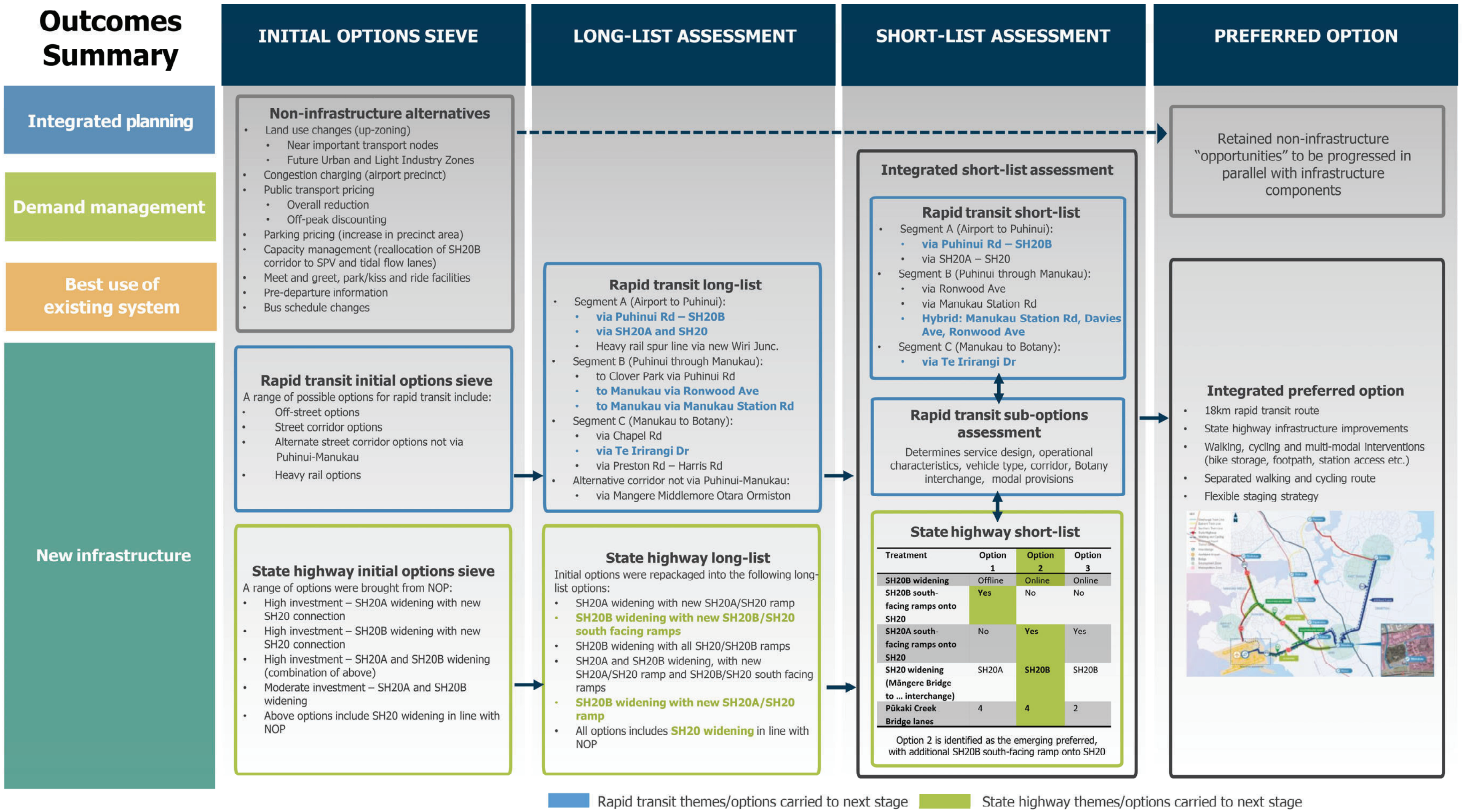

Figure 8-3: Options assessment outcomes summary

9 Non-infrastructure alternatives

Alternatives – different ways to address the problems through a range of approaches such as land-use changes or inducing behavioural change - were analysed in the earlier Airport Access Supplementary Programme Business Case (SPBC). While the SPBC concluded that some level of investment in rapid transit was essential in the A2B corridor, as well as the state highway infrastructure surrounding the Airport, the alternatives and options were revisited for this SSBC.

The alternatives and options assessment process were undertaken in accordance with AT and Waka Kotahi requirements, with the engagement of stakeholders.

9.1 Travel demand management

Travel demand management (TDM) was a key component considered as part of the SSBC with an emphasis on encouraging behaviour change and managing (motorised) demand. Provision of additional infrastructure will not solve the pressures on the transport network from traffic congestion but can provide temporary relief. TDM measures – including modal changes – will provide a way to help manage reliability of travel through efficient usage of existing transport infrastructure in a growing urbanised environment.

The *SWGP Travel Demand Management Technical Note* (Appendix H) outlines and recommends potential TDM initiatives and measures, especially those that can be implemented promptly and lead to quick-win results, but also measures that will support the development of the preferred option.

- A range of TDM initiatives were recommended, including:
- Provide and improve walking and cycling options
- Improve bus reliability and more frequent services
- Increase number of High-Occupancy Vehicle (HOV) lanes
- ‘Meet and Greet’ terminal and ‘Kiss-and-Ride’ facilities
- Ride-sharing incentives
- Improved first km-last km experience for customers
- Pre-departure information for customers
- Variable message signs (VMS) at key decision-making points
- Land use changes – up zoning
- Pricing led initiatives for parking and public transport.

These initiatives were retained as opportunities to be explored in more detail in the future.

9.2 Non-infrastructure strategic interventions

In addition to the SWGP TDM investigation summarised in Section 9.1, non-infrastructure alternatives were proposed and compared specifically for 20Connect. These were termed ‘strategic interventions’ and analysed alongside the initial infrastructure strategic interventions for 20Connect. For details on strategic interventions, refer to *Strategic Interventions Technical Note* in Appendix B-2.

Table 9-1 below summarises the base case and non-infrastructure strategic interventions for 20Connect. The infrastructure strategic interventions are discussed in Section 10.3.

Table 9-1: Base case and non-infrastructure strategic interventions summary

Base Case	
BC1 Do nothing	No new services or infrastructure beyond that which is currently committed.
BC2 Do-minimum	Currently identified parallel projects within the SWGP of works. ▪ SH20B Short Term Improvements SSBC ▪ STAAI SSBC, including Puhinui Station and Puhinui Road bus lanes ▪ Auckland Airport Transport Improvements ▪ City Centre to Māngere Rapid Transit Project.
Non-infrastructure - Integrated planning, demand management and best use of existing network	
DM1 Land use – Up-zoning	Address growth pressure through the change of land use, altering dynamics by increasing the expected 2046 Auckland Unitary Plan densities.
DM2 Land use – Down-zoning	Address growth pressure through the change of land use, altering dynamics by decreasing the expected 2046 Auckland Unitary Plan densities.
DM3 Land use – Up-zoning at transport nodes	Maximise utility infrastructure through multi-function zoning around transport nodes, altering travel dynamics and general use of the network
DM4 Pricing led – Congestion charging	Optimise use of existing assets, infrastructure and services by applying variable congestion pricing and road user charges in the Airport precinct to reduce congestion and to encourage mode shift from private vehicles to public transport.
DM5 Pricing led – Public transport	Influence behaviour change and travel mode choice and timing by reducing public transport fares to encourage greater use of public transport mode and off-peak travel. Specifically, reduce bus and rail fares for both AT Hop card users and cash fares Auckland-wide.
DM6 Pricing led – Parking	Encourage mode shift from private vehicles to public transport and/or use of park and ride facilities away from Airport terminals by increasing parking fees at all parking sites located within 500m of the Airport terminals to discourage private vehicle trips to the Airport.
DM7 Capacity management	Optimise productivity of the corridor, for example, by introducing special purpose vehicle and tidal flow lanes.

In consultation with investment partners, analysis of the strategic interventions was undertaken through a sieve process whereby each intervention was evaluated against three high level measures:

- Effectiveness
  - Achievement of ILM benefits and objectives.
- Feasibility
  - Technical, implementation and construction considerations.
  - The degree to which Auckland Transport, Waka Kotahi and partners can control the intervention.
  - Cost estimates were not developed at this stage of the analysis – cost is considered (including estimates) in the short list assessment – see Section 13.
- Risk, constraints and impacts
  - Degree of social, environmental and economic risks, constraints and impacts.

Qualitative approaches were applied to interventions and demand and capacity analysis undertaken to assess the criteria. The outcomes of the qualitative assessment of strategic interventions were as follows (further details are contained in *Strategic Interventions Technical Note* in Appendix B-2):

- Non-infrastructure interventions (DM1, DM3, DM4, DM5, DM6 and DM7) were retained as opportunities and are considered effective complements to any future preferred infrastructural option in achieving investment objectives.
- Non-infrastructure intervention DM2 was discarded following the sieve process as, as with up-zoning of land intervention, the re-zoning of land is at the discretion of the property owners and Auckland Council and therefore outside Auckland Transport and Waka Kotahi's control.

9.3 Best use of existing network

As part of the option assessment, the following key opportunities were explored in consideration of getting the best from the existing network:

- Integration with local bus network. Bus services will be optimised to reflect the provision for rapid transit, to provide better network coverage and connect to new stations.
- Potential provision of high occupancy vehicle (HOV) lanes in the preferred option (on SH20/20A/20B). Provision of these HOV lanes could provide better people throughput and help meet the SWGP objectives.
- A local road assessment was undertaken to review opportunities for local road improvements adjacent to the immediate 20Connect study area that could complement the proposed improvements and facilitate traffic and public transport access. This assessment can be found in *Local Road Assessment Technical Note* in Appendix H.

Examples of the proposed interventions at particular locations include:

  – Additional capacity on local roads
  – New grade separated links across SH20A
  – Interchange improvements
  – Provision of special vehicle lanes for public transport, freight and HOV prioritisation
  – Improved walking and cycling facilities.

These local road improvement opportunities were retained and included in later assessments as a sensitivity test in the transport modelling. The model outputs show potential valuable travel time savings for certain local road improvements within the modelled area. These could be progressed separately to the SSBC as an opportunity.

10 Initial options sieve

The assessments of TDM initiatives and non-infrastructure strategic interventions concluded that these measures alone would not be sufficient in meeting the forecast transport demand. The final consideration in the intervention hierarchy is new infrastructure. New infrastructure interventions, including rapid transit and highway components, were initially generated and sieved at a high level to form the corresponding long lists of options.

10.1 Network management and drivers

10.1.1 Network Operating Plan

The SWGP Network Operating Plan (NOP), see Appendix G-1, focuses on outcomes for the year 2048. It provides a common vision and understanding across core operational and planning stakeholders as to how the SWGP will operate once completed. Its 30-year design horizon was used to help determine the preferred option for the SWGP, ensuring that the operation of the network is considered up-front and integrated with both planning and design optioneering workstreams. The NOP principles are detailed in Section 3.2.4.

Figure 10-1 illustrates the network priorities for cyclists, public transport, HCVs and freight and general traffic, across the study area.

Figure 10-1: NOP priorities map

Although not shown on this map, pedestrians are also considered a high priority along every corridor with the exception of SH20 where the priority is lower. Notwithstanding this, pedestrians are prioritised around public transport stations (Puhinui, Manukau etc) as well as in town centres such as Mangere, Manukau and on the Airport precinct, in particular around the Auckland Airport terminal buildings.

On SH20B there is high priority given to both public transport and cycling along the full length of the corridor. The Te Irirangi Drive and Puhinui Road routes are prioritised for public transport and cycling.

The NOP is a key driver for shaping investment and optioneering, in line with the overall objectives of the SWGP. In identifying strategic interventions, non-infrastructure and infrastructure interventions were considered to align with the NOP's 2048 outcomes.

10.1.2 ATAP

The ATAP strategy, discussed in Section 2.2, refers specifically to the staged delivery of a rapid transit corridor in the Airport to Botany corridor. This business case is therefore required to assess the need for, and conditions under which, a form of rapid transit corridor would be required.

10.2 Rapid transit component initial sieve

The following sections describe the initial options sieve process for the route and alignment of a rapid transit service in the A2B corridor.

10.2.1 Achieving mode shift – required characteristics

A key purpose of the public transport element of the SWGP is to achieve mode shift as this underpins the objectives and many of the KPIs. To achieve mode shift, the service must:

- Provide competitive journey times – particularly compared to private cars (further discussed in Section 14.3.1)
- Be reliable and have a narrow range of journey time variability as well as even headways to provide consistent wait times (further discussed in Section 14.3.2)
- Be legible and easy to understand. This is key to attract new local customers as well as unfamiliar and infrequent users such as travellers. It implies having a simple service pattern
- Provide a good ride quality for comfort and customer experience
- Provide confidence and reassurance to users through information pre and during journeys
- Provide for safety and personal security of customers in journeys to stations, at stations and in transit
- Be affordable and have costs that are competitive with private vehicle usage
- Be easy to access. This can mean a wider range of things but as a minimum should cover:
  - Access to stations by a variety of modes
  - Buying tickets and fares – off-vehicle
  - Level boarding
  - All-door boarding.

Another primary purpose of the public transport element is to help achieve land-use objectives by supporting increased density in high priority locations. This requires:

- Consideration of station locations to align with land use planning and potential
- Consideration of station precincts and urban form in the detailed location, access modes and facilities provided
- Integrated planning and identification of opportunities to enhance land-use and transport outcomes.

10.2.2 Mode and operational requirements for route selection

To inform the route choice part of the assessment, an understanding of the potential modes and capacities was required. This definition was continued in greater detail based on the recommended alignment (Section 14).

Future demand for the A2B rapid transit service was estimated using the MSM model. The modelling estimated that overall, occupancies in 2048 would be in the range of 500 to 1,000 passengers per hour each way during the interpeak and in the counter peak direction, increasing to peak loads of around 2,000 passengers in the peak direction at peak times. This suggests the line could be served by a relatively simple service pattern that provides base capacity for 1,000 passengers per hour in each direction at all times, supplemented by additional capacity up to a total of 2,000 passengers per hour in the peak direction, at peak times.

The objective is to achieve an efficient operating model with good occupancies at headways commensurate with rapid transit (6 per hour or higher) but not so high that at-grade intersections create reliability issues (less than 20 per hour). Figure 10-2 is used to guide this decision making.

Demand is expected to grow over time, meaning that the fleet and operation can evolve to meet the demands. This characteristic is particularly important as a way to mitigate uncertainty.

By the 2040s, in order to maintain a reliable service of no more than 20 vehicles per hour, a large, high capacity vehicle will be required.

In Figure 10-2, the green bars indicate the “desirable” headways (3-5 minutes, or 12-20 vehicles per hour), blue headways are at a level that would result in poor reliability with an at-grade system, while yellow headways present low service levels that would result in long passenger wait times. The vertical red lines indicate forecast demands by decade. All figures are hourly.

For the purposes of corridor selection, the mode was likely to be one capable of running within the road corridor, with at-grade intersections. It is likely to be a bus-based mode, with the potential for light rail. This was used as the assumed requirements for the route selection process.

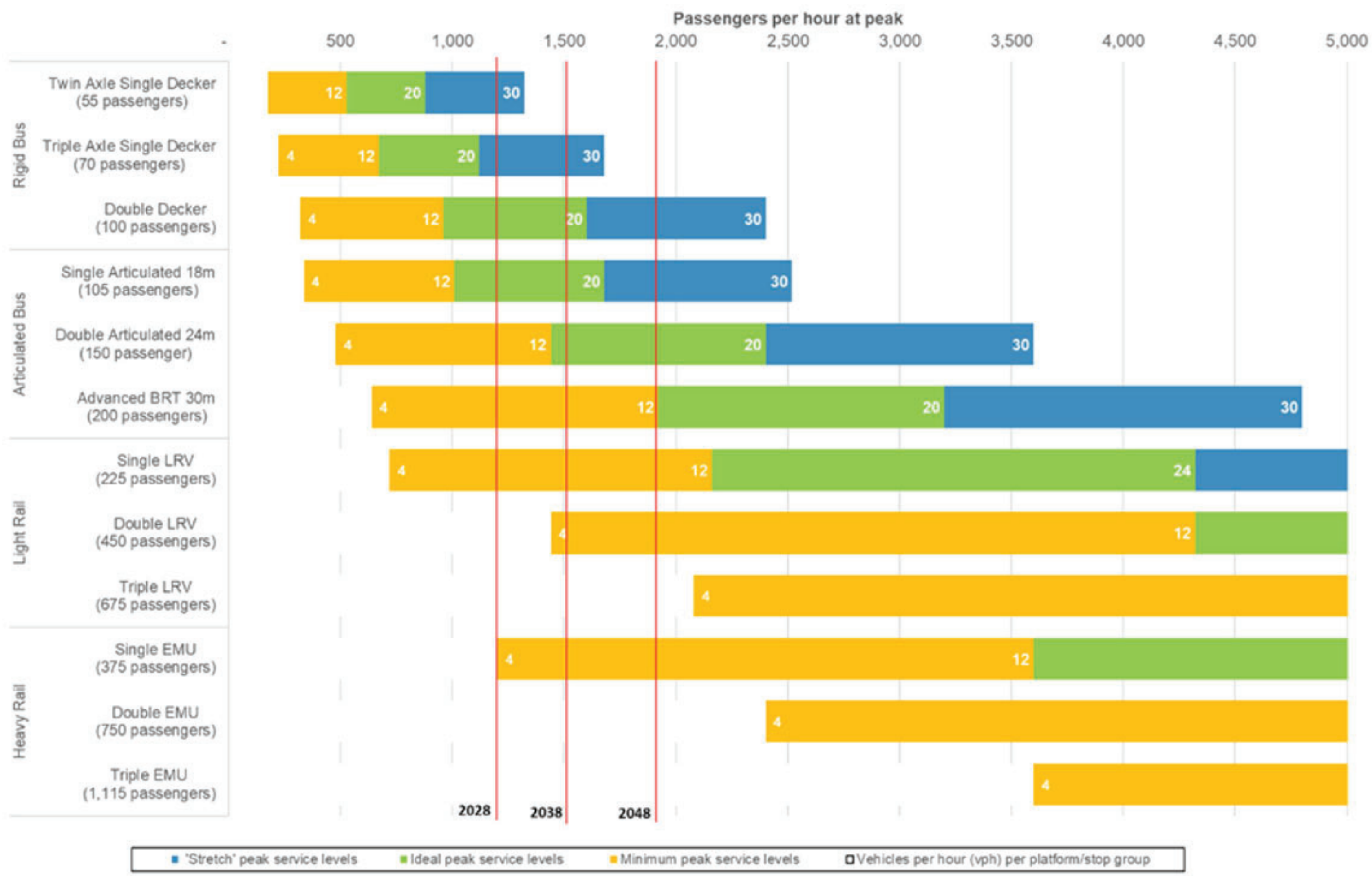

Figure 10-2: Corridor demand vs. capacity and service levels (Closed system with inline stops, 80% peak load) [92]

[92] MSM forecasts i11 land use. The numbers in the bars represent the number of vehicles per hour for each service level and vehicle type

10.2.3 Option generation and sieve

A range of possible options for the rapid transit element, likely to be BRT based on the analysis in the previous section, were generated.

- Possible geographical alignments between the Airport and Botany:
- Street corridor options (the Airport to Botany corridor was broken down into Segments A to D and options for each segment were developed)
  - Segment A: West (Airport to Puhinui/Southern Line/Manukau)
  - Segment B: Central (Puhinui through Manukau)
  - Segment C: East (Manukau to Botany)
  - Segment D: Beyond Botany
- Off-street options connecting the Airport and Botany; eg Airport to Botany Metro (fully grade separated rail line, tunnel and/or elevated).
- Alternate street corridor options not via Puhinui-Manukau

This process produced 21 initial options that were feasible for integration into the existing transport network. For a detailed list of these options, see the *Airport to Botany Initial Options and Sieving Process* Technical Note, in Appendix B-1.

These options were then assessed through a high-level sieving process to develop the long list. The sieving process used a seven-point scale (-3 to 3) with the following criteria:

- Potential to provide benefits established during ILM
- Potential to provide the required capacity (neither insufficient nor especially superfluous capacity)
- Major environmental risks
- Cost impacts and feasibility of delivery.

Professional judgement was used to progress or discard options which had fundamental flaws not captured adequately by the scoring.

Sieving of options for Segment D, *Beyond Botany*, was postponed until the short list assessment, see Section 13.1 below. For more detail and specific scoring of each initial option, refer to Appendix B-1.

Heavy rail options

Initially, five heavy rail options were considered. Four of these - Heavy Rail loop via Onehunga, Heavy Rail loop via Ōtāhuhu, Heavy Rail Airport Shuttle Line and Airport to Botany Heavy Rail Crosstown were discounted prior to the formal long list stage as described in Appendix R. They were all very high cost options, had high environmental and social costs, provided excess capacity, and/or were likely to be incompatible with the rail network operating plan.

A6 (Heavy Rail Airport Spur Line) was retained for inclusion in the long list, as the best of the Heavy Rail options. While the core technology considered was BRT, a heavy rail option was retained, despite scoring negatively on three of the four criteria, so that it could be tested more comprehensively during the long list assessment stage, given that it had exceptional stakeholder

The progressed options formed the rapid transit component long list, analysed in Section 12.1.

10.3 Highway component initial sieve

The highway component of the initial options sieve is detailed in the *Strategic Interventions* Technical Note in Appendix B-2 and summarised below.

Through a comprehensive review of the PBC recommended programme and consultation with investment and programme partners, the following infrastructure interventions were identified for assessment.

- C1 High investment – SH20A:
  - Focus investment on the SH20A corridor by widening to six lanes with a new SH20 connection to better accommodate buses, freight and special purpose vehicles.
  - Walking and cycling infrastructure to be introduced along SH20 with connections to the local network.
  - SH20B to remain as existing for general traffic.
- C2 High investment – SH20B:
  - Focus investment on the SH20B corridor by widening to four lanes with new SH20 connections to improve access to development land and the Airport from the north and south.
  - Walking and cycling infrastructure to be introduced along SH20 and SH20B with connections to the local network.
  - SH20A to remain as existing for general traffic.
- C3 High investment – SH20A and SH20B: C1 and C2 combined.
- C4 Moderate investment – SH20A and SH20B: A reduced variant of C3.

The highway interventions have primarily considered additional state highway connections and capacity (including shared use paths and priority infrastructure for other modes) to cater for the rapid transit service. The highway interventions will complement public transport and connect with local walking and cycling facilities.

Like the non-infrastructure strategic interventions discussed in Section 9.2, these infrastructure interventions were analysed in a sieve process whereby each intervention was evaluated against three high level measures:

- Effectiveness
  - Achievement of ILM benefits and objectives.
- Feasibility
  - Technical, implementation and construction considerations.
  - The degree to which Auckland Transport, Waka Kotahi and partners can control the intervention.
  - Cost estimates were not developed at this stage of the analysis – cost is considered (including estimates) in the short list assessment – see Section 0 below.
- Risk, constraints and impacts
  - Degree of social, environmental and economic risks, constraints and impacts.

Qualitative approaches were applied to interventions and demand and capacity analysis undertaken to assess the criteria.

All four infrastructure interventions (C1, C2, C3 and C4) were retained as the foundation of the long list assessment options, which is analysed in Section 12.2. They were all deemed to be feasible and align with the investment objectives by providing additional capacity along state highway corridors to meet future demand, improve journey reliability and support active modes (in alignment with the NOP, Section 3.2.4 and 10.1.1).

11 Assessment methodology

11.1 Objectives and MCA framework

The assessment framework was drawn from the problem definition outlined in the Strategic Case, Section 2. The framework connects the problems, objectives and benefits outlined in Section 4.10 to a suite of KPIs and measures against which all long list and short list options were tested.

Table 11-1: Investment objectives and KPI's

Investment Objective	KPI	
More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland, as well as the Airport area.	KPI 1.1	Population accessible to key locations
	KPI 1.2	Jobs accessible from key locations
	KPI 1.3	Access to education and social opportunities
	KPI 1.4	Access to resources and places of customary practice
	KPI 1.5	Cost of travel in South and East Auckland
Reliable, resilient and easy to use transport system in South and East Auckland that also forms a gateway to the region from Auckland Airport.	KPI 2.1	Capacity and resilience of the option to meet demand
	KPI 2.2	Directness and ease of use
	KPI 2.3	Travel times for key journeys
	KPI 2.4	Travel time reliability, including separation of road space
	KPI 2.5	Ability for high priority trips to have reliable journeys
To improve economic performance of the Airport area, Auckland and New Zealand. Transport network that enables the efficient movement of goods and people. Urban regeneration and improved built environment.	KPI 3.1	Population accessible to key destinations
	KPI 3.2	Jobs accessible from key locations
	KPI 3.3	Improved access to local, town and metropolitan centres
	KPI 3.4	Land development around stations
Reduce impact of the transport system on the environment and taonga.	KPI 4.1	Air emissions from transportation
	KPI 4.2	Water quality effects of transportation system
	KPI 4.3	Effects on places of heritage
	KPI 4.4	Māori communities and wellbeing
	KPI 4.5	Te taiao (air, land, water, taonga)
	KPI 4.6	Effects on culture and tradition
Safe and secure transport facilities in South and East Auckland.	KPI 5.1	Air emissions from transportation
	KPI 5.2	Walking accessibility to public transport stations

Investment Objective	KPI	
	KPI 5.3	Extent of local walking and cycling connections
	KPI 5.4	Amenity function of activity areas and town centres
	KPI 5.5	Safe walking and cycling conditions

The Auckland Forecasting Centre (AFC) Macro Strategic Model (MSM) was run for the options in the later stages. The model outputs formed the basis of assessment for many of the quantitative measures. The evidence-based judgement of subject matter specialists was the basis for most qualitative measures.

11.2 Multi-criteria analysis approach

Multi-criteria assessment (MCA) of the long list and short list options was undertaken in accordance with the following steps:

- Agree the MCA methodology to be used
- Confirm the options to be evaluated
- Complete preliminary scoring of options by the project team
- Detailed MCA workshop with stakeholders to agree the specific MCA evaluation criteria and scoring
- Establish the option or list of options to progress to the next stage.

The MCA process builds on the strategic interventions identified following the ILM workshop and was developed in a series of workshops with the project team and stakeholder representatives from Te Ākitai Waiohua, Waka Kotahi, Auckland Council, Auckland Transport, Auckland Airport, KiwiRail, Ngāi Tai ki Tāmaki, Ngāti Maru, Ngāti Tamaoho, Ngāti Te Ata Waiohua, Ngāti Whanaunga, Panuku Development, Supporting Growth Alliance, Te Patukirikiri, and The Southern Initiative.

The MCA for the SWGP comprised three groups of assessments, as shown in Table 11-2.

Table 11-2: SWGP MCA assessment groups

Assessment Group	Criteria	Rating Scale
Transport planning	Population accessibility, jobs accessibility, access to education and healthcare, peak travel time reliability, directness, travel time, access to 'centres', land development around stations, walking access to stations, safety.	A seven-point scale (-3 to 3, including 0) was used to assess the metrics for transport planning, which focuses on how the options affect transport users and the accessibility to key destinations and opportunities.
Planning, environmental and cultural effects	Ecology, arboriculture, stormwater, landscape, visual and urban design, social, noise and vibration, archaeology, cultural values[93], contaminated land and air quality[94].	A seven-point scale was used, each specialist assigned each option a score ranging between -3 (significantly adverse/unmitigable effect) to 3 (significant positive benefit).

[93] Te Ākitai Waiohua, Cultural Values Assessment Addendum for Southwest Gateway Programme, 2018

[94] The long list air quality assessment was a broad qualitative assessment. Refer to 20Connect - Environment Multi Criteria Analysis Scoring of Short List Options in Appendix B-1.

Engineering feasibility	Constructability, safety in design, operation and maintenance, construction disruption, property, construction cost and risk.	The rating scale for the feasibility of implementation uses a five-point scale (1 to 5) with no negative or neutral values as these would be meaningless.

11.3 Options assessment and cultural values

As programme partners, Te Ākitai Waiohua have been integral to the option development and assessment process. Through involvement in workshops and the development of a CVA, key sites, waterways and areas that are of significance to Te Ākitai Waiohua have been identified including (but not limited to):

- Pūkaki Creek
- Waokauri Creek
- Ngā Kapua Kohuora
- Papāhinau
- Mimiti Te Arero
- Tararata Creek
- Te Hopua a Rangi.

This understanding enabled options to be developed that would reduce the potential impact on sites, waterways and areas of cultural significance. For example, options were developed that avoided additional capacity requirements across Pūkaki Creek, reduced the need for widening along SH20 between SH20A and SH20B and associated potentially increased impacts on Ngā Kapua Kohuora. Other options were refined, for example lane reductions, reducing impacts by widening one side of the transport corridor in preference to the other, or shifting elements offline such as shared paths.

When assessing options, impacts on areas of cultural significance were taken into account and those options that avoided or reduced impacts were scored higher than others. The benefits of avoiding or reducing the impact on areas of cultural significance were assessed alongside other benefits.

Te Ākitai Waiohua are the owners of Pūkaki and Waokauri Creeks (which includes areas of Māori Reservation). Those areas are highly significant to Te Ākitai Waiohua. Te Ākitai Waiohua also has a longstanding involvement in the area's development, including in the Puhinui Structure Plan and as a signatory party to the significant Eastern Access Agreement (1991), which agreed that the form of the Pūkaki Creek Bridge would remain as a two-lane bridge in perpetuity. Those matters are being worked through in a respectful manner and in the spirit of partnership and collaboration between the four programme partners.

While the business case has identified a preferred option, the four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

Other Mana Whenua Treaty Partners have provided feedback on the options assessment and development process via workshops (Section 11.2) and the Southern Table Hui. Ongoing engagement will be undertaken throughout future phases of the project to continually seek input as the programme progresses.

11.4 Do-minimum

The options assessment used the *ATAP 2 Update* scenarios as the do-minimum for the network assumptions. Major projects included in ATAP are:

Committed Projects

- City Rail Link
- Puhoi-Warkworth motorway
- Additional electric trains
- Manukau-Papakura motorway widening
- Northern corridor improvements and Northern busway extension to Albany.

New Projects

- Light rail (City-Airport and Northwest corridor), initial investment to leverage further funding
- Eastern Busway (Panmure-Botany)
- Lower cost East West Link
- Pukekohe electrification, third main Westfield-Wiri and further new electric trains
- Papakura-Drury motorway widening
- Mill Road (first phase)
- Penlink toll road and Albany-Silverdale bus improvements
- Significant safety programme
- Enhanced walking and cycling, bus priority and network optimisation programmes
- New infrastructure to enable greenfield growth

Some additional variations were made to the public transport network, reflecting the recommended network changes in the early deliverables programme of the SWGP. These are:

- Bus/transit (T3) lanes between the Airport and Manukau, on SH20B, Puhinui Road, Lambie Drive and Manukau Station Road to Manukau Station
- A frequent service operating with a 10-minute headway between the Airport and Manukau (replacing the Airport to Manukau segment of the existing route 380) via the bus lanes noted above
- Some changes to the surrounding public transport network:
  - An additional *Frequent Service* bus route between Onehunga, Māngere and the Airport replacing the Onehunga to Airport segment of the existing route 380
  - An additional *Connector Service* bus route between New Lynn and the Airport
  - An additional *Frequent Service* bus route between Onehunga, Māngere, Papatoetoe and Manukau (replacing part of the former route 380)
  - Increased frequencies and small route adjustments to some Māngere area bus routes
- A new bus/train interchange at Puhinui Station
- An upgraded road network within the Airport precinct.

12 Long list assessment

12.1 Rapid transit component long list

12.1.1 Rapid transit long list options

The long list options were a combination of mode and segment, as shown in Figure 12-1.

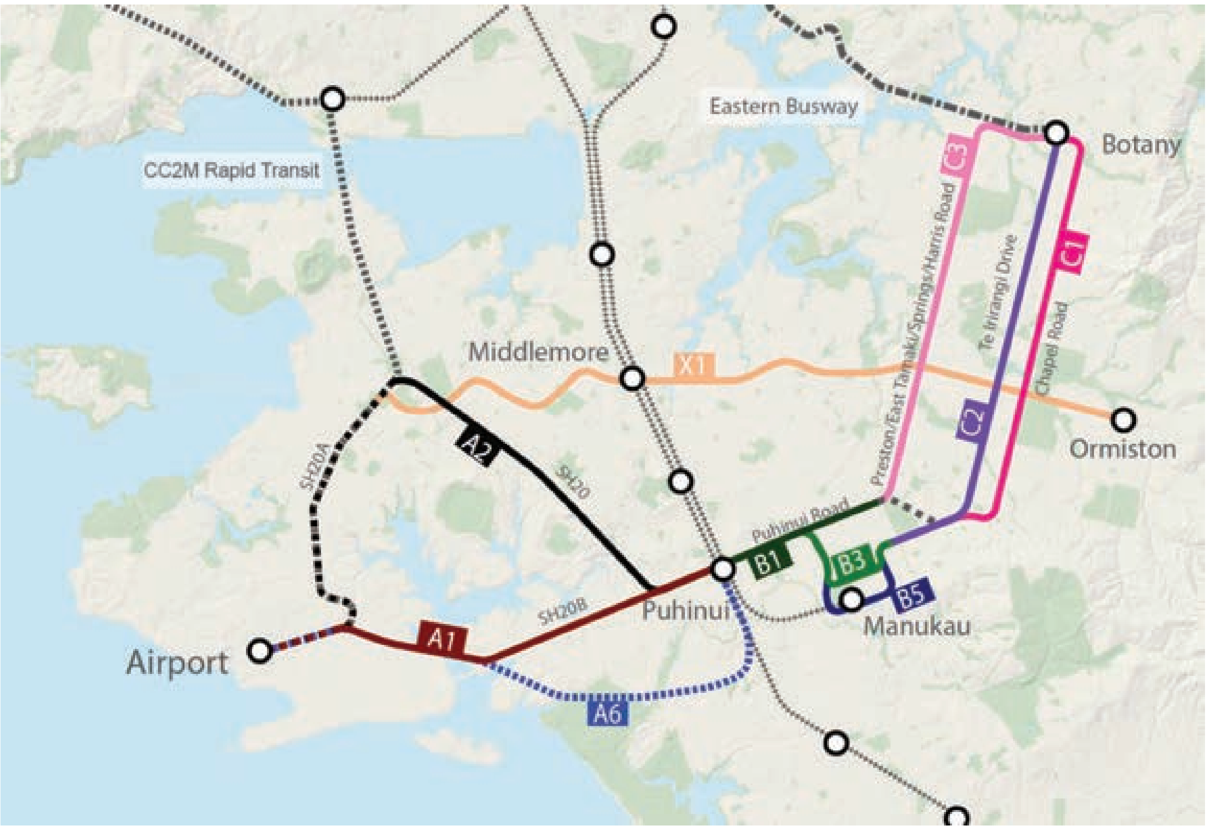

Figure 12-1: Long-list options alignment

Each option in the long list allows for BRT (which could ultimately be LRT) except for Option A6, Heavy Rail. The options are described below along with a short explanation as to why the option was included:

Segment A – Airport to Puhinui

- A1 Airport to Puhinui via Puhinui Road-SH20B
  - The most direct and fastest route to Puhinui from the Airport. Moderate cost. Potential impacts on a number of culturally significant sites in the Puhinui Precinct, including Pūkaki Creek.
- A2 Airport to Puhinui via SH20A and SH20
  - Avoids the significant cultural and environmental areas in the vicinity of the Puhinui Precinct and Pūkaki Creek, but potentially impacts Ngā Kapua Kohuora (Crater Hill). Is able to connect with important interchanges at Māngere.
- A6 Heavy Rail Airport Spur Line

- Of the heavy rail options, this option had the lowest cost and was most aligned with the A2B project objectives, although it does not go to Botany. This option was also the most feasibly constructible heavy rail option.
- Although it performed poorly during the initial sieve compared to BRT options, one heavy rail option was included in the long list because it had strong stakeholder support, and it should be comprehensively investigated. However, it is noted that it would potentially have impacts on significant cultural and environmental areas in the vicinity of the Puhinui Precinct, depending on the alignment.

Segment B – Puhinui to Manukau

- B1 Puhinui to Clover Park via Puhinui Road
  - Misses Manukau metropolitan centre and Manukau Station
  - Prioritises speed and directness between Botany and the Airport.
- B3 Puhinui to Manukau via Ronwood Ave
  - Alignment travels through core of Manukau's metropolitan centre, while maintaining a relatively direct route.
- B5 Puhinui to Manukau via Manukau Station Road
  - Provides best connection to Manukau bus and rail stations for interchange

Segment C – Manukau to Botany

- C1 Manukau to Botany via Chapel Road
  - Prioritises routing through residential area, and closest route to Ormiston Town Centre.
- C2 Manukau to Botany via Te Irirangi Drive
  - Makes use of the existing public transport reservation thus reducing the level of property conflict. Most direct route when paired with either B3 or B5. Passes through Botany Junction and central Botany.
- C3 Manukau to Botany via Preston Road-Harris Road
  - Has lower interaction with residential areas and high interaction with East Tāmaki's industrial zones.

Alternative Option (X)

- X1 Airport to Ormiston via Māngere, Middlemore, Otara, Ormiston Road.
  - Provides access to Middlemore Hospital. Ōtara (including MIT Ōtara), and Ormiston Town Centre.

Heavy rail, option A6, was kept in the long list to ensure this option was further assessed as it had at one time been included in adopted plans such as the 2012 Auckland Plan[95] and retained significant stakeholder support. Refer to Appendix T *Heavy Rail Option Summary* for further detail.

The long list and short list were assessed assuming the mode could be either LRT or BRT.

12.1.2 Rapid transit long list assessment

This section describes the process followed to apply MCA to the long list options.

The assessment of the rapid transit long list was completed in parallel to the assessment of the highway elements. For the long list MCA, the assessment criteria were aligned, not the elements themselves. At the short list stage (see Section 13.2), the options were integrated.

The MCA is a significant document. The long list MCA is included in Appendix B-1 A2B Long List Assessment.

Assessment summary

Segment A – Airport to Puhinui

- **A1 Airport to Puhinui via Puhinui Road and SH20B – Option A1** was considered to have straightforward engineering (standard widening, single interchange, lesser utilities interfaces etc), and a greater benefit to travel times and population accessibility compared with the other two options. Option A1 has potential impacts on sites, waterways and areas of cultural significance in the Puhinui Precinct along SH20B.
- **A2 Airport to Puhinui via SH20A and SH20** was considered to have a more complex set of engineering requirements (owing to highway interchanges, traverse of a jet fuel line, potential need to widen existing local road bridges etc) than option A1 but provided strong opportunities for growth and intensification within Māngere Town Centre due to large areas of land with significant redevelopment potential being available. Option A2 avoids the culturally significant sites, waterways and areas in the Puhinui Precinct along SH20B and Pūkaki Creek, but has potential impacts on Ngā Kapua Kohuora (Crater Hill) near SH20.

Both options A1 and A2 were progressed to the short list.

- **Option A6 (Heavy Rail Airport Spur Line) -** Despite the advantage of being able to be constructed offline, the spur line routing through commercial and business land and the requirement for tunnelling meant that pursuing the heavy rail option would lead to significant impacts on businesses and much higher construction costs compared to BRT or LRT options, A1 (via SH20B) and A2 (via SH20A).
  - Additionally, the option was assessed to have poor environmental effects (particularly contaminated land encountered at McLaughlins Road Landfill) and provided little-to-no difference in benefit against the investment objectives compared to A1 and A2.
  - It is noted that it would potentially have impacts on culturally significant sites, waterways and areas in the vicinity of the Puhinui Precinct, depending on the alignment.

Option A6 (heavy rail) was therefore discounted at this stage, and not taken through to the short list.

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[95] The Auckland Plan the World's Most Liveable City, Auckland Council, 2012, Chapter 13

Segment B Puhinui to Manukau

- **B1 Puhinui to Clover Park via Puhinui Road** – Option B1 proposed bypassing Manukau metropolitan centre and therefore improved travel time, but generally worsened performance against the other principal objectives for the transport planning criteria (particularly a reduction in comparative population and job accessibility). This option performed similarly or worse than the other segment B options against all metrics in the planning and environment and engineering feasibility assessments (no major distinction). Given the strategic importance of accessibility and behaviour change objectives of this project, option B1 was not progressed to the short list.
- **B3 Puhinui to Manukau via Ronwood, B5 Puhinui to Manukau via Manukau Station** – As options B3 and B5 scored similarly across all criteria, and both scored higher than option B1, both were progressed to the short list assessment.

Segment C Manukau to Botany

- **C1 Chapel Road, C3 Preston/Harris Road** – Options C1 and C3 scored lower than option C2 in the MCA due to having less interaction with neighbourhood and local centres while creating greater construction disruption to local residents and businesses.
- **C2 Te Irirangi Drive** – Option C2 along Te Irirangi Drive presented significantly lower construction costs, land acquisition costs and anticipated construction delay due to the presence of the wide median future-proofed for a rapid transit line within the northern section. Additionally, the option scored highly with regards to its interaction with neighbourhood and local centres.

Option C2 (Te Irirangi Drive) was considered the strongest option and was the only option for segment 3 progressed to the short list.

Alternative Option (X)

- **X1 Airport to Ormiston via Māngere, Middlemore, Otara, Ormiston Road** was removed as an option because it generally performed poorly in all assessment groups.
    - While it did not deliver against the A2B project objectives, this corridor provides some benefits that other options are unable to achieve (such as significant population catchment for tertiary institutes along the X1 route, single seat journey for different routes, good walking access to Kāinga Ora land etc). Therefore, this option may be worthwhile as a frequent service bus route or other transit line.

For further detail on reasoning and analysis for each criterion, refer to Appendix B-1 *A2B Long List Assessment*.

The five short-listed sub-options described above were combined to produce the final four short list route options as shown in Figure 12-2.

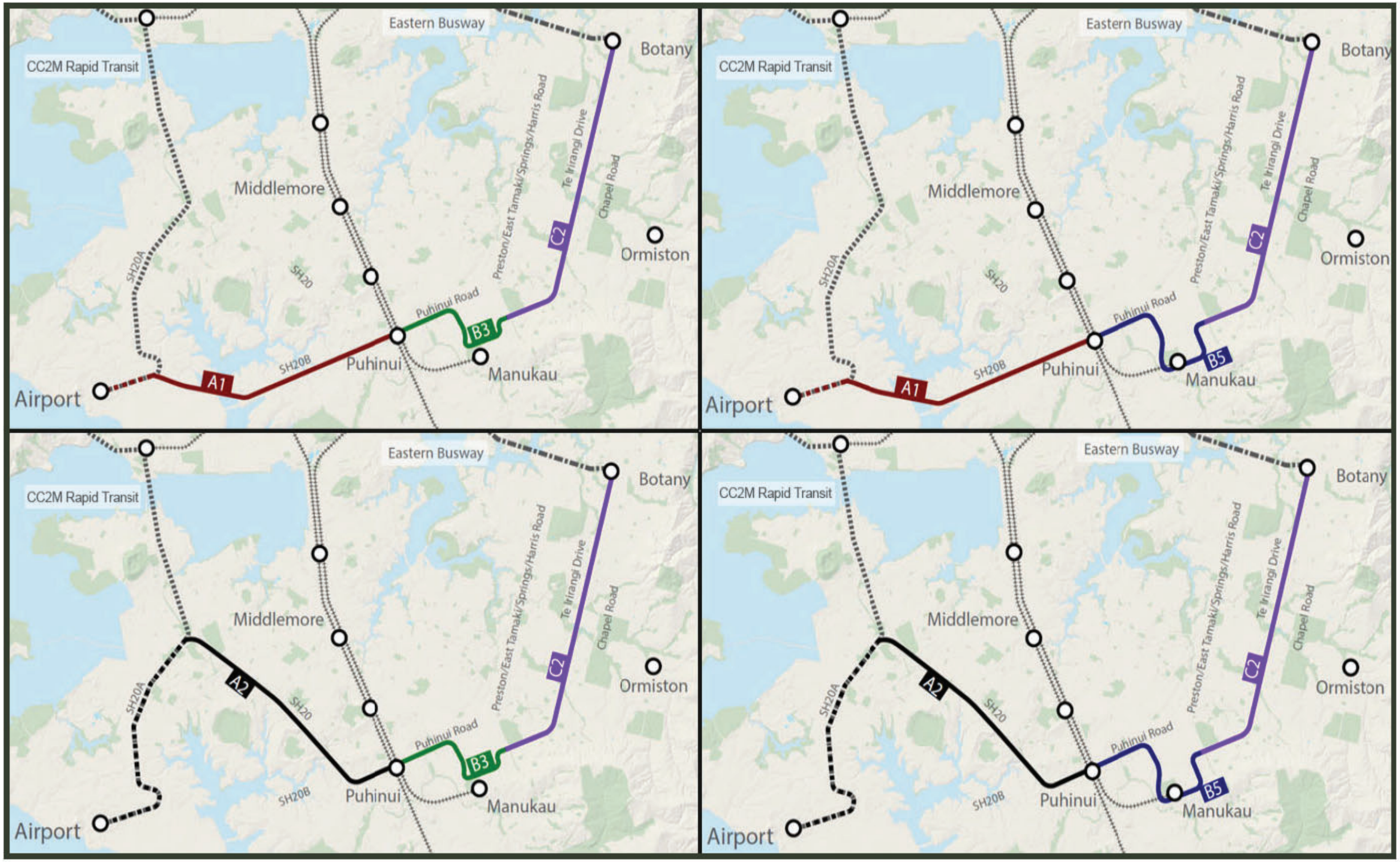


Figure 12-2: Rapid transit long list options carried through to the short list assessment

12.2 Highway component long list

12.2.1 Highway long list options

The infrastructure interventions from Section 10.3 were repackaged into five long list options to add or improve highway infrastructure. These are listed below.

These options represent varied treatments along the corridors, both in isolation (Options NI1, NI2A and NI2B) and combined (Options NI3 and NI4). As there are two corridors - SH20A and SH20B - there are opportunities for route choice between them. It was therefore recognised that an assessment down to individual ramp provision was necessary as the ramps provide the inter-highway connections.

- Option NI1: Widen SH20A and add southbound ramp
- Option NI1B: Option NI1 but with access to the Airport precinct

via SH20B converted to rapid transit only.

- Option NI2A: Widen SH20B and add south facing ramps only
- Option NI2B: Widen SH20B and add all ramps
- Option NI3: Combine NI1 and NI2B
- Option NI4: NI3 without SH20/20B ramps or SH20A widening

Corridor specific options

Combined corridor options

Note that Option NI1B was the worst performing of all options in the SATURN modelling assessment (including do min for some measures), so was not carried forward as a long list option. The removal of private vehicle access to the Airport via SH20B resulted in significantly lower overall network travel speeds, higher overall network travel times, and higher overall network vehicle emission costs were predicted across all peak periods against all other options (including the do-min for the latter two measures) using the Option NI1B model.

Refer to 20Connect Transport Planning Longlist Assessment in Appendix B-2 for details.

Common elements

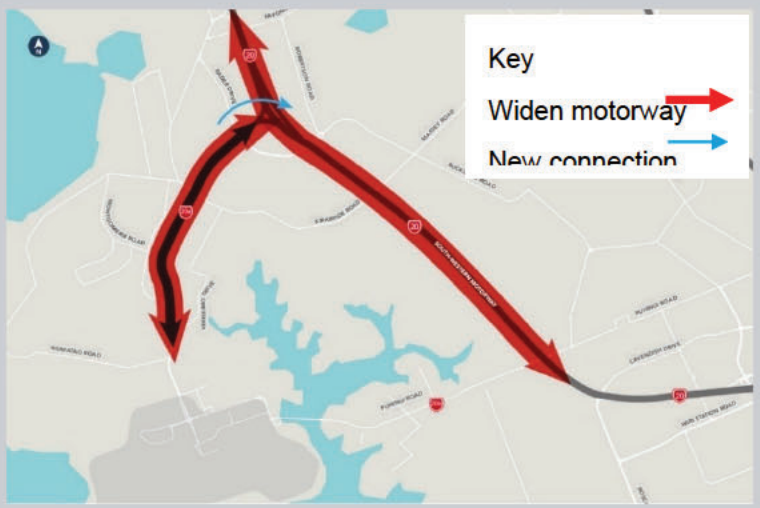
In line with the SWGP operating principles and the NOP (Section 3.2.4), all long list options include:

- Widening of SH20 north of SH20A to eight lanes and between SH20A and SH20B to six lanes, to enhance network efficiency, support the function of the WRR and deliver outcomes as defined by the ANOP and GPS.
  - In addition, widening of SH20 is further supported by additional traffic demand on SH20 due to the potential introduction of the SH20A to SH20 ramp and the predicted future traffic volumes, congestion, and travel time along SH20.
  - Appendix N2 - 20Connect Design Philosophy Statement (Appendix A - *Transport Modelling Report* and Appendix C - *SH20 Widening Assessment (SH20A to Puhinui Road) Technical Note*), provides further detail on SH20 widening assessment.
  - Widening SH20 has the potential to impact on sites, areas and waterways of high cultural value to Mana Whenua, including Ngā Kapua Kohuora (Crater Hill), Waokauri Creek, and Tararata Creek. It is noted that options that exclude SH20 widening between SH20A and SH20B are further explored in the shortlist (Section 13.1.2) to ensure a robust assessment. The sites and areas of cultural significance identified do not form an exhaustive list and ongoing engagement with programme partner Te Ākitai Waiohua and Mana Whenua will be undertaken throughout future phases of the programme.
- Long-term walking and cycling facilities in the Māngere East area adjacent to SH20 between the

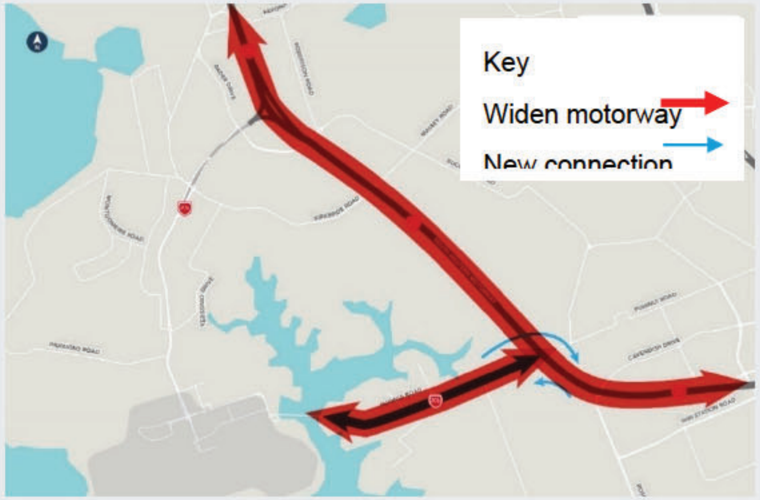
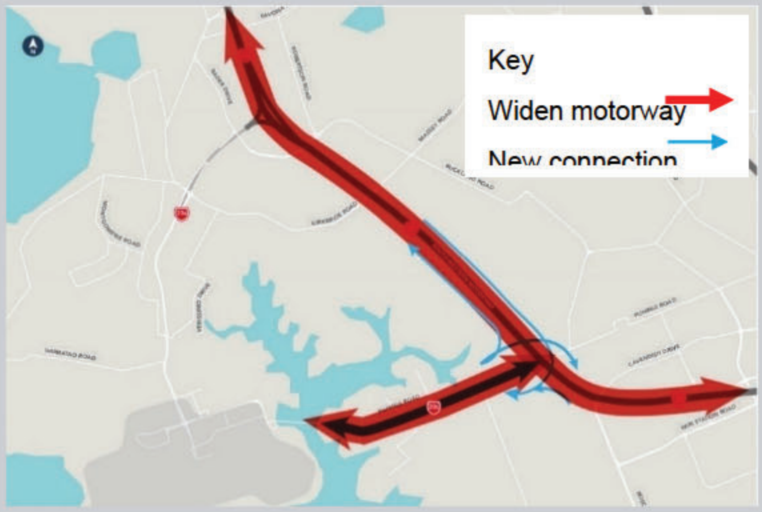
Māngere Harbour Crossing and the Puhinui Road / SH20B interchange, to provide a viable transport mode for local and medium distance trips for users of all ages and abilities. These facilities will also improve safety for all users on the transport system and support the amenity function around key activity centres.

Treatments and key outcomes

Table 12-1: Long list options descriptions

Option Name	Treatments	Key Outcomes[96]	Map
Option NI1	SH20A ■ Widen SH20A to 6 lanes ■ New SH20A/SH20 interchange ramp connection SH20 ■ Widening of SH20 north of SH20A ■ Widening of SH20 between SH20A and SH20B	■ New SH20A/SH20 south facing ramp connection provides better network resilience and removes strategic trips from local roads and SH20B, reducing rat running through the Airport ■ Increased capacity along SH20A, particularly for those coming to and from the central, west and north of Auckland ■ Increased capacity along SH20, enhancing network efficiency and supporting the function of the WRR ■ Improved journey times (particularly for buses and freight) along SH20A and SH20 ■ Safe active mode facilities to increase travel mode choices for commuters ■ Avoids impacts on sites and areas of cultural significance in the Puhinui Precinct along SH20B, including Pūkaki Creek, Papāhinau, Mimiti Te Arero and Waokauri Creek. However potentially impacts Ngā Kapua Kohuora (Crater Hill) and Tararata Creek.	

96 Refer Section 3.2 for the existing transport (including public transport) context.

Option Name	Treatments	Key Outcomes[96]	Map
Option NI2A	SH20B ▪ 4 lanes - offline grade separated ▪ New SH20B/SH20 interchange ramp connections - south facing SH20 ▪ Widening of SH20 north of SH20A ▪ Widening of SH20 between SH20A and SH20B ▪ Widening of SH20 south of SH20B	▪ New SH20/20B ramps improve access to the Airport and its surrounding land to and from the south ▪ Increased capacity on SH20B to cater to future demand, particularly to and from the east and south of Auckland ▪ Increased capacity along SH20, enhancing network efficiency and supporting the function of the WRR ▪ Improved journey times along SH20B and SH20 ▪ Safe active mode facilities to increase travel choices for commuters. ▪ This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	
Option NI2B	SH20B ▪ 4 lanes - offline grade separated ▪ New SH20B/SH20 interchange ramp connections – all ramps SH20 ▪ Widening of SH20 north of SH20A ▪ Widening of SH20 between SH20A and SH20B ▪ Widening of SH20 south of SH20B	▪ New SH20/20B ramps improve access to the Airport and its surrounding land to and from the north and south ▪ Increased capacity on SH20B to cater to future demand, particularly to and from the east and south of Auckland ▪ Increased capacity along SH20, enhancing network efficiency and supporting the function of the WRR ▪ Improved journey times along SH20B and SH20 ▪ Safe active mode facilities to increase travel choices for commuters. ▪ This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	

Option Name	Treatments	Key Outcomes[96]	Map
Option NI3	SH20A ▪ Widen SH20A to 6 lanes ▪ New SH20A/SH20 interchange ramp connection SH20B ▪ 4 lanes - offline grade separated ▪ New SH20B/SH20 interchange ramp connections – south facing SH20 ▪ Widening of SH20 north of SH20A ▪ Widening of SH20 between SH20A and SH20B ▪ Widening of SH20 south of SH20B	▪ New SH20/20B ramps improve access to the Airport and its surrounding land to and from the south ▪ New SH20A/SH20 south facing ramp connection provides better network resilience and removes strategic trips from local roads and SH20B, reducing rat running through the Airport and conflicts with active modes ▪ Increased capacity on all three corridors, enhancing network efficiency and supporting the function of the WRR ▪ Improved journey times along SH20A, SH20B and SH20 ▪ Lower average travel time variability (SH20, SH20A and SH20B) ▪ Safe active mode facilities to increase travel choices for commuters ▪ This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	

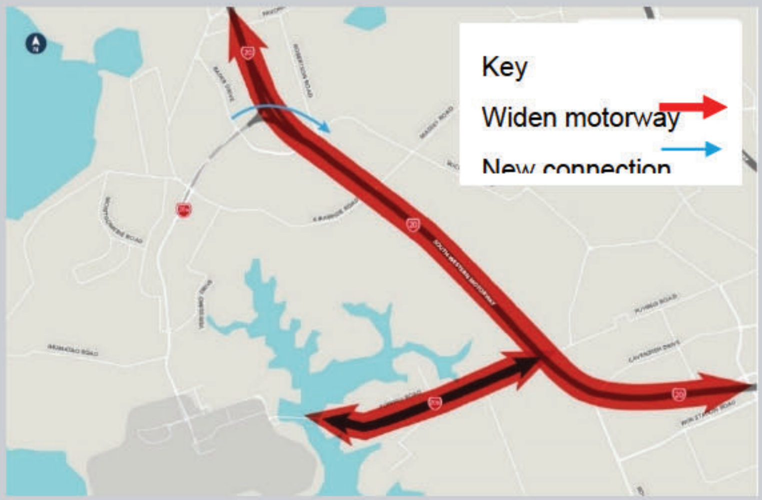
Option Name	Treatments	Key Outcomes[96]	Map
Option NI4	SH20A ■ New SH20A/SH20 interchange ramp connection SH20B ■ Refinement of short-term 4 lanes upgrade - online at-grade SH20 ■ Widening of SH20 north of SH20A ■ Widening of SH20 between SH20A and SH20B ■ Widening of SH20 south of SH20B	■ New SH20A/SH20 south facing ramp connection provides better network resilience and removes strategic trips from local roads and SH20B, reducing rat running through the Airport and conflicts with active modes ■ Increased capacity on SH20B to cater to future demand, particularly to and from the east and south of Auckland ■ Increased capacity along SH20, enhancing network efficiency and supporting the function of the WRR ■ Improved journey times along SH20B and SH20 ■ Safe active mode facilities to increase travel choices for commuters ■ This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	

Table 12-2 summarises the infrastructure treatments for each long list option.

Table 12-2: Long list options treatment summary

Corridor	Treatment	Option NI1	Option NI2A	Option NI2B	Option NI3	Option NI4
SH20A	Widen to 6 lanes	✓	✗	✗	✓	✗
	SH20A/SH20 interchange ramp connection	✓	✗	✗	✓	✓
SH20B	4 lanes – offline grade separated	✗	✓	✓	✓	✗
	4 lanes – online at-grade	✗	✗	✗	✗	✓
	SH20B/SH20 interchange ramp connection – south facing	✗	✓	✗	✓	✗
	SH20B/SH20 interchange ramp connections – all ramps	✗	✗	✓	✗	✗
SH20	Widening of SH20 north of SH20A (to Māngere Bridge)	✓	✓	✓	✓	✓
	Widening of SH20 between SH20A and SH20B	✓	✓	✓	✓	✓
	Widening of SH20 south of SH20B (to Lambie Drive)	✗	✓	✓	✓	✓

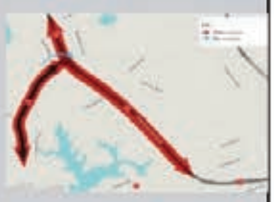
12.2.2 Highway long list assessment

Section 6.1 of the Supplementary Information details the MCA scoring for each of the long-list options. Further detail regarding evaluation criteria measures and methodology for each discipline is included in Appendix B-2.

The MCA and long list workshop found that Option NI2A (SH20B high investment with south facing ramps) and Option NI4 (SH20A and SH20B moderate investment) were the best performing options to take forward to the short list stage, as described in

Table 12-3. Options in bold were progressed to the Short List, whilst options in red were discarded.

Table 12-3: Highway long list assessment summary (refer to the Supplementary Information for related scores)

Long List Option	Comment	Visual Reference[97]
Option NI2A - Widen SH20B and add southbound ramp	Option NI2A provides an increase in capacity on SH20B to cater to growing demand and improve access to southern development areas. The new ramp connections at the SH20/20B interchange improve connectivity and accessibility between the two state highways and help to improve travel times. Accordingly, NI2A was taken forward. This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	
Option NI4 – NI3 without SH20/20B ramps or SH20A widening	Option NI4 also provides an increase in capacity on SH20B to cater to growing demand and improve access to southern development areas. The new SH20A to SH20 southbound ramp connection improves connectivity and accessibility and reduces the prevalence of rat running on local roads and subsequent conflicts with active modes. Accordingly, NI4 was taken forward. This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	
Option NI3 – Combine NI1 and NI2B	Despite having the highest transport planning scores, Option NI3 has been discarded, mainly due to poor engineering feasibility. This is largely due to the very large amount of infrastructure required and the level of long-term disruption to local roads and neighbouring facilities during the construction phase. Widening of the SH20A corridor was deemed excessive and would result in significant commercial property impact and much higher cost. This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	
Option NI2B – Widen SH20B and add all ramps	Option NI2B included north facing ramps at the SH20B/SH20 interchange which was assessed to have substantial impact on the Memorial Gardens Cemetery with relatively low benefits, so it has also been discarded from further assessment. This option has the potential to impact sites and areas of cultural value or significance at Pūkaki Creek and along SH20B.	
Option NI1 – Widen SH20A and add southbound ramp	Option NI1 does not include widening on SH20B, avoiding impacts on sites and areas of cultural significance in the Puhinui Peninsula along SH20B. However, this option has relatively low benefits and does little to improve access to the growing southern development areas. There are also significant commercial property impacts and associated costs related to widening the SH20A corridor. As a result, this option has been discarded.	

[97] For pictorial purposes only. Refer to Table 12-1 for larger versions of these images.

Following stakeholder feedback gathered through the long list assessment and further understanding of the cultural sensitivities associated with the Puhinui Precinct, Pūkaki Creek and Ngā Kapua Kohuora (Crater Hill), a refinement of options taken through to the short list was made. Specifically,

- The additional traffic lanes on SH20 between SH20A and SH20B were removed from Option NI2A in order to minimise impacts on Ngā Kapua Kohuora (Crater Hill). This option is labelled HS1 in the short-list assessment.
- A variant of Option NI4 was added that does not include additional general traffic capacity across Pūkaki Creek. This option is labelled HS3 in the short-list assessment.

13 Short list assessment

The assessment of the highway elements short list was integrated with the assessment of the rapid transit route. This section describes the options that were assessed, how the assessment was conducted, how scoring was applied, and how the short list MCA led to the preferred option.

13.1 Short list options

13.1.1 Rapid transit short list options

The final short list rapid transit alignment options are shown in Figure 13-1.

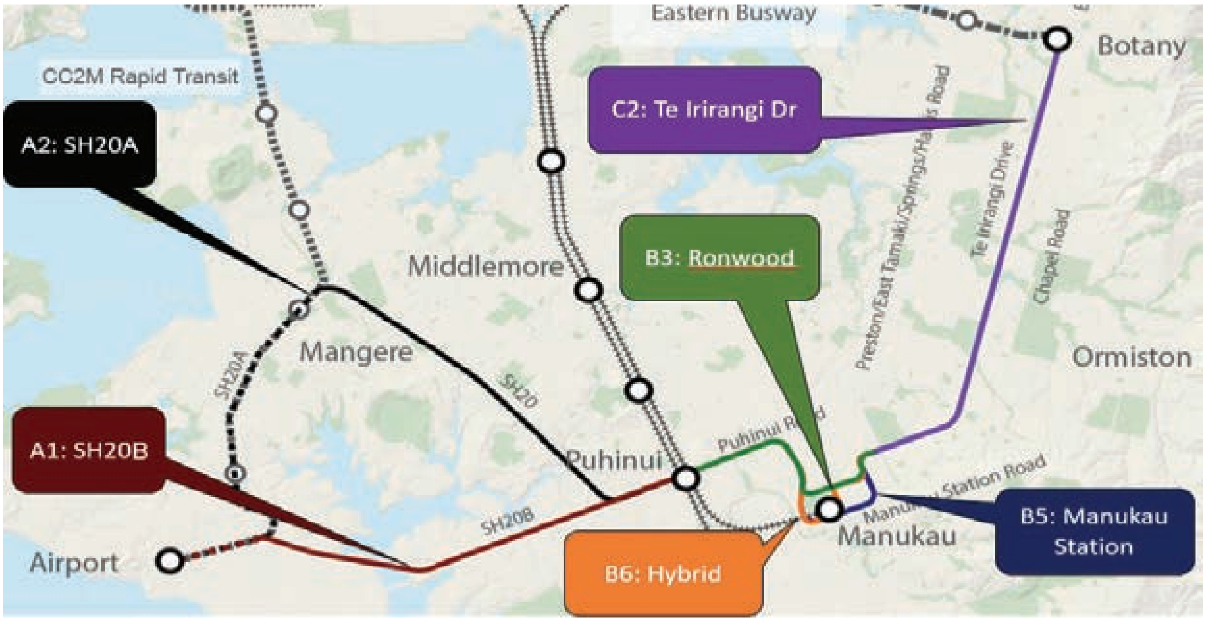


Figure 13-1: Rapid transit short list options summary alignments, including a ‘hybrid option’ in orange for the ‘B’ Segment.

The Segment A options depicted above (A1 and A2) were assessed in parallel with the highway short list options, as variants (as described in Section 13.1.2 below), whilst the Segment B options were assessed in isolation. The Segment C preferred option was confirmed at the long list stage.

Option B6 was added as a hybrid of options B3 and B5 after public consultation, to understand if combining elements of these options (connecting with the bus and train stations, town centre and shopping centre, and avoiding the Great South Road – Manukau Station Road intersection) could achieve a greater benefit than either provided separately[98].

13.1.2 Highway short list options

The highway focused short list comprised three options, each with a different set of investments in the SH20, SH20A and SH20B corridors. The highway short list options, and their attributes are as shown in Table 13-1. Each highway short list option has two variants – A1 for the SH20B rapid transit route and A2 for the SH20A rapid transit route.

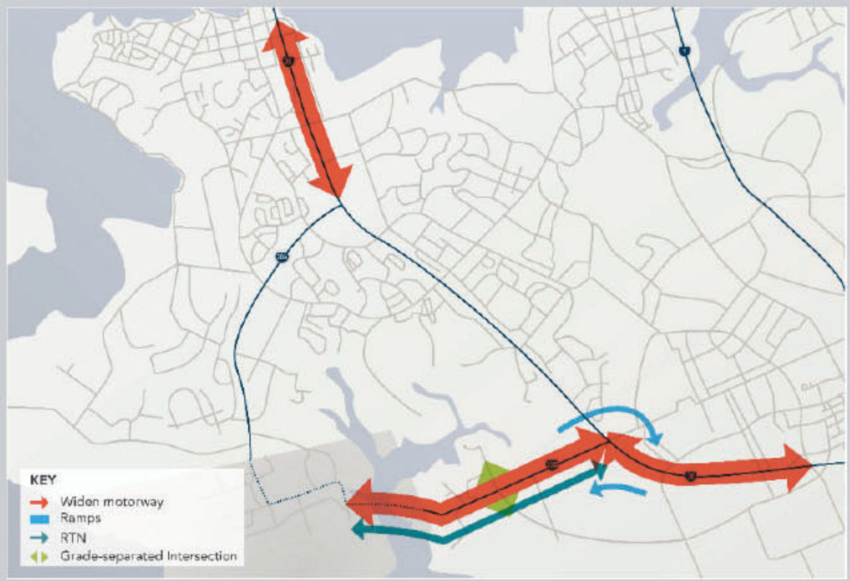
[98] See Appendix B -1 A2B Long List and Short List Recommendation

Table 13-1: Highway short list option components

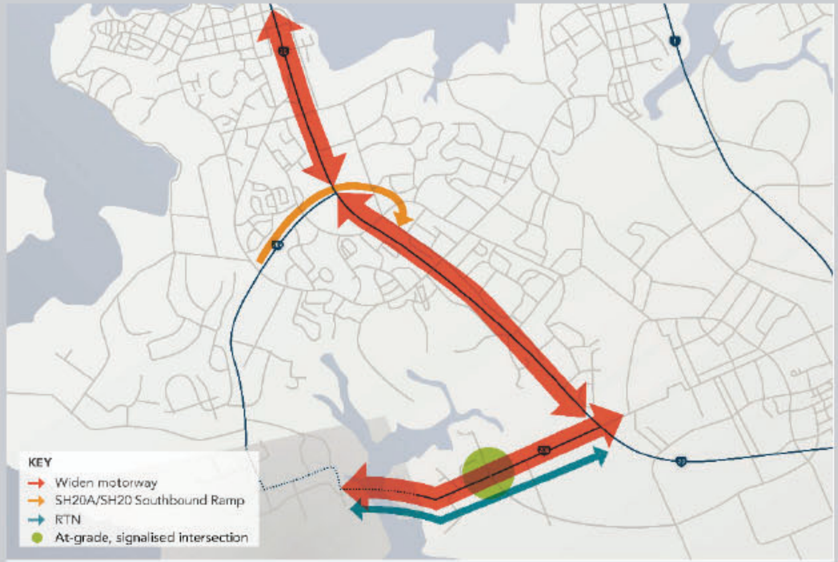
Components	Option HS1	Option HS2	Option HS3
SH20B widening	Offline	Online	Online
SH20B south-facing ramps onto SH20	Yes	No	No
SH20A south-facing ramps onto SH20	No	Yes	Yes
SH20 widening (Māngere Bridge to … interchange)	SH20A	SH20B	SH20B
Pūkaki Creek Bridge lanes	4	4	2

Table 13-2 details the treatments and key outcomes of each of the highway short list options, and its variants.

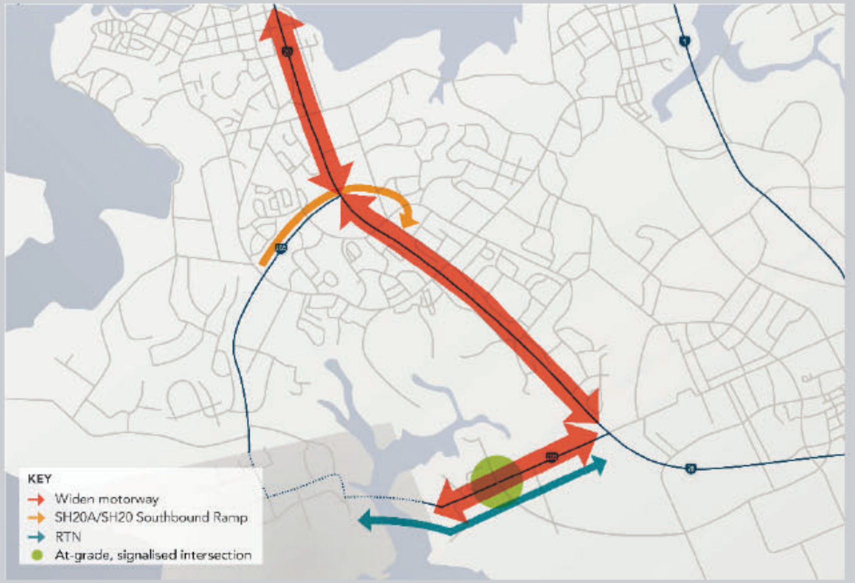
Table 13-2: Highway short list options

Option	Treatments	Key Outcomes	Map
Option HS1- A1	SH20B ■ Upgraded to a 4-lane grade-separated corridor ■ 4-lane widening extended over Pūkaki Creek ■ SH20B/SH20 interchange ramp connections - south facing ■ Rapid transit corridor (A1) SH20 ■ Widening of SH20 north of SH20A (to Māngere Bridge) ■ Widening of SH20 south of SH20B (to Lambie Drive)	■ SH20B offline grade separated will reduce vehicle conflicts and improve safety for users, as well as improving travel times and reliability. ■ New SH20B/SH20 interchange ramp connections (south facing) which: – increases capacity and thus improves accessibility to and from the south – reduces rat running on local roads. ■ Widening of SH20 south of SH20B will support the SH20B/SH20 connection, improving access between the Airport and southern development areas. ■ This option potentially impacts sites and areas of high cultural value to Mana Whenua in the Puhinui Precinct, including Pūkaki Creek.	

Option	Treatments	Key Outcomes	Map
Option HS1-A2	SH20A ■ Rapid transit corridor SH20B ■ Upgraded to a 4-lane grade-separated corridor ■ 4-lane widening extended over Pūkaki Creek ■ SH20B/SH20 interchange ramp connections - south facing SH20 ■ Widening of SH20 north of SH20A (to Māngere Bridge) ■ Widening of SH20 south of SH20B (to Lambie Drive) ■ Rapid transit corridor.	■ SH20B offline grade separated will reduce vehicle conflicts and improve safety for users, as well as improving travel times and reliability. ■ New SH20B/SH20 interchange ramp connections (south facing) which: – increases capacity and thus improves accessibility to and from the south – reduces rat running on local roads. ■ Widening of SH20 south of SH20B will support the SH20B/SH20 connection, improving access between the Airport and southern development areas. ■ This option potentially impacts sites and areas of high cultural value to Mana Whenua in the Puhinui Precinct, including Pūkaki Creek.	

Option	Treatments	Key Outcomes	Map
Option HS2-A1	SH20A ■ SH20A/SH20 interchange ramp connection SH20B ■ Upgraded to a 4-lane corridor with an at-grade intersection at Campana Road ■ 4-lane widening extended to over Pūkaki Creek ■ Rapid transit corridor SH20 ■ Widening of SH20 north of SH20A (to Māngere Bridge) ■ Widening of SH20 between SH20A and SH20B.	■ SH20B online at-grade will improve reliability for time-sensitive Airport traffic. ■ New SH20A/SH20 interchange ramp connection (south facing) provides better network resilience and reduces the prevalence of freight and general traffic rat running on local roads (thereby reducing potential conflicts with active modes). ■ Widening of SH20 between SH20A and SH20B will support the SH20A/SH20 southbound ramp to reduce rat running on local roads. ■ This option potentially impacts sites and areas of high cultural value to Mana Whenua, including in the Puhinui Precinct, Pūkaki Creek and Ngā Kapua Kohuora (Crater Hill).	

Option	Treatments	Key Outcomes	Map
Option HS2-A2	SH20A ▪ SH20A/SH20 interchange ramp connection ▪ Rapid transit corridor SH20B ▪ Upgraded to a 4-lane corridor with an at-grade intersection at Campana Road ▪ 4-lane widening extended to over Pūkaki Creek SH20 ▪ Widening of SH20 north of SH20A (to Māngere Bridge) ▪ Widening of SH20 between SH20A and SH20B ▪ Rapid transit corridor.	▪ SH20B online at-grade will improve reliability for time-sensitive Airport traffic. ▪ New SH20A/SH20 interchange ramp connection (south facing) provides better network resilience and reduces the prevalence of freight and general traffic rat running on local roads (thereby reducing potential conflicts with active modes). ▪ Widening of SH20 between SH20A and SH20B will support the SH20A/SH20 southbound ramp to reduce rat running on local roads. ▪ This option potentially impacts sites and areas of high cultural value to Mana Whenua, including in the Puhinui Precinct, Pūkaki Creek and Ngā Kapua Kohuora (Crater Hill).	

Option	Treatments	Key Outcomes	Map
Option HS3-A1	SH20A ▪ SH20A/SH20 interchange ramp connection SH20B ▪ Upgraded to a 4-lane corridor with an at-grade intersection at Campana Road ▪ Rapid transit corridor SH20 ▪ Widening of SH20 north of SH20A (to Māngere Bridge) ▪ Widening of SH20 between SH20A and SH20B.	▪ SH20B online at-grade will improve reliability for time-sensitive Airport traffic. ▪ Possible delays due to Pūkaki Creek Bridge remaining as two lanes. ▪ New SH20A/SH20 interchange ramp connection (south facing) provides better network resilience and reduces the prevalence of freight and general traffic rat running on local roads (thereby reducing potential conflicts with active modes). ▪ Widening of SH20 between SH20A and SH20B will support the SH20A/SH20 southbound ramp to reduce rat running on local roads. ▪ This option potentially impacts sites and areas of high cultural value to Mana Whenua, including in the Puhinui Precinct and Ngā Kapua Kohuora (Crater Hill).	

Option	Treatments	Key Outcomes	Map
Option HS3-A2	SH20A ■ SH20A/SH20 interchange ramp connection ■ Rapid transit corridor SH20B ■ Upgraded to a 4-lane corridor with an at-grade intersection at Campana Road SH20 ■ Widening of SH20 north of SH20A (to Māngere Bridge) ■ Widening of SH20 between SH20A and SH20B ■ Rapid transit corridor.	■ SH20B online at-grade will improve reliability for time-sensitive Airport traffic. ■ Possible delays due to Pūkaki Creek Bridge remaining as two lanes. ■ New SH20A/SH20 interchange ramp connection (south facing) provides better network resilience and reduces the prevalence of freight and general traffic rat running on local roads (thereby reducing potential conflicts with active modes). ■ Widening of SH20 between SH20A and SH20B will support the SH20A/SH20 southbound ramp to reduce rat running on local roads. ■ This option does not require include additional capacity across Pūkaki Creek, but will potentially impact other sites of cultural value in the Puhinui Precinct along SH20B and Ngā Kapua Kohuora (Crater Hill).	

13.2 Short list assessment

This section describes how the short list assessment was conducted, how scoring was applied, and how the short list MCA led to the preferred option. For further detail on the short list assessment, see Appendix C-1 A2B Shortlist Assessment and C-2 20Connect Shortlist Assessment.

For Segment A, the assessment of the highway elements short list was integrated with the assessment of the rapid transit route. However, to simplify the decision-making process the preferred rapid transit alignment was determined ahead of the preferred supporting highway option for this segment.

13.2.1 Rapid transit short list assessment

Segment A

MCA

Table 13-3 summarises the Segment A rapid transit short list MCA. It focuses on the main differentiators between the options with some qualitative and quantitative evidence providing a ranked preference summarising the MCA assessment.

In Table 12 3 and Table 12 4 (for Segment B, to follow), the options are ranked for each objective and allocated a number based on this ranking. For example, the first placed option for a specific objective is given a '1', whilst the second placed option is given a '2'. If two or more options rank equally on an objective, these options are also allocated an '='. If two options rank equally on an objective and there is one remaining option which ranks separately, the two equal-ranked options are allocated a combined ranking and draw symbol (eg '1=').

Table 13-3: Summary of short list MCA results (Segment A)

Objectives / Indicators	RTN route via		Reasoning summary[99]
	SH20B	SH20A	
IO1: More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	1	2	Via SH20B, the Airport is within the 45-minute PT catchment from both Botany and Ormiston, whereas it is excluded from both the do-minimum and the SH20A scenarios. Although SH20A increases accessibility to a greater number of jobs, educational and social opportunities from Botany and Manukau, SH20B provides better access to the Airport precinct. From a population accessibility perspective, SH20B opens up access to the Airport for significant parts of Manukau, Manurewa and East Tāmaki (an additional ~50,000). SH20A reduced access to the Airport (by ~30,000), because the do-minimum option includes the short-term rapid transit service between the Airport and Manukau on SH20B, whilst the SH20A option shifts that link to the new alignment. Additionally, access and travel choices for the SH20A corridor are likely to be served by the proposed CC2M light rail project, which will connect with A2B at the Airport.

[99] Refer Appendix C-1 Short List Options Assessment for more detail – including appendices to this technical note that provide analysis per KPI and a further breakdown of environmental and engineering elements.

Objectives / Indicators	RTN route via		Reasoning summary[99]
	SH20B	SH20A	
IO2: Reliable and resilient transport system in South and East Auckland that is easy to use.	1	2	The key differentiator in this KPI was travel time, as capacity, resilience, reliability, directness and ease of use had similar scores. Routing via SH20B provides more significant travel time savings for key journeys (33 minutes saved versus 25 minutes on the Botany to Airport journey) as well as between a range of origins and destinations in South Auckland.
IO3: To improve economic performance of the Airport area, Auckland and New Zealand. IO4: Transport network that enables the efficient movement of goods and people. IO5: Urban regeneration and improved built environment.	1	2	SH20A provides access to more of the town centres, as well as a larger catchment of Kāinga Ora homes within its walking catchment. However, SH20B improvements in other KPIs (access to population, jobs, social and cultural activities etc) outweigh these benefits slightly against this KPI. Additionally, the SH20A corridor is likely to be served by the proposed CC2M light rail project, which will connect with A2B at the Airport and combine to create a transport network that enables the efficient movement of goods and people.
IO6: Reduce impact of the transport system on the environment and Taonga.	=	=	Both options have potential impacts on sites, waterways and areas of cultural significance. While the route via SH20A avoided the highly sensitive Pūkaki Creek area, the need to widen SH20 between SH20B and SH20A would potentially result in impacts on Ngā Kapua Kohuora and other sensitive sites. Future programme phases will need to further incorporate opportunities to mitigate and reduce potential adverse effects and achieve a more positive outcome for the environment, cultural values and taonga for selected alignment option.
IO7: Safe and secure transport facilities in South and East Auckland.	2	1	Routing via SH20A would extend access to the FTN/RTN to nearly 17,000 additional people by routing through Māngere (compared with 13,000 via SH20B). However, the SH20A corridor (and Māngere) will be served by the proposed CC2M light rail project. Other factors such as station accessibility, safety and security, and the extent of walking and cycling connections are similar across both alignments.
Environmental impacts	=	=	SH20A is likely to be less exposed to acid sulphate soils while routing via SH20B avoids demolition of properties potentially containing asbestos along the SH20A corridor and avoids potential noise and vibration effects during construction / operation to properties.
Engineering feasibility	1	2	The alignment on SH20B is less complex than on SH20A from a constructability (and therefore construction cost / risk) perspective. Disruption, safety in design, operation and maintenance and property were scored similarly across the alignments.

Objectives / Indicators	RTN route via		Reasoning summary[99]
	SH20B	SH20A	
OVERALL (based on investment objectives)	1	2	From the MCA assessment, **routing via SH20B is the preferred option for Segment A** (including the related 20Connect upgrades proposed for this alignment). This alignment is equal or superior across all KPIs (except for walking accessibility), particularly in improved travel times. These improved travel times are expected to act as an enabler to greater access into and out of the Airport economic hub for the RTN, offsetting some of the lower scoring experienced in the walking catchment accessibility criteria. The SH20B route does however necessitate a crossing of the Pūkaki Creek which is a highly significant cultural site. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

Stakeholder feedback

Stakeholder opinion was sought as part of the options assessment through the SWGP online feedback form[100]. The form asked for community opinion on the issues and opportunities for the public transport network across the two Segment A options. Figure 13-2 illustrates the view of each option.

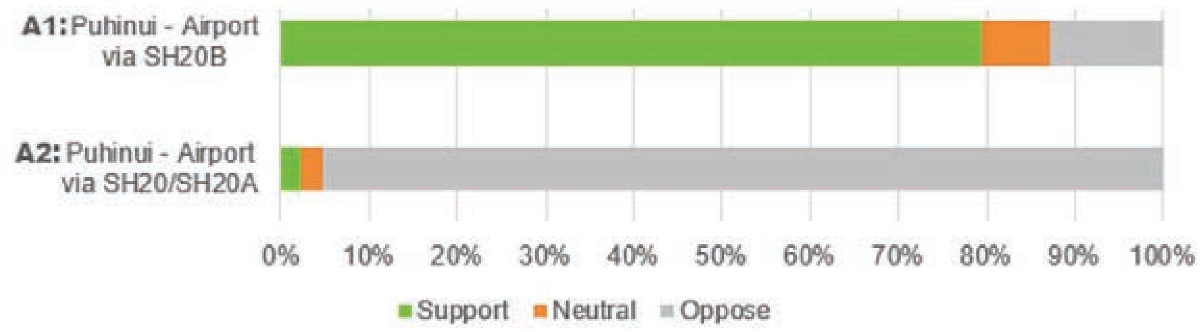


Figure 13-2: Airport to Botany Rapid Transit public sentiment toward options (Segment A)

There was strong public support for the A1 route via SH20B between Puhinui and the Airport, and strong public opposition for the A2 route via SH20 and SH20A. The main reasons for this preference were:

- The A1 route is direct, fast, and connects into industrial employment areas
- The A2 route duplicates the proposed CC2M route
- The A2 route would not appeal to people travelling from the south.

Feedback given on the preferred A1 route was that it would need to have intersection priority, and to *"ensure that separated cycling infrastructure is prioritised alongside the rapid transit route."*

Segment B

The rapid transit Segment B short list options were subjected to a similar assessment as the Segment A short list options, except that the assessment was isolated from the highway component. The assessment involved an MCA (summarised in Table 13-4) and qualitative analysis of stakeholder feedback.

Following the assessment, the hybrid option (B6) was confirmed as the preferred option for Segment B of the rapid transit route.

MCA

Table 13-4 summarises the rapid transit Segment B short list MCA. Scoring follows the same rules as in Table 13-3.

[100] Refer Appendix L for Engagement Summary Report

Table 13-4: Summary of short list MCA Results (Segment B)

Objectives / Indicators	RTN route via			Reasoning summary
	B3 (Ronwood)	B5 (Manukau Station)	B6 (Hybrid)	
IO1: More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	3	1=	1=	Both B5 and B6 connect directly to Manukau Station, enabling direct transfers to local buses and the train line. Option B3 accesses Manukau via Ronwood Avenue, so transfers to the local buses and train line require a five-minute walk reducing whole-of-network accessibility accordingly. Access to jobs, education, social opportunities and places of customary practice and cost of travel all have negligible differences which was generally good due to proximity of these places. B5 has more significant and identifiable destinations along its alignment, including civic buildings, Manukau Police Station, Manukau District Court and Rainbows End.
IO2: Reliable and resilient transport system in South and East Auckland that is easy to use.	1	3	2	Options B3 and B6 use the less trafficked and less constrained Ronwood Avenue, avoiding a major intersection with Great South Road. The additional delays caused by the routing through major intersections for option B5 meant it scored the worst from a travel time perspective while scoring was comparable across directness, ease of use and reliability.
IO3: To improve economic performance of the Airport area, Auckland and New Zealand. IO4: Transport network that enables the efficient movement of goods and people. IO5: Urban regeneration and improved built environment.	3	2	1	The Manukau Station Road option (B5) is limited by the inability to provide a highly accessible and legible central stop in the town centre. From a land development perspective, there was little differentiation except that the Ronwood Avenue alignment was inconvenient in terms of access to the Panuku development site to the south of Manukau Station Road.
IO6: Reduce impact of the transport system on the environment and Taonga.	=	=	=	This KPI was measured against environmental factors discussed below, with no clear distinction between options across water quality, effects on heritage, community, taonga and culture.

Objectives / Indicators	RTN route via			Reasoning summary
	B3 (Ronwood)	B5 (Manukau Station)	B6 (Hybrid)	
IO7: Safe and secure transport facilities in South and East Auckland.	=	=	=	All options provide considerable potential for walking and cycling improvements directly through changes to street corridors and indirectly through influencing future development patterns. Similarly, all increase walking and cycling catchments and opportunities to design for station accessibility / security.
Engineering feasibility	1	2	3	B5 and B6 present higher construction disruption challenges than routing via Ronwood Avenue due to interfaces with Manukau bus and train stations, as well as additional land purchase requirements. Challenges were not considered significant.
Environmental	2	1	3	Each option scored adversely for environmental impacts. Option B5 could have less impact from a stormwater perspective as nearby land could be used for attenuation. Impacts were not considered significant.
OVERALL (based on investment objectives)	2=	2=	1	Each alignment scored similarly, with differences in travel time, feasibility and environmental effects. Routing via Ronwood is a more direct (and slightly faster) route but reduces the benefits of a direct connection to existing rail and bus routes (B5 and B6). B6 was developed as a hybrid of B3 and B5 with the aim of combining the primary benefits of the two initial options. The slightly slower travel times through Manukau with option B6 is considered to be a reasonable trade-off against the benefits of providing a better-connected service through Manukau. **Option B6**, using Manukau Station Road, Davies Avenue and Ronwood Avenue **is the preferred option for the Manukau alignment** of the A2B service

Stakeholder feedback

Stakeholder opinion was sought as part of the options assessment through the SWGP online feedback form[101]. The form asked for community opinion on the issues and opportunities for the public transport network across the two initial Segment B options. Figure 13-3 illustrates the view of each option.

[101] Refer Appendix F for Stakeholder Engagement Report

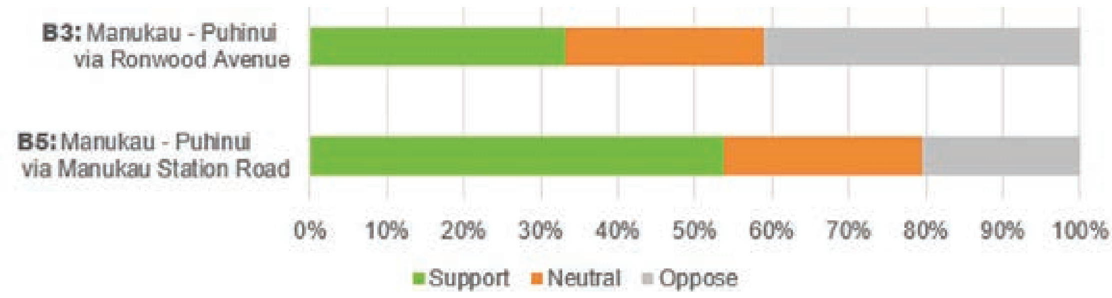


Figure 13-3: Airport to Botany Rapid Transit public sentiment toward options (Segment B)

Although there was a significant amount of support and opposition for both the B3 route via Ronwood Avenue and B5 via Manukau Station Road, B5 gathered more support and less opposition. The main reason for this preference was that B5 better connects to the bus and train stations in Manukau and hence maximises the use of current infrastructure and is more accessible for all users, in particular vulnerable users like the elderly and mobility impaired. B3, however, would deliver a faster route between Puhinui and Botany.

Feedback on both routes focussed on the need for any stations or stops in Manukau to be easily accessible by walking, particularly from other stations.

This process of public consultation took place prior to the development of the hybrid option B6. As such, feedback on B6 was not sought. Option B6 delivers the connectivity and accessibility benefits of option B5 with a slightly faster travel time, combining the elements of both options B3 and B5 that received public support.

13.2.2 Highway short list assessment

Following preliminary modelling results and the project risk assessment process, as well as the Segment A rapid transit short list MCA (summarised in Table 13-3), and stakeholder feedback on the Segment A rapid transit short list options, the A2 (rapid transit via SH20A and SH20) variants were discarded and only HS1-A1, HS2-A1, and HS3-A1 remained. Given that the rapid transit component was the same for each remaining option, these were abbreviated HS1, HS2 and HS3.

Localised road network analysis was carried out in SATURN, on the highway short list options and their rapid transit variants, to form quantitative comparisons for the MCA to add to qualitative insights. The overall shortlist MCA scoring summary can be found in Section 6.1 of the Supplementary Information.

Further sub-options for state highway improvements related to those components less connected to serving the RTN.

All short list options allow for a walking and cycling/shared use path (SUP) component (see general arrangement plans for proposed routes). These facilities are included within the scope of specialist assessment for the short list options. Locations include:

- Eastern side of SH20 between Bader Drive and Puhinui Road
- Southern side of SH20B between the western abutment of the Pūkaki Creek Bridge and Puhinui Road. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge, including cycling facilities.

Table 13-5 summarises the highway component short list assessment.

Table 13-5: Highway component short list assessment summary

Short List Option	Visual representation[102]	Comment
HS1		▪ Options HS1 and HS2 achieve similar benefits across the MCA, and both perform better than Option HS3 overall. ▪ Option HS1 has the most travel time savings overall, resulting in a wider population catchment and higher vehicle emission savings. The travel time savings for Option HS1 can mostly be attributed to the south-facing ramps at SH20B/SH20 interchange, and to a lesser extent the Campana Road grade-separation. ▪ Option HS1 is characterised by grade-separation at Campana Road and the addition of south-facing ramps at SH20/SH20B interchange. These interventions have a number of cost, programme, and reputational risks. Particular areas of risk include: – The need to remove direct access to properties adjacent to SH20B, including Memorial Gardens. – The potential requirement for additional property acquisition to accommodate the proposed Puhinui Road/Campana Road interchange. ▪ This option potentially impacts sites and areas of high cultural value to Mana Whenua, including in the Puhinui Precinct and Pūkaki Creek. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge ▪ Construction cost estimate (excl. propert [redacted] s7(2)(b)(ii) Prejudice to commercial position ▪ Option HS1 scored slightly higher for urb [redacted] noise and vibration than Options HS2 and HS3. Options HS2 and HS3 scored slightly better than Option HS1 for contaminated land. However overall, there is very little differentiation between the overall environmental risks of each of the options. All options had adverse effects identified and have the potential for complex consenting pathways. Therefore, no recommendation on a preferred option was made from an environment and planning perspective.

[102] For pictorial purposes only. Refer Section 12.2.10 for larger versions of these images.

Short List Option	Visual representation[102]	Comment
HS2		▪ Option HS2 has the least number of links operating over capacity, owing to SH20 widening and the SH20A/SH20 southbound ramp. ▪ Option HS2 achieves higher reductions in traffic using local roads such as Massey Road, because of additional SH20A – SH20 link. Vehicles (particularly HCV's) travelling south from the Airport Oaks area north of the Airport currently use a series of local roads rather than state highways, resulting in a number of congestion and safety concerns. This is detailed in Section 4.4.5. The option includes removal of direct access to SH20B from local properties, with the exception of Memorial Gardens that will have a signalised access to SH20B. ▪ Option HS2 does not have the south-facing ramps at the SH20/SH20B interchange nor the grade-separated interchange with Campana Road. Option HS2 is therefore expected to be less expensive and lower risk than Option HS1 as it would not require additional property acquisition nor the relocation of the Jet Fuel Line. ▪ This option potentially impacts sites and areas of high cultural value to Mana Whenua, including in the Puhinui Precinct, Pūkaki Creek and Ngā Kapua Kohuora (Crater Hill). The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge. ▪ Higher delays are expected with this option than in Option HS1 due to higher traffic conflicts at the at-grade SH20B/Campana Road intersection and use of the existing SH20 / SH20B interchange. ▪ Construction cost estimate (excl. property) s7(2)(b)(ii) Prejudice to commercial position
HS3		▪ Option HS3 is similar to Option HS2, with the exception that it does not include additional general traffic capacity on the Pūkaki Creek crossing. The RTN crosses Pūkaki Creek in this option. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge. ▪ This option has higher delays and is less resilient due to reduced general traffic capacity across the Pūkaki Creek crossing, and an at-grade intersection at the SH20B/Campana Road intersection. These delays and network resilience deficiencies will reduce accessibility of the Airport to communities in Auckland's eastern suburbs and those south of the Airport precinct. ▪ Construction cost estimate (excl. property) s7(2)(b)(ii) Prejudice to commercial position

While it performed well in terms of construction cost and risk, Option HS3 was discarded as it was outperformed by Options HS1 and HS2 for the majority of KPIs. The exclusion of 4 lane widening over the Pūkaki Creek crossing results in higher delays and resilience deficiencies due to the reduced general traffic capacity across the Pūkaki Creek crossing and at-grade SH20B/Campana Road intersection. These delays will reduce the accessibility of the Airport for those travelling from the east and south.

Although Option HS1 had the most travel time savings, overall, it did not perform as well as Option HS2. Option HS2 has higher reductions in local road traffic and Option HS1 was also expected to result in larger construction delays and additional property acquisition due to the proposed SH20B/Campana Road grade separated interchange, resulting in higher costs.

Option HS2 was the emerging preferred option taken through to consultation.

13.2.3 Preferred option(s) refinement

On further testing of Option HS2, a number of inefficiencies were explored relating to travel times along SH20B, which were underperforming compared to Option HS1. These inefficiencies related specifically to the operational requirements of the SH20 to SH20B interchange and the need to provide for rapid transit, and general traffic, through this busy interchange.

To address these inefficiencies, a southbound SH20B to SH20 interchange ramp treatment (similar to that included in Option HS1) was added to Option HS2, allowing the interchange to operate in a manner that could better accommodate public transport and therefore better enable the A2B rapid transit service, by removing a major demand and conflict element from the interchange. In doing so, this refinement achieved greater travel time savings compared to Option HS2. Option HS2 was therefore modified to include this additional treatment, creating a refined preferred option named Option HS2V (see Figure 13-4).

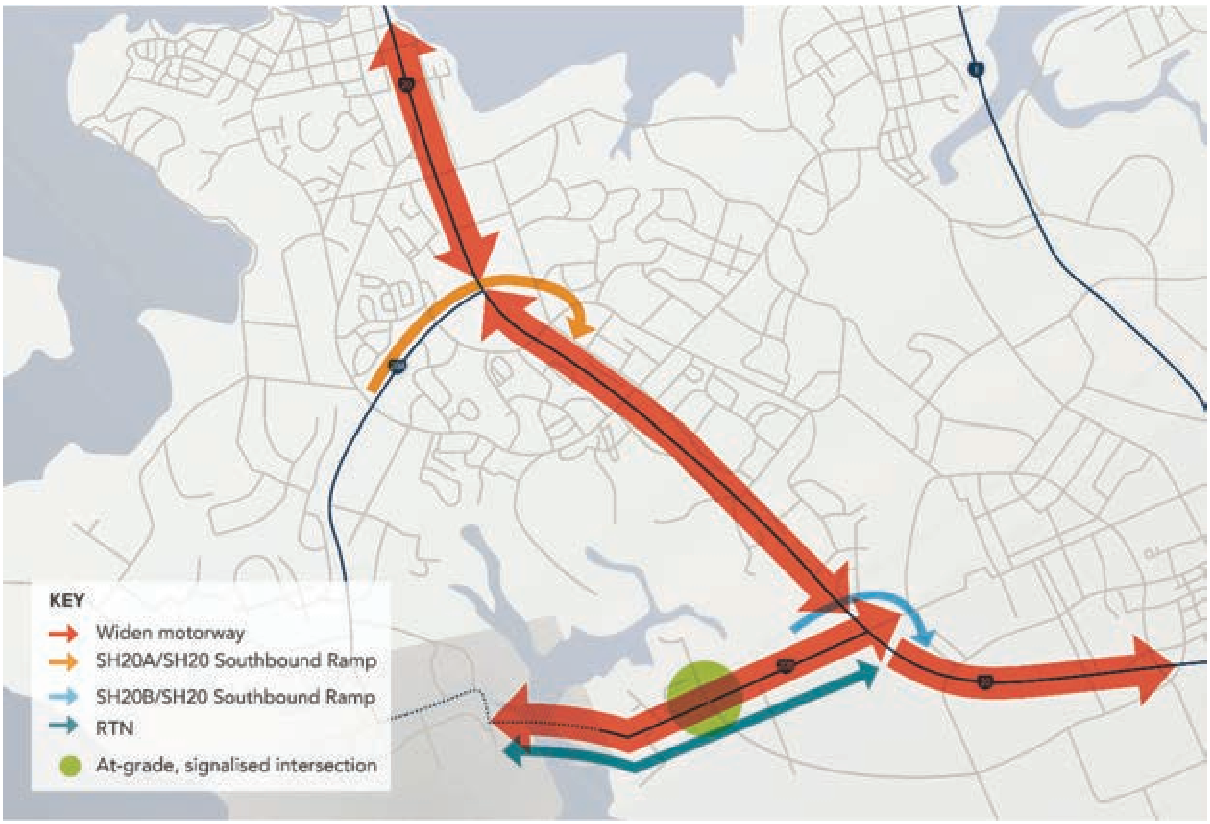


Figure 13-4: Refined preferred option (HS2V)

The combined Option HS2V achieves:

- Greater travel time savings than Option HS2
- More reliable travel times by all modes
- Higher population catchments
- A higher expected benefit cost ratio than Option HS2
- More resilient transport system as multiple route opportunities for public transport, freight and Airport traffic will be provided.

This option potentially impacts sites and areas of high cultural value to Mana Whenua, including in the Puhinui Precinct, Pūkaki Creek, Waokauri Creek, Tararata Creek, and Ngā Kapua Kohuora (Crater Hill). The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

14 Rapid transit service design and development

While the route selection decisions above were carried out using an assumed RTC type outlined in Section 10.2.2, in order to fully define the system costs, risks, benefits and performance more detail is required in respect of the rapid transit service. This section outlines the findings of a range of detailed assessments that are required to determine the form and operational specifications of the RTC. The findings are presented in greater detail in the following appendices and summarised here.

- Appendix G-2 – Concept of Operations
- Appendix R – Botany Interchange Assessment
- Appendix S – Botany Integration Options
- Appendix X - Other Technical Notes and Reports:
  - Station Locations
  - Potential Changes to Local Bus Network and Supporting Infrastructure in Response to A2B
  - Fleet and Procurement Technical Note.

14.1 Service design

The route has been established as described in Section 12.3.1 and is supported by preliminary network planning carried out by AT prior to commencement of this business case[103]. This work considered a range of operating models including:

- Through routing services from Ellerslie to Manukau via the Eastern Busway and Te Irirangi Drive
- Running services from Howick and Bucklands Beach to Manukau via Te Irirangi Drive
- Opening a Te Irirangi Drive busway to multiple routes connecting Ormiston, Panmure, Howick and Bucklands Beach

Based on criteria including speed, reliability, legibility, ease of use and capacity, AT considered that operating a single rapid transit service pattern was recommended.

Secondly, to support the options assessment for the Botany Interchange (see Section 14.8 below) and ensure that the scale of the Botany Interchange and supporting access is appropriate, between Botany and Manukau, multiple service design options were considered in detail. This assessment is in Appendix R.

The options that were assessed, as follows:

1. **Botany terminus** considers terminating the A2B infrastructure at Botany Town Centre. The rapid transit services would also terminate at Botany. This option creates the most reliable and legible service but requires a larger interchange at Botany than other options.
2. **Service extensions without infrastructure** does not extend the infrastructure beyond Botany Town Centre, however it does extend the services through Botany Downs, Highland Park and Bucklands Beach. This reduces the scale of the Botany interchange but adds significant

[103] AT Internal analysis of “East RTN”, 2017

unreliability to the rapid transit service due to the lack of bus priority beyond Botany Town Centre.

3. **Service and infrastructure extensions** includes the same service extensions as above, however it includes an extension to the Botany Road/Cascades Road intersection, the most unreliable segment of the corridor north of Botany. This reduces the scale of the Botany interchange but adds significant cost and land impacts for sections of A2B with low patronage.
4. **Eastern Busway full integration** connects the A2B and Eastern Busway services into one long service from Panmure to Manukau. This would require the joint service to terminate at Panmure, compared to the current Eastern Busway service plans, which extend that service via Ellerslie, Greenlane and Newmarket to the city centre. This would also create a very long route with potential reliability issues.
5. **Eastern Busway service through-route to Ormiston** would extend Eastern Busway services to Ormiston via the A2B corridor and Ormiston Road. This would create a more direct service for Ormiston. It would extend a route which is already very long, reduce legibility of the rapid transit services, and require additional infrastructure to facilitate additional bus movements between the A2B corridor and local roads.

Following the option assessment, the "emerging preferred" option was a variation on Option 1, in which the rapid transit service and A2B infrastructure is extended slightly north of Botany Town Centre.[104] This was intended to lessen the space requirements for a station in Botany Town Centre, where land is more valuable and in higher demand than outside of the town centre.

The subsequent assessment of the Botany interchange (Section 14.8) refined this option and provides for A2B services to terminate at Botany as reflected in Option 1.

14.2 Mode requirements

As established in Section 10.2.2, a road-based rapid transit mode is preferred. Demand modelling for an Airport to Botany RTC indicates bus rapid transit can deliver sufficient capacity to meet forecast demands to 2048 with flexibility for more or less capacity as required.

As the analysis indicates that a BRT system can meet the required capacities and investment objectives, there is no case for the significant additional investment and development constraints of building the corridor for LRT in the first instance. However, future growth in demand for this service and/or higher-than-modelled growth by 2048 may support the future development of this corridor to a higher-capacity mode such as an Advanced BRT 'trambus' or a rail-based vehicle. Future proofing is discussed further in Section 14.5.

14.3 Operational characteristics

The demands and operating requirements support a separated running way, with at-grade intersections. This decision is supported by:

- The need to achieve a journey time competitive with the private car
- The need to achieve a reliable travel time.

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[104] Appendix S

14.3.1 The need to achieve a competitive journey time compared to car

The need to achieve a journey time competitive with the private car resulting in a need for a journey time between 30 mins and 50 mins in peaks. This would require an average speed of between 22km/h and 36km/h

Modelling indicates that a separated running way, with signalised intersections could achieve journey times of around 35-41 minutes for the Airport to Botany route, placing it in the "competitive" range with private cars, key for achieving mode shift. This provides an average speed of 30km/h and an acceptable variation.

Compared to other mode options (see Figure 13-2 below) the journey time requirements for mode shift and the capacity requirements of around 2,000pph/d by 2048, the corridor is:

- Above the top end capacity and speed for bus lanes
- At the low end of the capacity and speed for light rail on street and very low for heavy rail
- Within the acceptable range for surface BRT.

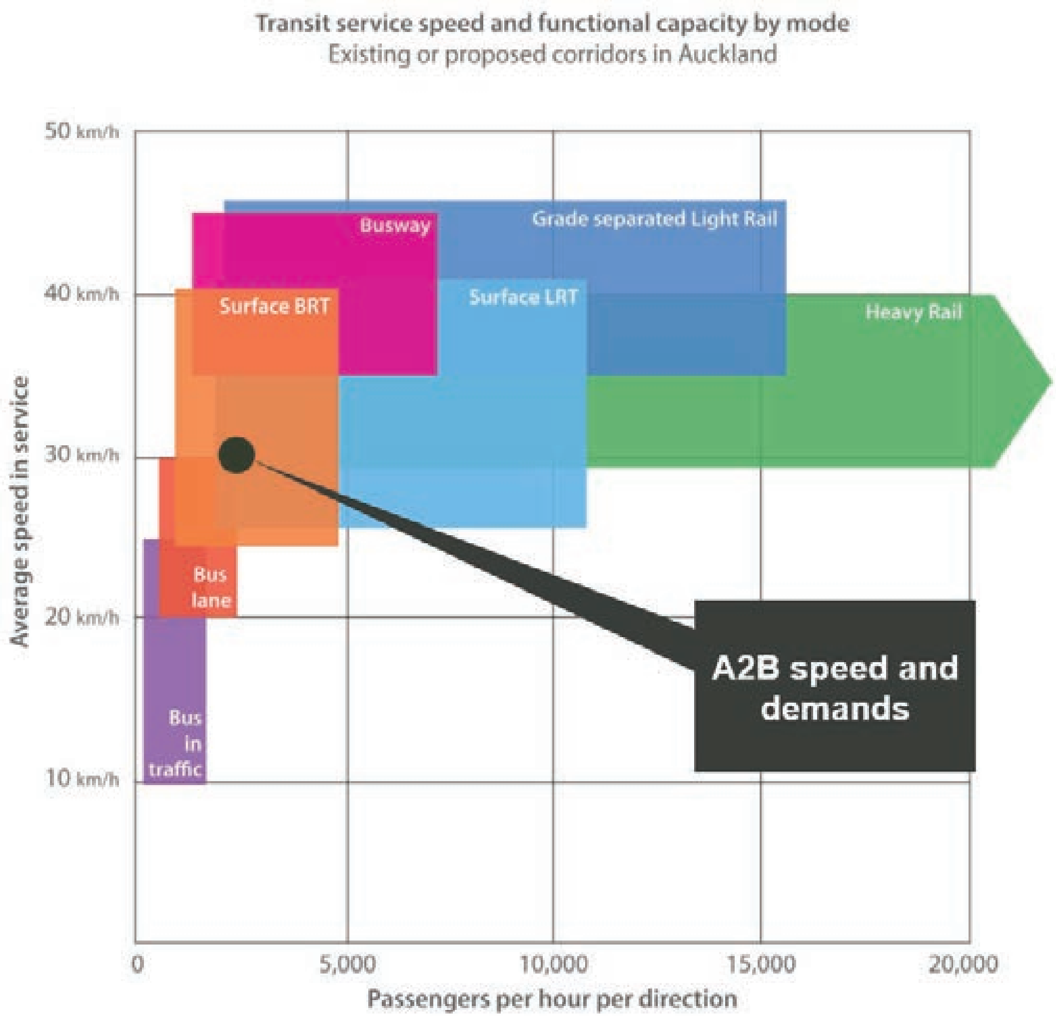

Figure 14-1: Transit service speed and capacity by mode[105]

This assessment supports the earlier mode assumptions to inform route selection and benchmarks well against the Transit Capacity and Quality Manual (TCQM) which is the internationally accepted standard for the design of transit operations. The TCQM has the following guidance in respect of the relationship between bus frequencies and operations (*source: TCQM Exhibit 5-2)*:

"</= 5 minute headway:

- Bus bunching more likely, which can result in longer than planned waits for a bus and more variable passenger loads

Exclusive right of way desirable to reduce external impacts on transit operations and to keep operating speeds high (minimising operating costs)".

14.3.2 The need to achieve a reliable journey time

From a user's perspective, reliability is affected by two key aspects:

- The variation in journey time while using the service
- The variation in wait time for the service arrival.

The latter is often a product of "bunching" of services and can result in two or three closely spaced services, followed by a significant gap. Bunching can also be an operational issue and affect operational and capital costs through the need for greater redundancy in the system.

Reliability is typically achieved through considering the service as a "system" and considering aspects such as:

- Degree and nature of interaction with traffic (running ways, priority at intersections)
- The number of buses, routes and vehicle types
- Dwell times at stations (ticketing system, level boarding, number of doors for boarding)
- System management (actively or passively managed).

The range of journey times achievable with a separated running-way with traffic signal prioritised at-grade intersections is within the range that is acceptable for this corridor.

Introducing a "managed" system including the following characteristics is expected to improve journey time and reliability outcomes, and create an easy to use system that attracts new users and creates mode shift:

- Separated running ways
- Signal pre-emption and active headway management
- Level, all-door boarding
- Off-board ticket validation.

The Institute for Transportation and Development Policy (ITDP) is an internationally recognised authority on BRT design and considers the following five factors "basic" in BRT design. These are core characteristics of a rapid transit service that have been included in the recommended option:

- Dedicated right of way for separation from traffic

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[105] This figure is an adaption of a figure from the Transit Capacity and Quality Manual modified to reflect actual Auckland operational experience

- A high-quality alignment for ride quality
- Off-board fare collection
- Treatment of intersections for priority
- Platform level boarding.

14.4 Vehicle type

A passenger capacity of approximately 150 passengers per vehicle delivers sufficient capacity at desirable headways for the third decade of operation (as shown in Section 10.2.2). Although a double-decker rigid bus could theoretically satisfy the peak demand in 2048, the required frequency would exceed the levels that would enable efficient priority at intersections resulting in reduced reliability due to bunching. An articulated single-deck bus of approximately 24m length and approximate 150 passenger capacity would be the best option from a capacity standpoint.

A single deck cabin configuration has the added advantages of fast boarding and alighting through multiple doors, maximised use of floor space, and sufficient headroom in the passenger cabin to allow for a significant ratio of standing passengers. In contrast, double decker buses require long dwell times for safe boarding and alighting, have limited lower deck space for luggage and wheelchairs (etc.), and have limited headroom on both decks, restricting standing capacity.

Therefore, a double-articulated bus was chosen as the preferred vehicle type as a long-term solution.

The Vehicle Specification and Fleet Procurement for RTN Corridor technical note[106] provides more detail on the process by which the preferred vehicle was chosen, including how it must have an emissions-free drive train, and the reasoning behind the preference.

It has been assumed that an electric vehicle is used in this corridor. Patronage is expected to grow over time and as noted in the Vehicle Specification and Fleet Procurement for RTN Corridor technical note, several fleet renewals may be required as the system evolves. Technology is advancing in this field and more options may be available in the future.

14.5 Future-proofing and staging

As the analysis in Section 10.2.2 and Section 14.3 indicated that a BRT system can meet the required capacities and investment objectives, there is no case for the significant additional investment and development constraints of building the corridor for LRT in the first instance. However, future growth in demand for this service and/or higher-than-modelled growth by 2048 may support the future development of this corridor to a higher-capacity mode such as an Advanced BRT ‘trambus’ or a rail-based vehicle.

For added flexibility, futureproofing of the design has been considered, wherever practical, to allow a conversion to an LRT-based system in the future[107]. The key elements to consider in future-proofing the infrastructure design include vertical grades, tracking at intersections, loading on structures and stray current protection for structures (in the case when overhead high voltage supply is required), platform lengths, pavement depth and relocation of utility services from within the corridor. Whilst some of the design requirements of these will be dependent on the LRT vehicles and specifications that are

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[106] Vehicle Specification and Fleet Procurement for RTN Corridor, Aurecon NZ, April 2020 (Appendix X)

[107] A2B Preliminary Design Philosophy Statement (Appendix N-1) covers the engineering design of the corridor, and notes where future-proof design elements have been implemented.

selected for the corridor, extended platform lengths have been included in the design and vertical grades have been reviewed for compliance with LRT standards. The structural, pavement and utility design is still at a conceptual level and future proofing requirements will require further consideration as the design evolves.

Future proofing of the corridor for alternate service patterns has been considered, including providing passing lanes for vehicles to overtake stopped vehicles at some stations and consideration of alternate service patterns with vehicles entering and exiting the corridor at intersections. As described in Section 15.2.3, two sets of station designs have been developed for the A2B rapid transit route.

A staged approach to delivery is expected (refer to Section 15.6), which presents opportunities for the roll-out of the proposed BRT fleet. As bus-based options can operate in both “normal” and mass-rapid transit corridors (unlike LRT), earlier stages can utilise existing fleet and phase the procurement of more expensive vehicles over time: ie, standard, double decker, articulated, electric and advanced BRT vehicles could be rolled out progressively as demand and capital funding permits.

14.6 Rapid transit corridor

The RTC is predominantly be a central-running rapid transit service as depicted in Figure 14-2. The Davies Avenue section and part of the SH20B section are side-running (see Figure 14-3).

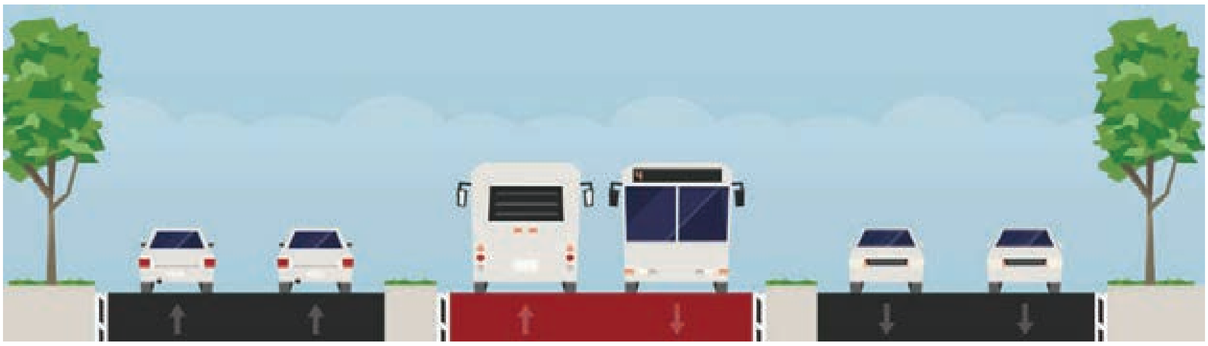


Figure 14-2: Central-running RTC route, preferred for most of the A2B corridor

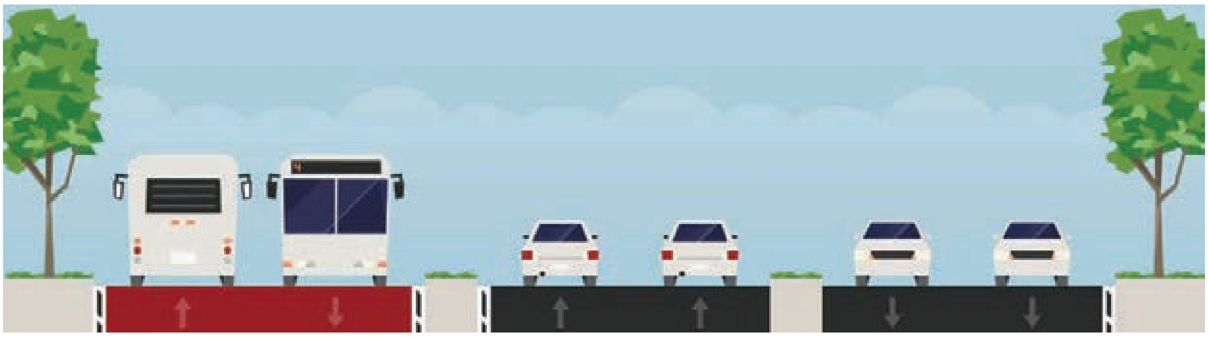


Figure 14-3: A-side running RTC route, the preferred placement for the Davies Avenue and SH20B section of the A2B corridor

Central-running is preferred for most of the route along Te Irirangi Drive, through central Manukau and along Puhinui Road, as it:

- Retains easy street-entry from driveways and side streets; all other options would require vehicle access points to cross the RTC
- Means fewer RTC conflicts with vehicle movements; the only conflict is with right turn movements, which will require signalisation

- Means driveways and smaller side streets can operate as uncontrolled left-in left-out intersections
- Provides a consistent crossing distance for users accessing from either side of the catchment.

All pedestrian crossings and access to stations will be via signalised facilities.

In the case of Davies Avenue, in Manukau, side running on the western side is preferred due to the lack of any driveways and side streets (owing to the adjacent Hayman Park) allowing for the removal of any conflicts with general traffic and the retention of full access to driveways and side streets on the eastern side along this section. The intersections at either end of Davies Avenue allow for a smooth transition between side running and centre running of the adjacent streets.

Side running is also preferred along SH20B between Manukau Memorial Gardens and Pūkaki Creek, due to the Airport terminal being on the south / west side and side road access being limited to signalised intersections within this segment. It also results in reduced potential impacts on sites, waterways and areas of cultural significance such as Waokauri Creek, Papāhinau and Mimiti Te Arero located to the north of SH20B.

14.7 Station locations and function

Station locations have been confirmed through the *Station Locations Technical Note* (Appendix X). Station location options were assessed, and final locations selected based on a three-level priority:

1. **Major demand destinations** - stops at high demand destinations, including employment areas, tertiary education centres, major shopping areas, and centres of unique demand such as Auckland Airport. The metropolitan centres of Manukau and Botany incorporate several of these major demand drivers in a single location and are also important interchange points, which means they are very high priority destinations.
2. **Interchange points and transfer nodes -** The second priority for the station locations is to enable the A2B rapid transit line to function as part of a connected public transport network, by locating stations at places where it:
   - Connects with other rapid transit lines, including the rail network at Puhinui Station, the rail, bus and coach network at Manukau Station, the future Eastern Busway at Botany, and the future CC2M line at the Airport
   - Is intersected by frequent and local bus routes, providing a local grid of connecting bus services. This typically means locating stops at main roads and cross streets where buses run
   - Connects to major pedestrian pathways, cycle links or local roads.

This criterion improves the catchment of public transport journeys using the FTN, by increasing its connectivity to first and last kilometre trips.

3. **Additional residential and local coverage -** The third priority for station locations is for additional intermediate stops to provide coverage to other areas, where appropriate. These locations are typically local residential areas, which can be served with ‘infill’ stops between major destinations and transfer nodes. Under this third criterion, a trade-off between speed and coverage arises. Due to the delays and travel time variability introduced by each additional stop, these coverage stops are mostly warranted under the following conditions:
   - If they service (current or future) dense residential areas, especially apartments and clusters of terraced housing directly accessible to the rapid transit line
   - If they cover residential areas that are otherwise not served by the public transport network

- If they provide coverage of lesser demand destinations, such smaller town and local centres, shopping strips, schools and community facilities that are otherwise not served by the public transport network.

Table 14-1 provides the full list of the transit stations and their indicative classifications, including functions and priority levels.

Table 14-1: Station function and priority

Potential stop number	Section	Location	Major Destin-ation?	Transit Inter-change?	Local Coverage?	Spacing from previous	Indicative Priority
1	Airport	Passenger Terminal	Yes	Yes	No	-	Critical
2	Airport	The Quad Business Park (Airport Precinct)	Yes	TBC	No	1,000 m	Major
3	Puhinui	Puhinui Rail Station	No	Yes	Yes	6,100 m	Critical
4	Puhinui	Puhinui Road/ Lambie Drive	No	Limited	Yes	1,400m	Minor
5	Manukau	Manukau Station	Yes	Yes	Yes	1,750 m	Critical
6	Manukau	Ronwood Avenue (Manukau Central)	Yes	No	Yes	550 m	Major
7	Manukau	Diorella Drive	Limited	Limited	Yes	1,300 m	Minor
8	Te Irirangi	Dawson Road	No	Yes	Yes	1,300 m	Major
9	Te Irirangi	Ormiston Road – Botany Junction Shopping Centre	No	Yes	Yes	1,600 m	Major
10	Te Irirangi	Accent Drive	No	Limited	Yes	1,100 m	Minor
11	Te Irirangi	Smales Road	No	Yes	Yes	1,400 m	Major
12	Botany	Botany Metropolitan Centre	Yes	Yes	Yes	1,200 m	Critical

These stations are a mixture of intermediate and interchange stations, where customers can connect with other public transport services. Design features of the intermediate and interchange stations are outlined in the *Station Locations Technical Note* in Appendix X. Many stations provide a critical role in access to the system through facilitating interchange with local bus services.

There is currently no proposed station along SH20B within the Puhinui Precinct due to geographically dispersed land uses without significant transit demand. However, this can be considered further in the future should the land use change as it is future proofed for.

14.8 Botany Station options assessment

Botany has been proposed as the terminus and interchange for A2B. Botany Interchange is the connection between the proposed Eastern Busway and the A2B route, along with a large number of local services.

This section summarises the options assessment process for Botany Station and identifies a recommended option. The Botany Interchange Assessment Technical Note (Appendix R) provides an assessment of service options for Botany and the Botany Integration Options Technical Note (Appendix S) details the options assessment and preferred option for Botany Station for the purpose of the A2B SSBC.

The optioneering undertaken for this SSBC considers an ‘ultimate’ Botany Station that provides for A2B, Eastern Busway and local bus services in 2048. The A2B Botany Station optioneering reflects a SSBC-stage of design (concept design). It also acknowledges that further optioneering will be undertaken by the Eastern Busway Alliance (EBA), which will be delivering the Eastern Busway by 2025, ahead of A2B.

The AT Eastern Busway project team have been involved throughout the A2B Botany Station options assessment process. At the time of writing, the EBA commenced in October 2019. The A2B project team have provided A2B’s Botany Station options assessment materials, including short-listed online and offline station layout options to the EBA to inform their further optioneering. Importantly, the A2B Botany Station optioneering undertaken to-date has identified A2B’s functional requirements. It is acknowledged that the location and form of the station may evolve as the EBA undertakes further options assessment, engagement and progresses the design in more detail. The A2B project team will continue to work with the EBA to confirm A2B’s functional requirements at Botany Station.

It is intended that Botany Station will be delivered in stages:

- Stage 1 – Botany Station will be consented, funded and delivered by the EBA, opening 2025. Includes designating for the ultimate (Stage 2 2030) station footprint and future-proofing for A2B.
- Stage 2 – Botany Station upgrade funded and delivered by A2B, opening 2030.

This SSBC’s Financial Case identifies the portion of funding required for the future A2B Stage 2 station upgrade. Stage 1 is funded by Eastern Busway.

14.8.1 Botany interchange options assessment

A range of options were considered for Botany Interchange, including:

- Online station options (located within the road corridor), offline station options and hybrid options with online and offline components
- At-grade and grade-separated station options
- Extending A2B north
- Bus service operating patterns, including differing combinations of terminating and through-routing of services, which resulted in different numbers of bus stops and layover spaces (see service pattern scenarios below).

A MCA framework was used to assess options generated by the A2B team and AT specialists against the problems, benefits and investment objectives. The report presents Botany Station locations, layout designs and possibilities for routing services into and through Botany.

The assessment of a station at Botany and surrounding services required consideration of, and integration with the Eastern Busway project, and local bus services. The station options were assessed against a framework agreed to by the project stakeholders. The assessment criteria included A2B and Eastern Busway investment objectives, and were grouped into three headline assessment criteria, including transportation planning, engineering implementability, and environmental effects.

Two emerging preferred station options included both online and offline options, which were then optimised against the preferred service pattern scenario (see below), opportunities to reduce the number of long term layover bays at the station and reducing access impacts for a property owner. A preferred station option for the purposes of the A2B SSBC was identified.

14.8.2 Service pattern scenario

In developing options for Botany Interchange, a range of service operating patterns were tested to determine how many bus stops and layover spaces were required. Service patterns tested included:

- Terminating all local buses and rapid transit services at Botany Station as per the base public transport network plan;
- Terminating rapid transit services at Botany Interchange and through-routing all local buses to reduce the layover requirement;
- Through-routing all services (including Airport to Botany and the Eastern Busway).

Terminating all services at Botany results in the largest station footprint requirement due to the need to provide additional bus stop and layover spaces for all local and rapid transit services. By contrast, through-routing all services reduces the footprint requirement at Botany but requires additional platforms, turnaround facilities and layover spaces to be provided at other locations where the services terminate.

Following internal engagement with subject-matter experts within AT's Service Network Development, Infrastructure Specifications and Integrated Network Planning teams, through-running all local services was not seen as viable for a range of reasons. Joining local routes risks creating long and unreliable services that do not serve customer catchment needs. This may also result in remainder sections of routes that are uneconomic and do not serve customer needs (dead-running). In addition, catchments either side of Botany are not balanced, with industrial/commercial to southwest, residential to north and east, which does not enable logical through-routing. However, it is feasible to through-route some local services, where network and customer needs can still be met and where it is appropriate to do so. A hybrid network option was developed as the preferred service pattern.

The recommended operating pattern confirmed the termination of both rapid transit lines at Botany Station and through-routes approximately half of the local bus services where it is practical and desirable to do so. This preferred network scenario ensures services serve strategic and catchment needs, retain existing coverage, minimise long and unreliable out-of-service circulation movements, take into account OPEX considerations and that services joined together for through-routing do not leave partial severed routes that are uneconomic to run.

This preferred network option is recommended to be implemented at the opening of Eastern Busway and the stage 1 Botany Station in 2025. A map of the recommended bus service network is provided in Figure 15-20.

14.8.3 Recommended Botany Station option

After considering the performance of the options against the MCA criteria and further optimisation of two emerging preferred options, the recommended Botany Station option was selected, and is shown in Figure 14-4.

s7(2)(b)(ii) Prejudice to commercial position

The preferred Botany Station option is a hybrid online/offline station with online A2B and Eastern Busway platforms, layover and turnaround. The key features are:

- All rapid transit (Airport to Botany and Eastern Busway) services are fully accommodated on-line, with spaces to pick-up and drop-off passengers and layover and turnaround facilities. This reduces conflicts between rapid transit services and local buses, general traffic and active modes, allowing rapid transit services to avoid congestion and operate more reliably to / from and within the station.
- One pick up bay and one drop-off bay is provided for A2B services, while Eastern Busway services have two pick up and drop-off bays. Rapid transit passengers will arrive and depart on platforms facing the direction they are travelling in, offering customers a high quality 'train station' style experience.
- Four A2B and six Eastern Busway layover bays are provided online.
- Local buses are directed into an offline station via a bus-only lane. In this area, six layover bays, four pick-up bays, and three drop-off bays are provided. Bus congestion in the offline station is reduced by separating local buses from rapid transit services.
- A pedestrian bridge is provided over Te Irirangi Drive to access each platform, with access located directly adjacent to the cycle lane and footpath which runs along each side of Te Irirangi Road. This grade separated crossing provides safe pedestrian transfers and access to all services.
- The station design and functional requirements reflect a balanced local network and operational scenario, where some local bus services are through-routed where network and customer needs can still be met, and where it is feasible and appropriate to do so. This ensures services serve catchment needs, retain existing coverage, and OPEX considerations are taken into account.
- Opportunities for reduced long term layovers at Botany Station, with some potentially provided off-site, for example adjacent to the nearby Howick & Eastern Bus Depot.
- The option offers flexibility and the ability to accommodate future growth of rapid transit services within the existing online footprint and does not preclude a future extension of the rapid transit corridor to the north to serve additional catchments if required.
- There are opportunities to work with property owners for land use and transport integration outcomes, which can be progressed by the EBA.
- As outlined above, further options assessment for Botany Station will be undertaken by the EBA as part of the Eastern Busway project, which is programmed for delivery ahead of A2B, opening in 2025. Due to the SSBC-level of the options assessment completed to-date, it is acknowledged that that station's location and form may evolve as further engagement and detailed assessment is completed by EBA. As such, the A2B project team will continue to work with the EBA to confirm A2B's functional requirements within the station. This will ensure A2B is future-proofed for within the Stage 1 station delivered by EBA in 2025. The A2B project will undertake a Stage 2 upgrade to align with the opening of A2B in 2030.

PART C - RECOMMENDED OPTION ASSESSMENT

15 Recommended option

The following sections describe the A2B and 20Connect projects' recommended option and its delivery strategy in detail, and how the option solves the problems identified, while realising the benefits and investment objectives sought.

15.1 Overview

The strategy adopted by the SWGP is consistent with that adopted by the in the SPBC and is one of behaviour change and supporting a mode shift in access to the Airport area and wider study area. This has resulted in a strategy that delivers outcomes that influence behaviours and create mode shift early and an emphasis on interventions that enable such a shift. As a result of the assessment outlined in Part B, the A2B and 20Connect's recommended option aligns with the overall strategy to encourage mode shift by leading with public transport and influencing land use, particularly at high priority centres such as Manukau. Initial investment in state highway capacity on SH20B is primarily to give effect to the public transport outcomes by enabling a separated running way for buses, although significant benefits could also accrue to freight and other essential traffic classes. Investment in further highway assets are proposed, but only after the completion of the public transport, walking and cycling elements of the programme.

The recommended option (Figure 15-1) combines a rapid transit line between the Airport and Botany with infrastructure improvements to the SH20 network (including SH20, SH20A and SH20B), connecting important economic hubs (Airport precinct, Manukau and Botany urban centres) as well as residential areas. The rapid transit line accommodates accessible stations which serve its communities, whilst the state highway improvements help to maintain acceptable access to the Airport precinct and safeguard the long-term role of the Western Ring Route. In addition, the A2B and 20Connect's recommended option incorporates interventions that promote walking and cycling.

Figure 15-1: A2B and 20Connect recommended option

The key features of the A2B recommended option are:

An **18 km rapid transit route** connecting the Airport and its employment areas with two major urban centres (Manukau and Botany). The route connects to four existing and proposed rapid transit lines and 24 local bus services, some of which intersect multiple times, resulting in more connections and increasing the variety of public transport opportunities for customers in South and East Auckland.

The preferred option for the rapid transit is a BRT system that can be scaled to meet demand as it grows and includes:

- Separated running ways, with at-grade intersections
- Twelve stations with off-board ticketing, level boarding and all-door boarding (all provided to reduce vehicle dwell times, and provide a more reliable and accessible service)
- Connections to four existing and proposed rapid transit lines, including the proposed City Centre to Māngere (CC2M) LRT at the Airport.
- A single bi-directional service between the Airport and Botany (designed with flexibility to incorporate future additional services) with headways of as short as three minutes during peak times
- Fast, reliable journey times of 37-43 minutes (Airport to Botany) and 34-38 minutes (Botany to Airport)
- Potential to promote and support transit-oriented development at key centres

Figure 15-2 and Figure 15-3 illustrate the recommended mode of operation for the rapid transit component. The span of service is proposed to be as long as possible to meet the needs of shift workers and travelers.

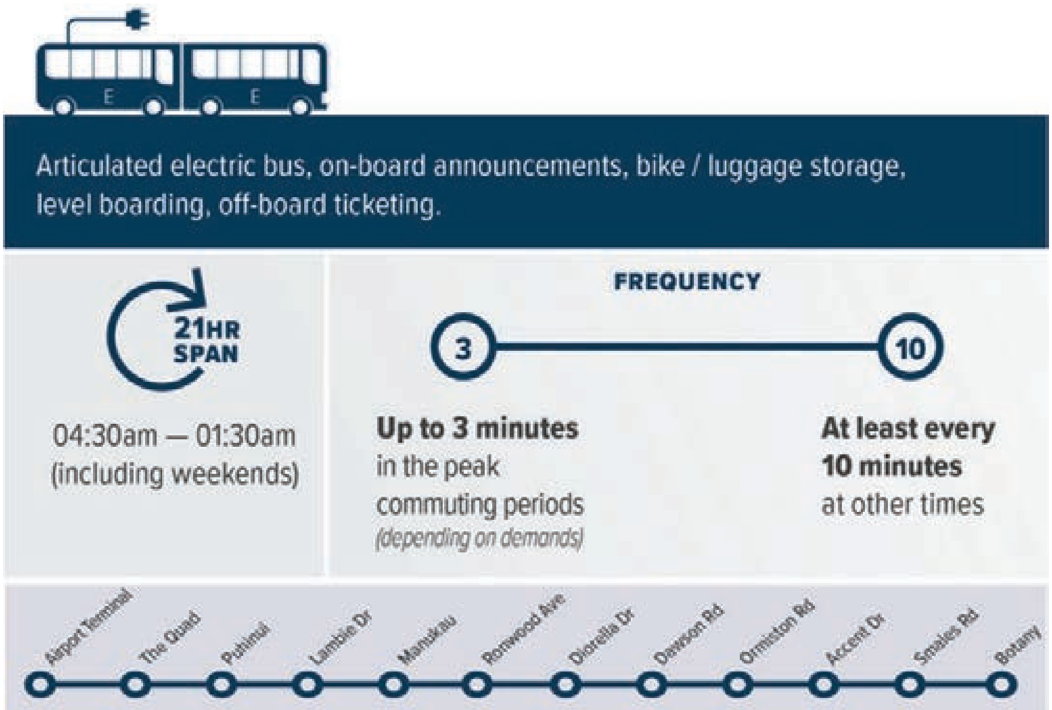
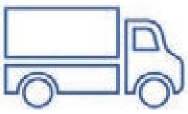


Figure 15-2: Summary of the A2B service

Figure 15-3: An example of a modern, low-floor BRT vehicle

The recommended A2B option comprises the following active mode elements:

- A **separated walking and cycling route** along the entire corridor, running parallel with all upgraded sections of the route.
- **Walking, cycling and multi-modal** interventions and opportunities, including bike storage facilities and footpath improvements, providing quality access to stations and potential expansion to further improve accessibility in the area.



State highway infrastructure improvements, which include improvements to SH20 (between Māngere Bridge and Manukau), SH20B and the northern section of SH20A. These improvements will provide for more general traffic and freight movements, including those traversing the strategically significant Western Ring Route, reduce the use of local roads and protect access to and around the Airport and Southwest Auckland.

The preferred option for the highway elements of the A2B and 20Connect includes the following treatments:

- Widening SH20B to 4 lanes expressway with at-grade intersections and remaining on the existing alignment. In particular, the SH20B section includes:
  - The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge within the Airport RCA area, to cater for predicted growth and development in the southeast
  - Rapid transit corridor on the south side of SH20B, enabling the rapid transit route
- New SH20B to SH20 southbound ramp at Puhinui motorway Interchange (includes widening of SH20 south of SH20B southbound to Lambie Drive), removing a significant movement conflict point between general traffic and the rapid transit provision – resulting in improved journey reliability
- New SH20A to SH20 southbound ramp (includes widening of SH20A northbound from Kirkbride Interchange) removing general traffic and freight from local roads in Māngere

- Widening SH20 north of SH20A to eight lanes, improving journey time reliability on the Western Ring Route
- Widening SH20 between SH20A and SH20B to six lanes, to better integrate the new SH20A to SH20 ramp and improve resilience of the network

A staged delivery strategy, enabling access and travel choice problems that exist now to be addressed early, investment to be aligned with related projects and capacity and performance to be matched with growth in demand.

The staged investment approach proposed is adaptive, allowing for ongoing assessment and consideration of any future unforeseen impacts arising from COVID-19.

The staged delivery strategy is split into five horizons, which each have indicative completion years, as summarised below:

- Horizon 1 (2021) – Short-term Airport Access Improvements (STAAI) and SH20B Early Improvements, including the Puhinui Interchange upgrades and early bus priority interventions on SH20B, Puhinui Road and Lambie Drive, Māngere cycling improvements, and the introduction of an 'AirportLink' bus service between the Airport and Manukau. These works are considered part of the do-minimum for this SSBC.
- Horizon 2 (2025) – A2B medium term premium bus service – a premium pre-rapid transit connection supported by relatively low capital-investment bus priority interventions, particularly between Manukau and Botany, to extend the 'AirportLink' bus service from Airport to Botany, with stations established at their long term locations prior to their upgrading and completion in Horizon 4.
- Horizon 3 (2030) – Opening of the A2B rapid transit service - targeted infrastructure upgrades on SH20B and SH20 south of SH20B to Manukau, including a four-lane expressway, a dedicated side and centre-running busway on SH20B, a shared path along SH20B, a new southbound SH20B to SH20 connection, a bridge for A2B over the rail lines at Puhinui, and ultimate A2B busway infrastructure and two stations in Manukau City Centre to support central and local government urban regeneration initiatives. Also includes Botany Station Stage 2 upgrade.
- Horizon 4 (2035) – Full A2B rapid transit service and infrastructure. Centre-running BRT between SH20/SH20B interchange and Botany. Establishment of new A2B stations between Manukau and Botany and at Lambie Drive. Walking and cycling facilities extended to Botany.
- Horizon 5 (2040) – SWGP final implementation – completion of the SH20 and SH20A upgrades, which involves highway widening and a new southbound SH20A to SH20 connection. Shared path alongside SH20, between Māngere Bridge and SH20B.

15.2 Rapid transit – Airport to Botany

15.2.1 Summary

The A2B recommended option combines a rapid transit line with accessible stations serving its communities, connecting important economic hubs and promoting active modes. Figure 15-4 below shows a render of the A2B recommended option at Manukau station.

Figure 15-4: A2B rapid transit at Manukau station

The key features of the option are:

- A route connecting the two major urban centres (Manukau and Botany), the Airport and its employment areas
- Connects four existing or proposed rapid transit lines and numerous frequent and local bus services.
- Opportunities to leverage land use change through transit-oriented development
- A staged delivery enabling access and travel choice problems that exist now to be addressed early, investment to be aligned with related projects and capacity and performance to be aligned with growth in demand
- A patronage demand of around 2,000 per hour in the AM peak in 2048 which requires a high frequency service with a 3-minute headway if a high capacity BRT vehicle is adopted
- A relatively high operating speed and level of reliability to enable mode shift and to support the specific needs of customers
- Articulated, low-floor electric BRT service running at high frequency in dedicated lanes between the Airport and Botany
- A long span of service to enable access and travel choice for shift workers and travellers (domestic and international)
- Allows for level boarding all-door boarding, off-board ticketing and tag-on (like a train or light rail) at stations, providing a best practice customer experience and reduced dwell times
- Opportunities to provide walking, cycling and multi-modal interventions for station access and along the route
- Integration with rapid transit, local bus, cycle and road networks
- Accessible and integrated station designs and locations
- Integrated with the delivery of improved state highways to and around the Airport and Southwest

Auckland as part of the SWGP.

15.2.2 Mode and service

In order to fulfil the role required of attracting additional customers, providing a good alternative to car use and supporting desirable land-use change, the recommended rapid transit service has the following characteristics:

- A relatively high operating speed and level of reliability to enable mode shift and to support the specific needs of customers
- Articulated, low-floor electric vehicles with a service running at high frequency in dedicated lanes between the Airport and Botany
- Operating times that enable access and travel choice for shift workers and travellers (domestic and international) - 04:30am - 01:30am (next day), seven days a week (as per the Concept of Operations – Appendix G2).
- Accessible and integrated station designs and locations.
- A direct route alignment and RTN-style station spacing to enable fast and reliable journey times.
- A single service design providing a direct, trunk route to key activity generators and interchanges, with local connector services 'branching' off, making the service easy to use, legible, and efficient. The design is flexible to allow for alternative service patterns and modes in the future.

The recommended mode is a BRT service that can be developed from a simpler standard bus-based service with local on-road priority. The mode and service of the BRT service is shown in Figure 15-5.

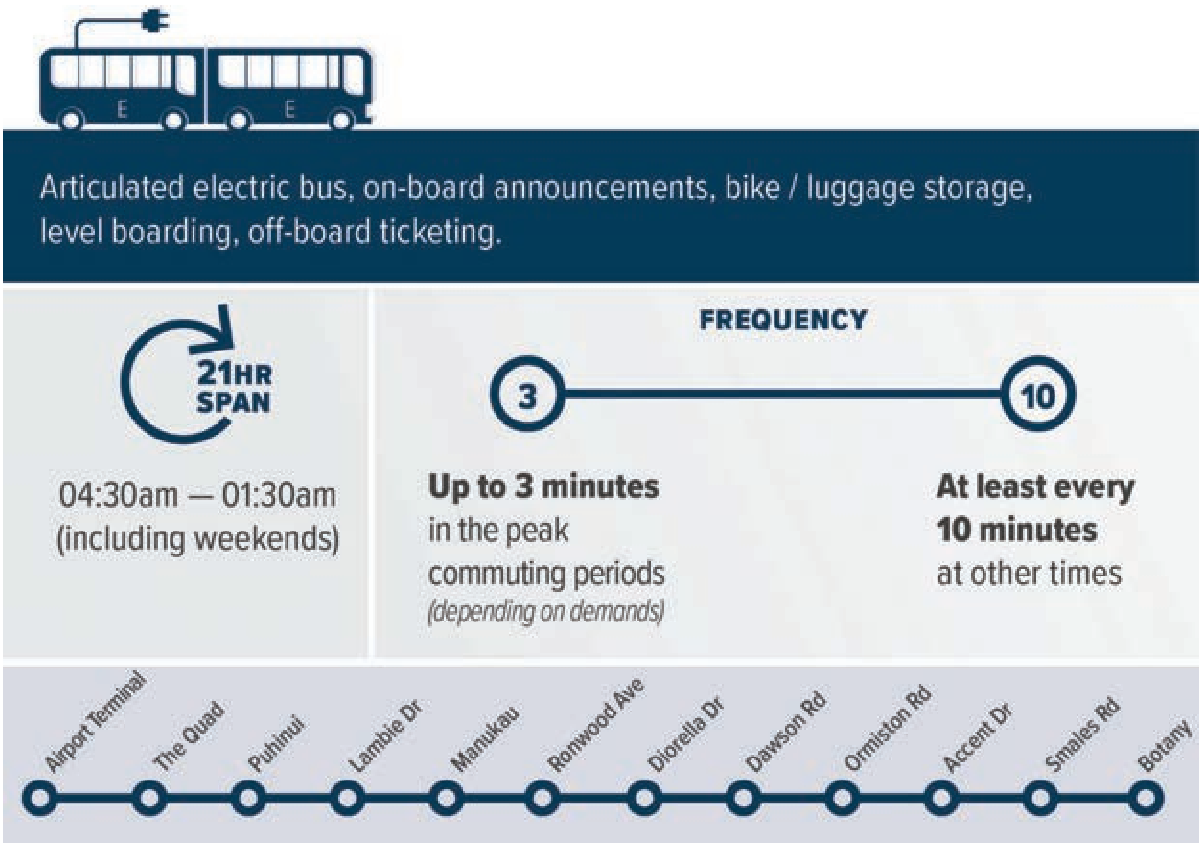


Figure 15-5: Summary of recommended rapid transit option

A BRT system that has its own running way but is required to negotiate signalised intersections would have signal pre-emption to optimise journey times and reliability and value from the investment.

With multiple service patterns, signal priority is harder to implement due to inconsistent headways. It is also likely that under a multiple service pattern system, buses will enter and exit the busway, making the network less legible and off-board ticketing and all-door boarding more difficult to implement. With a single service pattern, customers have certainty as to where the service is going to stop and what route it will take.

A high capacity double-articulated BRT vehicle of around 24m in length will be required to carry the forecast 2,000 people per hour, at a 3-minute frequency by the late 2040s. An example of this high capacity vehicle type is shown in Figure 15-6. The fleet can be staged with smaller vehicles operating until then. With a 24m BRT vehicle, the A2B service would have the ability to accommodate 20% more demand than forecast for the late 2040s, providing additional flexibility in the long term.

The demand profile is such that the line could be served by a relatively simple service pattern that provides base capacity for 900 passengers per hour in each direction at all times, supplemented by additional capacity up to 2,000 passengers per hour in the peak direction, at peak times.

A BRT system can meet the required capacities and investment objectives. Having such features as level boarding, off-board ticketing and multi-door entry and exit will support a reliable and fast service through minimising dwell times while making the service easy to use and accessible for customers.

Figure 15-6: Example of high capacity BRT vehicle (double-articulated bus - Van Hool Exquicity) 24m

15.2.3 Future-proofing and retaining flexibility

For the reasons indicated in Section 14.1, a single service pattern is recommended for the A2B RTC. However, as described in Section 14.5, the project team acknowledge that given the proposed longer-term timeframe for delivery of the ultimate A2B RTC, it is important to retain flexibility for alternative service patterns that may be identified in the future. To reflect this, two sets of potential station designs have been developed for the A2B RTC (see Appendix O-1):

- **Streamlined Design:** This design reflects the recommended single-service operating pattern for the A2B system, with inline stations with one lane in each direction and no passing lanes. Some provision will be made for operational flexibility by extending the length of RTN stops at some stations to enable two vehicles to stop at a station, while also allowing vehicles to manoeuvre out from the platform and pass one another if necessary (eg in the event of a breakdown). This provision is not reflected in the design appended to this SSBC and will be updated in the next project phase.

- **Future-proofed Design:** This design provides additional flexibility by providing passing lanes at selected stations where vehicles may need to pass one another if an alternate service pattern with multiple services using the busway were required (either rapid transit or local services). This design has a slightly larger footprint due to the additional width required at stations.

It is recommended that the future-proofed design is used for the purposes of the route protection and consenting phase of the project. This is a conservative assumption that reflects uncertainty regarding future land use and demand patterns which may further inform the ultimate local bus network and rapid transit service pattern[108].

15.2.4 Route alignment and cross-sections

The rapid transit alignment depicted in Figure 15-7 was chosen as part of the recommended option.

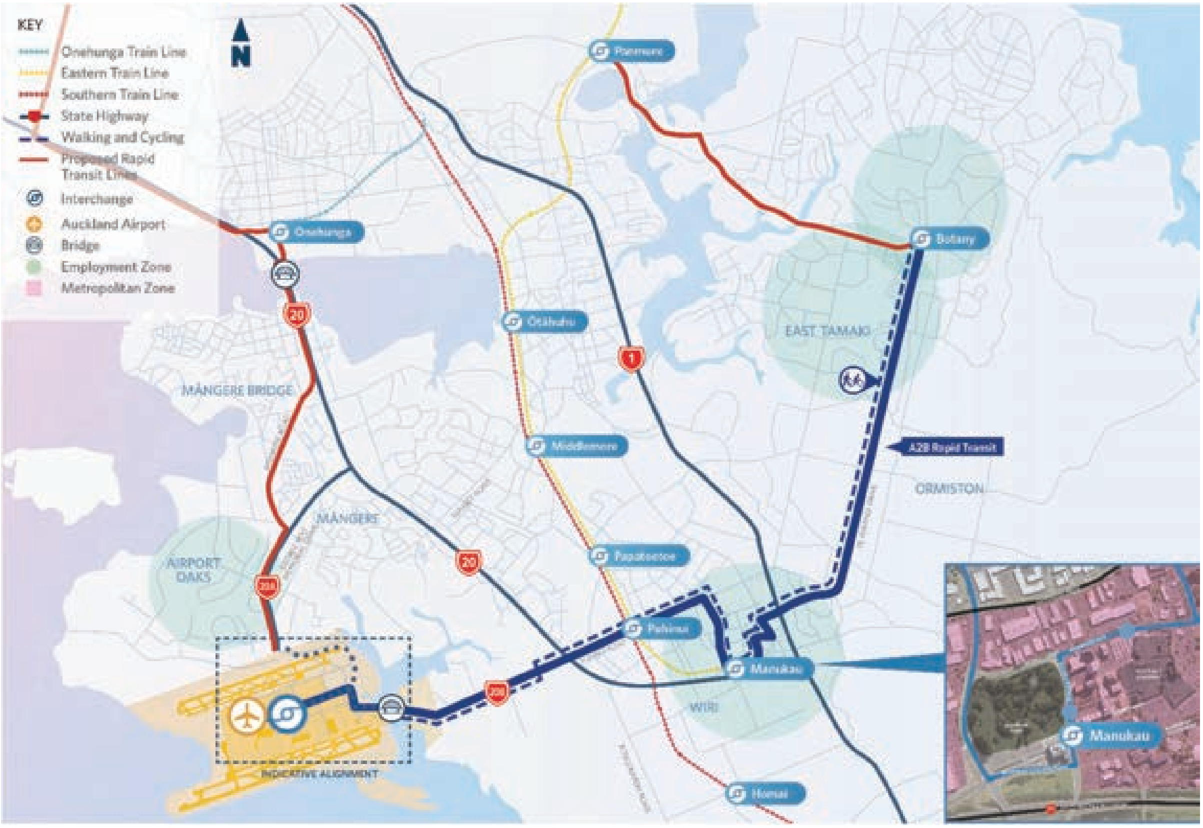


Figure 15-7: Airport to Botany recommended rapid transit route

A primary strength of the recommended rapid transit option is the direct link between the Airport and Puhinui Interchange, giving the shortest travel times for journeys between the Airport and East and South Auckland. These short travel times result in fast passenger trips, good regional network

[108] The cost estimates included in this SSBC have been developed based on the original concept design which does not include passing lanes or extended stopping bays. Updated cost estimates (construction and property) will be undertaken in the next project phase.

connectivity with a wide catchment area, and relatively low operating and fleet costs. This route was strongly favoured by the public. The route, however, traverses environmentally and culturally sensitive sites including Pūkaki Creek. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

The recommended option through Manukau was developed with an alignment (west east) along Manukau Station Road but continuing along Davies Avenue to Ronwood Avenue. This option was developed with the aim of achieving good access to the business area, despite being a slightly longer route, and serves both the rail-bus interchange and the northern side of the metropolitan centre. It also avoids the congested and constrained intersection of Great South Road, Manukau Station Road and the adjacent SH1 Southern Motorway ramps.

Te Irirangi Drive as far as Botany is the most direct, fastest and most reliable route and allows integration with the supporting bus, cycle and pedestrian networks. It takes advantage of earlier planning for Te Irirangi Drive (which provided a wide corridor and medians, resulting in limited property impacts) as a possible rapid transit route. The downside is the likely loss of mature trees and some possible noise impact on adjacent properties.

A focused assessment at Botany determined the best location for the terminal there, taking into account the interrelationship with the Eastern Busway.

The BRT corridor would have a separated running way but operate at-grade through signalised intersections assisted by managed signal pre-emption. The Preliminary Design Philosophy Statement (Appendix N-1) and the Concept of Operations (Appendix G-2) describe the physical and operational product in detail.

Typical cross sections are below. The placement and alignment of the rapid transit corridor itself is predominantly a central running rapid transit service as depicted in Figure 15-8.

Centre placement allows property access to be provided for without affecting the RTN and left-in-left-out movements for minor roads, while major intersections can be managed with traffic signals. The Davies Avenue and SH20B (on the western side of the SH20/20B interchange) sections would switch to side running (see Figure 15-9 and Figure 15-10) to limit traffic interactions and maintain travel time and reliability in the congested Manukau area. In these locations, there is limited side-access. The SH20B section proposes the rapid transit corridor running on the southern side of the highway alignment.

Figure 15-8 A2B cross-section - Te Irirangi Drive

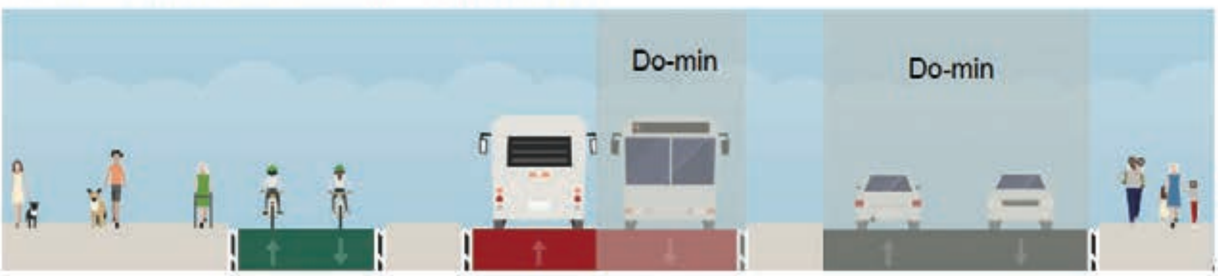


Figure 15-9 A2B cross-section - Davies Avenue

Figure 15-10 A2B cross-section - SH20B (western side of SH20/SH20B interchange)

15.2.5 Patronage

The rapid transit corridor is expected to carry around 2,000 people in the peak hour/direction in 2048 increasing from 1,000 in 2028, at its busiest point. The A2B occupancy by section for peaks and interpeak are shown in Figure 15-11, Figure 15-12 and Figure 15-13. Demand across the A2B route is relatively constant, reflecting the role A2B is expected to play in connecting with other rapid transit corridors at Puhinui and the Eastern Busway, serving the metropolitan centres at Manukau and Botany and employment zones in East Tāmaki.

This level of demand is significant, by the late 2040s requiring a high-capacity BRT vehicle every 3-minutes which confirms the case for a separated running way to maintain a reliable operation.

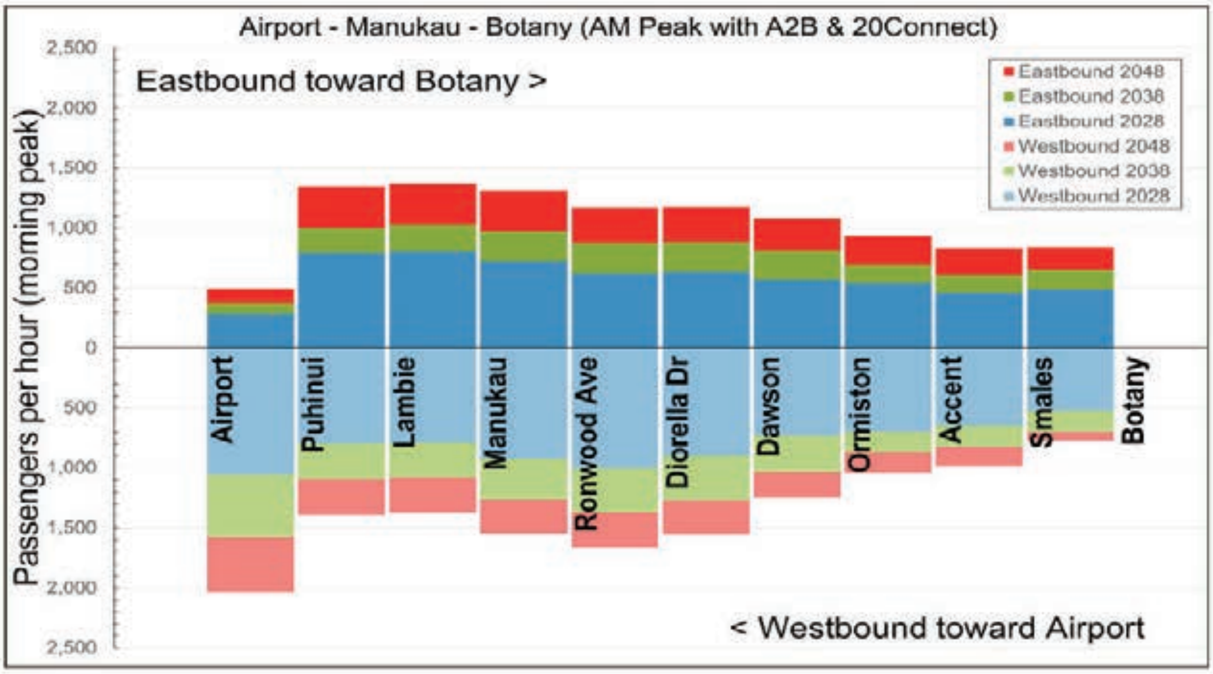


Figure 15-11: AM peak hour occupancy by section and direction, by decade

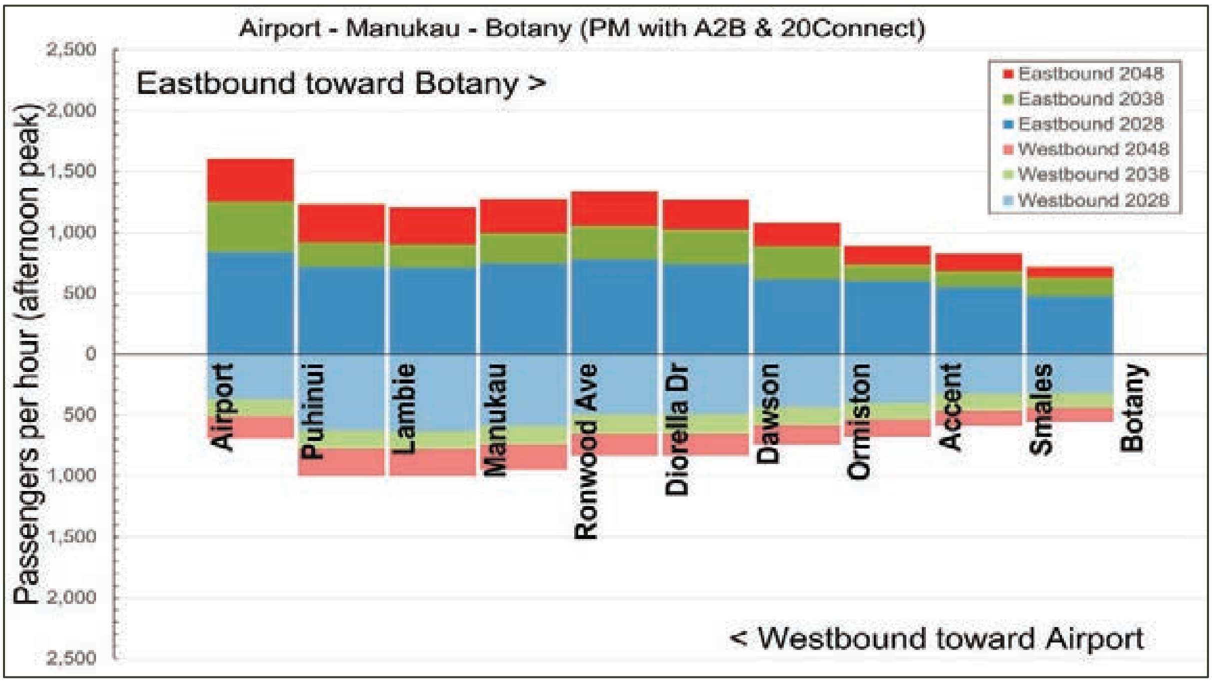


Figure 15-12: PM peak hour occupancy by section and direction, by decade

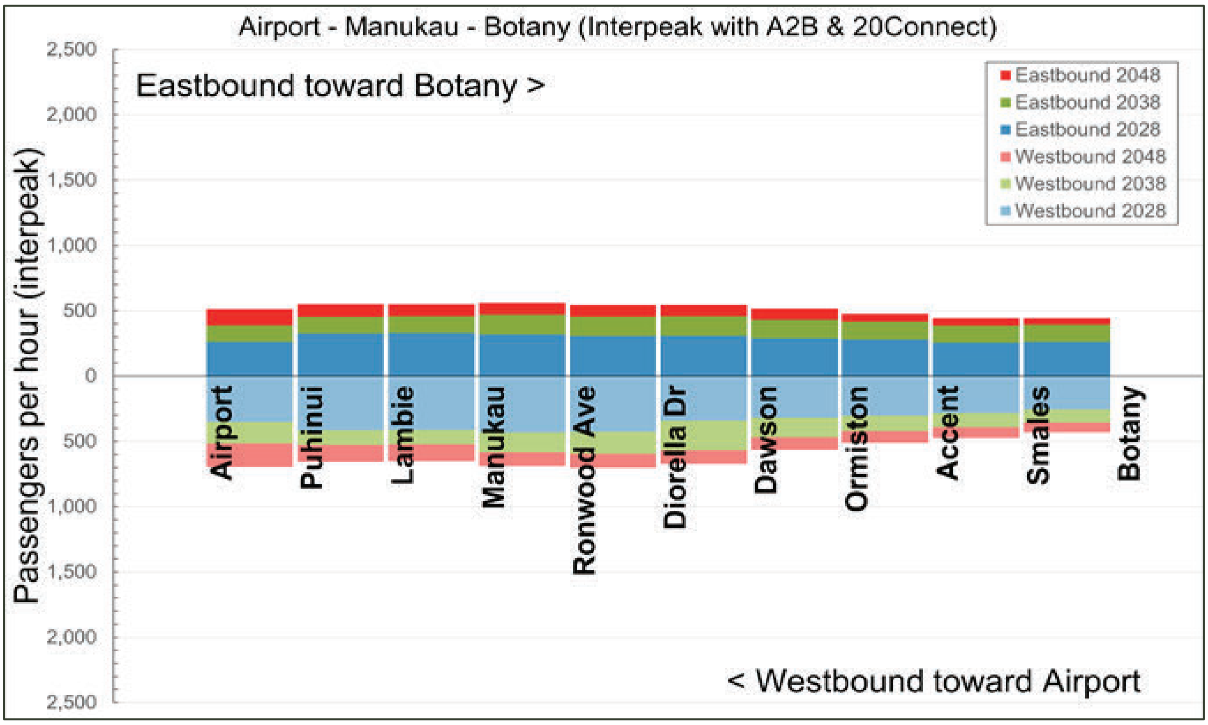


Figure 15-13: Interpeak hour occupancy by section and direction, by decade

15.2.6 Recommended station locations

Figure 15-14 shows the recommended route with stations and interchanges, noting the key interchanges with other rapid transit lines. The station location selection process is outlined in Section 14.7, and detailed further in the *Station Locations Technical Note* (Appendix X).

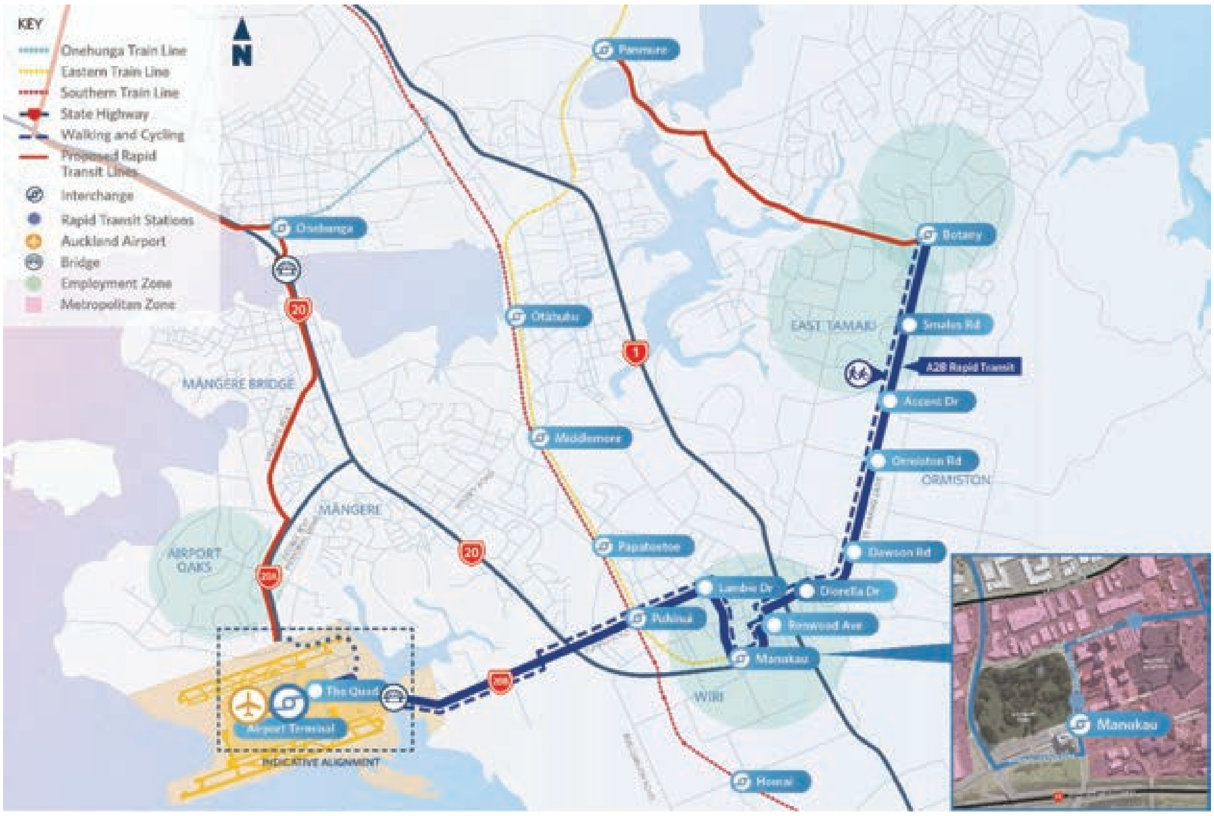


Figure 15-14: A2B route, stations and interchanges

Apart from the Puhinui, Manukau and Botany stations, stations would be similar in scale and quality to a light rail stop or those being designed for the Eastern Busway. An artist impression of Puhinui Station showing its stage 2 upgrade with the A2B rapid transit bridge over the rail lines and a typical A2B station are shown in Figure 15-15 and Figure 15-16 respectively.

Figure 15-15: Puhinui Station

Figure 15-16: Visualisation of a typical A2B station

Attributes of the stations are described in more detail in the Concept of Operations (Appendix G-2).

15.2.7 System integration

The strategic MSM model is used to draw some high-level conclusions as to the likely usage patterns. See the Concept of Operations (Appendix G-2) for further information.

Taking a forecast screenline on Te Irirangi Drive around the SH1 crossing entering Manukau in 2048 (Figure 15-17) shows that:

- Over half of all passengers crossing the screenline at Manukau have transferred from buses making operational and physical connections with local bus services crossing Te Irirangi Drive and at Botany important.

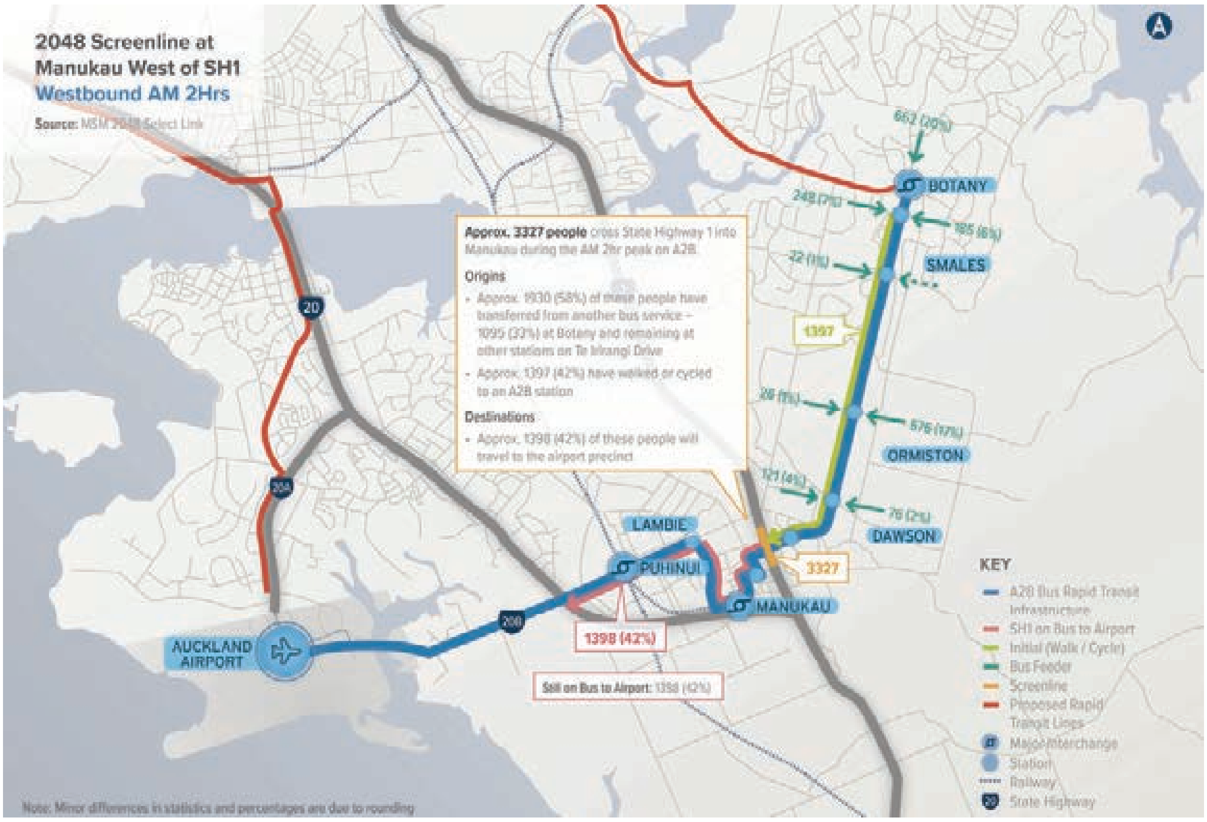


Figure 15-17 Demand origins and destinations. Screenline on Te Irirangi Dr, west of SH1 (source: MSM i11.5 2048)

Taking a screenline on SH20B as it enters the airport area in 2048 (Figure 15-18) shows that:

- There is a strong link with rail services at Puhinui Station. Almost half (45%) of the patronage entering the airport has come from trains (11% from the north and 34% from the south). This reinforces the importance of Puhinui Interchange and the importance of maintaining and enhancing a seamless transfer.
- There is a strong link with the southern growth areas of Auckland. Approx. a quarter of all people on the RTN as it enters the airport have come from Papakura or further south. This illustrates the alignment with Supporting Growth South and the need to consider wider network integration.

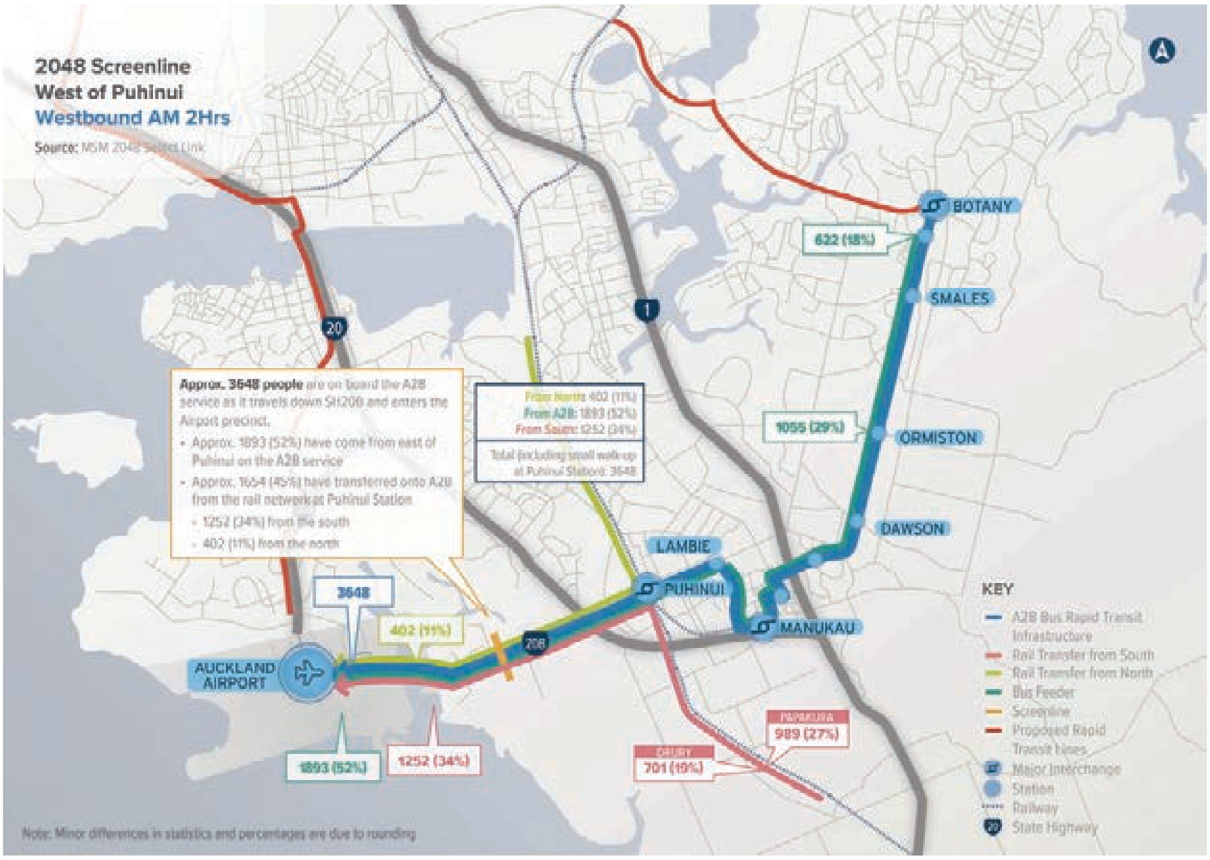


Figure 15-18 Demand origins and destinations. Screenline on SH20B (source: MSM i11.5 2048)

Taking a screenline on Puhinui Road as it enters Manukau in 2048 (Figure 15-19) shows that:

- There is a strong link with rail services at Puhinui Station. Over half (67%) of the patronage entering the Manukau from the west has come from trains (8% from the north and 59% from the south)
- There is a strong link with the southern growth areas of Auckland. Approx. half of all people on the RTN as it enters the Manukau from the west have come from Papakura or further south.

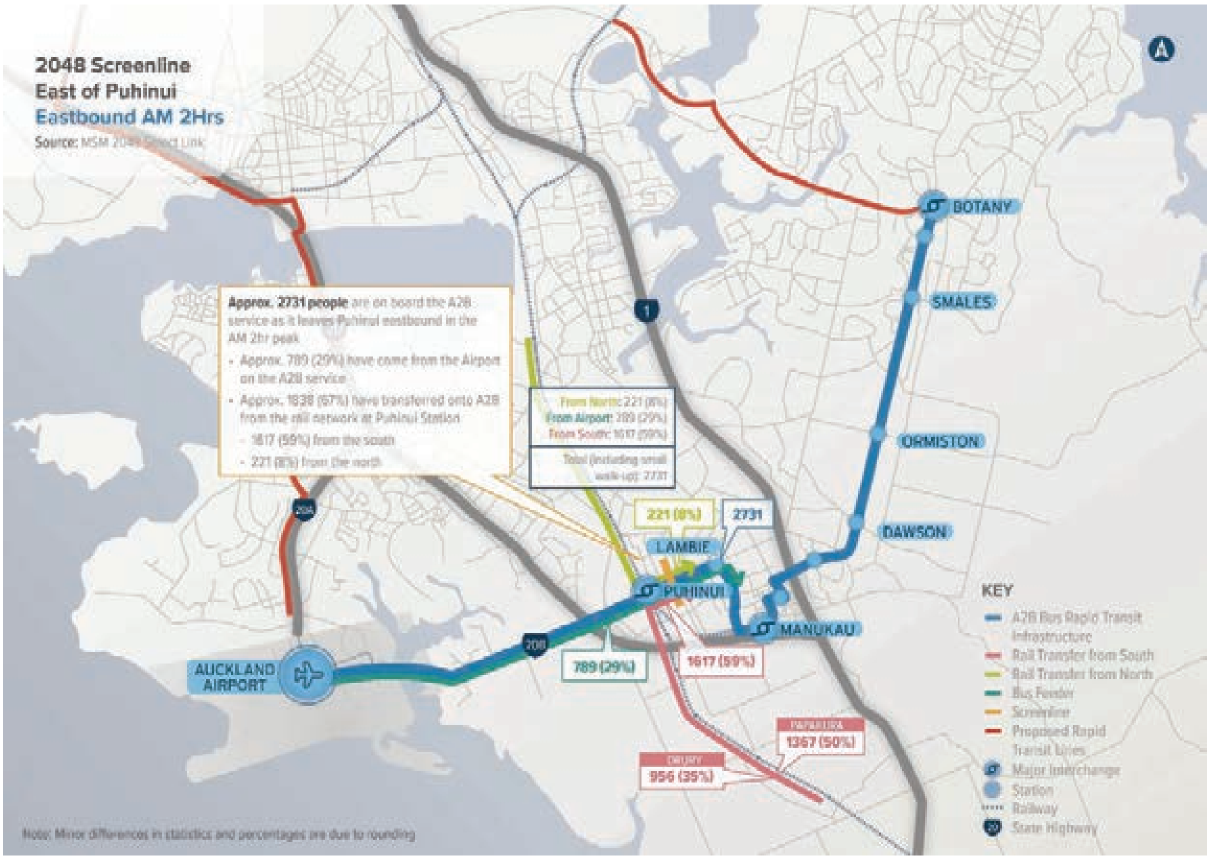


Figure 15-19 Demand origins and destinations. Screenline on Puhinui Road (source MSM i11.5 2048)

15.2.8 Proposed public transport network

As outlined in the *Potential Changes to Local Bus Network and Supporting Infrastructure in Response to A2B* technical note (Appendix X), the local bus network could be re-designed to get the most from the new rapid transit corridor, reduce duplication and provide better opportunities for travel. Figure 15-20 shows the A2B route with the proposed local bus network and connecting rapid transit lines showing all potential connections.

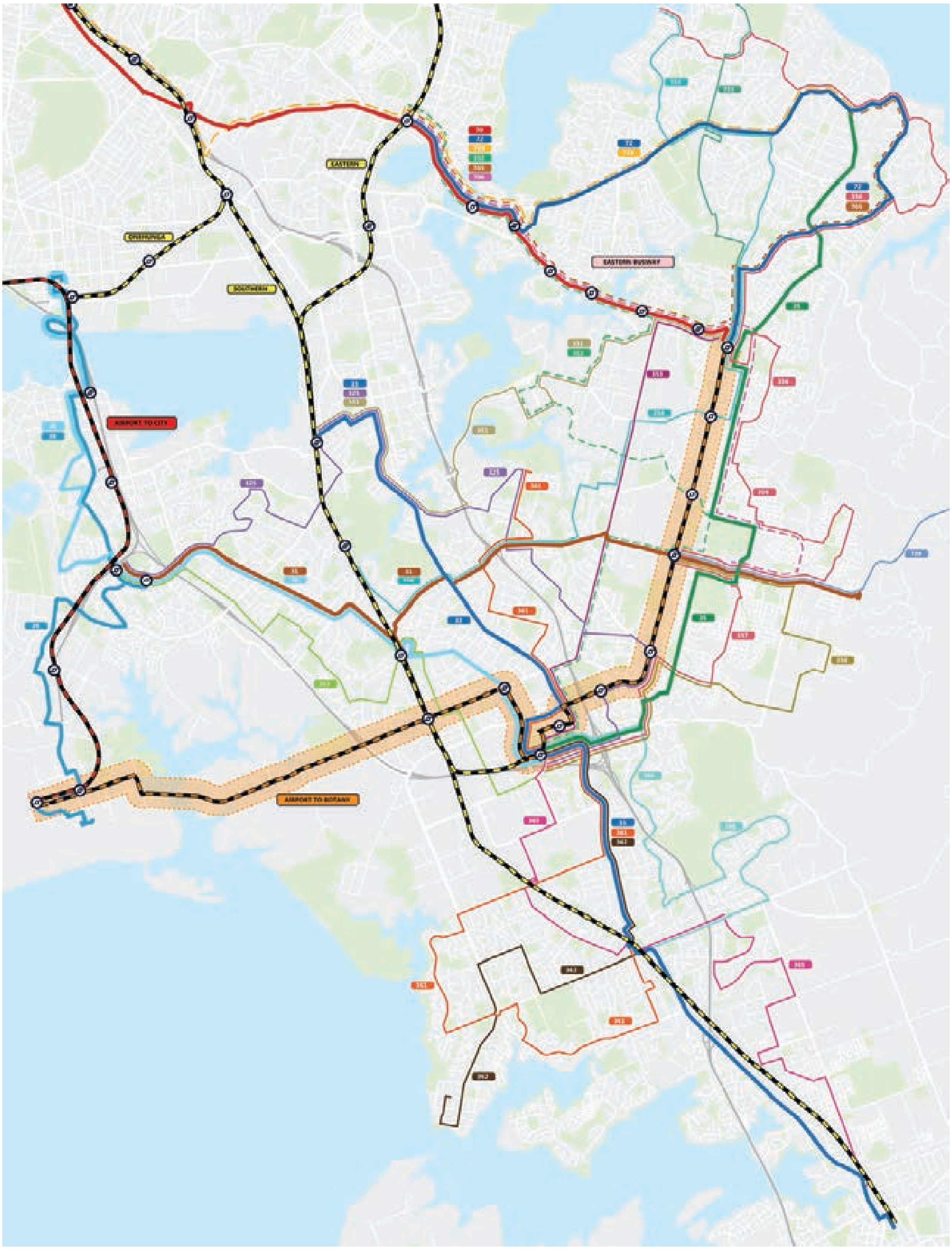


Figure 15-20: Proposed public transport network including A2B stations

While the significance varies, all stations have a role in connecting other public transport services to the A2B service, allowing people to make connected journeys. A2B will connect almost 30 existing and proposed local bus, train, BRT and LRT services at its stations. Key connections are as follows:

- A2B customers will be able to interchange with 13 bus routes at Manukau Bus Station and the Eastern Rail Line train service at Manukau Train Station.
- The A2B Airport Station connects A2B with the future LRT project CC2M.
- Customers will be able to transfer with the new Eastern Busway bus rapid transit service and up to nine local bus routes at the future Botany Station. Stage 1 station delivered by Eastern Busway by 2025.
- Customers will be able to transfer between six local bus routes at A2B's Ormiston Station, substantially improving access for the Eastern suburbs of Flatbush and Ormiston to jobs and other opportunities.

Table 15-1 below shows all the connections at all A2B stations.

Table 15-1: Post A2B public transport network

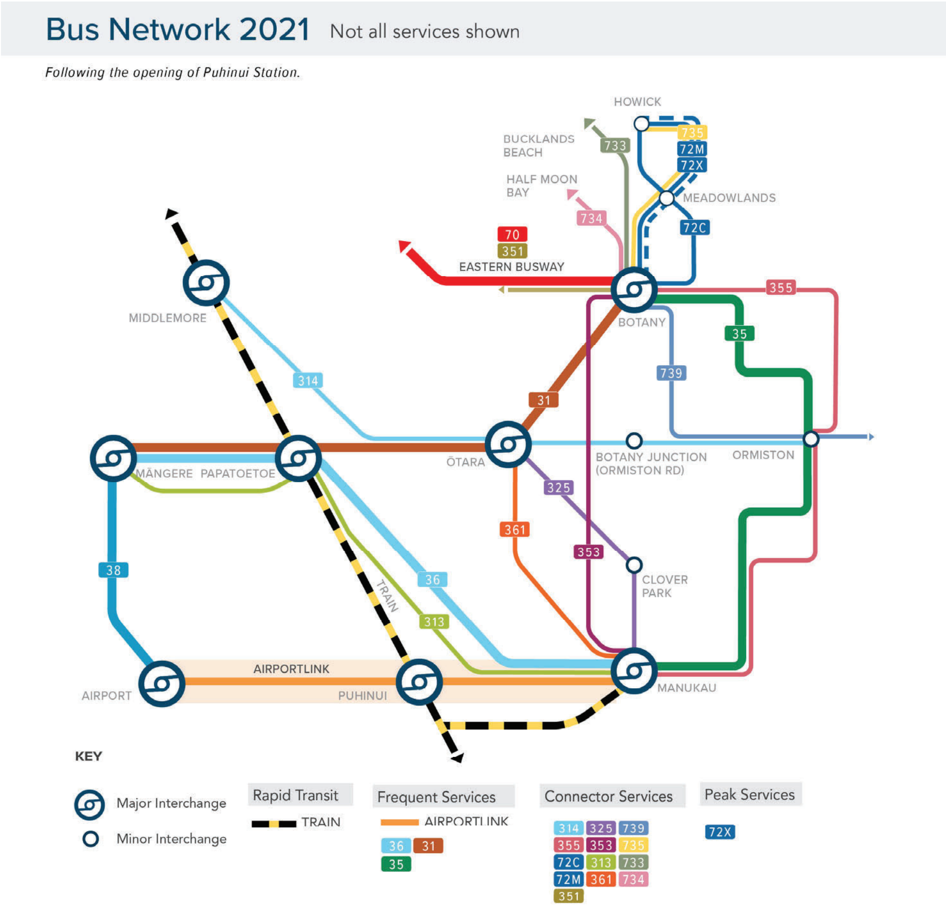
No.	Station	Bus Route Connections	RTN: Train Service / LRT / BRT	Total Connections	Routes / services
1	Botany	9	1	10	35; 70; 72; 351; 353; 354; 356; 705; 706[109]; 733
2	Smales	1		1	354
3	Accent	1		1	351
4	Ormiston	6		6	31; 352; 356; 357; 358; 739
5	Dawson	3		3	325; 357; 358
6	Diorella	1		1	325
7	Ronwood	0		0	
8	Manukau	13	1	14	33, 35, 36, 313, 325, 352, 353, 357, 358, 361, 362, 365, 366; Eastern Train Line Service
9	Lamble	1		1	
10	Puhinui	0	2	2	Southern Train Line Service; Eastern Train Line Service
11	The Quad	0		0	
12	Airport	2	1	3	380; NLX[110]; CC2M

[109] At Botany, the 705 and 706 are peak services that run via the Eastern Busway. It is preferred these call at Botany. However, this may depend on the layout of Botany Station and the EB4 link road.

[110] NLX new express service between New Lynn-New Windsor and the Airport subject to funding prioritisation.

No.	Station	Bus Route Connections	RTN: Train Service / LRT / BRT	Total Connections	Routes / services
Total connections		37	5	42	

Furthermore, Figure 15-21 below shows the pre and post A2B bus network, suggesting a more connected and grid-like network following the implementation of A2B.



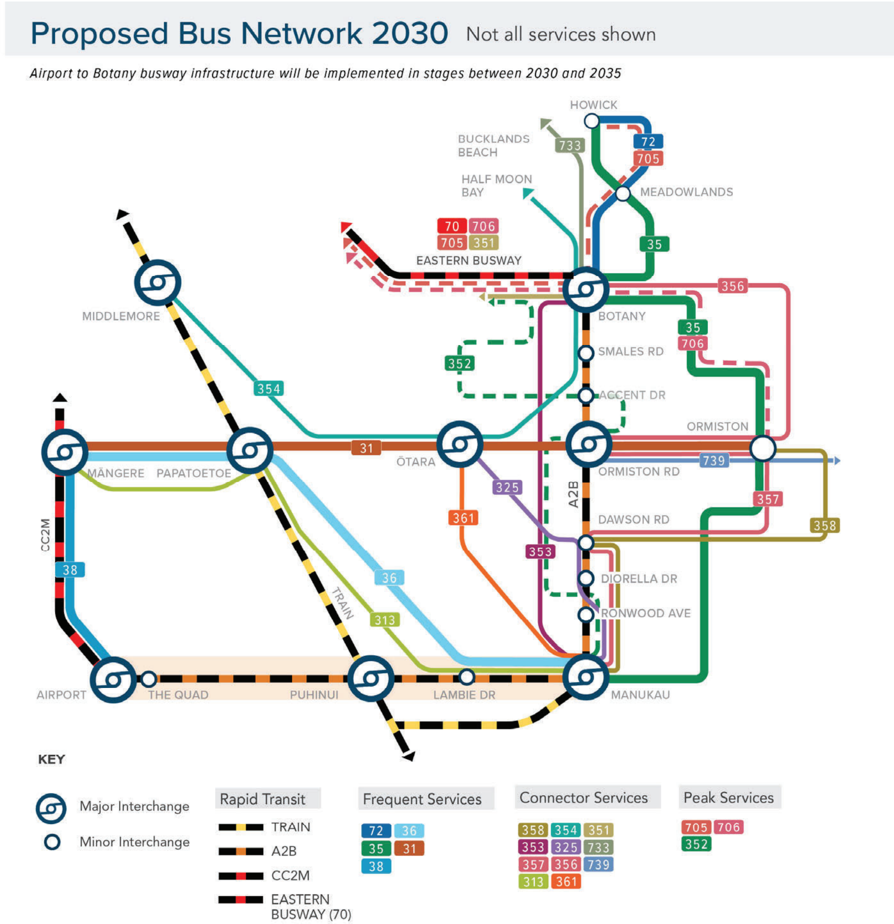


Figure 15-21: Pre and Post A2B bus network

15.2.9 Modal provision

To enable this wider catchment to be accessed effectively and provide people with genuine travel choices, consideration of network integration and specific design for the following arrival modes are recommended as opportunities to be investigated as part of future programme phases or as part of other programmes in the study area.

Cycling (including electric bikes)

Cycling is evolving and with the uptake of powered e-bikes cycling is becoming a real alternative for longer distances and for wider sections of the community. This requires:

- Secure bike storage
- Safe access routes
- Integration with wider cycling networks
- Potentially, bike share schemes.

Other micromobility

This is a mode or range of modes that is rapidly changing and may have evolved further when A2B is designed in detail. Consideration of access for, safety of and storage of scooters and other forms of mobility is required.

Demand responsive transport

While at this time there are no proposals to operate demand responsive transport in the study area, it has the potential to support access to the system and should be provided for, if proposed.

Taxi and ride share

Taxis and ride share, including Uber, for example, are likely to be a mode of access to stations, particularly with the Airport as a key destination. Opportunities to provide for sufficient space on local streets near stations with lighting and quality access to stations should be considered.

Private vehicle pick-up and drop-off

While private vehicle arrivals are not high in the access hierarchy, drop-off and pick-up may be an attractive mode of access given the number of cross-arterial roads that access motorways and major employments zones, meaning that ride-sharing and drop off could be a practical access mode.

Figure 15-22 illustrates these key commuter routes and the likely locations for this activity. Short term parking that is safe and well connected to stations are opportunities to be considered at these locations.

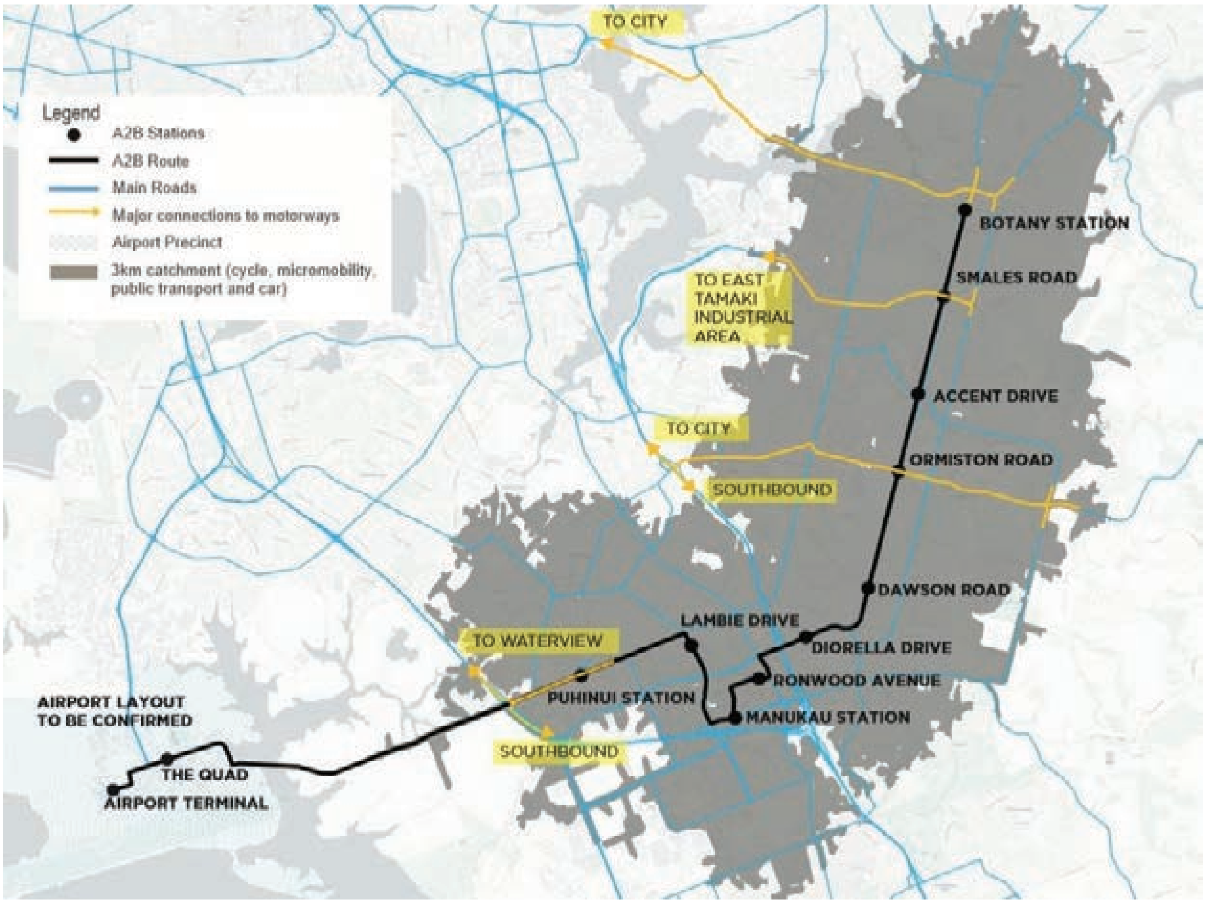


Figure 15-22: Potential drop off and pick up routes and locations

Park and ride

Consideration has been given as to the appropriateness of park and ride at stations along the A2B corridor, however, it is inconsistent with objectives and policy set up in the AT Parking Strategy and the Regional Public Transport Plan. Park and ride facilities are not always appropriate: Auckland Transport's strategy supports park and ride at the periphery of the public transport network where low density, semi-rural catchments are difficult to serve by feeder public transport services. Auckland's public transport network is built around a "hub and spoke" model where customers can use feeder bus services to access "hubs", or interchanges, where they can transfer to other bus, train or ferry services. The A2B route serves an existing urban area with a good walking and cycling catchment and feeder bus services.[111]

15.2.10 Station access opportunity

Station access (the first and last kilometre) is an integral part of every public transport trip and requires careful attention in the planning and design of A2B. To realise the potential of a rapid transit route, safe and convenient station access will be needed. This also responds to concerns expressed by customers in AT's customer insights surveys and evidence outlined in the problem definition.

[111] For more information, refer to Appendix X, 502334-7000-REP-KK-0028 High Level Walking and Cycling Station Access Assessment

Appendix X contains the High-Level Walking and Cycling Station Access Assessment, as well as the Detailed Walking and Cycling Station Access Assessment.

The plans focus on station access by walking and cycling (active modes). Refer to Section 15.2.9 for corridor-wide walking and cycling provisions proposed as part of the recommended option for A2B and 20Connect. These include high quality, dedicated walking and cycling facilities along the lengths of the rapid transit and state highway corridors.

It is recognised that stations can be accessed by a range of other modes, particularly when considering the relatively low land use densities in parts of the corridor. The plans therefore also consider:

- Cycling and micromobility (including electric bikes and scooters)
- Local buses
- Private vehicle access through vehicle pick-up/drop-off ('kiss and ride', taxi, ride-share).

This follows the mode access hierarchy, shown in Figure 15-23.

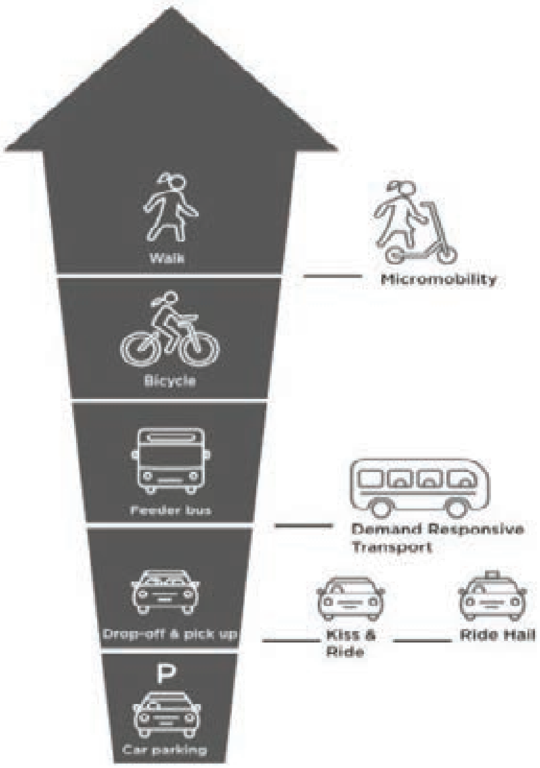


Figure 15-23: Mode access hierarchy

The station access requirements were assessed[112] with targeted street design recommendations made for each station to contribute to the achievement of the SWGP objectives. The station access network is designed to reduce the distance and time it takes for people to travel from their origins to stations and from stations to destinations, while simultaneously improving the user experience and safety.

The Financial Case (Section 18) for the project includes the following:

- Local bus stops

[112] High Level Walking and Cycling Station Access Assessment and Detailed Walking and Cycling Station Access Assessment (Appendix X)

- Drop off and pick up zones
- Pedestrian improvements in the immediate station environs
- Cycle access and storage.

Given the relatively low land use densities on some of the route, careful attention will be required to arrival modes that can extend the catchment of the service and enable the system to fully give effect to the project objectives. Figure 15-24 illustrates the 1km and 3km catchments of proposed stations.

The 1km catchment is a reasonable catchment for walk-up passengers, and is consistent with best practice for rapid transit corridors and supported by the *Walkable Catchment Analysis at Auckland Train Stations technical report.*[113]

A 3km catchment is applied to a range of modes including cycling, micromobility, taxi, ride share or drop-off and pick-up. The 3km catchment extends to cover a significant proportion of the urban area in the corridor. This 3km catchment represents the opportunity to increase the accessibility benefits of the rapid transit corridor to a wider population through wider improvements to station access for a range of arrival modes.

Improvements to wider access routes further from stations is an opportunity that should be progressed in parallel to A2B. Further information can be found in the Management Case.

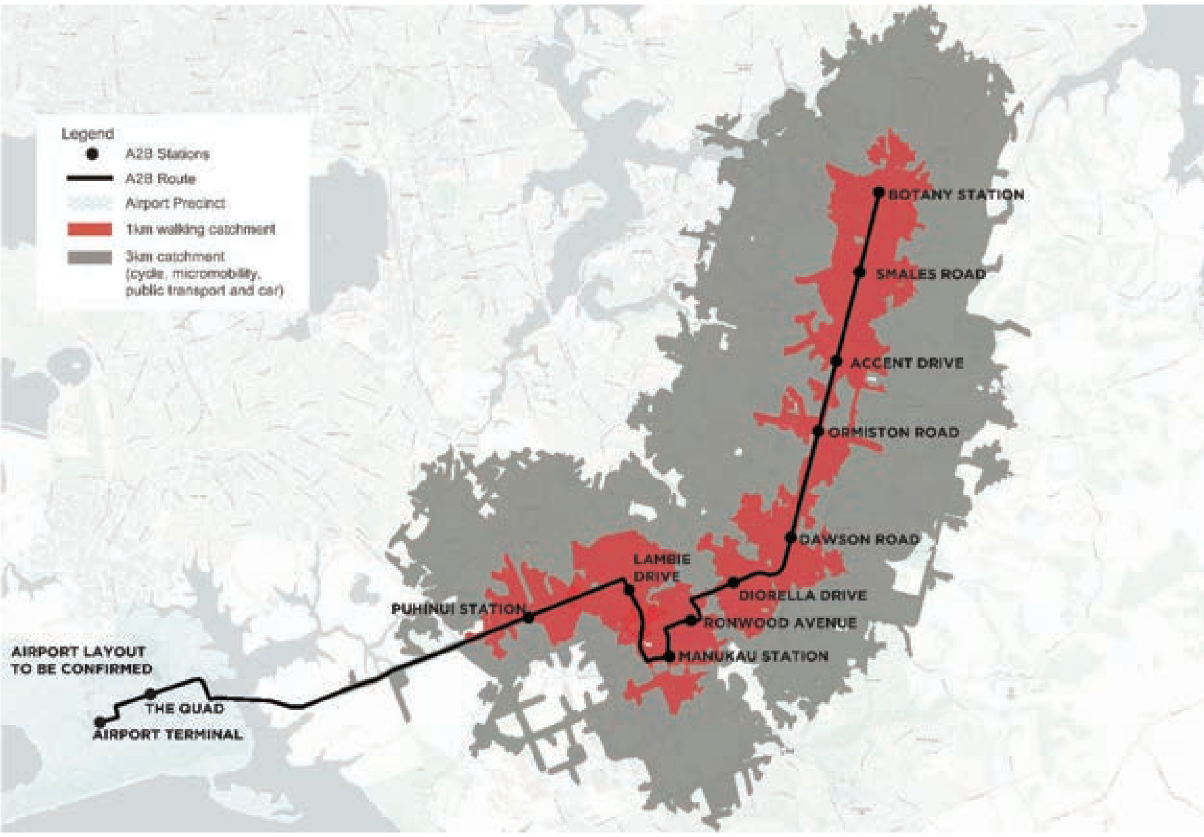


Figure 15-24: Walking catchment and cycling/micromobility/motorised catchment for A2B stations

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113 Auckland Council 2012, TR2012/023

15.2.11 Transit oriented development (TOD) potential

The recommended option connects major centres of travel demand and urban regeneration potential. The route connects two metropolitan centres in Manukau and Botany as well as NZ's gateway to the world and major business area in Auckland Airport and its surrounds.

The A2B and 20Connect projects carried out an assessment of the potential for TOD which considered current zoning provisions as well as the potential for changes in zoning to better give effect to the increased redevelopment potential that A2B can provide[114]. This study has found that there are extensive opportunities for TOD near the proposed stations. The TOD opportunities – both for TOD site development and up-zoning – exist to varying degrees within segments of each station catchment.

Figure 15-25 below shows the recommended level of priority for exploring TOD opportunities. High priority areas are the Metropolitan Centres at Manukau and Botany as well as Puhinui Station. Manukau is a very high priority due to the proposed investment by Government and the private sector in housing, education and employment, permissive planning provisions and large, agglomerated land holdings. Opportunities also exist at Botany Junction (Ormiston Road) and Lambie Drive. The first stage of Botany Station will be delivered by Eastern Busway, opening in 2025. Supportive zoning already exists, including business metropolitan and mixed-use zoning in the town centre, with potential opportunities able to be realised sooner.

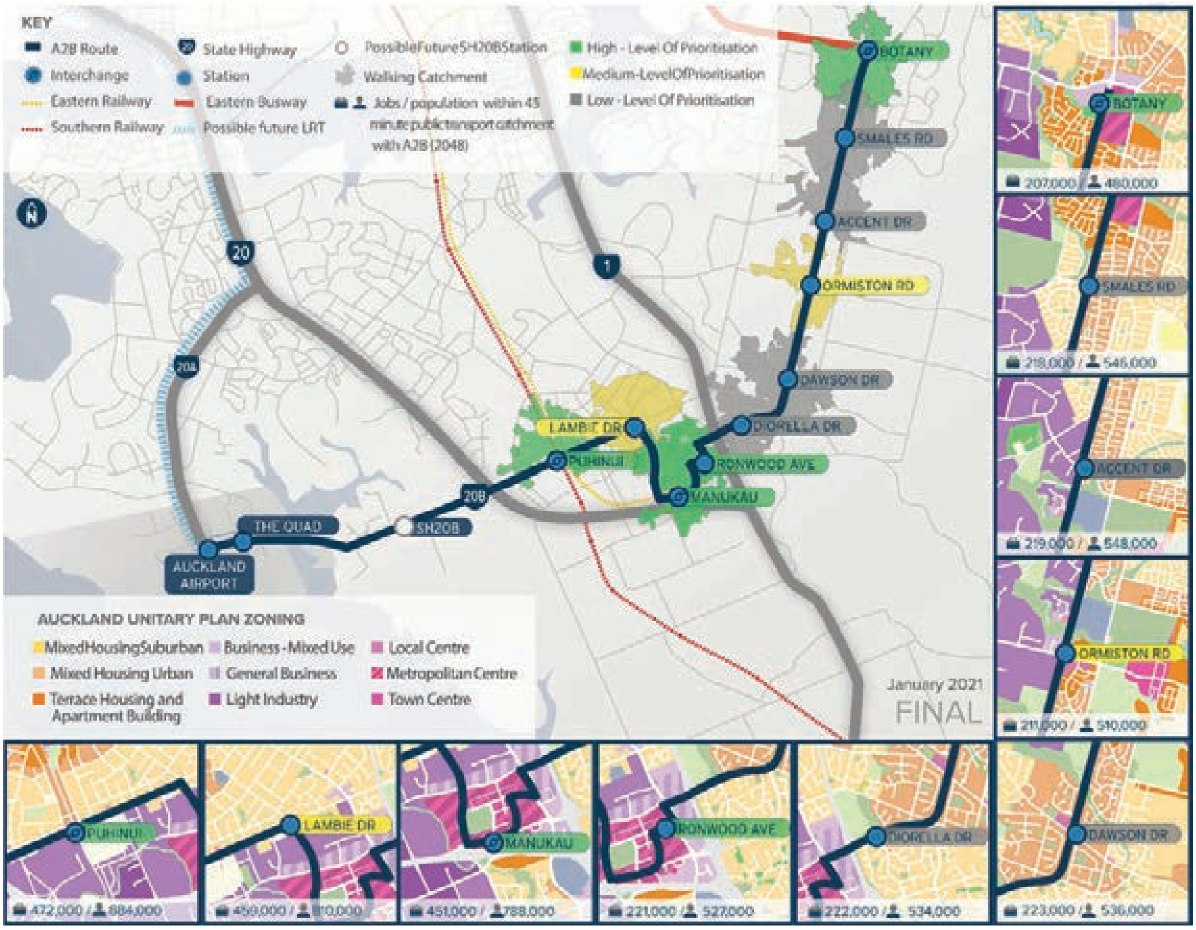

Figure 15-25: A2B stations with AUP zoning and recommended level of priority for exploring TOD opportunities

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114 Appendix U - Transit Oriented Development Land Use Study

The ultimate preferred option will be identified by Eastern Busway, with potential land integration opportunities explored via that project.

Since the analysis was undertaken the government has published the National Policy Statement on Urban Development 2020[115] which took effect on 20 August 2020. The policy will have very significant ramifications for TOD potential. Among other things, the NPS-UD requires Auckland Council to make changes to the AUP to enable "building heights of at least 6 storeys within at least a walkable catchment of existing and planned rapid transit stops."

TOD opportunities are to be further explored during the next project phase, particularly with Panuku and Kāinga Ora in Manukau. It is also noted that there are important land use integration opportunities at the two Airport stations (Airport terminal and the Quad precinct) and the programme partners will work together towards these.

15.3 Integrated section: SH20B

15.3.1 Strategy and arrangement

The SH20B section is unique in that its upgrade delivers both the A2B rapid transit route and a key element of the 20Connect suite of improvements in one physical corridor. The recommended option for SH20B is a key driver of the mode shift strategy and will require joint delivery from all programme partners (Te Ākitai Waiohua, AT, Waka Kotahi, and Auckland Airport).

Figure 15-26 illustrates the integration, form and function of the SH20B option. The Horizon 1 improvements currently underway (and assumed in the do-minimum for this SSBC) involves widening the highway to provide priority lanes for buses and other high productivity users. This outcome, while effective in the short term has four key issues which are expected to be significant as demand increases that are resolved by the recommended option:

- The rapid transit corridor will eventually require its own right of way due to increasing frequencies and the need for whole-of-route reliability and performance
- There is a merge remaining east of the Pūkaki Creek Bridge that will cause time delays, reduced capacity and reliability
- There is a heavy right turn movement from SH20B eastbound to SH20 southbound which will conflict with the rapid transit at the SH20/SH20B junction and/or cause delays on SH20B eastbound
- The proposed development of the Puhinui Precinct area to the south of SH20B will generate additional traffic, including freight with a new safe access required.

[115] National Policy Statement on Urban Development 2020 (NPS-UD 2020), NZ Government, July 2020

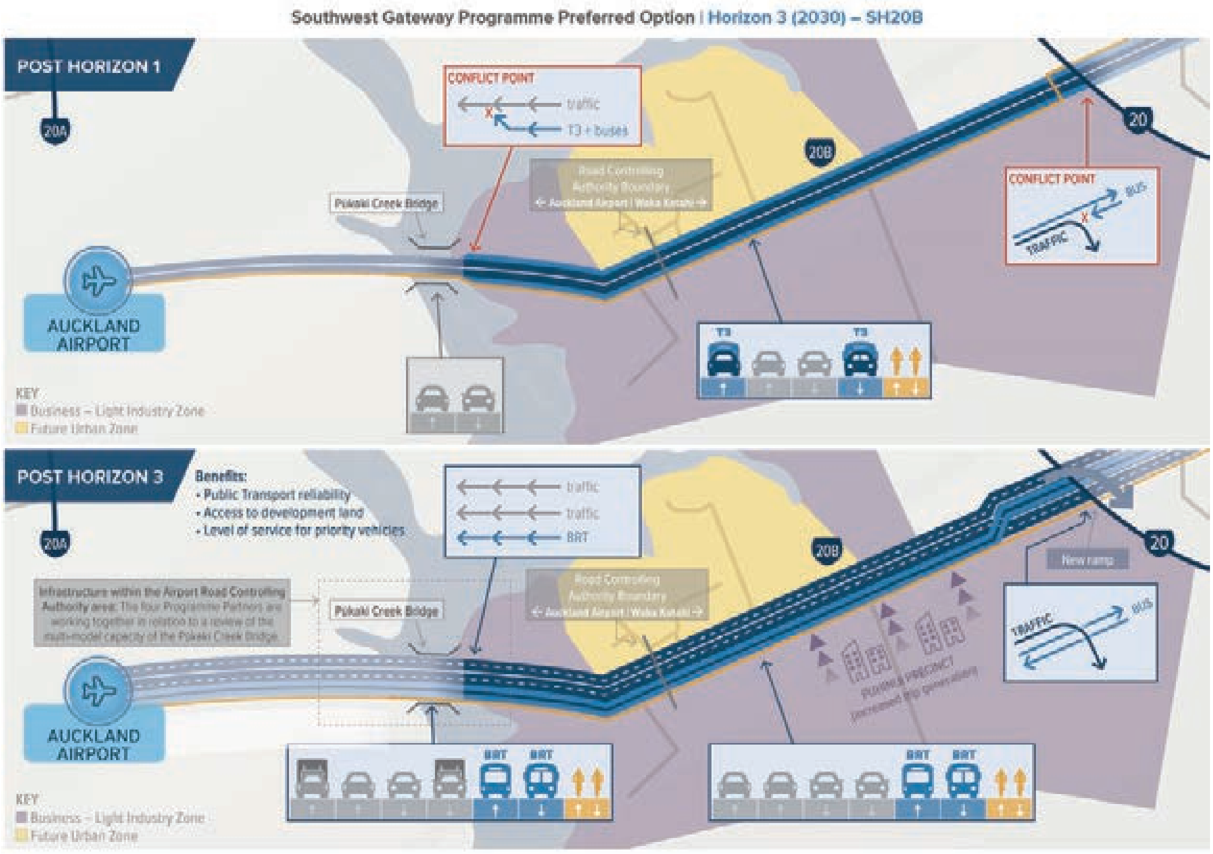


Figure 15-26: Integration and attributes of SH20B option

The proposed response is to:

- Construct a new rapid transit corridor south of the SH20B carriageway with a switch from centre running to kerbside operation just west of SH20, due to the Airport terminal being on the south / west side and side road access being limited to signalised intersections within this segment
  - Relocate the pedestrian and cycle shared path to south of the rapid transit corridor
  - Southern side running also results in reduced potential impacts on sites, waterways and areas of cultural significance such as Waokauri Creek, Papāhinau and Mimiti Te Arero located to the north of SH20B.
- Reallocate the use of the high productivity lanes built in Horizon 1 to general or selected traffic
- Remove a key movement conflict at the SH20B/SH20 motorway interchange through a new grade separated connection
- Free up capacity on SH20B for high value freight and other general traffic movements, by partially satisfying the demand with public transport.

The reallocation of space and delivery of a multi-modal corridor means that in practical terms, the SH20B improvements are a fully integrated outcome in which outcomes are fully interdependent. This is true of all programme partners as:

- There is an integration and reallocation of space between the rapid transit corridor and highway (including active modes)
- There is a logical prerequisite in continuing multi-modal infrastructure within the Airport RCA area as part of the AAPI, as part of the wider SWGP
- This preferred option potentially impacts Pūkaki Creek, one of the most sensitive environments in

the study area from a cultural and environmental perspective. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

15.3.2 Description of SH20B

Widening SH20B to 4 lanes expressway – online at-grade

It is proposed that SH20B is widened from four lanes (two general traffic and two bus/transit lanes) to a four-lane expressway, while retaining at-grade intersections. The outcome involves constructing a new rapid transit and active mode corridor to the south of the do-minimum facility. The additional bus/T3 lanes assumed in the do-minimum would be repurposed into general traffic lanes with an opportunity for HOV lanes. While not evident in the cross sections, the upgrade involves a new grade-separated connection between SH20B eastbound and SH20 southbound and upgraded intersections. This has the following advantages:

- Provides high quality public transport whilst not reducing general traffic and freight capacity
- Provision for a rapid transit corridor allows for the implementation of the rapid transit route, in line with multi-modal strategies and the desired mode shift outcomes of the SWGP
- Provides a high-quality pedestrian and cycle connection consistent with the proposed provision in the study area
- Aligns with the capacity and network design on the surrounding network, for example the expected network on the Airport precinct
- Provides opportunities for priority lanes to cater for high productivity classes, for example high occupancy vehicles (HOVs) and freight.

Figure 15-27: SH20B cross-section

15.4 State highway sections

This section describes the recommended state highway elements along SH20, SH20A and SH20B. While not proposed until late in the programme, the analysis has shown a need to improve connections between the Airport's northern access (SH20A) and the western ring route (SH20). Figure 15-28 below shows the recommended option for state highway sections.

The western ring route is a key route for business and freight as it links to SH16 at Waterview and SH1 at Manukau and Upper Harbour/Rosedale, allowing access to destinations within and outside the Auckland Region. The existing connection between SH20A and SH20 does not allow for trips from SH20A to head south on SH20, requiring trips from the Ascot employment area, north of the Airport, to use the local network in Māngere or travel through the Airport and use SH20B, neither of which are considered appropriate from a network efficiency and safety perspective. Improving this connection will also require improvements to SH20 and pedestrian/cycle paths are proposed.

Figure 15-28: Recommended state highway elements

15.4.1 SH20B to SH20 southbound ramp

A new SH20B to SH20 ramp, including the widening of SH20 south of SH20B in southbound direction, would:

- Allow the SH20B/SH20 interchange to operate in a way that reduces traffic conflict by removing a major right turn movement, enabling it to better accommodate public transport and active modes
- Improve access to the south from the Airport by increasing capacity and reducing delays for this movement
- Widening of SH20 south of SH20B will support the SH20B/SH20 connection, improving access between Airport and the southern development areas.

15.4.2 SH20A to SH20 southbound ramp

A new SH20A to SH20 southbound ramp, including the widening of SH20A in the northbound direction from Kirkbride Road, achieves the following objectives:

- Improves network resilience through provision of an additional connection in the state highway network, enabling more than one connection between the Airport area and the western ring route southbound.
- Removes strategic general traffic movements and freight trips from local roads (such as Māngere town centre and Massey Road), reducing rat running through the Airport and potential conflicts with active modes resulting in safer streets for people living in these areas. It is expected that there will be a decrease in traffic volumes on local roads including Bader Drive, Massey Road, Kirkbride Road and McKenzie Road due to this connection

- Removes the need for freight and other traffic to and from the south to travel through the Airport precinct and SH20B to access SH20 south toward/from Manukau. This will allow the Airport precinct network to function better and allow more time and space for rapid transit and other, higher priority uses
- Southbound freight movements from the Airport Oaks/Ascot area will only travel through three signalised intersections instead of up to eight. For example, for a journey from Richard Pearse Drive to west of SH20 / Roscommon Road interchange, the number of intersections that this traffic need navigate decreases with the provision of the SH20A to SH20 ramp, thereby enhancing convenience and reducing delays for drivers. This is illustrated Figure 15-29 below.

Figure 15-29: Intersections for a journey with (left) vs without (right) SH20A to SH20 ramp

15.4.3 Widening SH20 north of SH20A to eight lanes

The option includes widening SH20 by one lane between SH20A and Manukau Harbour Crossing in each direction. This intervention will:

- Improve journey time reliability, network resilience and safety
- Support objectives for reliability, resilience and economic performance
- Align with the ANOP to support the implementation of the northern rapid transit link to the Airport
- Support the intended function/objective of the Western Ring Route, by maintaining a reliable alternative to SH1, whilst accommodating growth and associated access requirements of the Airport and surrounding industrial and development areas.
- The improvement will involve the addition of a pedestrian/cycle shared path. Details on the recommended walking and cycling network can be found in Section 15.2.9.

Figure 15-30: Proposed SH20 north of SH20A cross-section

In the northbound direction, the four lanes will connect to the existing four lanes across Māngere Bridge, whilst in the southbound direction, the four lanes carry on from the four lanes across Māngere Bridge down to the SH20/SH20A bifurcation.

15.4.4 Widening SH20 between SH20A and SH20B to six lanes

The widening of SH20 from four lanes to six lanes between SH20A and SH20B is proposed to:

- Support the SH20A to SH20 southbound ramp, which will reduce rat running on local roads. From a safety and geometric perspective, widening of this section southbound is required to enable the new SH20A to SH20 southbound ramps to merge safely and efficiently and whilst maintaining required levels of service for the Western Ring Route
- Supports objectives around reliability, resilience and economic performance
- Improves journey time and network performance along SH20
- Supports the intended function/objective of the Western Ring Route, by maintaining a reliable alternative to SH1, whilst accommodating growth and associated access requirements of the Airport and surrounding industrial and development areas
- The improvement will involve the addition of a pedestrian/cycle shared path. Details on the recommended walking and cycling network can be found in Section 15.5 below.

It is noted that the widening on the western side of SH20 will encroach on the former settlement and explosion crater Ngā Kapua Kohuora (Crater Hill) in Papatoetoe, which holds cultural value to Te Ākitai Waiohua and Mana Whenua. The impacts can be minimised through routing the shared path via the adjacent local road network.

Figure 15-31: Proposed SH20 between SH20A and SH20B cross-section

15.5 Corridor-wide walking and cycling provisions

The A2B and 20Connect projects include improvements for active modes across the programme and in a number of forms along the lengths of the rapid transit and state highway corridors. Separate opportunities for improved station access are overviewed in Section 12.2.8. The significant walking and cycling provision proposed as part of this programme include the following elements:

- High quality, dedicated walking and cycling facilities alongside the SH20 corridor between Māngere Bridge and Puhinui Road
  - Shared path adjacent to SH20 on the southbound (eastern) side between the southern abutment of Māngere bridge and the Walmsley Road overpass
  - Walmsley Road overpass replaced with compliant walking and cycling facilities on both sides of the carriageway to allow for walking and cycling connectivity across SH20
  - Shared path adjacent to SH20 on the northbound (western) side between Walmsley Road overpass and Portage Road overpass, with an 8% ramp to connect to Portage Road
  - Portage Road overpass replaced with compliant walking and cycling facilities on both sides of the carriageway to allow for walking and cycling connectivity across SH20
  - Selfs Road redesigned to provide compliant walking and cycling facilities on both sides of the carriageway, whilst bypassing the Crater Hill area on the southbound (eastern) side of SH20

- Shared paths adjacent to the southbound (eastern) side of SH20 between Selfs Road and the Puhinui Road interchange.

- High quality dedicated walking and cycling facilities on the southern side of SH20B, between the western abutment of the Pūkaki Creek Bridge and Puhinui Road. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge, including cycling facilities.
- High quality walking and cycling facilities along the entire A2B rapid transit corridor. A mixture of bi-directional and uni-directional cycle facilities are provided for the length of the corridor. These are located on both sides for the majority of the corridor.
  - Separated bi-directional cycle facilities and walking facilities on both sides on Puhinui Road
  - Separated bi-directional cycle facilities and walking facilities on both sides of the majority of Te Irirangi Drive which also includes bicycle / access streets treatments where existing limited access roads exist
  - Separated uni-directional cycle facilities and walking facilities on Lambie Drive, Manukau Station Road, Ronwood Avenue and Great South Road
  - Separated bi-directional cycle facilities on western side of Davies Avenue along with walking facilities
- Improved intersection designs on the A2B route with removed slip lanes and improved pedestrian environments
- Reduced speed limits on sections of the A2B route, particularly on Te Irirangi Drive
- Enhancements and modifications to existing walking and cycling facilities to accommodate state highway treatments.
- Proposed walking and cycling facilities will connect to existing cycling network including facilities on SH20A, Bader Drive and Kirkbride Road.

The above treatments support objectives for providing safe walking and cycling facilities and multi-modal plans as well as helping to better connect communities and improve travel choices. Inducing more travel by active modes will contribute to the realisation of A2B and 20Connect's benefits by reducing negative health impacts associated with high dependence on private motorised transport and sedentary lifestyles, and reducing air, noise and greenhouse gas pollution.

High level forecast cycle demand was undertaken via EEM and GIS forecast population, supplemented with a comparison of similar facilities in Auckland for 20Connect (see Appendix E and Appendix F of Appendix N-2 20Connect DPS). Flow's Southwest Gateway Walking and Cycling Improvements Economic Benefit Evaluation also provides forecast cycling and pedestrian demands for the full study area (see Appendix K – Southwest Gateway Programme Economics). These forecasts confirm the appropriateness of the recommended option.

Figure 15-32 below shows the extent of the A2B and 20Connect proposed walking and cycling provisions.

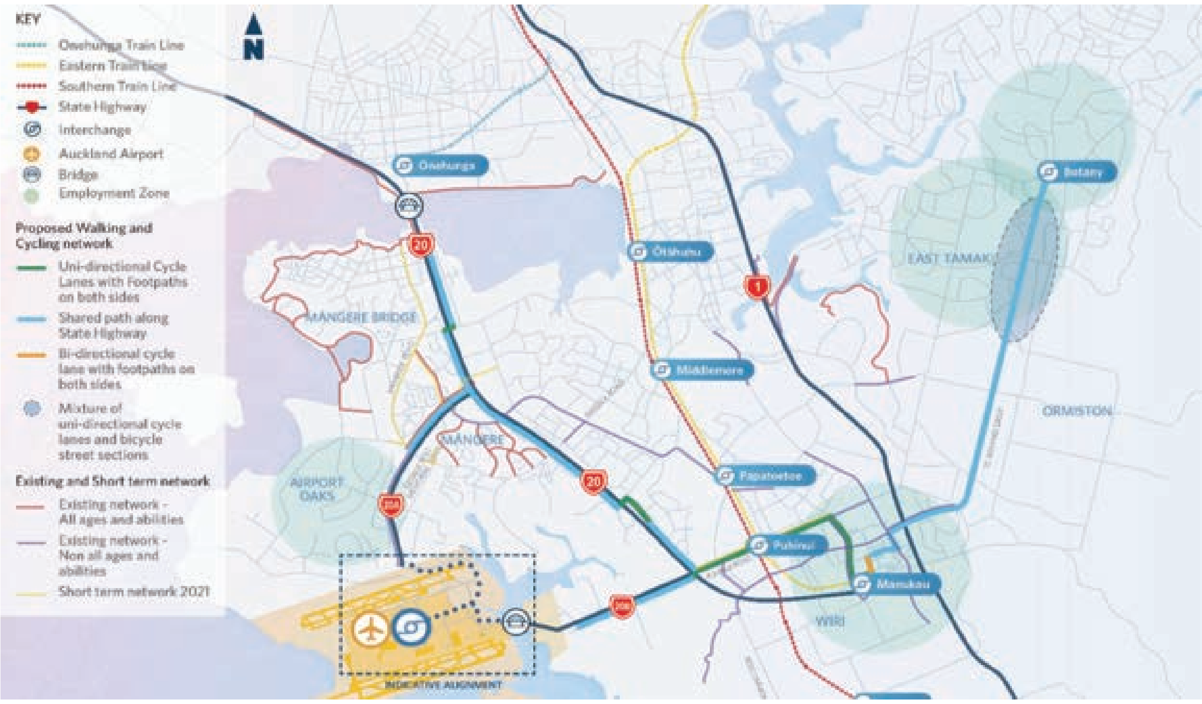


Figure 15-32: SWGP proposed walking and cycling provision

A typical A2B rapid transit cross-section on Te Irirangi Drive is shown in Figure 15-33 below and includes walkways and bi-directional cycleways.

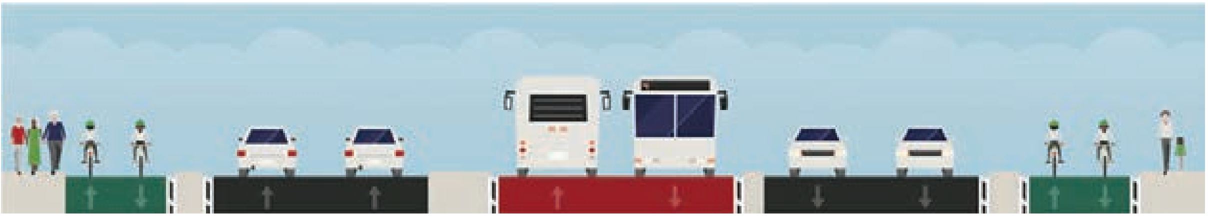


Figure 15-33: A2B Te Irirangi Drive typical cross-section

Further information on walking and cycling provisions, including how these provisions integrate with the long-term walking and cycling network in the south-east, can be found in the Appendix N Design Philosophy Statement.

15.6 Staged delivery

15.6.1 Summary of staging and sequencing

The final component of the recommended option is a staged delivery of infrastructure and service components, that aligns with the SWGP strategy and is flexible to adjust to trends in demand growth or changes in assumed dependencies. The five SWGP ‘horizons’ and their corresponding years, have been established to present an indicative timeframe for the programme and for use in the project economics calculations and as the basis for understanding likely cashflow. In reality, over such a long implementation period, delivery timeframes and sequences may change and therefore investment drivers have been identified for each element. This is reflected in a proposed dynamic staging and sequencing approach with gateway reviews ahead of major investments outlined in the Management Case.

For the purposes of this SSBC (financial and economic analysis), an expected staging and sequencing approach has been adopted. The earlier horizons focus on driving mode shift from private vehicle usage to public transport and walking/cycling before additional highway elements are implemented in the later horizons. An ongoing review of the short-term interventions, such as the short term HOV lane, is recommended to assess for effectiveness, and consider the possibility of other interventions, such as bus only lanes or alternatives to achieve the maximum benefits.

The makeup of each horizon is summarised below:

- Horizon 1 (2021) – Short-term Airport Access Improvements (STAAI) and SH20B Early Improvements, including the Puhinui Interchange upgrades and early bus priority interventions on SH20B, Puhinui Road and Lambie Dr, and the introduction of an 'AirportLink' bus service between the Airport and Manukau. These works are considered part of the do-minimum for this SSBC.
- Horizon 2 (2025) – A2B medium term premium bus service – a premium pre-rapid transit connection supported by relatively low capital-investment bus priority interventions, particularly between Manukau and Botany, to extend the 'AirportLink' bus service from Airport to Botany, with stations established at their long term locations prior to their upgrading and completion in Horizon 4
- Horizon 3 (2030) – Opening of the A2B rapid transit service - targeted infrastructure upgrades on SH20B and SH20 south of SH20B to Manukau, including a four-lane expressway, a dedicated side and centre-running busway on SH20B, a shared path along SH20B, a new southbound SH20B to SH20 connection, a bridge for A2B over the rail lines at Puhinui, and ultimate A2B busway infrastructure and two stations in Manukau City Centre to support central and local government urban regeneration initiatives. Horizon 3 also includes Botany Station Stage 2.
- Horizon 4 (2035) – Full A2B rapid transit service and infrastructure. Centre-running BRT between SH20/SH20B interchange and Botany. Establishment of new A2B stations between Manukau and Botany and at Lambie Drive. Walking and cycling facilities extended to Botany.
- Horizon 5 (2040) – SWGP final implementation – completion of the SH20 and SH20A upgrades, which involves highway widening and a new southbound SH20A to SH20 connection. Shared path alongside SH20, between Māngere Bridge and SH20B.

The *Southwest Gateway Staging Technical Note*[116] outlines the full details of the indicative staged delivery, including the investment drivers for Horizons 2 to 5.

Figure 15-34 shows the earlier service and infrastructure interventions for A2B and Figure 15-35 illustrates the ultimate recommended SWGP infrastructure elements and their corresponding horizons.

[116] SWGP Staging Strategy Appendix E

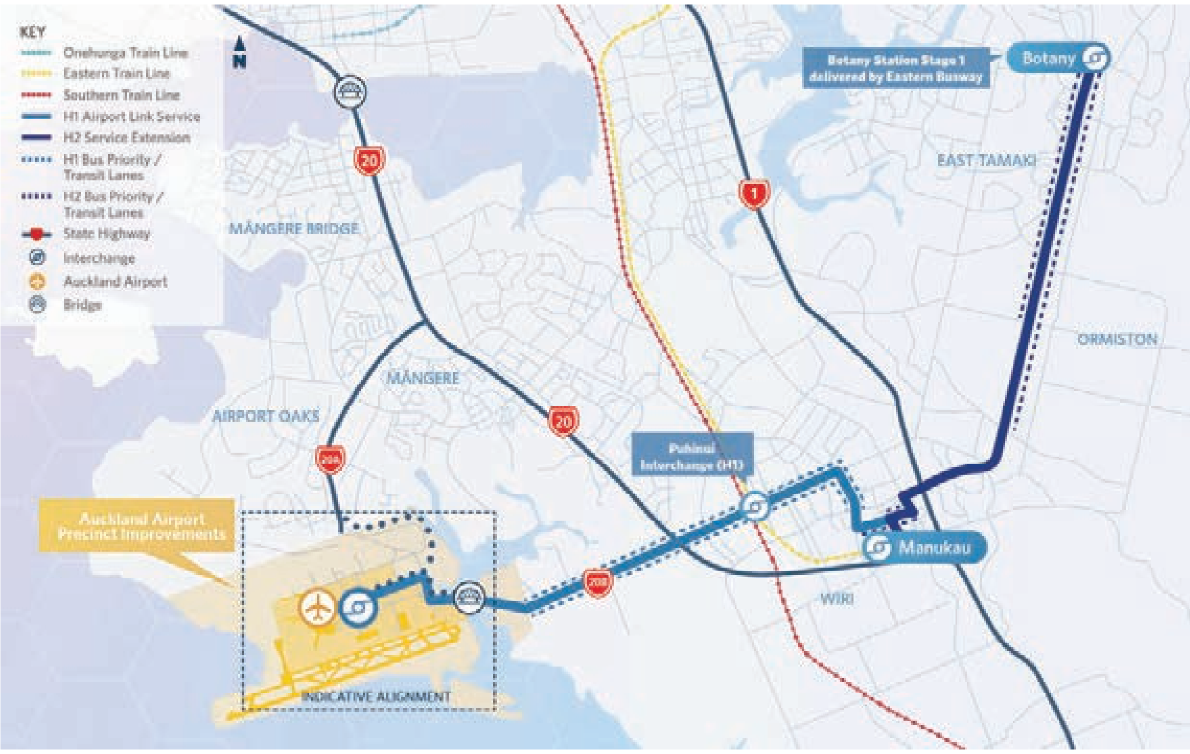


Figure 15-34: H1 and H2 service and infrastructure interventions

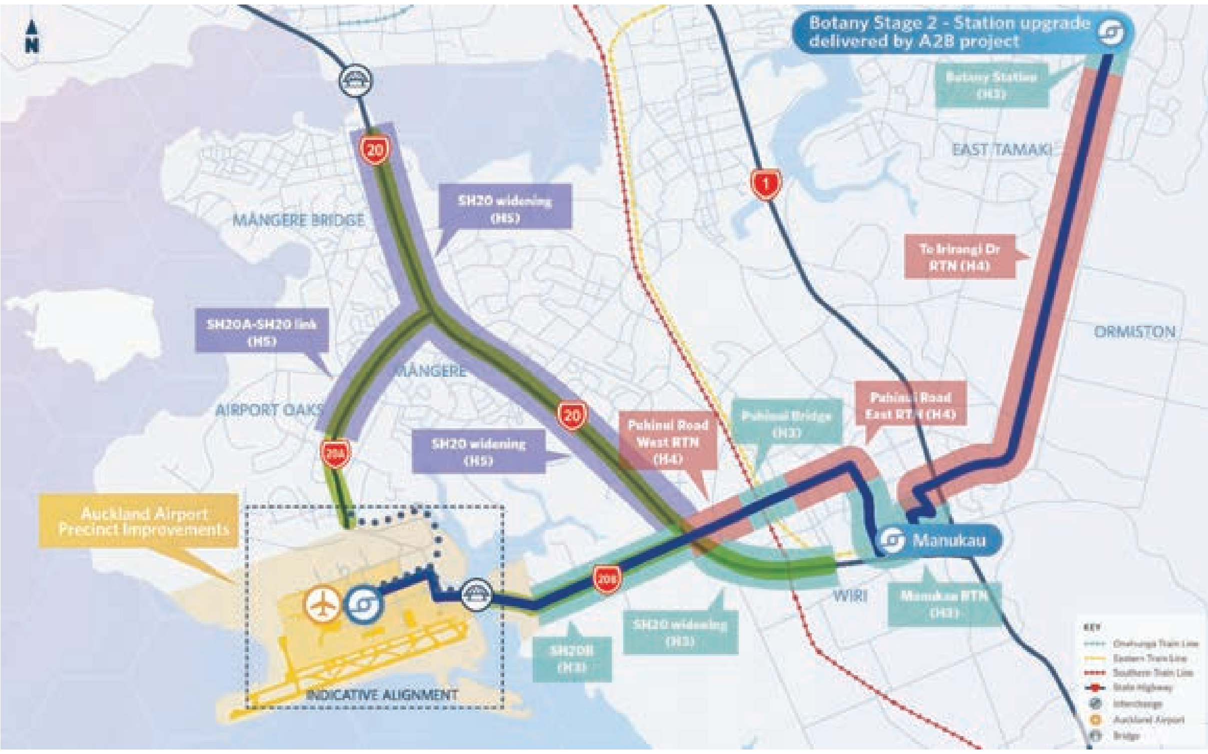


Figure 15-35: Indicative staged delivery of the SWGP infrastructure elements (eg H3 = Horizon 3)

15.6.2 Rapid transit service evolution

Along with the infrastructure upgrades proposed in the indicative staged delivery, the A2B bus service will also evolve over time. As such, a programme of bus service upgrades, including fleet replacements to higher capacity vehicles and frequency increases, has been established to satisfy demand forecasts. These are highly connected to the infrastructure upgrades as separated running ways, station improvements, and access improvements are required to enable the requisite capacity, journey time and reliability outcomes required for the service. These upgrades are also vital for the customer experience required to generate mode shift. The rapid transit service and fleet is defined in the Concept of Operations (Appendix G-2).

Figure 15-36 compares the SH20B westbound AM Peak indicative service capacity and demand forecasts and demonstrates that the programme of bus service upgrades will be sufficient to satisfy the growing trends in service usage, leading demand and creating mode shift while not over-investing in excessive capacity.

Note that the MSM model forecasts demand every decade (2028, 2038 and 2048) and demand forecasts between these years has been interpolated linearly. In reality, demand is unlikely to trend linearly, and will rather increase directly as a result of future interventions, like the introduction of the Airport to Botany medium term premium bus service (H2). Although there may be some periods when demand will exceed capacity, the staging is indicative and flexible, and the rapid transit capacity can easily be increased or reduced to reflect shifts in service demand. For example, post-Horizon 1, the frequency of the new “AirportLink” bus could be increased to satisfy growing demand at a relatively low cost. In the future, model forecasts will be updated and new forecasts developed.

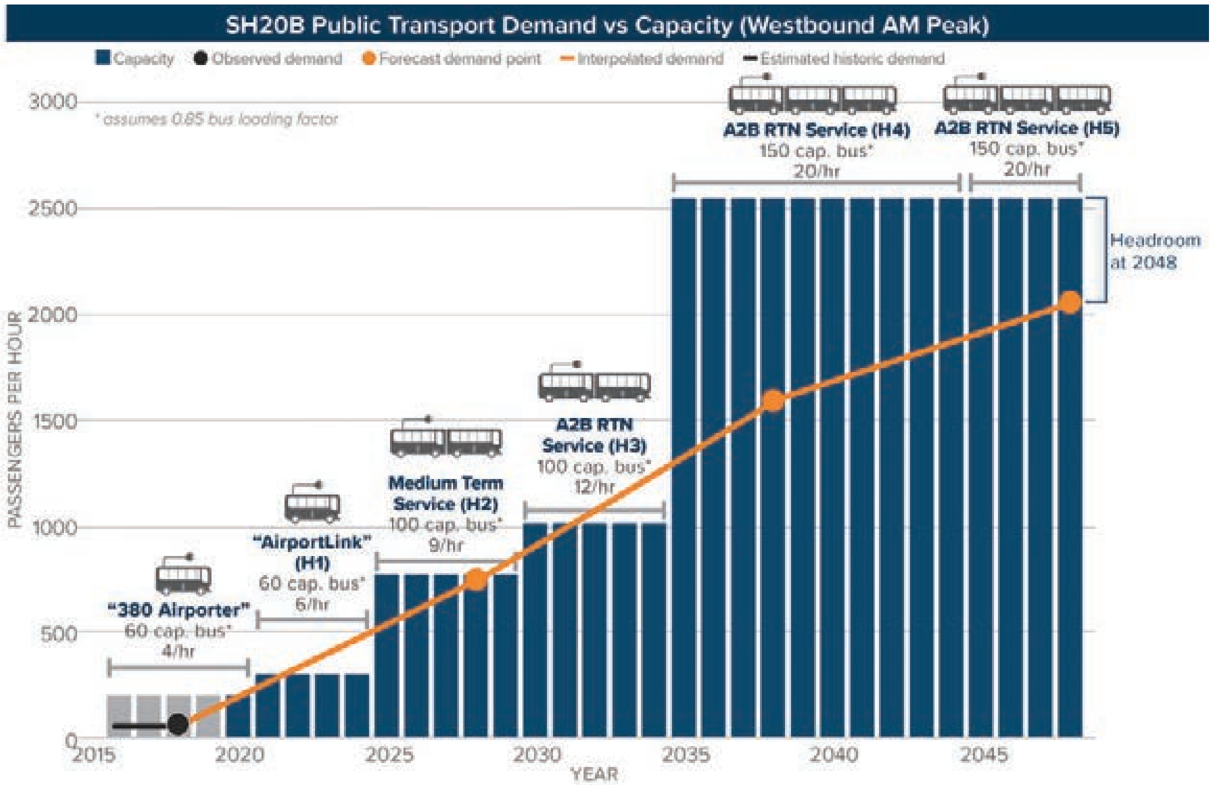


Figure 15-36: SH20B public transport demand vs capacity westbound AM peak (patronage: MSM i11.5)

The Management Case outlines an approach to proactively updating forecast as well as monitoring actual patronage to inform service evolution decisions. The recommended option has the flexibility to adapt to a range of future scenarios.

15.7 A2B medium term premium bus service (H2)

This section outlines the A2B medium term strategy – stage 2 of the A2B/20Connect delivery staging strategy. For further information refer to A2B Medium Term Strategy Report in Appendix Q.

15.7.1 Intent and methodology

The A2B medium term proposal builds on the SWGP early deliverables (Stage 1), extending the AirportLink service (delivered in 2021) to provide a premium pre-rapid transit connection between the Airport and Botany.

The medium term strategy follows a “service-led” methodology, implementing an Airport to Botany bus service following the ultimate A2B route and stopping pattern before investing in the full rapid transit infrastructure. This approach has the following advantages:

- Delivers progress towards the A2B investment objectives sooner, delivering more equitable access and travel choice to South and East Auckland – areas with large transport disadvantaged communities
- Fills a significant existing gap in the public transport network between South and East Auckland with a quality service that promotes mode-shift towards public transport
- Establishes travel patterns and builds demands along the ultimate A2B corridor
- Provides a reliable cross-town connection to the Eastern Busway at Botany, programmed for completion in 2025, as well as the southern and eastern rail lines at Puhinui, proposed future light rail at the Airport and seven local bus services across the route
- Delivers infrastructure that can support a high quality pre-rapid transit service until the opening of the A2B rapid transit service supported by targeted busway infrastructure in 2030, onwards until the full completion of the rapid transit corridor in Horizon 4 (approximately 2035)
- The medium-term strategy option is proposed for delivery by 2025. As such it has been designed to fit within the existing road corridor and to avoid significant resource consent, approvals requirements, or property acquisition.

The proposed public transport network (summarised in Section 15.2.7) is planned to be rearranged to support the A2B rapid transit corridor as part of Horizon 2 in conjunction with the Eastern Busway project.

15.7.2 Options

In developing the medium term strategy, different service patterns, vehicle and fleet requirements, local bus network improvements, station designs and bus priority measures were considered and assessed. Further details on the options assessment process can be found in A2B Medium Term Strategy Report in Appendix Q.

15.7.3 Do-minimum

The do-minimum scenario that was used as a reference case in the assessment of options for the medium term included the STAAI and SH20B improvements that are expected to be implemented in 2021. The improvements include a direct, branded bus service between the Airport and Manukau (the western half of the A2B route) supported by bus lanes on Puhinui Road and Lambie Drive.

The connection from Manukau to Botany is currently serviced by the 35 service which operates every 15 minutes and is timetabled to take between 30-55 minutes to complete the journey depending on the time of day. The 35 service takes an indirect route via Stancombe Road, Murphys Road and Ormiston Road and stops some 24 times between Manukau and Botany.

Taking the above into account, the do-minimum for the medium term involves the STAAI improvements between Airport and Manukau, and 35 service between Manukau and Botany.

15.7.4 A2B medium term recommended option

The following provides an overview of features of the recommended A2B medium term premium bus service option:

- **Service design:** The recommended option adopts the long-term A2B service design with a single service pattern operating at high frequencies between Botany and the Airport, across the same service span (4:30am to 1:00am the following day, seven days a week). Implementing a single service from the Airport to Botany in the medium term establishes the A2B travel pattern, building demand for the long-term service. It also removes the need for customers travelling past Manukau to transfer, improving journey times and reliability and removing uncertainty from these cross-town journeys. The service option is depicted in Figure 15-37 and the A2B service and route is shown in Figure 15-38 below. The medium-term service is routed via Ronwood Avenue and Davies Avenue, which does not follow the long term A2B route in Manukau. This is because through the MCA, it was found that median busway options were deemed impracticable and routing via Manukau Station Road involves the SH20 interchange, which will have a higher risk of congestion and unreliable travel times.

Figure 15-37: A2B medium term premium bus service design

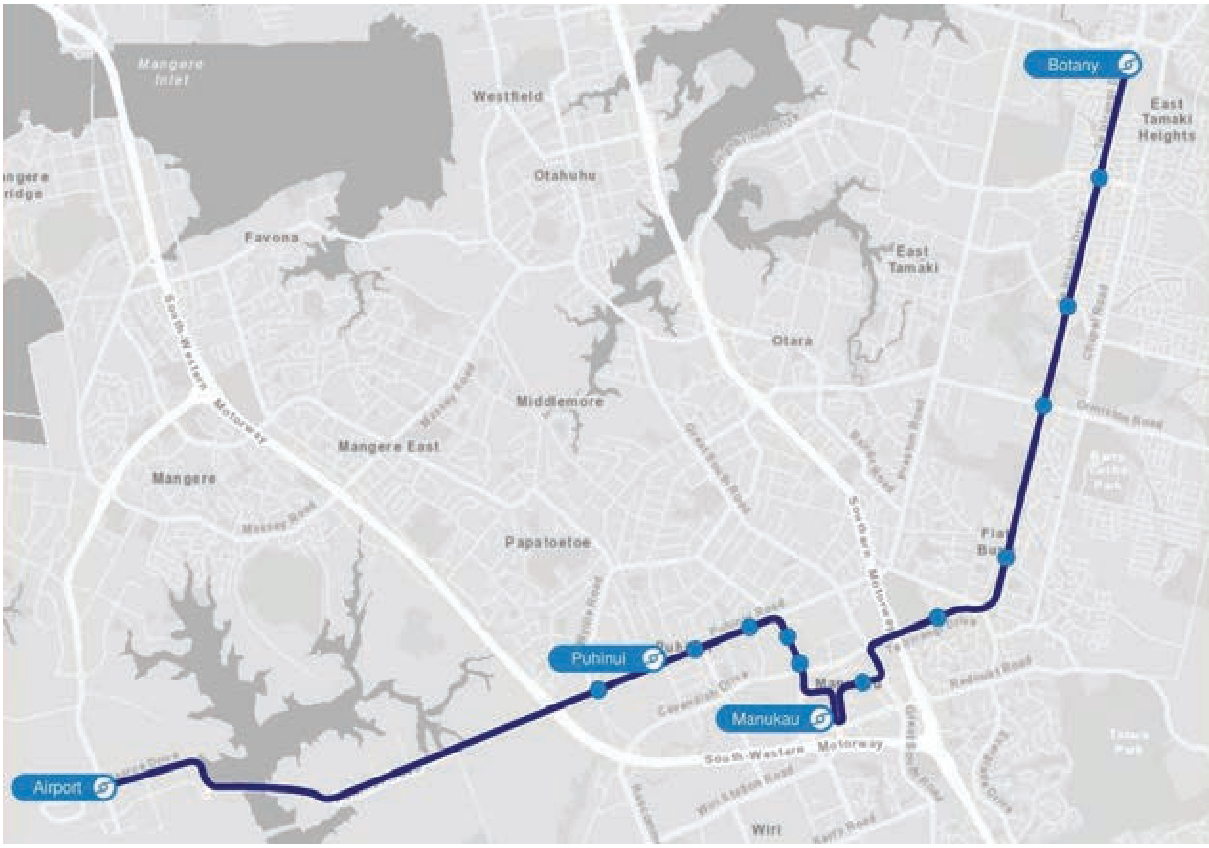


Figure 15-38: Recommended medium term premium bus service route

- **Vehicles and fleet:** A modern single-deck articulated bus of approximately 18m in length, with capacity for approximately/at least 100 passengers (seated and standing), is recommended for the A2B medium term premium bus service. Using a single-deck articulated bus (as opposed to a double decker bus) enables faster boarding and alighting at stations and is much easier for passengers with luggage as customers do not need to use stairs. This will reduce dwell time at stops and improve overall travel time and reliability for the service. This is important for the orbital Airport to Botany service which has high forecast passenger turnover and serves the Airport. It also provides opportunities for multiple-door level boarding. The vehicle should have distinctive A2B branding and will need to be compliant with AT's zero emissions vehicle policy. It is noted that there are some potential issues with implementing articulated vehicles in relation to existing or committed infrastructure. Further assessment by AT Metro bus services team is required to confirm the vehicle type and the procurement model (PTOM).

Figure 15-39: A2B medium term recommended vehicle type

- **Local bus network:** Changes to local bus routes and service levels are recommended to respond to the addition of the A2B medium term service, as shown in Figure 15-40. These changes are in line with those recommended in the long-term and make use of bus to bus connections to provide a wider catchment for the A2B service and better service for the bus network overall. Some of these local bus network changes will also likely occur as part of the Eastern Busway project and the delivery of Botany Station Stage 1.

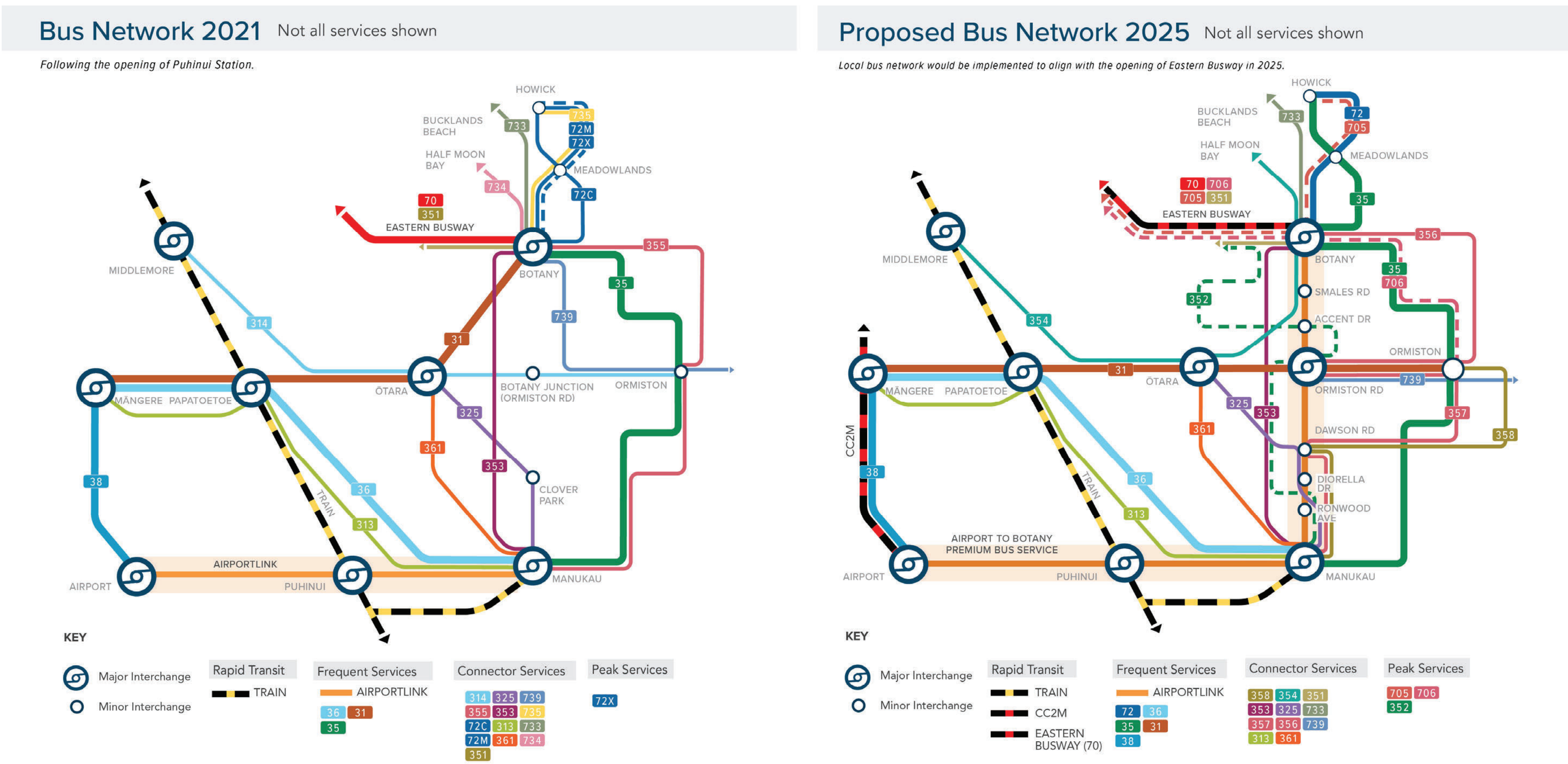


Figure 15-40: Medium term A2B bus network

- **Stations:** The A2B medium term premium bus service stations between Manukau and Botany will be located kerbside at the ultimate long term A2B station locations. The existing AirportLink stops between the Airport and Manukau section of the route will be retained. This limited-stops pattern ensures the service is fast and reliable and ensures customers will not need to change their travel patterns as the ultimate busway is delivered. High quality station environments are proposed at all stations between Botany and Manukau to provide a premium customer experience and highlight that this is a pre-rapid transit route to induce early TOD along those stations.
- **Station access:** Some improvements around A2B medium term stations are proposed to ensure customers can safely and comfortably access stations using different modes. These include:
  - Treatment of slip lanes at all intersections where stations are located via raised zebra crossings to provide priority to crossing pedestrians/cyclists and slow approaching vehicle speeds.
  - Shared path and cycle storage within the station environment
  - Relocation of local bus stops closer to the A2B medium term stations, connected with consistent paving, landscaping and wayfinding to ensure transfers are easy and intuitive
  - Generous paving to access and waiting areas within the station zone
- **Bus priority:** Similar bus priority interventions are proposed to those delivered between the Airport and Manukau in 2021, effectively providing consistent treatment across the whole route. These include:
  - Transit lanes allowing for T2 and heavy commercial vehicles on sections of Te Irirangi Drive in both directions.
  - Bus lanes on Ronwood Avenue (east of Davies Avenue) in both directions.
  - A westbound bus lane on Ronwood Avenue (west of Davies Avenue).
  - A map of the extent of bus priority measures (transit lanes and bus lanes) in the A2B route is shown in Figure 15-41 below.

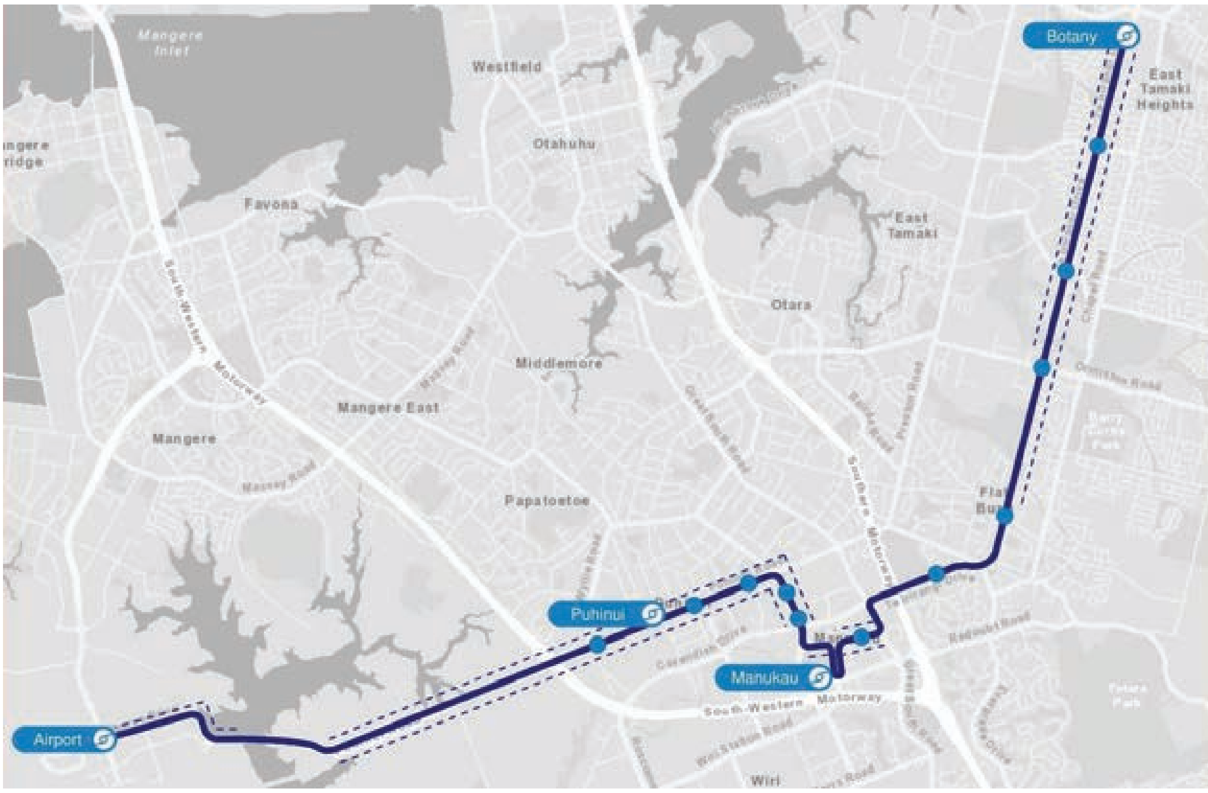


Figure 15-41: Extent of bus priority measures in the A2B medium term route

15.7.5 Recommended bus priority outcomes and performance

Patronage

The medium term recommended option can be expected to generate a significant increase in public transport ridership, as shown in Table 15-2 below.

Table 15-2: Medium term patronage forecast (2028 AM Peak)

Section	Do-minimum patronage 2028	Medium term 2028
Botany - Manukau	0 – A2B route 540 /hr (Route 35)	500 - 900/hr (A2B medium term route (service only) – full A2B) + 420 /hr (Route 35)
Manukau - Airport	520 /hr (AirportLink service)	700 - 1,000/hr (A2B medium term route (service only) – full A2B)

Travel time and reliability

The recommended option for the medium term provides both travel time and reliability benefits for public transport users on the proposed A2B route. The travel time and reliability benefits are broken down and shown in Figure 15-43 below. The performance of the base (ie do-min, AirportLink and existing route 35 service), service only (A2B medium term service without bus priority between Manukau Station and Botany Station) and recommended option (A2B medium term service with bus priority between Manukau Station and Botany Station) are compared to provide insight on the benefits provided by the recommended medium term interventions.

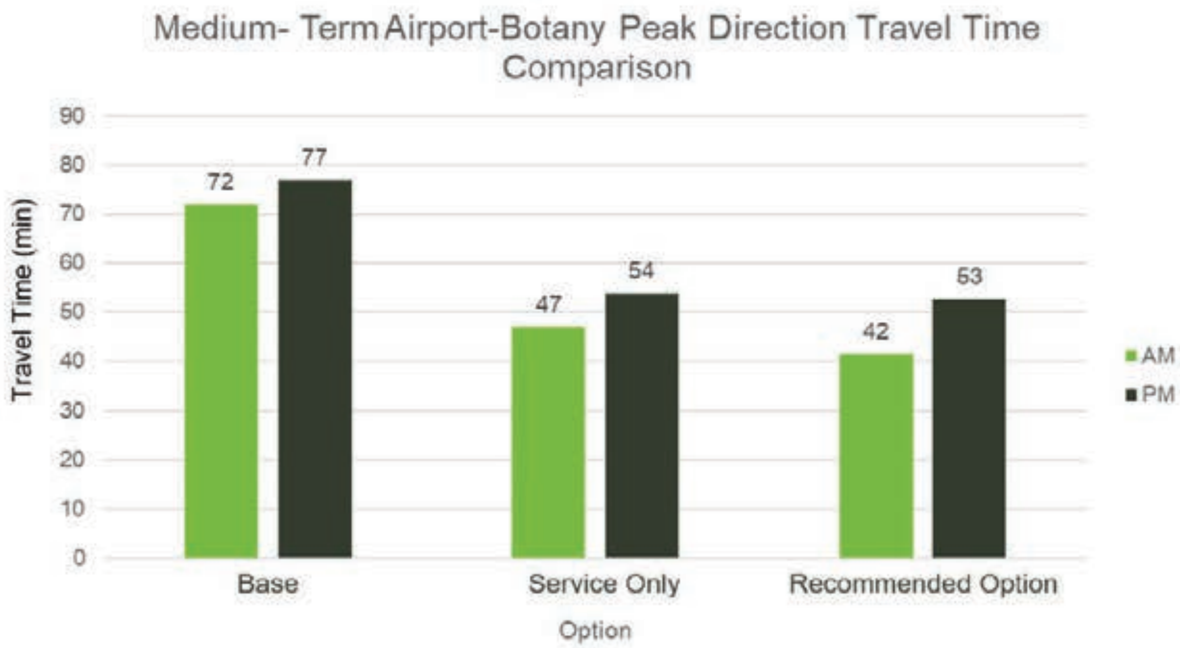


Figure 15-42: Medium term peak direction travel time comparison (Airport – Botany). Source: AT real time data for route 35, AIMSUN model.

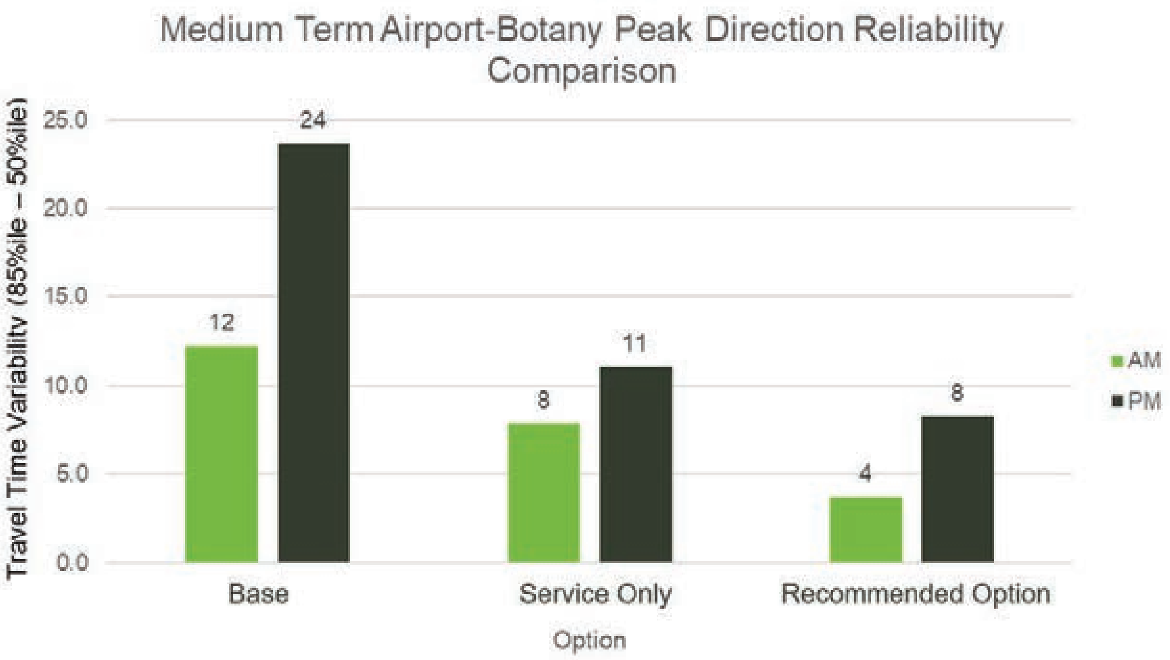


Figure 15-43: Medium term peak direction travel time reliability comparison (Airport – Botany). Source: AT real time data for route 35, AIMSUN model.

Customer experience

The high-quality station environments and facilities, improved pedestrian access, modern high capacity buses and premium service branding all contribute to a high-quality customer experience. In addition, the improved public transport journey times and reliability creates a foundation where public transport demand can be grown to support the long-term plans of a tier one rapid transit service between Airport, Manukau and Botany. The high-quality station environments and features proposed are as per below:

- Real time information
- Network maps
- Wayfinding tactiles and signage
- Step-free access to stations, platforms and stops
- Cycle parking
- Integrated service branding
- Distinctive white lighting
- Standard shelters with seating
- CCTV coverage

Assessment against objectives

Overall, the recommended option performs well against the long term and medium term objectives by providing more equitable access and travel choices to jobs, learning, cultural and social activities in South and East Auckland. The recommended bus priority infrastructure enables a reliable and faster public transport service, as well as efficient movement of people and goods. The recommended option also involves reduced impact to the environment.

15.8 Cultural values and the SWGP recommended option

The key culturally significant sites, waterways and areas potentially impacted by the recommended option are identified below, including feedback from programme partner Te Ākitai Waiohua and Mana

Whenua. Incorporation of this feedback is outlined, both as part of this SSBC phase and proposed as part of future programme phases.

Table 15-3: Cultural values and feedback on the SWGP recommended option

Element	Feedback	Proposed incorporation
SH20 widening (from Manukau Harbour Crossing to Puhinui Interchange)	The potential impact of widening over Tararata Creek in Favona. This important waterway leads out to Māngere Inlet in the Manukau Harbour and was traditionally used for local settlements and gardens in east Māngere.	Reducing potential impacts on Tararata Creek to be further considered as the option is refined in the Route Protection and Resource Consent phase.
	The potential impact of widening on the former settlement and explosion crater Ngā Kapua Kohuora (Crater Hill) in Papatoetoe. Ngā Kapua Kohuora was a matter raised in Unitary Plan appeal proceedings for its zoning which involved Te Ākitai Waiohua. Preference for widening on eastern side of existing Ngā Kapua Kohuora section of SH20 instead of western side as the location of the main explosion crater. Any widening should be retained within the existing designation. It is noted that earthworks to both sides of SH20 will impact on the cultural values of Ngā Kapua Kohuora.	Opportunities to minimise impacts have been included within the design such as taking a section of shared path offline, however further refinement should be considered as the option is refined in the future 20Connect Route Protection and Resource Consent phase.
SH20B on-line widening with at-grade connections and RTC beside SH20B	Potential impact of widening on former settlements Papāhinau (closest to Pūkaki Creek) and Mimiti Te Arero (to the east of Papāhinau) as well as the Waokauri Creek. Preference for modification on southern side of SH20B, instead of the northern side where the settlements were located. This does not preclude the southern section of SH20B from having other areas of significance such as traditional urupa or burial sites. The Waokauri Creek is an important waterway located on the northern side of SH20B, that feeds into Pūkaki Creek and through to the Manukau Harbour, which is also a significant resource to Te Ākitai Waiohua.	Consideration of side of road widening has been undertaken, with widening on southern side adopted along SH20B between Manukau Memorial Gardens and the Airport RCA area. Further opportunities to mitigate any potential effects should be considered as the design develops in the Route Protection and Resource Consent phase.
Pūkaki Creek Bridge multi-modal capacity	The existing Pūkaki Creek Bridge structure has impacted Pūkaki Creek and the former settlement Papāhinau located on the western coastal area of the Papāhinau peninsula. Other areas in the vicinity may contain areas of significance such as traditional urupa or burial sites. Te Ākitai Waiohua are the owners of Pūkaki and Waokauri Creeks (which includes areas of Māori Reservation). Those areas are highly significant to Te Ākitai Waiohua. Te Ākitai Waiohua also has a longstanding involvement in the area's development, including in the Puhinui Structure Plan and as a signatory party to the significant Eastern Access Agreement (1991), which agreed that the form of the Pūkaki Creek Bridge would remain as a two-lane bridge in perpetuity. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.	The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

Element	Feedback	Proposed incorporation
Local Service Road alongside SH20B	Potential impact of a proposed service road on Papāhinau and Mimiti Te Arero to the north of SH20B where these prior settlements were located.	Further consideration of extent of service road required. Opportunities to shorten this will be investigated in the Route Protection and Resource Consent phase.

15.9 Outcomes delivered by the SWGP recommended option

This section summarises the outcomes of the SWGP recommended option. An assessment of the performance of the recommended option against the problems and investment objectives, along with detailed evidence, can be found in Section 15.11.

Figure 15-44: Outcomes delivered by the SWGP recommended option

15.9.1 A step change in access for Auckland Airport and its employment areas

- A2B service will allow AM peak travel times between Botany and the Airport by bus to reduce from between 41 to 58 minutes (variability of 19 minutes) to between 34 to 38 minutes (variability of 4 minutes) – see Section 15.11.2. The improvement is less variable and generally competitive with general traffic travel times between 29 to 49 minutes (variability of 20 minutes) – see Section 15.11.2.
- The A2B service is expected to contribute to deliver around 40% of AM peak public transport trips to the Airport and 16% of all trips to the Airport in 2048. Current 2016 mode share within the study area is around 4% - see Section 15.11.2.
- The A2B rapid transit corridor will bring an additional population of 269,000 to within 45 minutes public transport travel time of the Airport in 2048, a 76% increase in its accessibility by public transport – see Section 15.11.1.
- The A2B rapid transit line contributes to an estimated 2048 AM peak overall public transport mode share to the Airport on its eastern access of 21% compared to 9% without A2B in 2048 – and 2% today - see Section 15.11.2.
- The 20Connect state highway elements are expected to significantly reduce journey times on SH20, SH20B and SH20A - see Section 15.11.2.
  - The evening peak travel time on SH20B eastbound reduces from 26 minutes to 9 minutes due to Horizon 3 and Horizon 5 interventions
  - The journey time from Māngere Bridge to SH20 Roscommon Interchange via SH20 in the southbound direction reduces by 4 minutes, from 18 minutes to 14 minutes during the inter peak due to Horizon 5 interventions. This particularly benefits freight within the study area.

15.9.2 Better access to jobs and education for South and East Auckland

- The projects provide significant increases in access to jobs, education and other activities for a large section of Auckland, some of which has with high levels of socio-economic deprivation.
- Being an orbital route, the proposed route supports the movement pattern in the study area which has a high reliance on jobs within the South and East Auckland area.
- A2B creates a connection between four existing or proposed rapid transit lines, four frequent bus routes and several local routes, all at specifically designed interchanges allowing connected journeys by public transport to multiple destinations. A2B will connect with over 30 existing and proposed local bus, train, LRT and BRT services, providing up to 42 connections.
- The stations will allow an additional 27,000 (increased from 795,000 to 822,000) more Aucklanders to be within a 10-minute walk of a rapid transit station, particularly in communities with high levels of deprivation – see Section 15.11.1.
- The service will connect major catchments directly to metropolitan centres in Botany, in particular, Manukau with its two tertiary education campuses, employment, social services, retail and cultural opportunities
- The service will bring more jobs within easy public transport journeys for people as well as customers and labour within easy reach of businesses

15.9.3 Opportunities for urban regeneration and support for whole of Government investment

- The SWGP will provide access and urban realm improvements to support $3.6 billion[117] investment in Manukau over the next 25 years by Government agencies in housing, education and employment as well as private sector in accommodation, retail and employment. The staging timing for A2B within Manukau Centre aims to align with the timing of government investment.
- SWGP will spur population increases above do-minimum forecasts of up to 11% near some station locations by 2048 (see Section 15.11.4) , enabling opportunities for transit-oriented development in multiple locations[118]. Higher levels may be possible following the release of the Government's National Policy Statement on Urban Development 2020 (NPS UD) which took effect on 20 August 2020. Figure 15-45 below is an example of what future Manukau station may look like with potential developments in white boxes.

Figure 15-45: Artist impression of Manukau station with potential future developments in white boxes

15.9.4 Safe, comfortable and more equitable travel and urban environments

- The service design will be simple, legible and easy to use for visitors from the Airport, new users and infrequent users, all of which are prevalent in the study area and supported by AT's customer insights.
- The service will open up travel options for people of all ages and abilities through provision of level boarding, low-floor accessible vehicles and accessible stations
- The design considers all arrival modes at all stations including opportunities for further walking and

[117] Figures provided by Kāinga Ora, April 2020

[118] Transit Oriented Development Land Use Study, March 2020 (Appendix U)

cycling connections 1km and 3km into the community to ensure that access, safety, customer experience and equity benefits can be realised

- The design provides for safe station environments with CCTV, help points, passive surveillance and good lighting as well as upgrades for identified station access routes
- The highway component of the SWGP will remove freight off local roads and onto state highways by creating additional connections to the south, which will create safer environments for local communities in South Auckland.
- Separated walking and cycling facilities along the entire 18km A2B rapid transit route with raised crossings at all side streets, signalised intersections providing safe and comfortable environment for pedestrians and cyclists
- An off-road shared path along SH20 connects to the existing cycling network (eg on SH20A, Bader Drive and Kirkbride Road), providing safe and equitable travel choices.

15.9.5 Ensuring the Western Ring Route retains its strategic function

- The widening of SH20 north of SH20A, and between SH20A and SH20B supports the intended function/objective of the Western Ring Route, by maintaining a reliable alternative to SH1, whilst accommodating growth and associated access requirements of Auckland Airport and surrounding industrial and development areas
- More direct connections and improved travel time reliability on the state highway network will provide better network resilience and remove long-distance and/or freight trips from local roads, reducing rat running and conflicts with active modes

15.9.6 Reduced impacts on the environment and potential cultural benefits

- Modelling forecasts (based on vehicle-kilometres-travelled, VKT, metrics) suggest that the effects of A2B and 20Connect combined will result in a reduction of approximately 8 tonnes of CO2 emissions annually in 2048, down to 2,893,305 tonnes (comparing the Horizon 5 and do-minimum model outputs).
- The service will use electric vehicles operating efficiently with signal pre-emption resulting in low energy consumption
- The design provides for treatment of stormwater runoff from all carriageways, including existing untreated carriageways, resulting in improved overall water quality
- The programme area covers the Puhinui Precinct which is of high cultural value to Mana Whenua, in particular Te Ākitai Waiohua. To reflect the significance of the area to Te Ākitai Waiohua, the SWGP is based on a strong strategic partnership between four programme partners: Te Ākitai Waiohua, AT, Waka Kotahi and Auckland Airport. Other Mana Whenua have also identified a range of culturally significant sites, areas and waterways within the study area. Consequently, ongoing participation, collaboration and involvement of programme partner Te Ākitai Waiohua, as well as ongoing engagement with Mana Whenua via the Southern Table Hui will be undertaken during future programme phases to ensure potential adverse effects on cultural values are appropriately avoided, remedied or mitigated and that opportunities for positive cultural outcomes are explored.
- The provision of high-quality walking and cycling facilities along SH20, SH20B and the A2B rapid transit corridor encourages behaviour change and mode shift from private motorised transport to active modes, thereby reducing air, noise and greenhouse gas pollution.

15.10 Transport user benefits

Transport modelling was undertaken to understand and quantify transport user benefits. These benefits are an important input into the economic analysis in Section 15.2.4 and provided in detail in Appendix K Economics, but is also important in understanding the effectiveness of the proposed system in meeting people's transport needs. The key findings are summarised in this section.

Three models were used in this analysis.

- The Macro Strategic Model (MSM), run by the Auckland Forecasting Centre (AFC), with the most up-to-date land use forecasts (i11.5) and interrelated transport system and infrastructure improvement assumptions was used to model the whole transport network, inform the mesoscopic models and provide public transport user benefits
- A SATURN network model was developed for the study area covering SH20, SH20A and SH20B and used for option assessment and as a basis for the project economics. This mesoscopic traffic model was informed by demands taken from the 'higher tier' MSM, and used to provide road user benefits
- The Auckland Cycle Model (ACM) was used to estimate the benefits arising from the proposed cycling infrastructure along 20Connect and the A2B corridor.

15.10.1 Public transport benefits

This section summarises the sources of public transport benefits from the A2B recommended option. Additional detail is provided in Section 15.11.

Journey time and reliability

The recommended A2B option will significantly reduce times and the variability in times for journeys to and from key centres in South and East Auckland. In many cases, journey times by public transport are expected to be halved and public transport will be competitive with, if not better than, comparative car journeys at peak times. This is expected to deliver genuine travel choice to the people of South and East Auckland and drive mode shift. AM peak travel time from Botany to Airport on bus reduces from between 41 to 58 minutes (variability of 19 minutes) to between 34 to 38 minutes (variability of 4 minutes), where a comparable journey by car is expected to take between 29 to 50 minutes (variability of 21 minutes).

This journey time reliability is primarily enabled by the creation of a separated running way for buses that is unencumbered by delays caused by general traffic and the variations in general traffic performance. Pre-emption for buses at traffic signals is an important contributor to reduce or eliminate time spent at red signals

A number of key operational and design integration aspects of stations contribute to lower overall dwell times which can be a major contributor to public transport speed and reliability, including:

- Level boarding so that people of all ages and abilities can board and alight quickly
- All-door boarding so that people can spread boarding and alighting more evenly reducing the time required at stations
- Off-board ticketing assists in reducing delays caused by passengers 'tagging on and off'
- Wide stop spacing to reduce the number of times the service is required to stop, removing cumulative acceleration/deceleration time and dwell time.

Public transport patronage

The faster journey times noted above, combined with the increased access to major destinations and improvements to frequency, customer experience and ride quality (reflected in a mode specific constant in MSM) are expected to result in increased ridership which will generate public transport user benefits.

The forecast two-hour AM peak westbound public transport demand on SH20B in 2048 for the full A2B preferred option is ~3,400 passengers, compared with ~1,700 for the do-min. This equates to an increase of over 100%. Even more significant is the same comparison for patronage on Te Irirangi Drive, west of the Diorella Drive proposed station. The forecast two-hour AM peak westbound public transport demand on this corridor is ~2,800 passengers for the preferred option, over 10 times the demand generated by the do-minimum option (~200 passengers).

Figure 15-46 below shows the estimated daily boardings by station across the horizons and shows the significant increase in public transport uptake once A2B fully opens in Horizon 4.

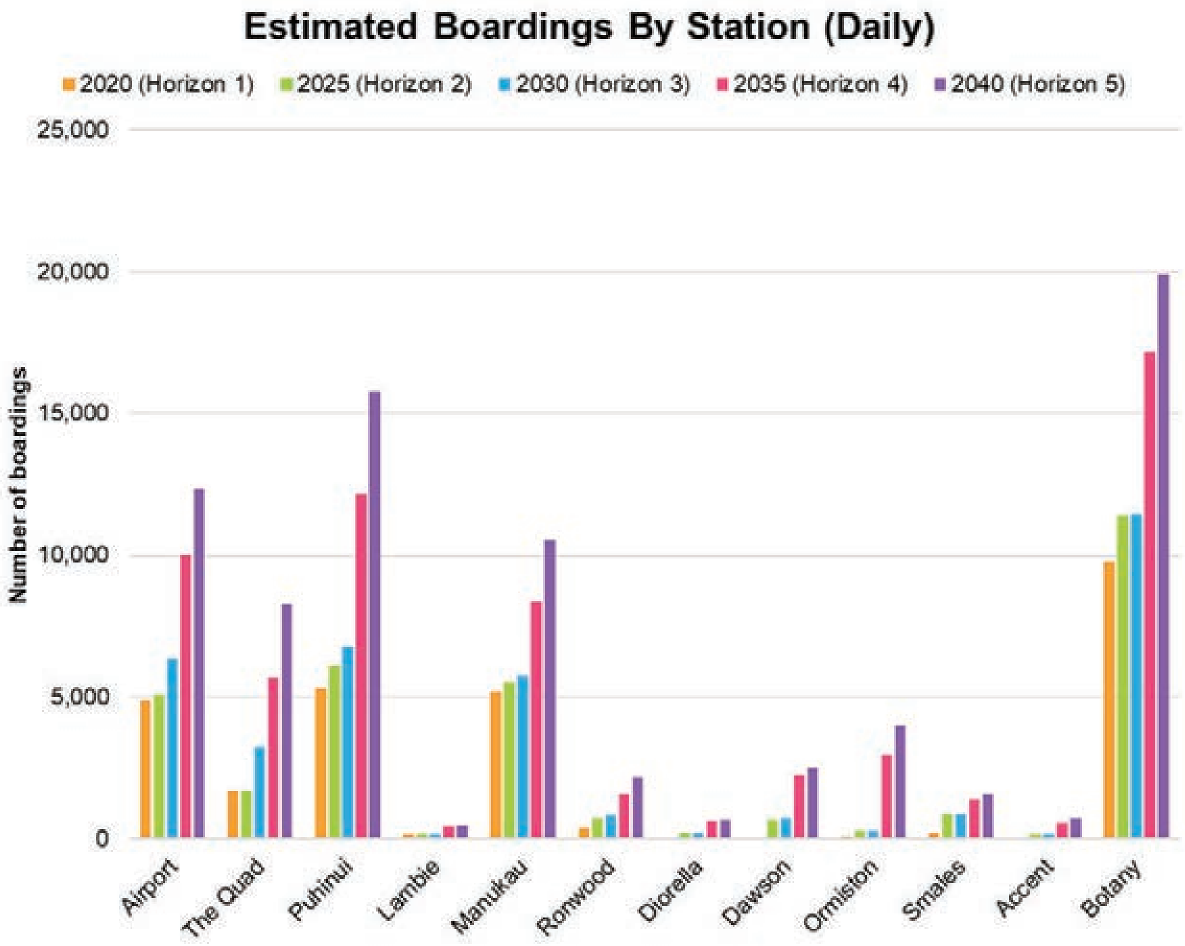


Figure 15-46: Boardings by station (Daily)

Connected journeys

A key benefit of A2B is its connective function across South and East Auckland. It provides connections not only to other rapid transit lines but also to train and local services. For example, over half of all passengers crossing the screenline at Manukau in the 2048 model have transferred from local buses, with Botany being the major contributor. As previously discussed in Section 15.2.7, there is expected to be a strong link with rail services at Puhinui Station. Almost half (45%) of the 2048 forecast patronage entering the Airport on SH20B has come from trains (11% from the north and 34% from the south).

A2B will connect to four existing and proposed rapid transit lines and 24 local bus services at its stations, providing a total of 42 connections as previously discussed in Section 15.2.8.

This dynamic illustrates more travel choices for customers through better and easier connected journeys for customers, thereby multiplying options for trips and growing wider network patronage.

Mode share

The increased number of people attracted to public transport for the reasons described above creates a mode shift from cars, which in a congested network creates further road user benefits by creating more space on the roads for demand that might have been supressed or might have taken other, less efficient routes. More information on change in mode share can be found in Section 15.11.2 - KPI: Public transport mode share change.

15.10.2 Road user benefits

This section outlines the SATURN traffic model outputs including traffic volume changes, travel times along the state highway network and forecast congestion for Horizon 3 and Horizon 5 in 2048.

Key network performance statistics that drive road user benefits as they apply to the investment objectives and KPIs are outlined in Section 15.11.2.

For the Horizon 3 model, which includes the SH20B and SH20B/SH20 motorway interchange improvements, but no improvements to SH20A/SH20, the SH20B priority provision for high occupancy vehicles from the earlier horizon is retained, thus limiting the general traffic capacity improvements. By limiting the general traffic capacity, it would work in favour of the behaviour change/mode shift objectives of the programme.

Daily traffic volume difference

The improvements to the state highway network apply to a wide section of the network, increasing capacity to the links to the Airport (SH20A and SH20B) as well as the western ring route (SH20). They result in increased throughput of traffic on these routes.

In Horizon 3, it is predicted that there will be an increase of traffic demand along SH20B by approximately 8,000 vehicles per day eastbound and 2,400 vehicles per day westbound in the transit lanes. Southbound traffic volumes along SH20 will reduce by approximately 2,600 vehicles due to re-routing. With the transit lanes providing additional capacity along SH20B, reduced traffic volumes are predicted in the SH20B general traffic lanes, which relieves congestion, particularly for high value freight movements. It is predicted that there will be an increase in traffic of approximately 10,100 vehicles per day on SH20 south of SH20B due to the introduction of the SH20B to SH20 ramp.

Due to the proposed SH20 widening in Horizon 5, traffic volumes along SH20 are predicted to increase by approximately 6,300 vehicles per day and 15,000 vehicles per day in the northbound and southbound directions respectively, on the sections of SH20 between SH20A and Massey Road. The more significant southbound demand increase is associated with the proposed southbound direct connection from SH20A to SH20. Trip redistribution as a result of these interventions will lead to reductions in traffic on both SH20A and SH20B.

Travel time

The predicted vehicle travel times for three key journeys along the state highway network within the study area have been extracted from the 2048 SATURN traffic models. These three journeys are described below. Further details around travel times for morning peak, interpeak and evening peak periods for Horizon 3 and Horizon 5 can be found in Section 7.1 of the Supplementary Information.

For Horizon 3:

- Travel time savings are expected on the majority of the routes particularly during the interpeak period, with travel time savings of more than one minute predicted on all but one route.
- The reduction in traffic demands on SH20A and SH20 will result in travel time savings in the peak direction on these routes.
- The transit lanes along SH20B are predicted to result in travel time savings in the morning peak, evening peak and interpeak periods, with a significant travel time saving of 20 minutes 30 seconds for transit lane users between the Airport and south of Roscommon interchange.
- For Horizon 5:
- Similar to Horizon 3, travel time savings are predicted along SH20, SH20A and SH20B, especially during the interpeak period
- There is an increase in travel time for eastbound general traffic along SH20B in the interpeak period. This is likely due to the increased demands on SH20 south of Puhinui Road, which increases the delays on SH20 east of Puhinui Road interchange
- Significant travel time savings are predicted along SH20 for morning peak, evening peak and interpeak due to proposed SH20 widening.

Congestion

To understand the predicted congestion on the network, volume over capacity outputs have been obtained from the 2048 SATURN traffic models for Horizon 3 and Horizon 5. Further details around modelled congestion for morning peak, interpeak and evening peak for Horizon 3 and Horizon 5 can be found in Section 7.2 of the Supplementary Information.

Key congestion outcomes for Horizon 3 are:

- In morning, evening and inter peak periods, SH20, between SH20A and SH20B, is operating close to or at capacity
- The operations along SH20B and at the SH20 / SH20B interchange are predicted to improve due to the proposed SH20B improvements in Horizon 3
- The predicted re-routing between SH20B and SH20/SH20A is predicted to improve performance on both SH20 and SH20A. However, the improvement will be limited due to the predicted high volumes generated by the proposed new land use developments in the surrounding area
- The public transport interventions delivered in Horizon 3 free up road capacity for high value freight movements.

Key congestion outcomes for Horizon 5 are:

- The proposed widening on SH20 is predicted to improve network performance along SH20 during all modelled periods
- However, SH20 south of the Puhinui motorway interchange is predicted to be operating over capacity, with higher delays
- No significant improvements are expected along SH20A and SH20B as well as intersections in the Wiri area in Horizon 5, during both 2048 morning peak and evening peak periods.

Summary

The economic analysis shows that for Horizon 3 and Horizon 5 there are significant road user benefits. These are the result of increased throughput on sections where additional capacity is provided and reduced demands through congested sections as a result of trip redistribution. The benefits also result from generally lower journey times and reduced levels of congestion on the state highway network serving the Airport area, as well as on the Western Ring Route, compared to the do-minimum.

15.11 Assessment against investment objectives

15.11.1 Investment Objective 1

Investment Objective 1: More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland, as well as the Airport area.

Table 15-4: Investment objective 1 and associated performance measures

Investment Objective 1	Performance measures
More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	▪ Change in population and jobs within 45-minute public transport trip (or walking trip) to: – Airport – Manukau – Botany – Ormiston ▪ Number of places within walking distance of MRT

KPI: Change in population and jobs within 45-minute public transport trip (or walking trip) to: Airport, Manukau, Botany, Ormiston

Figure 15-47 and Figure 15-48 below show the changes in the catchments for public transport with and without A2B. The option is highly effective in improving access to opportunities for people in South and East Auckland and increasing labour and customer catchments for business. Specifically, these additional catchments deliver:

- An additional population of 269,000 (76% increase) and 203,000 (162% increase) jobs within 45 minutes public transport travel time of the **Airport** in 2048. The route brings the southern growth areas and East Auckland including Pakuranga and Howick into the 45 minutes reach of the Airport area. In addition, a significant part of the isthmus, Newmarket and the city centre
- An additional population of 98,000 (18% increase) and 28,000 (9% increase) jobs within 45 minutes public transport journey of central **Manukau** including all of Howick and Pakuranga and the wider Airport area
- An additional population of 72,000 (26% increase) and 24,000 (23% increase) jobs within 45 minutes public transport journey of **Ormiston** including the Airport area and South Auckland
- An additional population of 87,000 (19% increase) people and 35,000 (14% increase) jobs within 45 minutes public transport journey of **Botany**, including the Airport area

- Table 15-5 below provides a comparison of base and post-SWGP 45 minute population and employment catchment statistics.

Table 15-5: 45 minute population and employment catchment

Origin (key centre)	Population 2048			Employment 2048		
	Do-minimum	SWGP	Increase	Do-minimum	SWGP	Increase
Airport	356,000	625,000	269,000 (76%)	125,000	328,000	203,000 (162%)
Manukau	557,000	655,000	98,000 (18%)	295,000	323,000	28,000 (9%)
Ormiston	276,000	348,000	72,000 (26%)	104,000	128,000	24,000 (23%)
Botany	462,000	549,000	87,000 (19%)	248,000	283,000	35,000 (14%)
Highbrook	206,000	214,000	8,000 (4%)	94,000	96,000	2,000 (2%)

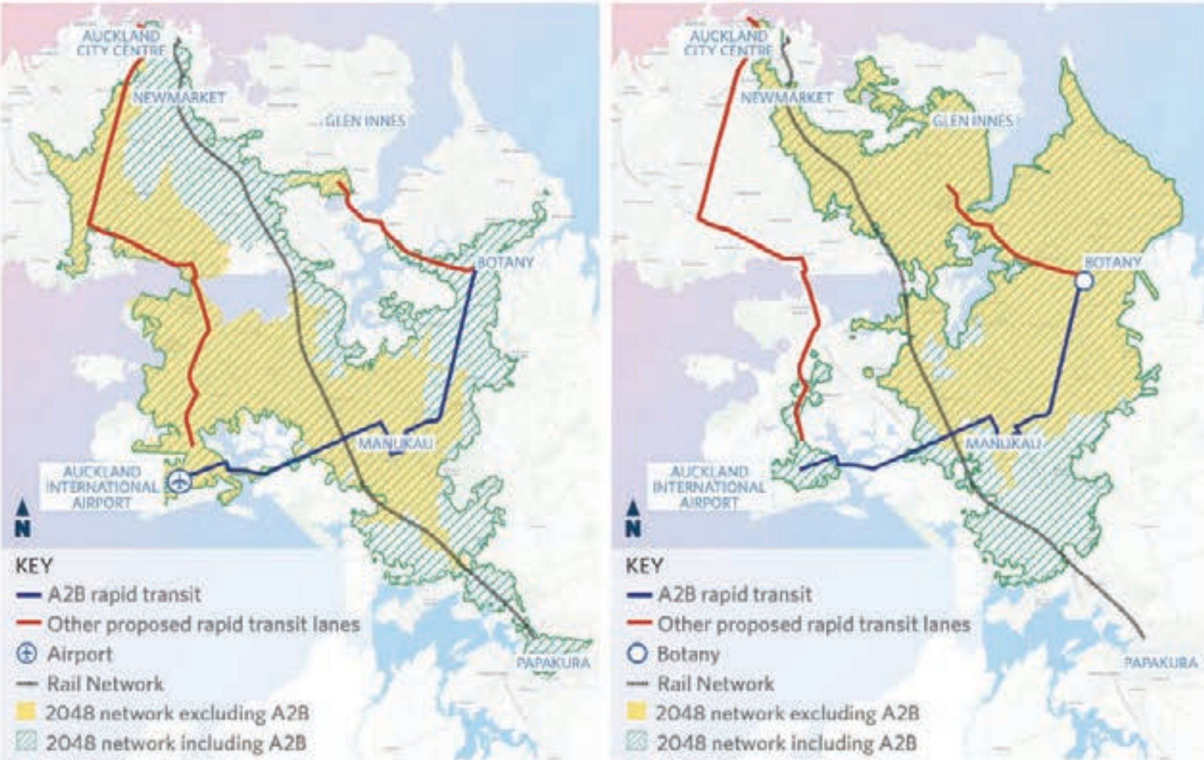


Figure 15-47: Change in 45 minute public transport catchment for Auckland Airport and Botany with and without A2B

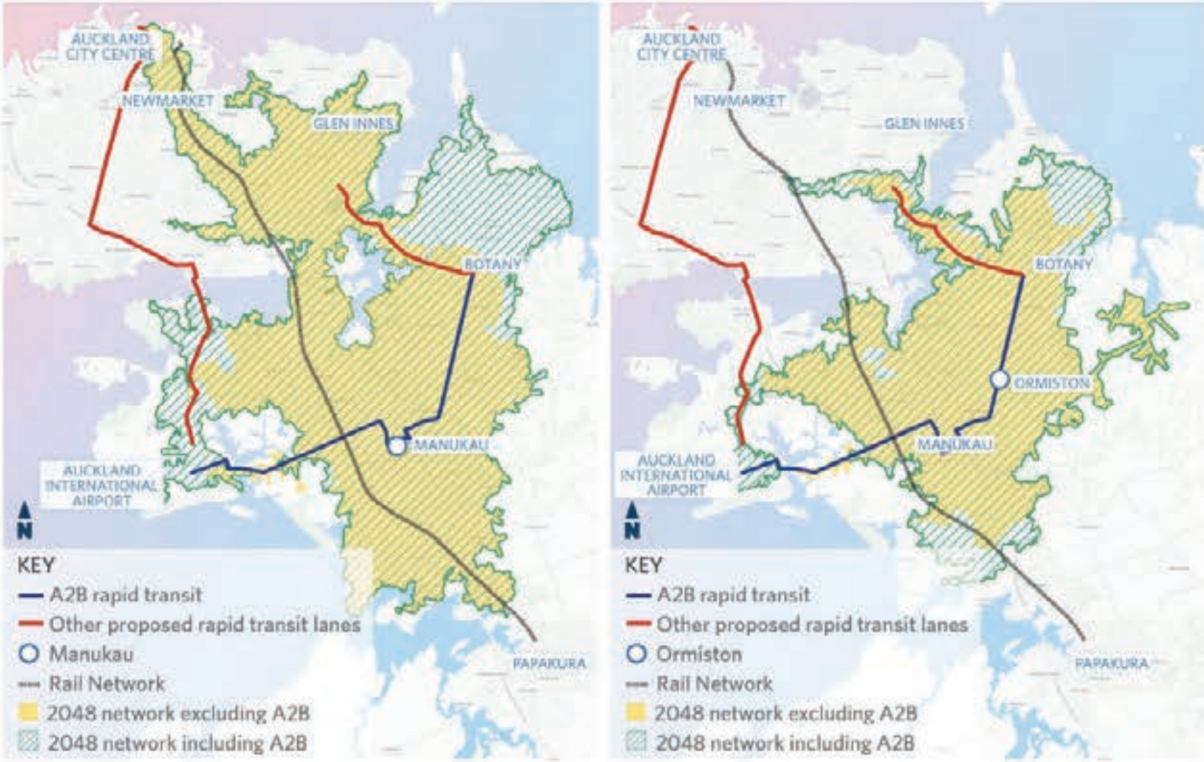


Figure 15-48: Change in 45 minute public transport catchment for Manukau and Ormiston with and without A2B

Breaking down by stations, Figure 15-49 and Figure 15-50 show the projected public transport accessibility for population and jobs from each station by 2048 within 45 minutes, with and without A2B and 20Connect, respectively. Table 15-6 shows the percentage change for the accessibility with and without A2B and 20Connect. This data should be viewed as an approximate order of magnitude projection.

There is a significant increase in population and jobs accessible from stations with A2B and 20Connect interventions. While the most significant increases are to locations not served by the rapid transit corridor in the do-minimum, significant increases are also achieved in those that are.[119] The significant increases in catchment are at Airport, Lambie Drive, Diorella Drive, Accent Drive and Smales Road.

Table 15-6: Percentage change in 45 minute accessibility with and without A2B and 20Connect

Station	Population 2048			Employment 2048		
	Without A2B & 20C	With A2B & 20C	% Change	Without A2B & 20C	With A2B & 20C	% Change
Airport	220627	774121	251%	101091	439050	334%
The Quad Business Park	439329	541975	23%	270100	223910	-17%[120]

[119] The catchments used in Table 15-5 were measured from the town centre, whereas the catchments used for the data shown in Figure 15-49 and Figure 15-50 were measured from the stations themselves.

[120] The Quad Business Park and Ronwood Avenue stations both saw negative changes in employment catchments, due to modelling limitations. It is likely that minor scheduling differences across the different

Station	Population 2048			Employment 2048		
	Without A2B & 20C	With A2B & 20C	% Change	Without A2B & 20C	With A2B & 20C	% Change
Puhinui Station	689338	883875	28%	418497	472478	13%
Lambie Drive	368950	809877	120%	207680	458685	121%
Manukau Station	690965	787815	14%	417618	451470	8%
Ronwood Avenue	461450	527478	14%	233041	220742	-5%[121]
Diorella Drive	207764	533850	157%	85802	222181	159%
Dawson Road	266284	536329	101%	115269	222580	93%
Ormiston Road	262015	510070	95%	108034	211411	96%
Accent Drive	242644	547908	126%	100705	218964	117%
Smales Road	241709	546359	126%	91785	218467	138%
Botany Town Centre	385192	480478	25%	188461	207013	10%

model scenarios/years have caused slightly different physical catchment areas. Where these slight differences have overlapped with areas of high population density (eg the CBD), they have in turn disproportionately amplified the do-minimum employment catchments. Therefore, these decreases should be viewed with caution.

[121] Ibid.

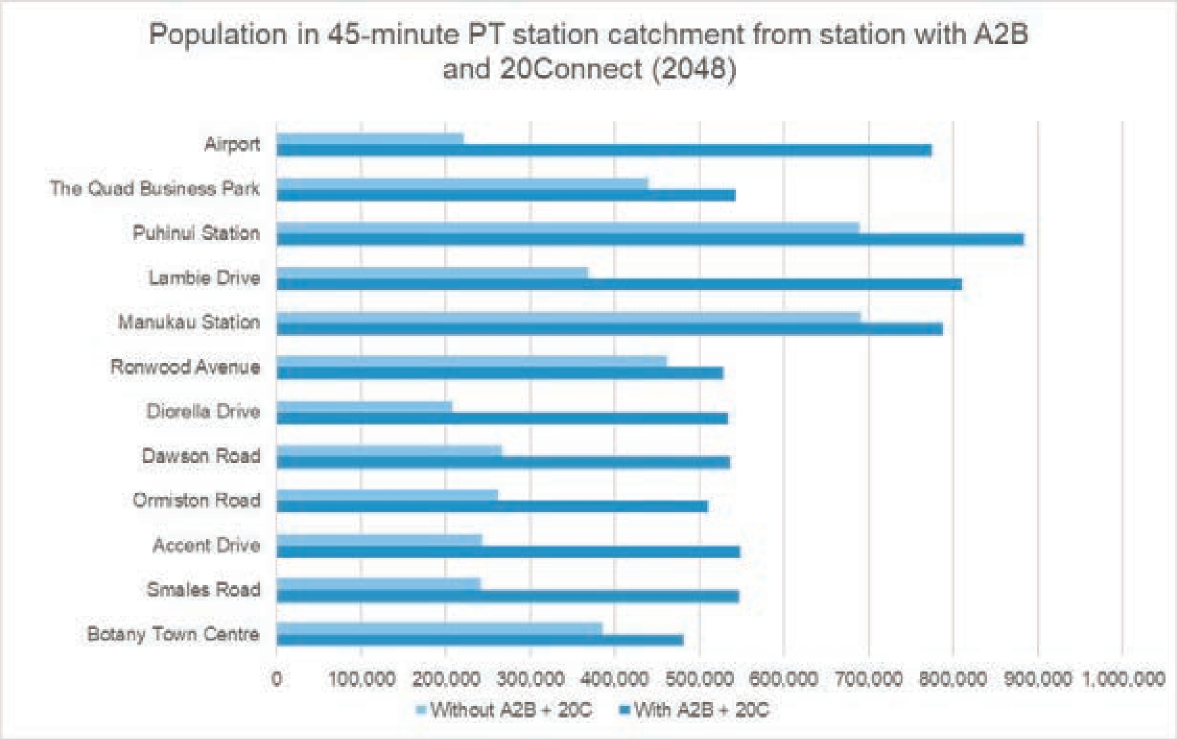


Figure 15-49: Population in 45-minute public transport station catchment with and without A2B and 20Connect (i11.5)

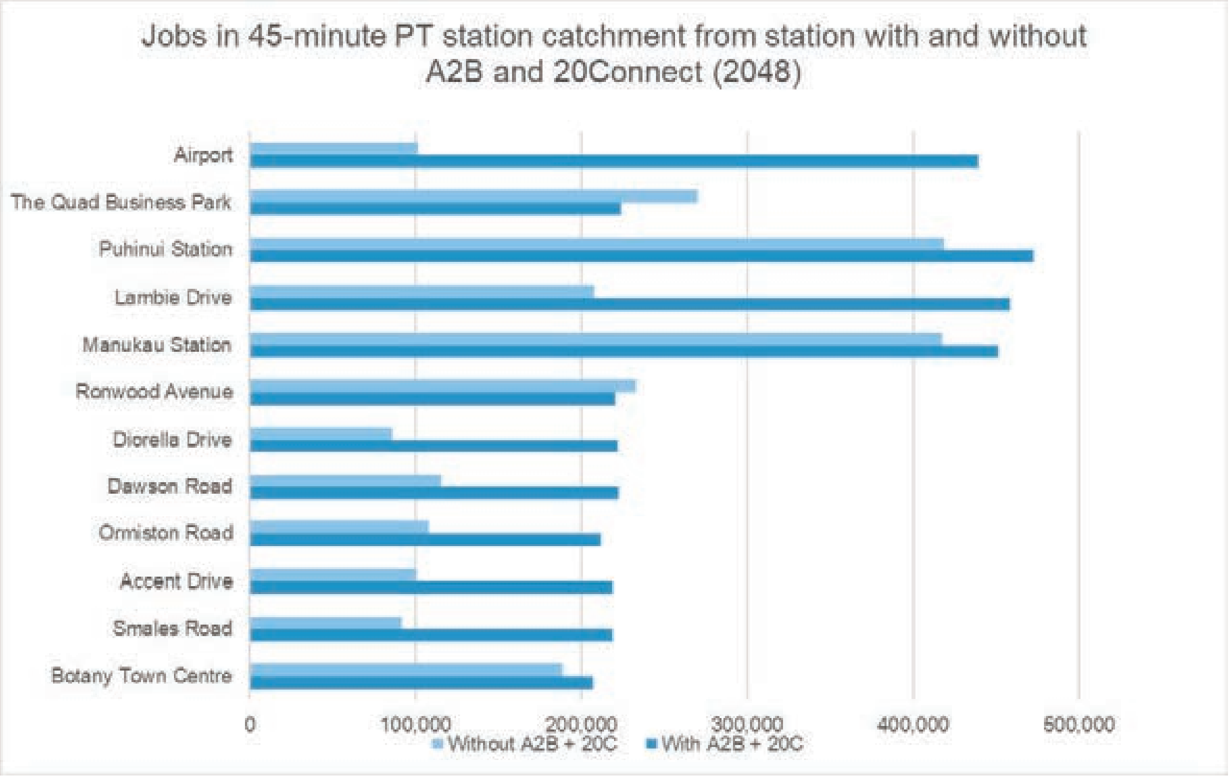


Figure 15-50: Jobs in 45-minute public transport station catchment with and without A2B and 20Connect (i11.5)

KPI: Places within walking distance of MRT

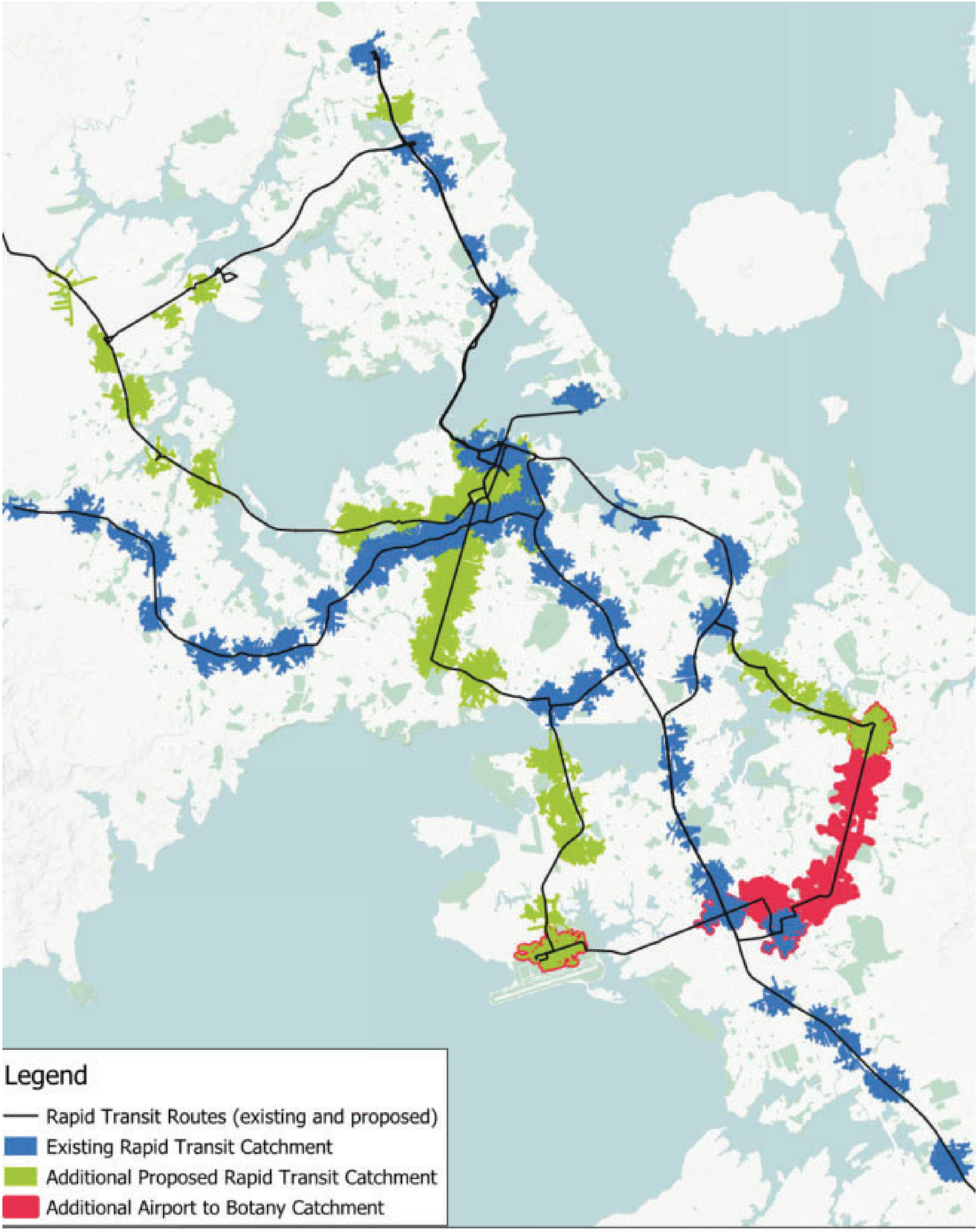
The additional rapid transit stations will bring an additional 27,000 people and 9,000 jobs within 1km of a rapid transit station, as shown below.

Table 15-7: Population and employment forecasts within walking distance of MRT

	Population 2048	Employment 2048
Without A2B	795,000	479,000
With A2B	822,000	488,000
Difference	27,000	9,000

The additional catchments are shown in Figure 15-51. These fall into two categories:

- Firstly, completely new catchments for the RTN are shown in red. These include:
  - **Ormiston** (Botany Junction) with access to retail, a hospital and Barry Curtis Park
  - **Davies Avenue and Diorella Drive** with access to Unitech Manukau and the northern part of the Manukau Metropolitan Centre
  - Residential areas in Flat Bush, East Tāmaki and Papatoetoe
- Secondly, catchments that have additional access to the RTN are shown with a red outline. These include:
  - **The Airport** including terminals and employment zones (note that the northern rapid transit connection is assumed in the do-minimum)
  - **Manukau** with its significant opportunities in education (MIT), retail, employment, social and Government services, entertainment, community and cultural opportunities as well as Hayman Park
  - **Botany** with associated retail, employment entertainment and community facilities.



The "Future Rapid Transit Network Catchment" includes the following projects: City Rail Link Rosedale Station, Northwest Rapid Transit Corridor, City Centre to Māngere Corridor, Eastern Busway.

Figure 15-51: Additional RTN catchments with A2B

Improving equity and safety in access

Figure 15-52 shows the relationship between Auckland's existing (black) and proposed (red) rapid transit network with and without A2B. Large areas of Auckland's least advantaged people (yellow and light green shaded) are afforded access to rapid transit with the recommended option in place, improving the equity within Auckland of access to opportunities for employment, education and other activities that can enhance people's lives.

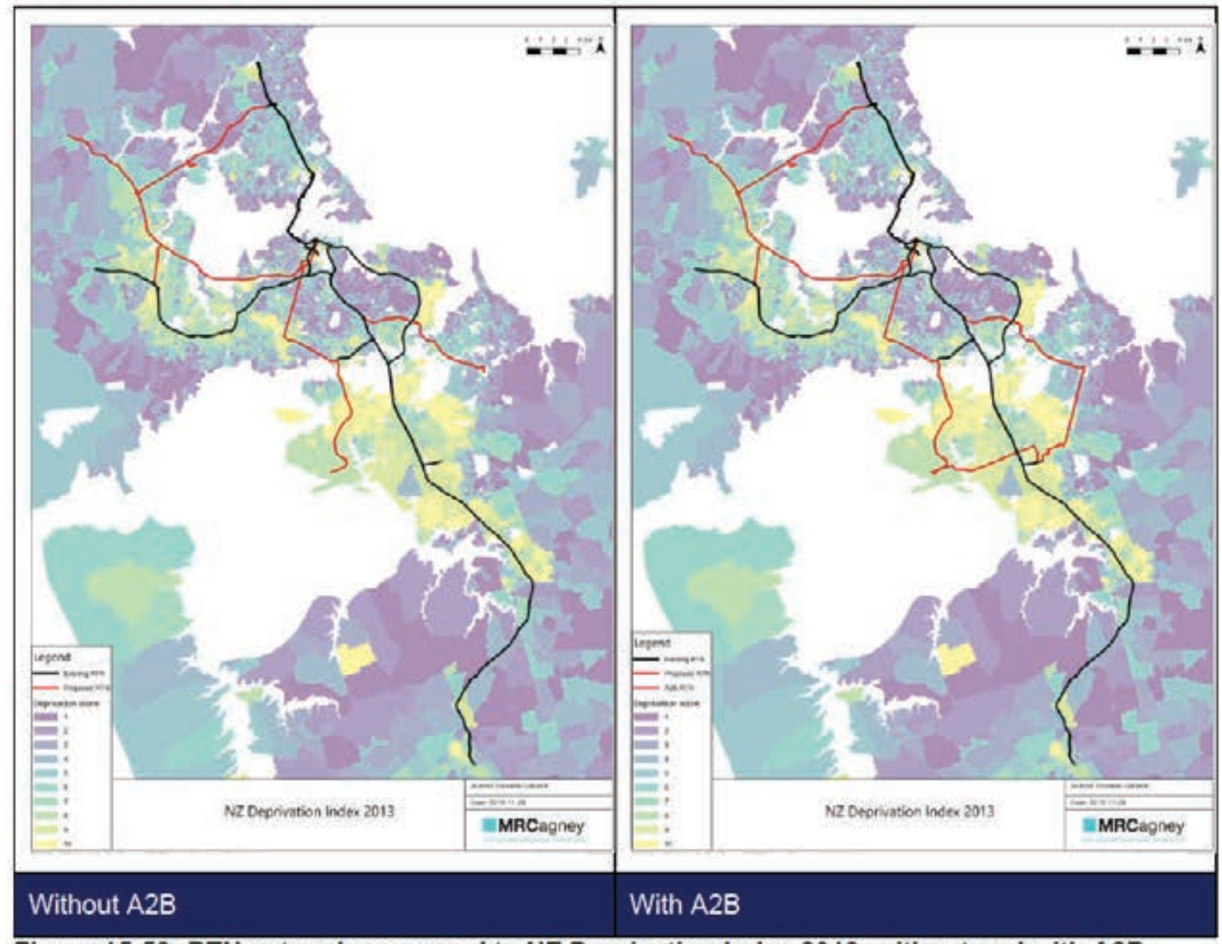


Figure 15-52: RTN network compared to NZ Deprivation Index 2013, without and with A2B

At a more detailed level, an assessment of the needs of vulnerable people in terms of socio-economic, age, physical and mental health, ethnicity and gender[122] indicates that the A2B system will be effective in reducing barriers to access for vulnerable people through:

- Having a simple, legible and reliable service pattern, reducing anxiety and being easy to understand for unfamiliar users or those less confident
- A long span of service to allow travellers and shift workers, both prevalent in the A2B customer base, to rely on the service
- Providing safe, level, comfortable access to stations routes into the community to make it easy for parents, elderly and those less physically able to use the system comfortably and safely
- Level, all-door boarding to make it easier for parents, elderly and people with physical or visual impairments
- Off-board ticketing to minimise stress and allow people to board at any location on the platform
- A safe environment for all users through quality stations, cover, seats, lighting and CCTV

[122] A2B Equity Assessment Technical Note (Appendix X)

- Provision of reassurance and confidence for users who may be unfamiliar, less confident, hearing or vision impaired through audible and visual information, multi-lingual signs
- A route that provides access to key community and social services.

15.11.2 Investment Objective 2

Investment Objective 2: Reliable, resilient and easy to use transport system in South and East Auckland that also forms a gateway to the region from Auckland Airport.

Table 15-8: Investment objective 2 and associated performance measures

Investment Objective 2	Performance measures
Reliable and resilient transport system in South and East Auckland that is easy to use.	▪ Expected travel time ▪ Expected reliability ▪ Capacity and demand ▪ Network performance: – Total demand serviced on A2B and 20Connect corridors – Degree of saturation of key links and intersections – Assessment of travel time reliability for key journeys – Volume/capacity of key routes and special purpose lanes – Vehicle travel time for key journeys: City-Airport, Papakura-Airport, Botany-Airport, Albany-Airport, Westgate-Airport ▪ Directness / ease of use ▪ Public transport mode share change

KPI: Expected travel time and reliability

Figure 15-53 shows the do-minimum and expected option journey times and reliability. The recommended option delivers significantly faster travel times, to a point where peak time journeys by public transport will be as fast and, in some cases faster than a comparable car journey. Achievement of this situation is key to delivering mode shift. Specifically:

- The end-to-end travel time (Botany to Airport, AM peak) by public transport is expected to reduce from 41-58 minutes in the do-minimum to 34-38 minutes with the option.
- A2B is expected to be highly reliable, reducing travel time variation from around 19 minutes to less than 5 minutes (Botany to Airport, AM peak).
- Figure 15-53 below shows the morning peak travel times for A2B and general traffic, in comparison with the do-minimum. It shows that the recommended A2B option will significantly reduce travel times and the variability in times for journeys to and from key centres in South and East Auckland by bus. In many cases, public transport will be competitive with, if not better than, comparative car journeys at peak times. This is expected to deliver genuine travel choice to the people of South and East Auckland and drive mode shift.

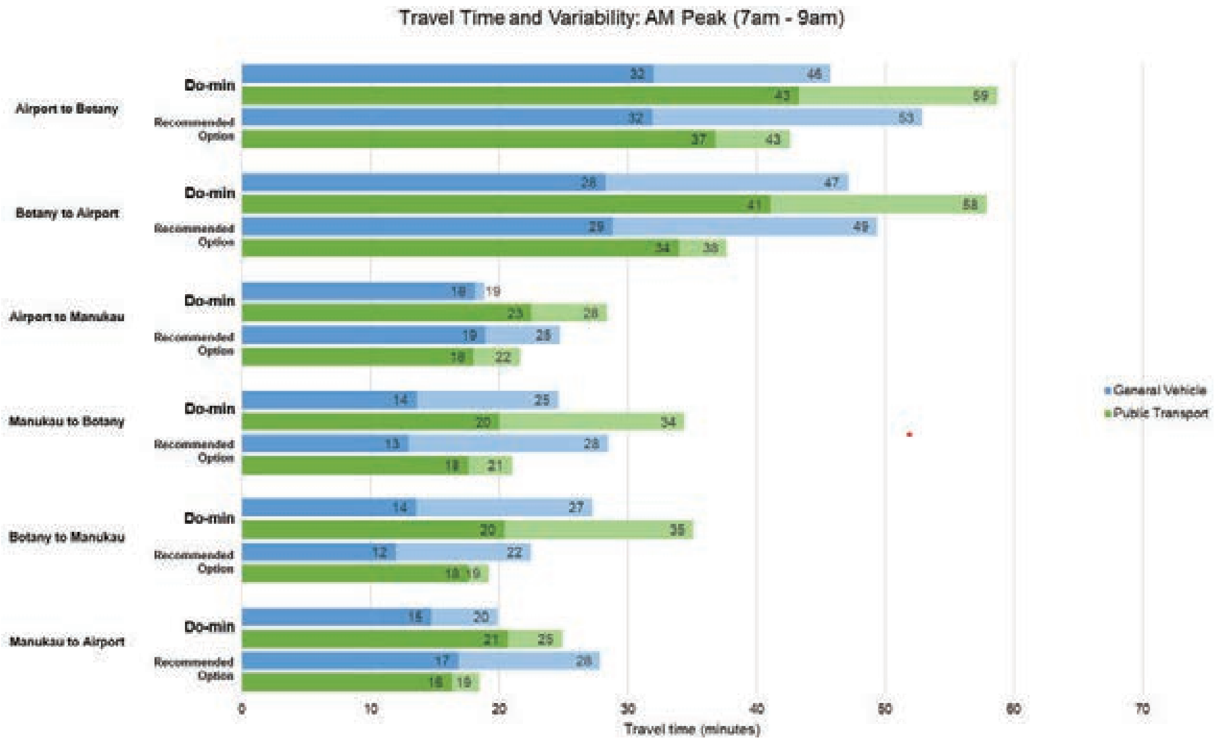


Figure 15-53: Do-minimum and recommended option travel times by car and public transport[123]

KPI: Capacity and demand

The BRT mode included in the recommended option provides a level of service that this SSBC demonstrates will both be capable of handling the forecast demand and significantly growing demand. While many expensive and high-impact rapid transit modes are capable of both (refer Section 10.2.2) the BRT mode selected is able to lead demand, provide a capacity relevant to the forecast demand and be scalable and resilient as demand increases over time.

Figure 15-36 illustrates how the proposed staged delivery of the A2B rapid transit corridor can lead demand through providing a high-quality transport alternative, while not over-providing capacity thereby ensuring that the investment is efficient. This is managed through provision of a combination of decreased headways to a minimum of 3 minutes, which is essential for achieving reliability through at-grade intersections (refer Appendix G-2 Concept of Operations) and increasing vehicle size through fleet renewal. The “final” evolution of the system with 150 capacity vehicles at 3-minute headways, provides “headroom” for growth beyond this, or growth faster than expected.

Furthermore, with the introduction of A2B, there is an increase in demand and capacity along SH20B. The number of people accessing the Airport via SH20B compared to SH20A increases from 32% (do-minimum) to 45% (with A2B).

Table 15-9 below shows the number of people accessing the Airport via SH20A vs SH20B for do-minimum and with A2B.

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[123] The travel times shown are minimums and maximums for the AM peak 2 hour period. Do-min and modelled travel times are obtained from AIMSUN models, which used current demand levels.

Table 15-9: AM people access to Airport with mode share (MSM), 2hr

Airport access via			Accessing by Car	Accessing by PT	Total	% Airport access via SH20B
SH20A	AM	Do min	7230	3000	10230	
		With A2B	6370	2870	9240	
SH20B	AM	Do min	3200	1690	4890	32%
		With A2B	4050	3400	7450	45%

KPI: Network performance

The integrated, multi-modal option provides improvements to all modes in the network.

Specifically:

- The A2B rapid transit corridor is expected to carry 2,000 passengers in the peak hour/direction by 2048 with a journey time of approximately 34-38 mins. The additional people moving capacity provided by a dedicated public transport corridor frees up road space, including in and around the Airport area for high value trips such as freight and high occupancy vehicles.
- More travel choice when travelling around Southwest and East Auckland and to and from the Airport, including provision of fully separated pedestrian and cycle facilities.
- New state highway connections result in redistribution of traffic from local roads onto state highways, particularly freight resulting in improved performance of local roads, improved safety for vulnerable users on local roads, and faster journey times for key movements between Airport Oaks/Ascot and SH20 south.
- Travel time, reliability and capacity improvements on state highways.

The key attributes of the rapid transit performance are described in Section 15.10.1. The following sections outline the key network performance information for the state highway network.

Daily traffic volume difference

The state highway components of the recommended option allow the network to handle forecast increased volumes of traffic more effectively, including growth in freight and movements in and around the Airport area.

The daily traffic volume changes for Horizon 3 (predicted by the Horizon 3 SATURN traffic model) are shown in Figure 15-54.

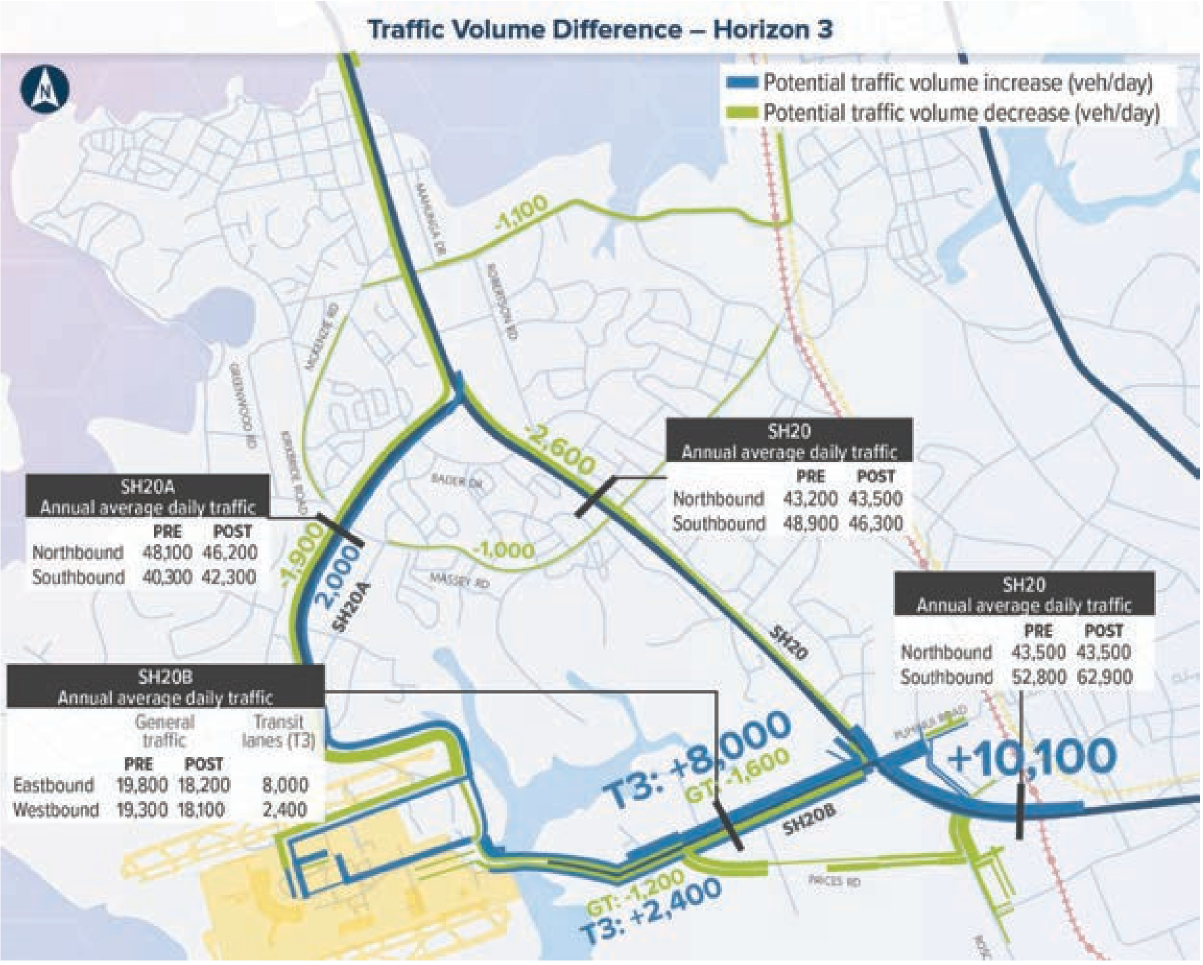

Figure 15-54: Daily demand flow difference and future forecast Annual Average Daily Traffic, Horizon 3, 2048

In Horizon 3:

- It is predicted that there will be an increase of traffic demand along SH20B by approximately 8,000 vehicles per day and 2,400 vehicles per day in the eastbound and westbound directions respectively in the transit lanes.
- Southbound traffic volumes along SH20 will reduce by approximately 2,600 vehicles due to re-routing. With the transit lanes providing additional capacity along SH20B, reduced traffic volumes are predicted in the SH20B general traffic lanes, which relieves congestion.
- It is predicted that there will be an increase in traffic of approximately 10,100 vehicles per day on SH20 south of SH20B due to the introduction of the SH20B to SH20 ramp.

The daily traffic volume changes predicted by the SATURN traffic model for Horizon 5, which includes the Horizon 3 improvements and adds those to SH20A and SH20 is shown in Figure 15-55 below.

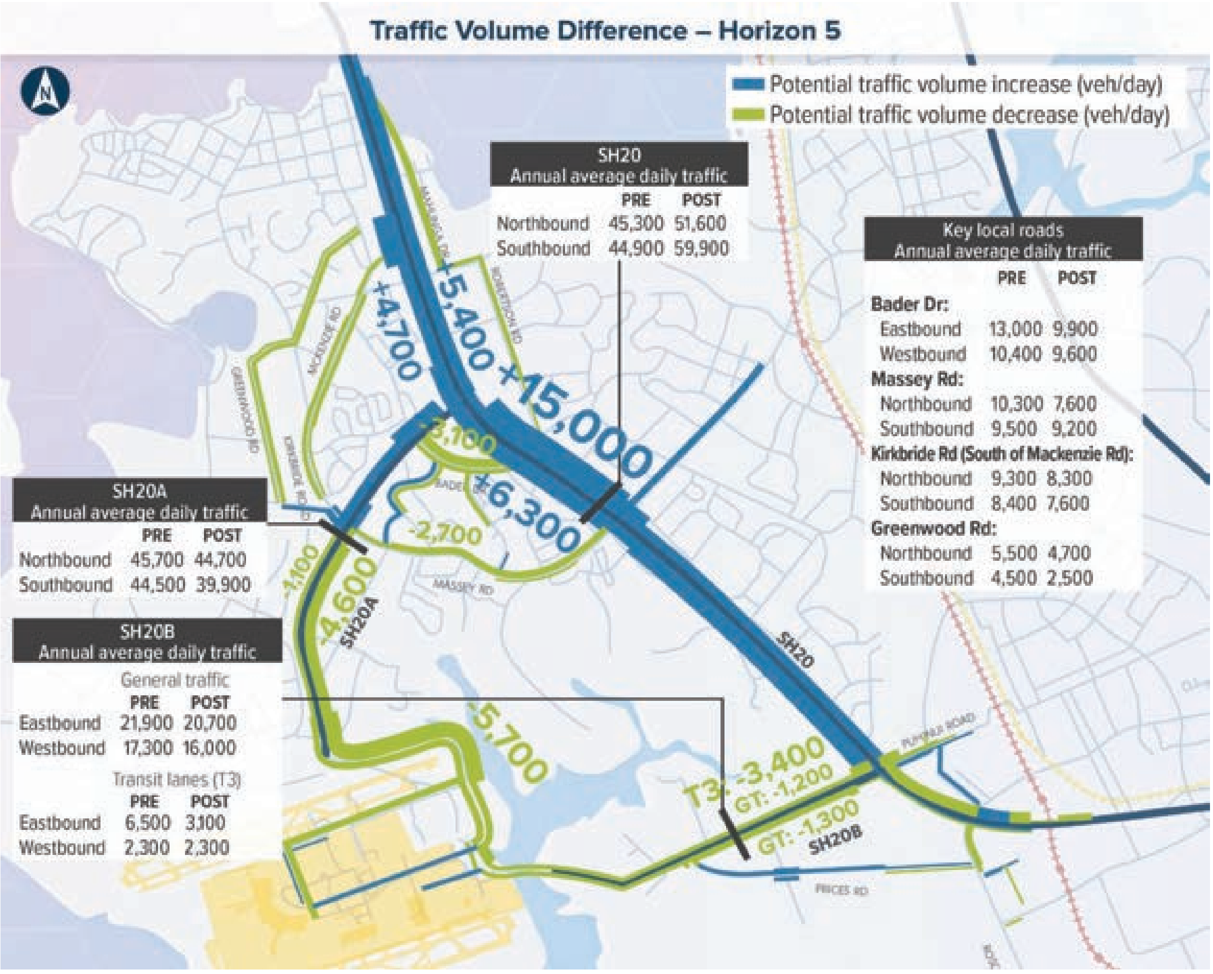

Figure 15-55: Daily demand flow difference and future forecast Annual Average Daily Traffic, Horizon 5, 2048

In Horizon 5:

- Due to the proposed SH20 widening in Horizon 5, traffic volumes along SH20 are predicted to increase by approximately 6,300 vehicles per day and 15,000 vehicles per day in the northbound and southbound directions respectively,
- On the sections of SH20 between SH20A and Massey Road. The more significant southbound demand increase is associated with the proposed southbound direct connection from SH20A to SH20. Trip redistribution as a result of these interventions will lead to reductions in traffic on both SH20A and SH20B.

Travel time

The predicted vehicle travel times for three key journeys along the state highway network within the study area have been extracted from the 2048 SATURN traffic models. These three journeys are described below:

- **Route A** – Along SH20 and SH20A, between Māngere Bridge and Auckland Airport
- **Route B** – Along SH20B and SH20, between SH20 south of Roscommon Road interchange and Auckland Airport, both for general traffic and transit lanes
- **Route C** – Along SH20, between south of Roscommon Interchange and Māngere Bridge.

Figure 15-56 below is an example of the travel times and travel time differences for Horizon 3 for the interpeak period. The interpeak period is shown as it is particularly important for freight, and because the future network demand and associated performance profile is likely to be flatter over the course of the day and therefore less ‘peaky’.

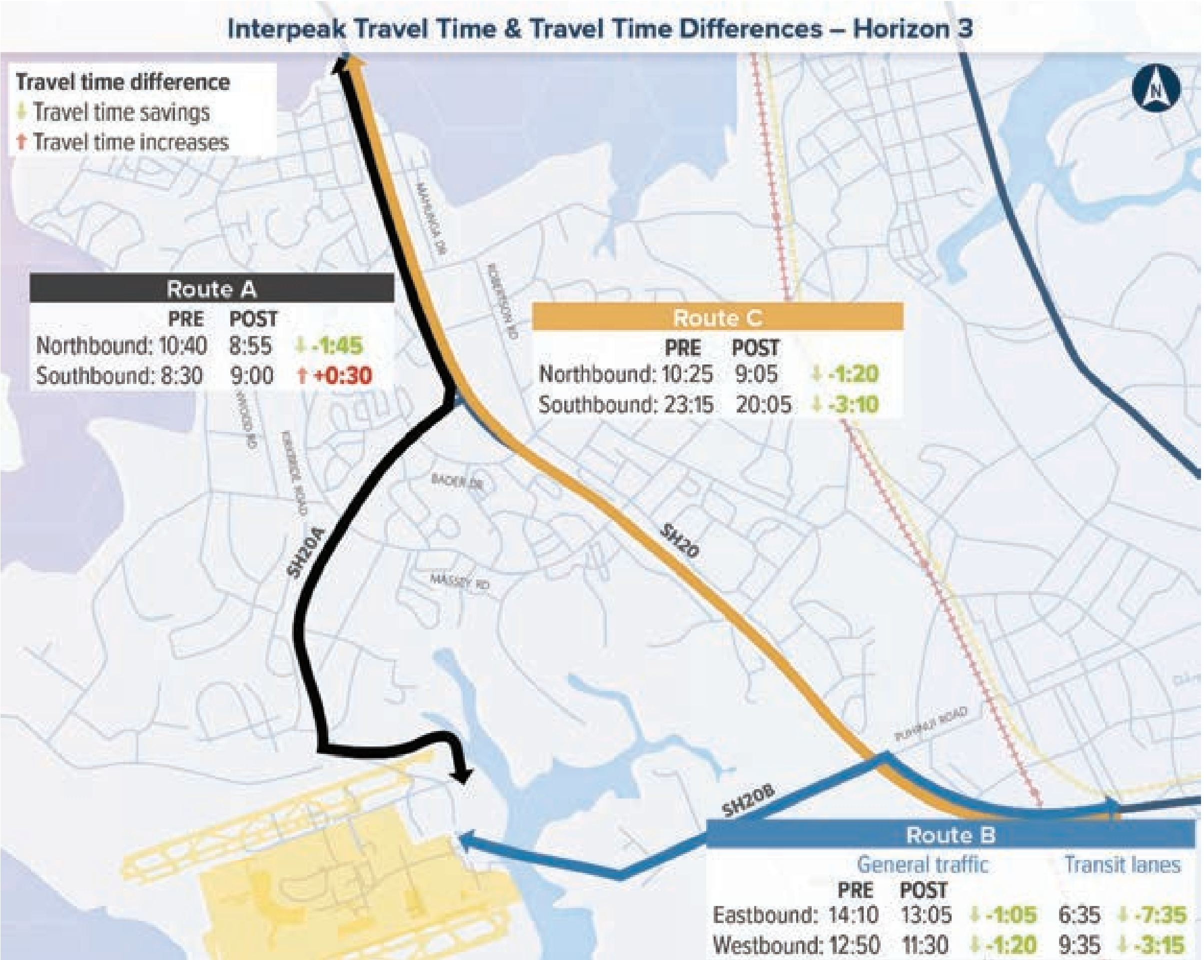

Figure 15-56: Interpeak travel time (MM:SS) and travel time differences, 2048

Key travel time outcomes for Horizon 3 are noted below:

- Travel time savings can be seen on the majority of the routes particularly during the interpeak period, with travel time savings of more than one minute predicted on all but one route
- The reduction in traffic demands on SH20A and SH20 will result in travel time savings in the peak direction
- The transit lanes along SH20B are predicted to result in travel time savings in the morning peak, evening peak and interpeak periods, with a significant travel time saving of 20 minutes 30 seconds for transit lane users between the Airport and south of Roscommon interchange in the evening peak[124].
- There is an increase in travel time for westbound general traffic along SH20B in the evening peak period. This is likely due to the additional capacity along SH20B increasing westbound demands at SH20B Roscommon Road interchange, increasing delays for westbound traffic.

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[124] Appendix L Saturn Model Outputs Summary of Appendix N2 20Connect Design Philosophy Statement

Figure 15-57 below is an example of the travel times and travel time differences for Horizon 5 for the interpeak period.

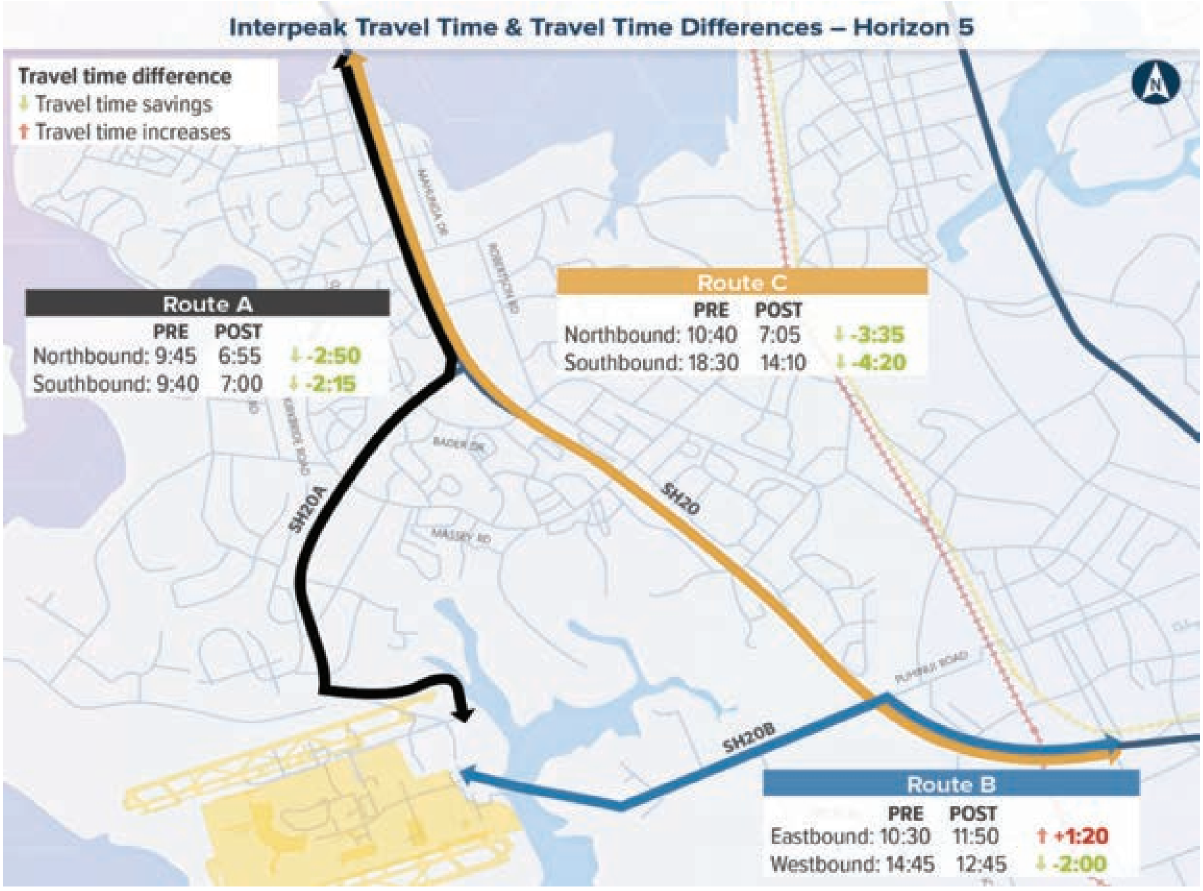

Figure 15-57: Interpeak travel time (MM:SS) and travel time differences for Horizon 5, 2048

Key travel time outcomes for Horizon 5 are noted below:

- Similar to Horizon 3, travel time savings are predicted along SH20, SH20A and SH20B, especially during the interpeak period
- There is an increase in travel time for eastbound general traffic along SH20B in the interpeak period. This is likely due to the increased demands on SH20 south of Puhinui Road, which increases the delays on SH20 east of Puhinui Road interchange
- Significant travel time savings are predicted along SH20 for morning peak, evening peak and interpeak due to proposed SH20 widening.

Further details around travel times for morning peak, interpeak and evening peak periods for Horizon 3 and Horizon 5 can be found in Section 7.1 of the Supplementary Information and Appendix L of Appendix N2 (20Connect Design Philosophy Statement).

Congestion

To understand the predicted congestion on the network, volume over capacity outputs have been obtained from the 2048 SATURN traffic models for Horizon 3 and Horizon 5. An example of the congestion levels on the state highways for Horizon 3 in the forecast interpeak period is shown in Figure 15-58 below. Again, the interpeak period is shown as it is particularly important for freight, and because the future network demand and associated performance profile is likely to be flatter over the course of the day and therefore less ‘peaky’.

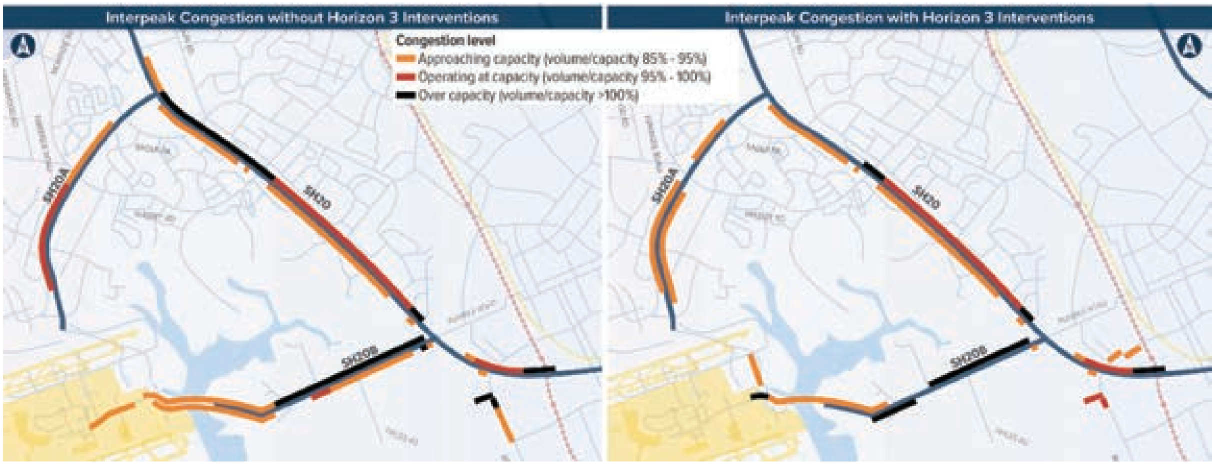

Figure 15-58: Interpeak predicted congestion without (left) and with (right) Horizon 3 interventions, 2048

Key congestion outcomes for Horizon 3 are noted below:

- In morning, evening and inter peak periods, SH20, between SH20A and SH20B, is operating close to or at capacity
- The operations along SH20B and at the SH20 / SH20B interchange are predicted to improve due to the proposed multi-modal SH20B improvements in Horizon 3
- The predicted re-routing between SH20B and SH20/SH20A is predicted to improve performance on both SH20 and SH20A.

An example of the congestion levels on the state highways for Horizon 5 interpeak period is shown in Figure 15-59 below.

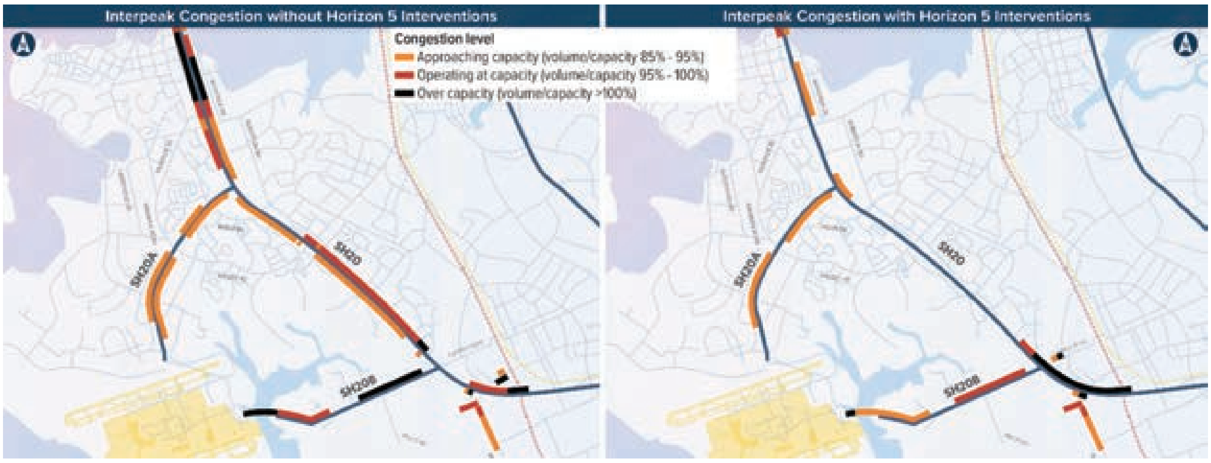

Figure 15-59: Interpeak predicted congestion without (left) and with (right) Horizon 5 interventions, 2048

Key congestion outcomes for Horizon 5 are noted below:

- The proposed widening on SH20 is predicted to improve congestion issues along SH20 during all modelled periods
- However, SH20 south of the Puhinui motorway interchange is predicted to be operating over capacity, with higher delays
- Improvement to forecast congestion on SH20B eastbound is predicted during the interpeak period
- No significant improvements are expected along SH20A and SH20B as well as intersections in the

Wiri area in Horizon 5, during both 2048 morning peak and evening peak periods.

Further details around modelled congestion for morning peak, interpeak and evening peak for Horizon 3 and Horizon 5 can be found in Section 7.2 of the Supplementary Information and Appendix L of Appendix N2 (20Connect Design Philosophy Statement).

KPI: Ease of use

As summarised in Section and Appendix G-2 Concept of Operations, the proposed rapid transit corridor is proposed to have many attributes that will make the system easier to use for the specific customers of this line than the do-minimum network, including:

- Connecting to almost a total of 30 services including rapid transit, frequent and local bus services through specifically designed facilities.
- A simple, legible service design providing a direct, trunk route to key activity generators and interchanges
- A relatively high operating speed and level of reliability
- Articulated, low-floor electric BRT vehicles providing level entry and movement within the cabin for ages and abilities
- A long span of service (4:30am to 1.30am, including weekends) to enable access and travel choice for shift workers and travellers (domestic and international)
- Allows for level boarding all-door boarding, off-board ticketing and tag-on (like a train or light rail) at stations, providing a best practice customer experience and reduced dwell times
- Opportunities to provide walking, cycling and multi-modal interventions for station access along the route
- Integration with rapid transit, local bus, cycle and road networks
- Accessible and integrated station designs and locations

This, compared with the do-minimum situation characterised by:

- Long, complicated journeys with relatively poor legibility (compared to the rapid transit option)
- Low frequencies
- Poor speeds and poor reliability
- Standard buses with standard kerbside boarding not allowing level access
- No ability to buy tickets off the vehicle or top up HOP cards
- No provision for multi-modal arrivals or storage of cycles or other vehicles.

KPI: Public transport mode share change

The recommended option generates a significant increase in mode share for public transport in the corridor and study area, as shown in Figure 15-60. Overall AM peak mode share in the study area is expected to increase from 4% in the 2016 base to 14% in 2048 without A2B and 16% with A2B. However, of significance is the mode share for trips to major centres of employment and higher density land uses, including Manukau, Botany and the Airport. For example, public transport mode share to Manukau is expected to increase from 10% to 43% (39% in the do-min 2048) and to the Airport from 2% to 44% (39% in the do-min 2048).

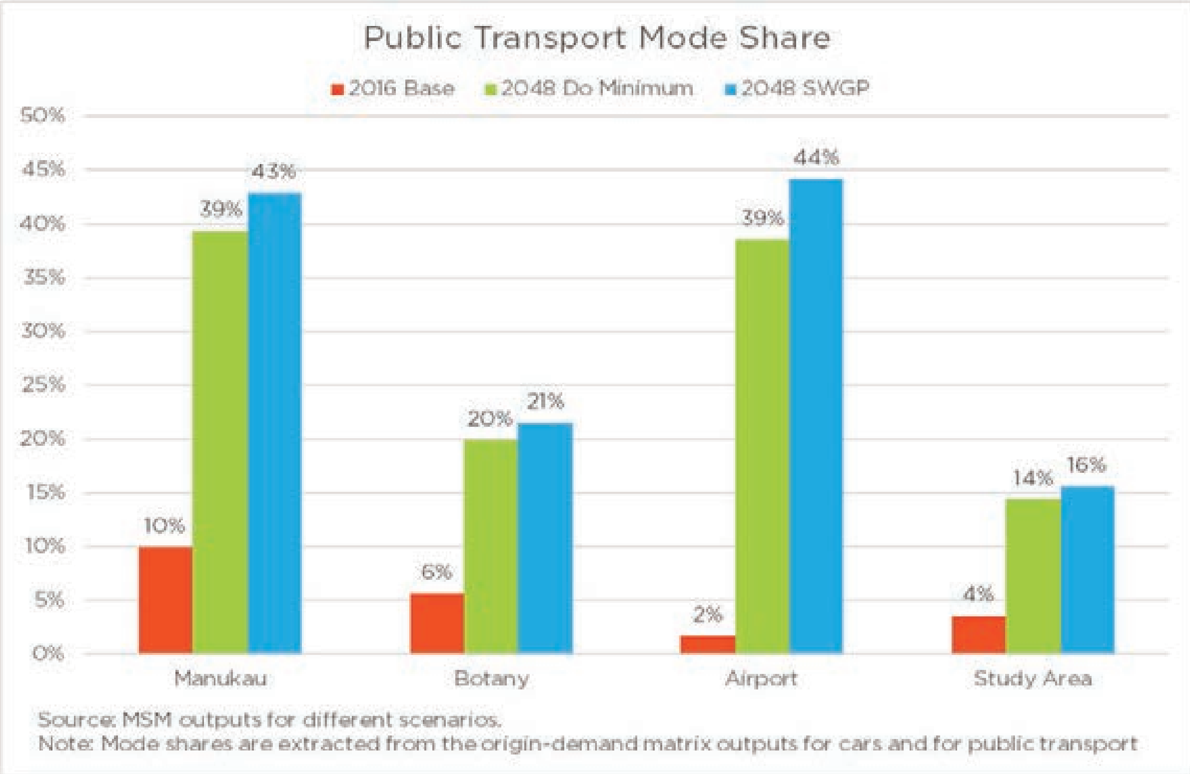

Figure 15-60: Public transport mode share AM peak for key centres and study area

Figure 15-61 below shows the mode share at different Airport access points. With SWGP, 46% of access to Airport via SH20B is attributed to A2B. A2B is expected to carry 20% of all trips to the Airport in 2048, more than Light Rail in the northern corridor.

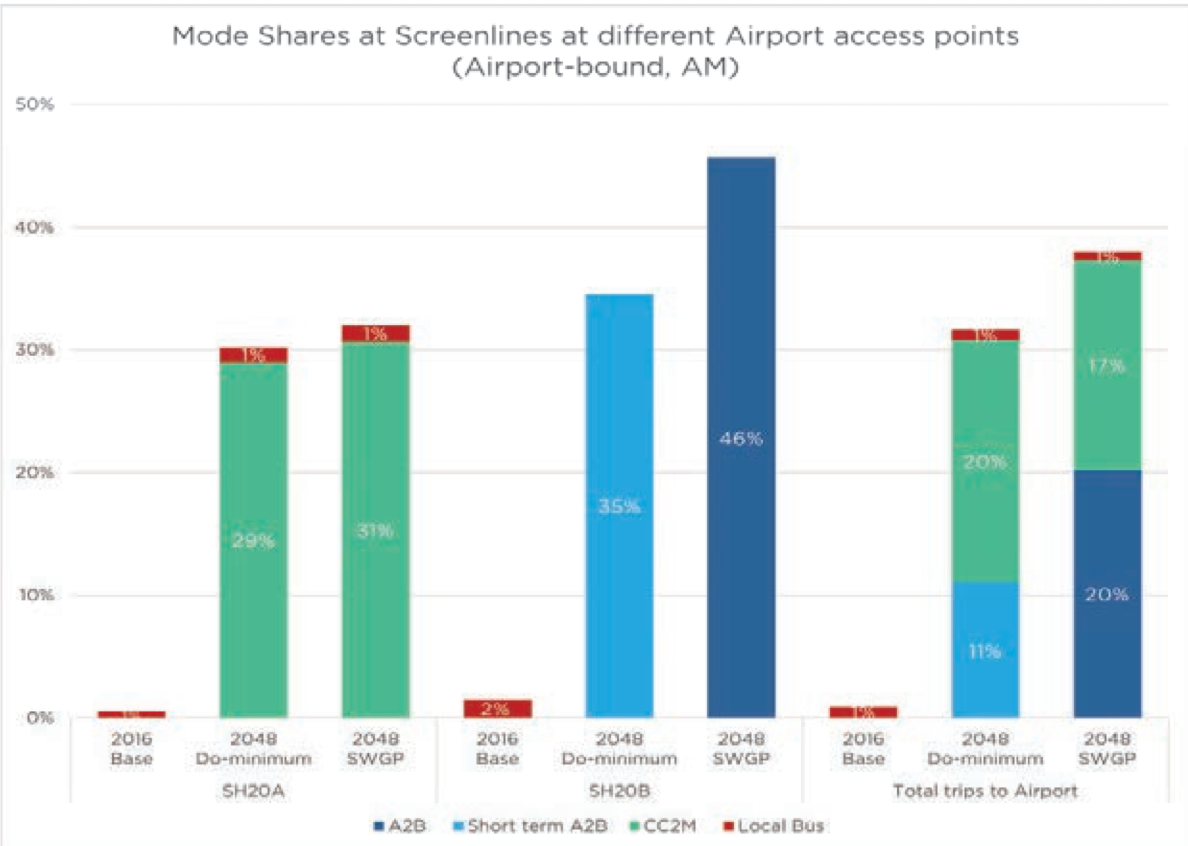

Figure 15-61: Mode shares at screenlines at different Airport access points

Figure 15-63 and Figure 15-64 show the forecasted proportion of road-users travelling by public transport in the Botany – Airport and Airport – Botany directions respectively, across the screen-lines illustrated in Figure 15-62. It draws a comparison between the public transport proportions in 2048 with and without A2B rapid transit. Figure 15-63 and Figure 15-64 show that the mode share proportion is higher for the model including the rapid transit corridor across all screen lines in both directions, and this difference is particularly high at the Puhinui screen-line. In 2048, at the Puhinui screen lines, the public transport mode share is:

- 60% with A2B compared to 21% without A2B from Botany to Airport
- 79% with A2B compared to 30% without A2B from Airport to Botany.

Figure 15-62: SWGP preferred option, including mode-share screen-lines

MODE SHARES AT SCREENLINES IN SWGP STUDY AREA
(Botany–Airport AM Peak, Public Transport)

KEY: 2016 | 2048 ATAP excl A2B | 2048 ATAP incl A2B | 2048 percentage increase with A2B

PT patronage	Botany	Ormiston	Dawson	Puhinui	SH20B
2048 ATAP incl A2B	1681	2335	3055	2315	3396
2048 ATAP excl A2B	824	719	1867	411	1688
2016	112	200	270	9	43

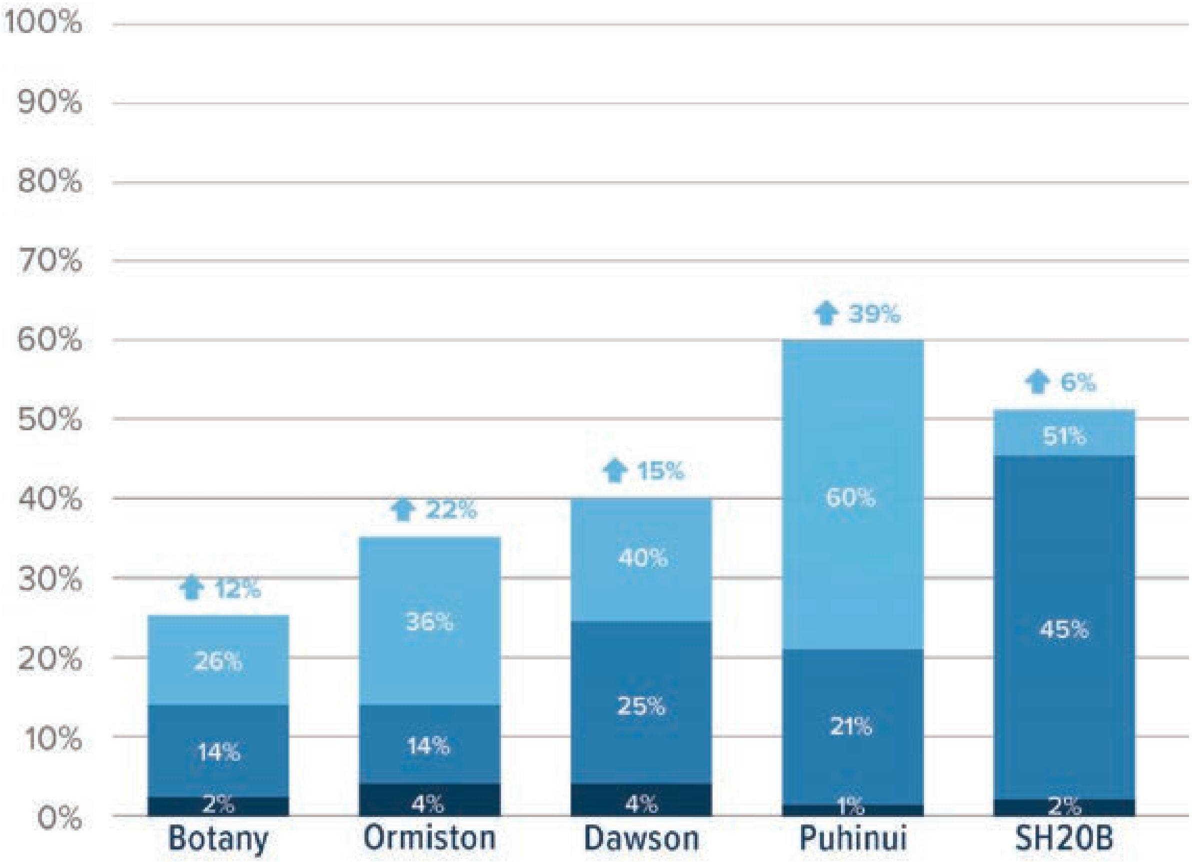

Figure 15-63: Botany to Airport AM peak public transport mode-share (MSM i11.5 2048)

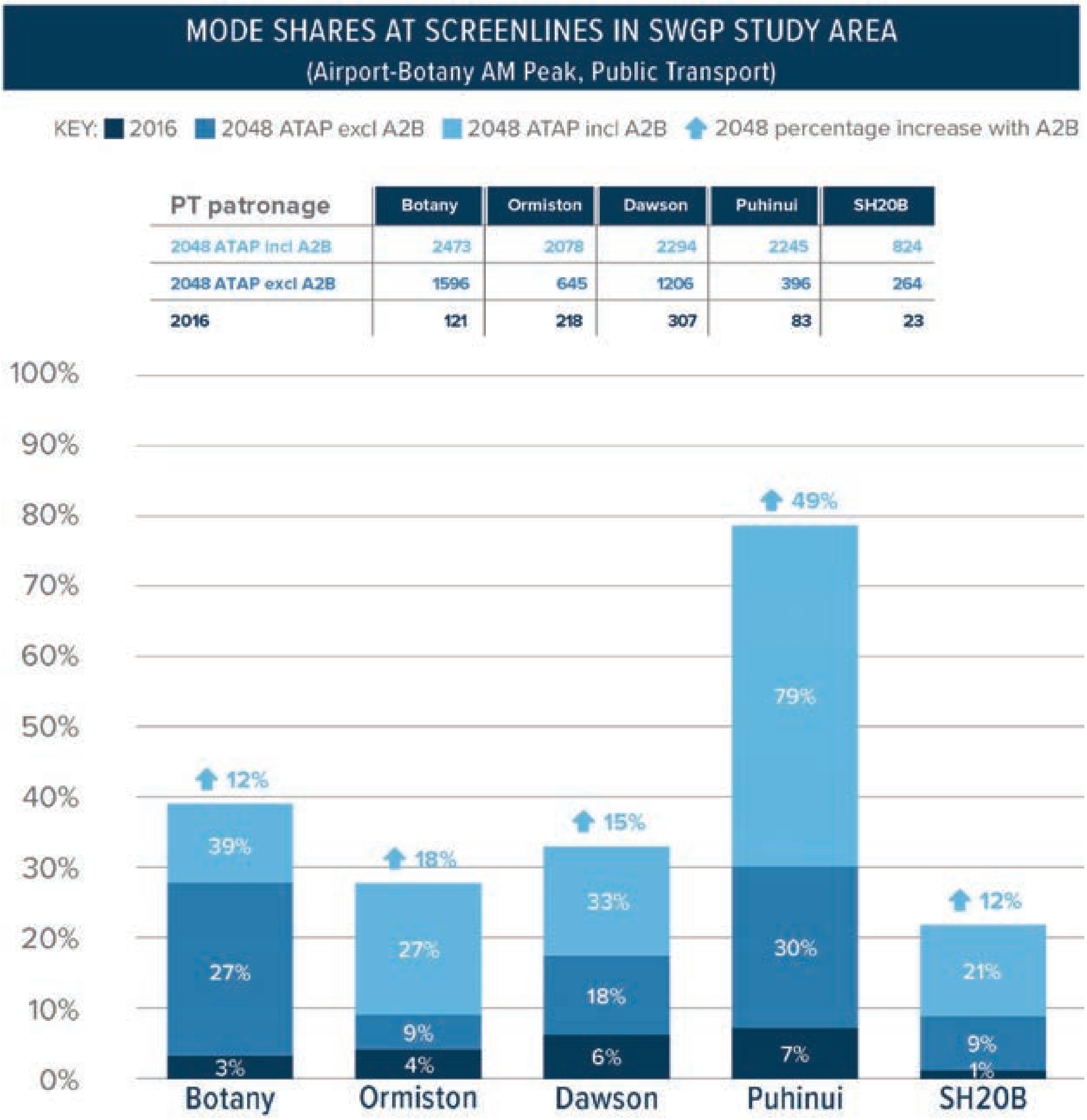

Figure 15-64: Airport to Botany AM peak public transport mode-share (MSM i11.5 2048)

15.11.3 Investment Objective 3 & 4

Investment Objective 3: To improve economic performance of the Airport area, Auckland and New Zealand.

Investment Objective 4: Transport network that enables the efficient movement of goods and people.

Table 15-10: Investment objective 4 and associated performance measures

Investment Objective 3 & 4	Performance measures
To improve economic performance of the Airport area, Auckland and New Zealand. Transport network that enables the efficient movement of goods and people.	▪ Change in population and jobs within 45-minute public transport trip (or walking trip) to key centres: – Airport – Manukau – Botany – Ormiston ▪ Network performance ▪ Change in accessibility by road: – Population within 30-minute drive from the Airport (peak hours, 2048) – Jobs within 30-minute drive from the Airport (peak hours, 2048) – Number and performance of grade separations and at-grade junctions and intersections

KPI: Change in population and jobs within 45-minute public transport trip (or walking trip) to: Airport, Manukau, Botany, Ormiston

Refer to Section 15.11.1.

KPI: Network performance

Refer to Section 15.11.1.

KPI: Change in accessibility by road

- The improved journey times result in a change in access to opportunities by road. This is an indicator of access to markets for business in the employment, industrial and freight forwarding sectors around the Airport:
  - Population within 30-minute drive of the Airport in 2048 increases by approx. 40,000, from 150,000 to 190,000 in the PM peak.[125]
  - Job opportunities within 30-minute drive of the Airport in 2048 increases by approx. 40,000, from 95,000 to 134,000 in the PM peak.
  - The 30-minute driving catchment area for do-minimum compared to emerging preferred is shown in Figure 15-65 below.

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[125] Population and jobs opportunities within 30-minute drive are estimated from emerging preferred option, which provides a conservative estimate for the recommended option.

- Peak traffic able to access the Airport increases from 8,000 to 10,000, including 700 freight vehicles per hour, enabling growth of the key Southwest Auckland commercial areas
- Southbound freight movements from Airport Oaks area (north of the Airport) travel through three signalised intersections instead of up to eight and can avoid using local roads.

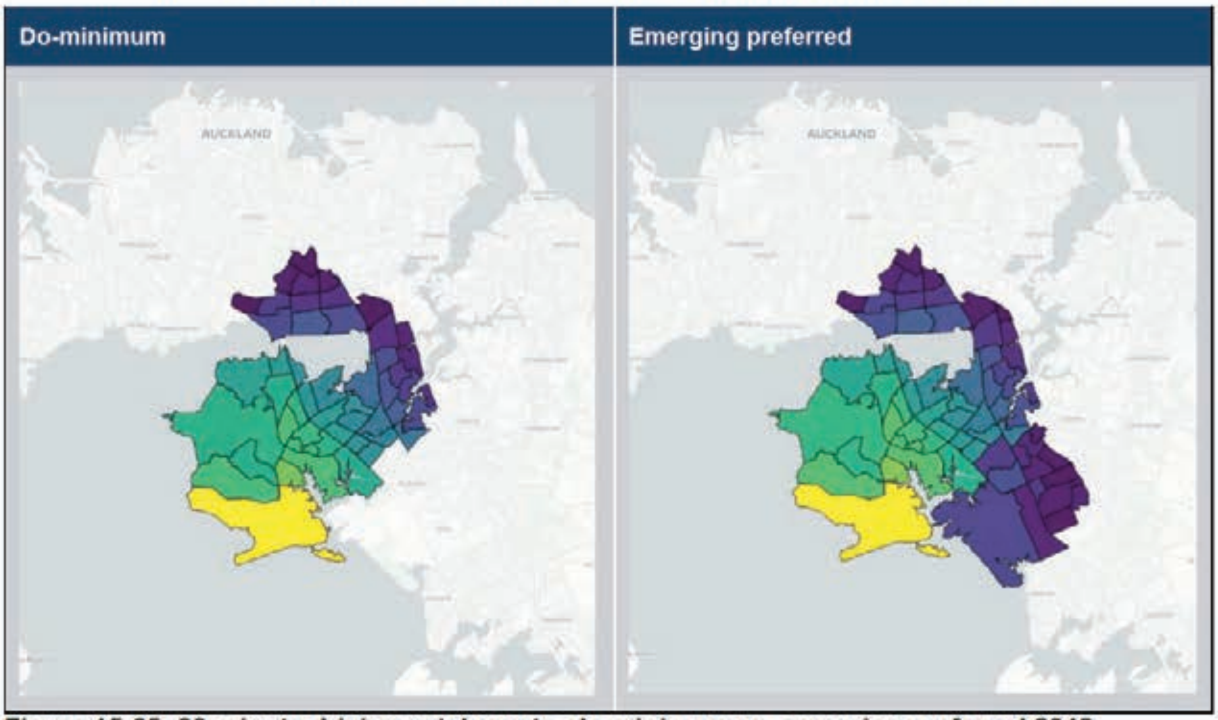

Figure 15-65: 30-minute driving catchments, do-minimum vs. emerging preferred 2048

15.11.4 Investment Objective 5

Investment Objective 5: Urban regeneration and improved built environment.

Table 15-11: Investment objective 5 and associated performance measures

Investment Objective 5	Performance measures
Urban regeneration and improved built environment.	▪ Land development opportunities

KPI: Land development opportunities

- Connecting two metropolitan centres and New Zealand's largest airport and major employment zones with four existing or proposed rapid transit lines, means SWGP can be a significant catalyst for urban regeneration
- The Transit-Oriented Development (TOD) Technical Note (Appendix U), and Section 15.2.11 ,describes the potential for transit-oriented development. It concludes there is TOD potential at all of the proposed A2B stations
- A2B and 20Connect projects will spur population and employment increases near every A2B station, as well as across the wider area, as shown in Figure 15-66 and Figure 15-67 below. The colours in the figures represent the percentage change in population or employment triggered by A2B and 20Connect. There is up to 11% of population increase and 8% employment increase as indicated by the darkest blue zones. The model also predicts that Auckland Isthmus will have a growth reduction between 0 to 3%. However, it is not expected that the A2B and 20Connect projects will

actually lead to population or employment loss across the Isthmus, where population and employment is arguably more sustainable, leading to a more compact city outcome.

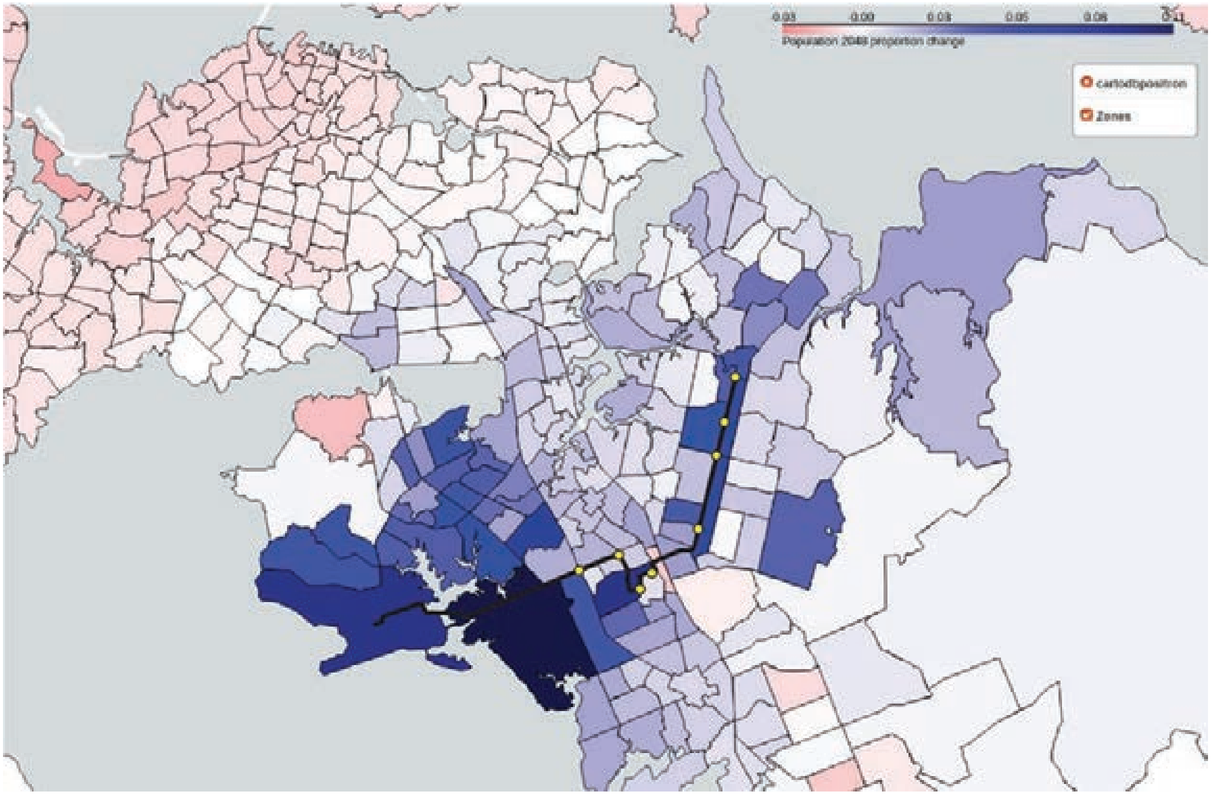

Figure 15-66: 2048 i11.5 + A2B & 20Connect forecast proportional population change by MSM zone

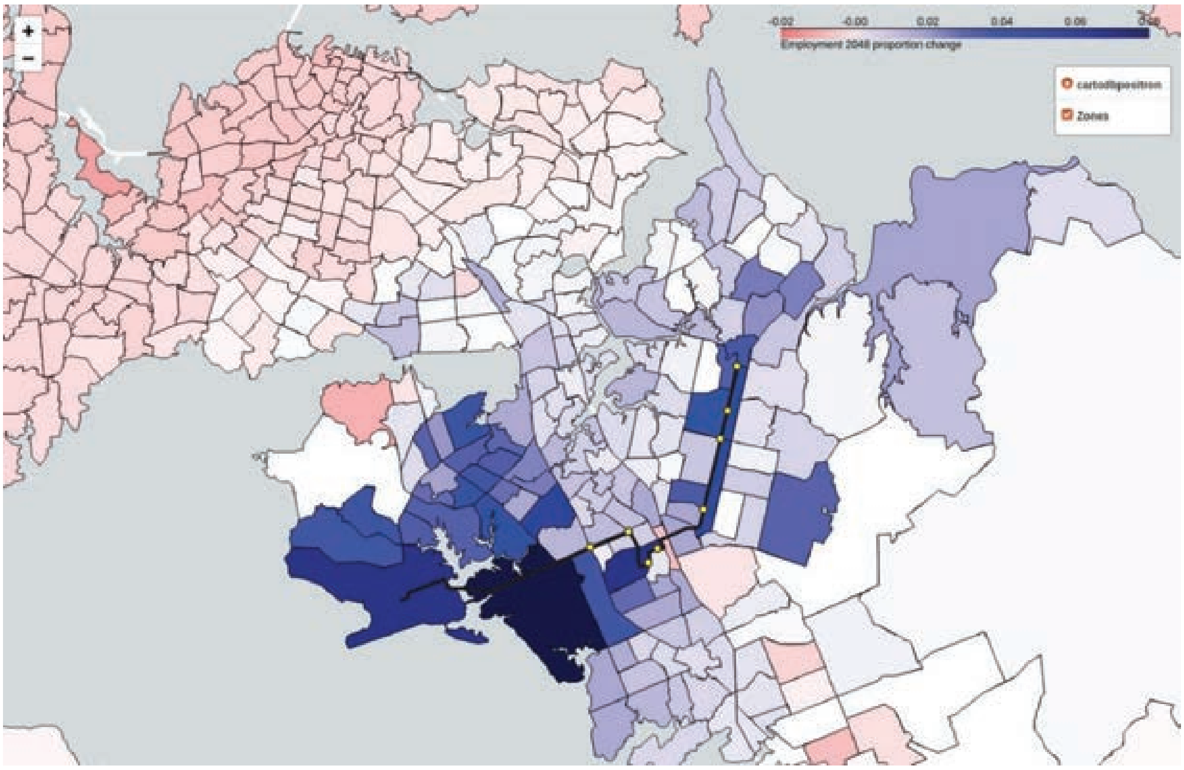

Figure 15-67 : 2048 i11.5 + A2B and 20Connect projected proportional employment count change by MSM zone

- There is a significant opportunity to align Crown and Council investment, taking a whole-of-Government approach to Transform Manukau through transit-led development. Panuku is leading the Transform Manukau project, unlocking local government and Crown land holdings (Figure 15-68). A2B, together with recent investments in Manukau bus and train stations, provides improved access and travel choice to support \$3.6 billion planned investment in Manukau over the next 25 years by government agencies in housing, education and employment. It also supports private sector investment in accommodation, retail and employment[126]. This will help address existing access and social equity problems in the area and help realise the huge amount of opportunities Manukau presents.
    - The population target for the project area in Manukau is to take it from the current base of 6,000 to 20,000 people by 2040.
    - The number of jobs in the project area in Manukau is expected to increase by over 22,500 to around 56,000[127].
    - Sites (1) and (2) in Figure 15-68 are already in construction while other sites are well advanced. The location of proposed A2B stations and the access to markets and jobs that A2B can provide will support this whole-of-Government investment in education, housing and employment.

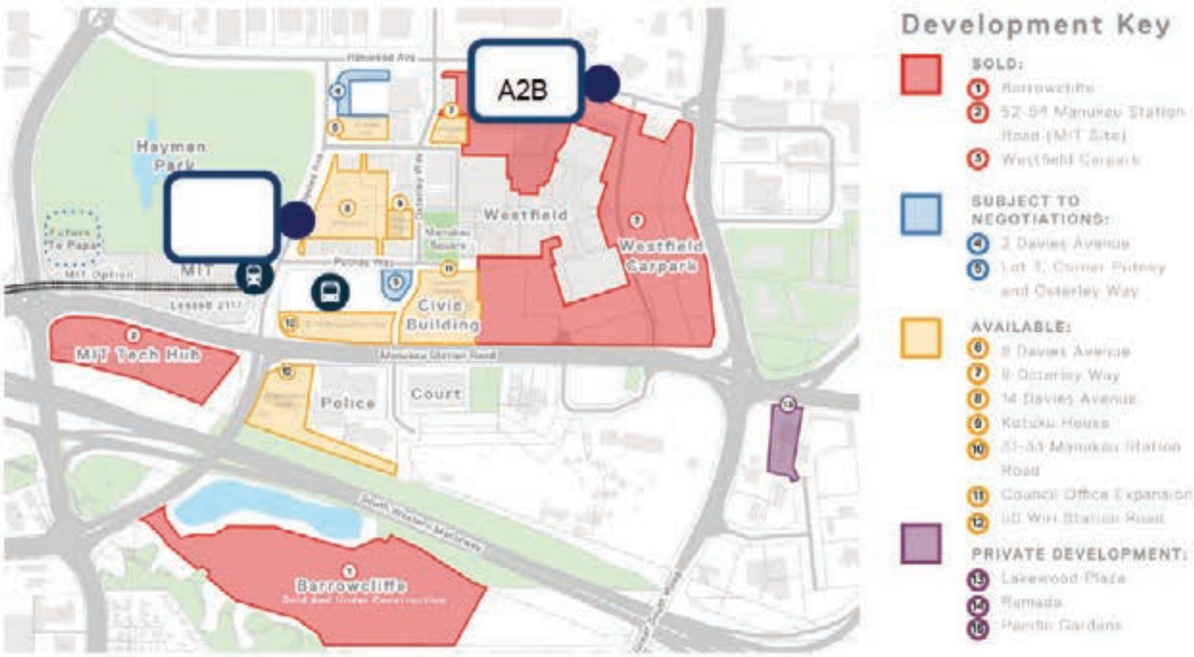

Figure 15-68: Crown land development potential and status in Manukau, A2B stations added (Source: Transform Manukau)

15.11.5 Investment Objective 6

Investment Objective 6: Reduce impact of the transport system on the environment and Taonga.

126 Source: Kāinga Ora

127 Source: Auckland Plan 2050

Table 15-12: Investment objective 6 and associated performance measures

Investment Objective 6	Performance measures
Reduce impact of the transport system on the environment and Taonga.	▪ Environmental quality measures ▪ Stakeholder engagement activities ▪ Effects on places of heritage ▪ Māori culture and traditions ▪ Te Taiao (air, land, water, taonga)

KPI: Environmental quality measures

- Environmental effects were important criteria in the MCA. These are summarised in Part B in detail. The recommended option provides improvements in all areas
- Forecasts suggest that the effects of A2B and 20Connect combined will result in a reduction of approximately 8 tonnes of CO2 emissions annually in 2048 (comparing the Horizon 5 and do-minimum model outputs).
- Reduction in vehicle emissions as a result of expected modal shift from private vehicles to public transport and active modes through enabling MRT along SH20B (noting that the major highway elements are slated for later years and should be reappraised before possible implementation).

KPI: Stakeholder engagement

- Strong stakeholder support has been received for the recommended option through public consultation and specific focus groups have been used to inform the testing of options. See the Engagement Summary reports (Appendix F) and the Kantar TNS Auckland Transport Airport Access Research Report (Appendix W) for further information.

KPI: Effects on places of heritage

- The programme area covers the Puhinui Precinct which is of high cultural value to Mana Whenua, in particular Te Ākitai Waiohua. To reflect the significance of the area to Te Ākitai Waiohua, the SWGP is based on a strong strategic partnership between four programme partners: Te Ākitai Waiohua, AT, Waka Kotahi and Auckland Airport. Te Ākitai Waiohua have highlighted in their addendum CVA the potential adverse effects on a range of their cultural, spiritual and historic values. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.
- The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.
- Other Mana Whenua also hold significant values and relationships with the SWGP study area and ongoing engagement with these Treaty partners will be undertaken going forward.

KPI: Māori culture and traditions

- There are opportunities to recognise cultural identity and taonga in design of the system, infrastructure and architecture.
- The programme area covers the Puhinui Precinct which is of high cultural value to Mana Whenua, in particular Te Ākitai Waiohua. To reflect the significance of the area to Te Ākitai Waiohua, the SWGP is based on a strong strategic partnership between four programme partners: Te Ākitai

Waiohua, AT, Waka Kotahi and Auckland Airport. Te Ākitai Waiohua have highlighted in their addendum CVA the potential adverse effects on a range of their cultural, spiritual and historic values. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.

- The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.
- Other Mana Whenua also hold significant values and relationships with the SWGP study area and ongoing engagement with these Treaty partners will be undertaken going forward.

KPI: Te Taiao (air, land, water, taonga)

- The impact of the proposed A2B rapid transit corridor on the environment is discussed in the Joint Consenting Strategy (Appendix L). Beyond this, the A2B design affords opportunities to improve the quality of the environment, including:
  - Treating all water runoff, including additional treatment for existing carriageways which are generally not being treated at present. This is an issue of particular importance to iwi
  - The "managed system" operation proposed from A2B allows a narrow footprint at stations, resulting in little impervious area and improved urban and water quality outcomes
  - Providing opportunities through later design phases for local cultural influence in the design of assets.
  - A2B (Horizon 4) is expected to result in a reduction of 15 tonnes of CO_2 emissions annually in 2048 compared with the do-minimum.[128]

15.11.6 Investment Objective 7

Investment Objective 7: Safe and secure transport facilities in South and East Auckland.

Table 15-13: Investment objective 7 and associated performance measures

Investment Objective 7	Performance measures
Safe and secure transport facilities in South and East Auckland	▪ Walking and cycling (active modes) safety and provision ▪ Population within 500m walking distance of frequent PT-stop or 1000m walking distance to RTN station ▪ Amenity function of activity areas and town centres

KPI: Walking and cycling (active modes) safety and provision

- The recommended option has included a whole-of-system view, identifying access routes and needs for all modes with a particular focus on walking and cycle access. The needs of people arriving by all modes and all abilities have been recognised or provided for in the design, including the specific needs of vulnerable people
- Separated walking and cycling facilities along the A2B rapid transit route with raised crossings at all

[128] MSM 2048 model outputs

side streets, signalised intersections providing safe and comfortable environment for pedestrians and cyclists

- High quality dedicated shared paths along SH20 and SH20B.

KPI: Population within 500m walking distance of a frequent public transport stop or 1000m walking distance of a rapid transit station

Refer to Section 15.11.1.

KPI: Amenity function of activity areas and town centres

Reduction in through traffic, particularly through Māngere as a result of the Horizon 5 (SH20A-SH20) improvements providing more direct connections and improved travel time reliability on the state highway network will provide better network resilience and remove long-distance and/or freight trips from local roads, reducing rat running and conflicts with active modes.

15.12 Effectiveness against problems

The investment logic map connects the problems identified by the programme partners to the objectives outlined in Section 15.2.1, in which the options assessment is described. The primary description of option performance is located in that section.

For completeness, the effectiveness of the recommended option in solving the problems is discussed briefly here. The combined ILM is shown in Appendix A. As would be expected, there are significant overlaps between the problems – and benefits - allowing them to be combined when examining the evidence.

The combined problem statements are:

- Costly, unreliable, long and complicated trips in South and East Auckland, including the Airport area, severely limit accessible travel choices for people to meet daily needs for work, learning and socialising, reinforcing ongoing deprivation and resulting in unreliable movement of people and goods.
- Poor east-west travel choices as well as inadequate transport system capacity connections and management, to, from and within the study area constrain current and future growth, undermining economic growth and prosperity for Aucklanders.
- The current transport system in South and East Auckland has adverse environmental effects and does not recognise cultural identity and taonga, diminishing the Mauri of the area.
- Perceptions of poor personal safety limit uptake of public transport and active modes.

Effectiveness of the recommended option against each is outlined below.

Costly, unreliable, long and complicated trips in South and East Auckland, including the Airport area, severely limit accessible travel choices for people to meet daily needs for work, learning and socialising, reinforcing ongoing deprivation and resulting in unreliable movement of people and goods.

The recommended option addresses this problem in the following ways:

- Improving transport choices and connections to major land uses including the Airport, its surrounding employment zones and two metropolitan centres with associated community facilities, employment, education and social services.
- Significantly reducing public transport journey times for access to major activity centres and hubs
- Significantly improving the reliability of public transport journeys to major activity centres and hubs
- Providing a simple rapid transit service design connecting four other rapid transit lines, enabling simple, less complicated journeys
- Improving customer experience and a simple user interface with level boarding, off-board ticketing, quality stations and multiple arrival modes provided for
- Providing realistic choices to private car use, means potentially reduced household travel costs through reduced need to car ownership
- Reduced congestion on the state highway network and improved reliability of journey times providing improved movements of people and goods to, from and around the Airport area
- Provision of quality movement for all modes including pedestrian and cycle paths on upgraded state highways and rapid transit links.

Poor east-west travel choices as well as inadequate transport system capacity connections and management, to, from and within the study area constrain current and future growth, undermining economic growth and prosperity for Aucklanders.

- The recommended option addresses this problem in the following ways:
- Providing a rapid transit connection with enough capacity to handle un-met demand for public transport usage.
- Providing public transport connections to key urban centres and employment zones, allowing greater densities and economic development.
- Providing additional capacity on the state highway network, including the western ring route, enabling continued growth in employment and economic development.
- Improving the performance of the public transport and state highway networks, improving efficiency of access for workers, freight, travellers and other journeys.

The current transport system in South and East Auckland has adverse environmental effects and does not recognise cultural identity and taonga, diminishing the Mauri of the area.

The recommended option addresses this problem in the following ways:

- Improved environmental outcomes, particularly in respect of treating water runoff and reduced emissions, reducing effects on taonga.

- Opportunities to reflect cultural identity, taonga and heritage in the system design.
- The recommended option traverses culturally significant areas, including the Māori cultural landscape around the Puhinui Precinct which is of high cultural value to Mana Whenua, in particular Te Ākitai Waiohua. To reflect the significance of the area to Te Ākitai Waiohua, the SWGP is based on a strong strategic partnership between four programme partners: Te Ākitai Waiohua, AT, Waka Kotahi and Auckland Airport. Te Ākitai Waiohua have highlighted in their addendum CVA the potential adverse effects on a range of their cultural, spiritual and historic values. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.
- Other Mana Whenua also hold significant values and relationships with the SWGP study area and ongoing engagement with these Treaty partners will be undertaken going forward.

Perceptions of poor personal safety limit uptake of public transport and active modes.

The recommended option addresses this problem in the following ways:

- Providing a new, separated pathway on the entire route for vulnerable users – walking and cycling.
- Provision of quality stations for public transport with sheltered waiting areas, lighting, CCTV, real time information, improved pedestrian and cycle environments and access.
- A route and stations that are connected to existing and proposed public transport, walking and cycling networks at purpose-design facilities.
- Opportunities for wider network upgrades for active modes to support wider journeys.

15.13 Urgency

While there is a long term, staged implementation plan proposed, there are multiple reasons that urgent action is taken to advance elements of the SWGP. These are dealt with in greater detail in the Management Case which also sets out a governance approach that is built around the highest priority actions. In a strategic sense, there is urgency as the problems identified have generally been shown to apply now and in fact, historically. Growth is shown likely to exacerbate the problems, but they exist now. There is also the need to protect the ability to deliver elements of the SWGP that are recommended to be delivered later.

There are two key elements of the programme that this SSBC recommends are progressed urgently:

- **Route protection** - There is an immediate need to progress with the joint route protection and consents phase, to be initiated by mid-2021 with the aim of lodging a Notice of Requirement (NoR) by the end of 2022. s7(2)(b)(ii) Prejudice to commercial position [redacted]
- **Medium term (Horizon 2)** - There is urgency with the Medium term service (Horizon 2) improvements as accessibility and travel choice problems have been demonstrated to exist now, and failure to address these problems would lead to their consequences increasing in severity. The unmet demand for public transport would be a lost opportunity should this not be taken up, given the strategic importance of achieving mode shift.

15.14 Key Risks

The SWGP risk register was developed through a series of workshops with AT and Waka Kotahi. The risks identified in the following categories were compiled in the risk register in Appendix I:

- Programme level risks that affect the overall programme
- Project level risks that are anticipated to impact on individual segments of the corridor.

The risk register has been used as the basis for a Monte Carlo assessment undertaken to provide risk adjusted cost estimates for the capital works, with exception being the AT components of the P95 costs. Cost estimates are further discussed in the Financial Case (Section 18).

Delivery risks are discussed in the Commercial Case, including third party utilities and interfaces with adjoining projects.

15.14.1 Constructability

The recommended option will require some major construction works but nothing that is not standard practice in the industry, aside from the interface with the southern and eastern rail lines at Puhinui during the construction of the Puhinui Stage 2 rapid transit overbridge over a live rail corridor. Otherwise, it is likely that works across the project area will require local traffic management. The option passes through three motorway interchanges (SH20A/SH20, SH20/SH20B and SH1/Te Irirangi Drive) where construction is considered to be challenging however common for major contractors.

15.14.2 Construction disruption

Moderate construction impacts on people and businesses are expected. Along SH20B, the area that the route passes through is rural and a major Airport access route with a need for an additional bridge structure, however the majority of the works will be undertaken off-line.

The area that the route passes through in Manukau is mainly commercial, with several access points available from Cavendish Drive, Lambie Drive, Great South Road and Sharkey Street, so access can be maintained during construction. Although off-line work is possible, alternative routes for local traffic will be required while construction takes place. The traffic flow at Lambie Drive on- and off-ramps will be impacted due to works required at that intersection. Cavendish Drive, Lambie Drive, Great South Road and Sharkey Street can be used as detour routes. There will be an impact on the operation of the Manukau bus and train station during the construction period which will be managed. Overall, the construction impacts on people and businesses will be high, but manageable.

The land use on Te Irirangi Drive section is mainly residential, with some commercial. The northern section was future-proofed for a rapid transit corridor, providing construction space. Good alternative access connections exist via Chapel Road and Harris Road during construction.

Temporary traffic management (TTM) will be required on the SH1 bridge crossing, potentially displacing road users to alternative routes - to the busy connection at Redoubt Road and the lower volume Reagan Road.

Widening of SH20 will require Massey Road and Portage Road over-bridges to be upgraded. This will result in major traffic disruptions over long periods, resulting in programme delays and possibilities of reputational risk.

A new SH20A/SH20 southbound ramp will require removal of the existing Bader Drive off-ramp from SH20A. There is a risk that the local community may oppose such removal of the ramp, possibly resulting in programme delays, increased cost and reputation risk.

15.14.3 Safety in design and construction

During the concept design process, AT's Safety in Design Manual HS08-01 was followed and Waka Kotahi's Safety in Design manual was also referenced[129] and a Safety in Design Register developed and appended to the Preliminary Design Philosophy Statement.

Along the route there will be moderate to high level health and safety design and construction risks but nothing unusual, with a higher level of safety in design required for the SH20/SH20B interchange.

15.14.4 Factors affecting demand (COVID-19 in particular)

The pace of activity at the Airport and the surrounding area, including increasing passenger numbers and new commercial and residential developments is uncertain. Recent years have seen rapid growth, placing upside risk on forecasts, while the more recent COVID-19 pandemic will inhibit growth for some time. Although the duration of this reduction is unclear, Waka Kotahi's forecasts assume almost full recovery in the medium to long term. The effects of COVID-19 on demands are discussed further in the Waka Kotahi Arataki publication[130] and the Airport to Botany – COVID-19 Sensitivity Technical Note[131].

To manage uncertainties, constraints and interdependencies over the lifecycle of the programme and associated investment risks, an Investment Gateway Approach unique to the SWGP has been developed and outlined in detail in the Management Case. This establishes an adaptive and responsive framework to manage and monitor the timing of investment decision-making over the course of the SWGP. This dynamic approach to investment risk management provides flexibility to consider changes in underlying conditions, interdependencies, constraints and forecasts, including uncertainties related to COVID-19.

15.14.5 Property acquisition

The project requires a significant amount of property acquisition, this brings a risk of delays as well as public opposition. Refer to Sections 19.6 and 19.6.3 for property related risk commentary and proposed mitigation. For more detail on property risks and mitigation proposed, refer to Appendix M1 A2B Property Acquisition Strategy and Appendix M2 20Connect Property Strategy.

15.14.6 Utilities

Multiple utilities providers and network utility operators will need to be engaged with in the next route protection phase. These are detailed in Section 19.4.2.

Additionally, existing utilities on SH20B and Great South Road, amongst other locations, will potentially be affected. Works affecting utilities, particularly lifeline utilities, require long lead times to allow agreement to be reached with the utility owners and to settle cost share arrangements.

A third-party utilities engagement strategy is required to be developed as part of the next phase. Further engagement with utility and network operators will be critical to project delivery and will form part of the Route Protection and Resource Consent Phase. See Commercial Case (Section 19) for more information.

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[129] Appendix N-1 – A2B Preliminary Design Philosophy Statement

[130] Waka Kotahi Arataki (V2) publication

[131] Appendix V - A2B COVID-19 Sensitivity Technical Note

COVID-19's Effect on Industry and Regional Economic Outcomes (Infometrics, April 2020)

15.14.7 Specific risks with recommended option elements

Puhinui Over bridge across NIMT

The Puhinui over bridge proposed across the NIMT requires a new bridge. New structures within urban environments require careful consideration of environmental and social impacts.

SH20A/SH20 southbound ramp

A new SH20A/SH20 southbound ramp may have a potential impact on the Mount Māngere viewshaft (Viewshaft M4) resulting in loss of visibility.

15.15 Summary of cultural effects and opportunities

15.15.1 Cultural values

The preferred A2B route and 20Connect state highway improvements traverse environmentally and culturally sensitive areas.

Programme partners Te Ākitai Waiohua have highlighted in their addendum CVA[132] potential adverse effects on a range of their cultural, spiritual and historic values. This includes potential impacts on sites, waterways and areas of high cultural value such as Pūkaki Creek, Waokauri Creek, Tararata Creek, the former settlements at Papāhinau and Mimiti Te Arero, Ngā Kapua Kohuora (Crater Hill) and Te Hopua a Rangi (Geddes Basin and Gloucester Park). Also refer to Section 7.3.

Te Ākitai Waiohua are the owners of Pūkaki and Waokauri Creeks (which includes areas of Māori Reservation). Those areas are highly significant to Te Ākitai Waiohua. Te Ākitai Waiohua also has a longstanding involvement in the area's development, including in the Puhinui Structure Plan and as a signatory party to the significant Eastern Access Agreement (1991), which agreed that the form of the Pūkaki Creek Bridge would remain as a two-lane bridge in perpetuity. Those matters are being worked through in a respectful manner and the spirit of partnership and collaboration between the four programme partners.

Regular engagement with Mana Whenua has been undertaken via the Southern Table hui throughout the development of the SSBC. Refer to Section 7.2 for a summary of feedback received to date. Ongoing engagement through the Southern Table hui will be undertaken during future project stages to ensure that any concerns can be addressed in the design and/or mitigation measures included where practicable.

There are opportunities in the ongoing engagement process. This will include early involvement in the design process, particularly in relation to incorporation of cultural identity into the network, further consideration of potential effects on taonga such as waterways, and restoration the mauri of the area. Iwi have an elevated status as Treaty of Waitangi partners and as such it is important that iwi and hapū with Mana Whenua status over the area are meaningfully engaged with.

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[132] Te Ākitai Waiohua, Cultural Values Assessment Addendum for Southwest Gateway Programme, 2018

15.16 Summary of the main environmental and social impacts

The potential adverse environmental effects cover ecology, arboriculture, stormwater, landscape, visual and urban design, noise and vibration, archaeology and built heritage, contaminated land, and air quality.

The recommended option will provide positive social effects due to an increase in mode choice between Botany and the Airport, which allows for improved accessibility and greater social wellbeing.

Information on environmental and social impacts of the A2B Rapid Transit and 20Connect projects are included in the Joint Consenting Strategy (Appendix L).

15.17 Peer review

AT and Waka Kotahi have arranged WSP NZ Ltd to carry out a peer review of this business case and its supporting documents, and Richard Paling Consulting to perform a peer review of the Economics Report as a separate exercise. The peer review comments have been responded to within this SSBC. The peer review related documentation is included in Appendix Y.

15.18 Cost optimisation/parallel cost estimate

Construction cost estimates were developed based on the concept design developed for the corridor. Cost estimates were developed by Aurecon with a parallel estimate undertaken by Alta (Appendix J). The estimates were reconciled with a difference of 3% on the base costs.

P50 cost estimates were developed utilising Monte Carlo assessment based on the programme risk register (Appendix I). AT has adopted a more conservative P95 risk amount for construction costs (based on AT's Cost Estimation Manual guidance (20 percent risk), compared to the results under the Monte Carlo assessment. This more conservative approach for P95 cost is considered appropriate due to the SSBC phase level of design undertaken to date. The SH20B section of the A2B route and SH20 components have adopted the Monte Carlo P95 assessment.

15.19 Safety audits

15.19.1 A2B rapid transit

A road safety audit (RSA) for the majority of the A2B corridor[133] classified issues by their safety risk and identified no serious issues, four significant issues, 10 moderate issues and five minor issues. The design team prepared a response to the safety audit with AT making client decisions.

The significant issues identified included:

- A lack of formal pedestrian crossing locations along Puhinui Road
- The ability to provide a low speed traffic environment within the Manukau City Centre

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[133] Proposed rapid transit corridor between the Puhinui interchange and Botany Town Centre as far as, but not including, the Haven Drive and Parkway Drive intersection with Te Irirangi Drive. The remaining section of A2B busway and Botany Station were assessed under the Botany Station RSA.

- Severance for pedestrians caused by the RTC within the Manukau City Centre
- The removal of pedestrian over bridges across Te Irirangi Drive.

It is anticipated that all of these issues can be mitigated as the design evolves within the proposed corridor footprint. Additional cost estimate allowances have been made where necessary to accommodate additional infrastructure.

The rapid transit RSA report can be found in Appendix N-1 A2B Preliminary Design Philosophy Statement.

15.19.2 Botany Station

An RSA for Botany Station classified issues by their safety risk and identified one serious, one significant and five moderate issues.

The serious and significant issues included:

- A conflict area at the entrance of the local bus layover at Town Centre Drive.
- Alterations requirements for the Te Irirangi Drive / Ti Rakau Drive intersection due to the wide terminus median.

As the Eastern Busway Alliance was appointed for Botany to develop the design further, it is anticipated that these issues will be addressed appropriately by the alliance team. For further detail of the RSA, refer to Appendix R Botany Interchange Assessment.

15.19.3 20Connect (including SH20B)

The RSA for the highway components was carried out on the preferred option in accordance with Waka Kotahi requirements.

It identified a potential risk related to the proposed alignment for changeover of the RTC along SH20B heading eastbound in the preferred option – and requested as a mitigation investigating and costing an alternative arrangement. This arrangement was developed to a concept design level and costings for this mitigation included in the overall risk adjusted cost estimate.

The costs related to this proposed mitigation have been included at this stage of programme assessment. The proposed alignment and level of design will be progressed as the project is further developed. This item has been given a status of ‘action taken’ in line with the recommendations of the RSA. For further detail on other findings of the RSA and actions taken, refer to Appendix N-2 20Connect Design Philosophy Statement.

15.19.4 Medium term premium bus service

An RSA for the medium term premium bus service classified issues by their safety risk and identified three significant, three moderate, and four minor issues.

The significant issues included:

- Transit lane across high traffic volume accesses - addressed in the revised design.
- Entry into left turn slip lanes - addressed in the revised design.
- Cyclists using transit lanes with no adjacent cycle lane - to be addressed in the ultimate A2B project.

These issues are mitigated in the revised design and/or anticipated to be addressed in future stages of A2B. For further detail, refer to Appendix Q Medium Term Strategy.

16 Economics analysis

This section describes the economic assessment for the SWGP. It describes how annual and whole-of-life benefits from the preferred option were calculated, relative to a base. The purpose of the economic assessment was to evaluate the costs and benefits overall and those that arise from different components of the programme. More detail is contained in Appendix K – Economics.

The costs and benefits are computed based on the latest recommended project staging (first operational year in brackets), as follows:

- Horizon 1 (2021): STAAI (constructed by 2021), which forms the do-minimum
- Horizon 2 (2025): A2B medium term premium bus service
- Horizon 3 (2030): Construction of ultimate SH20B corridor (both for A2B and for general traffic under 20Connect), SH20B to SH20 ramp and SH20 widening south of SH20B
- Horizon 4 (2035): Construction of the ultimate A2B rapid transit infrastructure for the full corridor
- Horizon 5 (2040): Construction of the ultimate 20Connect infrastructure on SH20 and SH20A.

16.1 Transport models and do-minimum

This section gives the network assumptions for the do-minimum and for the model runs that were used for the benefit estimates.

16.1.1 Public transport model (MSM)

AT's Macro Strategic Model (MSM) of the vehicle and public transit network was used to estimate the benefits of the rapid transit project.

Additional modelling of general traffic was carried out using SATURN with model runs based on the MSM outputs. The models used the *ATAP 2 Update scenarios* as the do-minimum for the network assumptions. Some additional variations were made to the public transport network, reflecting the recommended network changes in the early deliverables programme of the SWGP; these are:

- Standard bus lanes between the Airport and Manukau, on SH20B, Puhinui Road, Lambie Drive, Ronwood Avenue and Davies Avenue to Manukau Station[134]
- A frequent service operating with a 10-minute headway between the Airport and Manukau
- Some changes to the surrounding public transport network including an additional Frequent Service bus route between Onehunga, Māngere, Papatoetoe and Manukau
- A new bus/train interchange at Puhinui Station
- An upgraded road network within the Airport precinct.

MSM includes planned upgrades to local Airport roads that would complement the public sector interventions. The Airport road upgrades are included in the do-minimum as they are expected to be completed by Auckland Airport independently. All costs for these upgrades accrue to Auckland Airport and the benefits to Auckland Airport are not considered here.

[134] Ultimately it was decided to provide transit lanes in the early deliverables programme rather than bus lanes, however the effects of this in the modelling are expected to be negligible.

s7(2)(b)(ii) Prejudice to commercial position

[redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

16.1.2 A2B MSM model details

In MSM, the A2B service was routed according to the preferred route alignment, as outlined in Section 15.2.

16.1.3 20Connect MSM model details

In the MSM, the highway interventions in the preferred option are summarised below. These interventions are split between Horizon 3 and Horizon 5.

Horizon 3

- SH20B widening: four lane expressways, including the widening of Pūkaki Bridge - which is subject to the four programme partners working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge (all infrastructure within the RCA area will be funded by Auckland Airport)
- SH20B-SH20 southbound ramp and SH20 widening south of SH20B: SH20B / SH20 SB ramp will replace the SB braided ramp, between Puhinui Road and Cavendish Drive interchanges. SH20 widening to three lanes southbound from SH20B to Lambie Drive.

Horizon 5

- SH20A-SH20 southbound ramp (including removal of Bader Drive off-ramp)
- Widening of SH20 between SH20B and SH20A to three lanes each direction. Widening of SH20 north of SH20A, to Māngere Bridge, to four lanes in each direction.

16.2 Vehicle traffic model for Airport area (SATURN)

A SATURN traffic model was developed to enable the effects of the SH20, SH20A and SH20B improvements on travel times and traffic congestion in the vicinity of the Airport to be assessed in greater detail than can be achieved through the MSM.

The SATURN model encompasses the area between the SH20 Māngere Bridge in the north through to south of the SH20 Cavendish Drive/Roscommon Road interchange in the southeast. It also includes the SH20A and SH20B routes from SH20 to the Airport and the Airport road upgrades.

The base model was validated to 2017 traffic flows and conditions and reflects the network with the substantial completion of the SH20A Kirkbride Interchange project. Forecasts have been developed for the years 2028 and 2048, with changes in traffic demands derived from the MSM.

16.3 Auckland Cycle Model

The Auckland Cycle Model (ACM) was used to estimate the benefits arising from the proposed cycling infrastructure. The ACM used the forecast person trips from MSM to estimate cycle demands, in response to the walking and cycling components of the SWGP:

- Cycle infrastructure on Te Irirangi Drive, Puhinui Road, SH20B, Lambie Drive, and through Manukau centre
- New and improved pedestrian crossings provided throughout the route
- A new walking and cycling route parallel to SH20, and improvements to the existing pedestrian route on SH20A
- New and improved pedestrian crossings provided where the route meets arterial roads.

The programme was compared against a Reference Case that includes all future infrastructure either currently proposed or expected to be implemented in the future.

16.4 Economics approach

Waka Kotahi's Economic Evaluation Manual (2018)[135] (EEM) procedures were used to compute the economic benefits. The 2019 values of time were used for this assessment[136] and the base evaluation year is the year ended June 2021. The new 4% discount rate that come into effect as the standard assumption on 1 July 2020 was applied, along with a non-standard evaluation period of 60 years. Given the expected horizon staging with Horizons 4 and 5 being implemented 10-15 years after Horizon 2, a 60-year evaluation period is considered more appropriate than the standard 40-year evaluation period to reflect the benefits of these investments and support a fairer economic efficiency test.

The impacts of COVID-19 have been considered as to how they might affect demands for components of the SWGP, particularly relating to public transport patronage. This is of particular interest for the SWGP due to its proximity to the Airport, which is likely to be one of the 'harder hit' areas by COVID-19 impacts. The immediate impact on employment located at the Airport related to international air travel has been significant; however, these effects are most likely expected to be temporary and employment in the area is likely to recover as international air travel bounces back. A technical note on the expected impacts of COVID-19 on the SWGP has been included with the business case (Appendix V). The key finding from that work was that if the effects of COVID-19 persist beyond 2-3 years, the effects on transport demand are likely to be relatively small for the SWGP, equivalent to a delay of demand growth of around 1-2 years. Ultimately, the investment gateway approach (see Section 20.5.1 in Management Case) to support future decision making for the SWGP is the ideal way to inform the decision-making process with respect to the lasting impacts (or not) of COVID-19 by ensuring the most up to date information is available for decision makers (eg international arrival and departure numbers) at the time decisions must be made.

This economic assessment takes a programme-wide approach to measure the ultimate benefit cost ratio of the SWGP. The SWGP is comprised of A2B and 20Connect, which are interrelated and

[135] The Monetised Benefits and Costs Manual (2020) is not required to be applied here as this business case began in 2018, however, the two manuals are consistent in many ways.

[136] At the time of assessment, the 2019 update factors were the most recent ones available.

complementary projects that are being jointly delivered. These projects affect the same corridors and have some interrelated costs and benefits, for example:

- SH20B upgrades generate a range of road user benefits while also enabling rapid transit on this key portion of the A2B corridor
- New southbound ramps at the SH20B/SH20 interchange are required to mitigate the impacts on constructing and operating the busway infrastructure through this section
- Early deliverables of SWGP (Horizon 1) and Horizon 2 provide transit lanes as initial infrastructure for A2B, which provides benefits for both public transport and road users.

Because of the interrelated nature of the project costs and benefits, this economic assessment takes a programme-wide approach to measure the ultimate benefit cost ratio of the SWGP. This approach was discussed and agreed upon at the *Economics Overview Workshop* on 18 October 2019, with representatives from Waka Kotahi, AT, and the consultant team.

Costs and benefits for the programme are calculated by horizons[137] rather than project and reported incrementally for each horizon to provide an indication of the value for money for each individual horizon. The focus of the economics assessment is on the programme economics results for Horizon 4 and Horizon 5, which represent the costs and benefits of that horizon and all preceding horizons.

16.5 Costs

This section identifies the cost estimates used for the economic assessment. An overview of CAPEX and OPEX are provided in this section with more detail found in the Financial Case in Section 18.

Table 16-1 below provides an overview of the different project cost components.

Table 16-1: Overview of project costs

Category	Description
Construction costs	Costs to physically build infrastructure for the SWGP, broken down to each component. Focused on the P50 cost estimate as the most likely outcome.
Land costs	Costs to acquire land, broken down by segment.
Maintenance costs	Expected annual maintenance costs.
Renewal costs	Expected renewal costs for the pavement, every 25 years.
Annual operating costs	Future changes to operating costs arising from additional A2B services, and implementation of new stations/ interchanges.

16.5.1 Capital expenditure

Table 16-2 summarises the capital expenditure estimates as they relate to each horizon. The following explains the assumptions:

- A2B construction costs exclude SH20B and Botany Station costs. Early Route Protection and Resource Consents costs were estimated for the full A2B programme at [redacted]. These are assumed

[137] Costs and benefits are calculated for each horizon independently and summed to make programme benefits. Further information can be found in Appendix K Economics

to relate to Horizon 3 and Horizon 4 proportionately based on their construction costs. These costs are still attributable to each of these horizons, however, are simply incurred equally over 2021-2023. All other costs are incurred in the years preceding the first operational year as follows:

- Horizon 2: 1 year of construction
- Horizon 3: 5 years of construction
- Horizon 4: 6 years of construction

- Botany Station and related construction costs: the Botany Station construction and property cost estimates included s7(2)(b)(ii) worth of construction costs relating to the approach of A2B to the station. This full cost, plus 35%[138] of the other Botany Station costs are assumed to be attributable to the A2B project.
- SH20B construction costs: includes total cost for AT and for Waka Kotahi. Incurred over 3 years before first operational year of Horizon 3.
- 20Connect construction costs: excludes SH20B. Incurred over 5 years before first operational year of Horizon 5.
- Property costs: incurred in full the year before construction begins for the relevant horizon.

Table 16-2: Capital expenditure summary (undiscounted, excluding 5.7% AT admin)

Cost details				P50 cost estimate
Horizon 2		Construction costs	A2B	s7(2)(b)(ii) Prejudice to commercial position
		Horizon 2 CapEx total		
Horizon 3	A2B elements	Construction costs	A2B	
			Botany Station[139]	
		Property costs	A2B	
			Botany Station[139]	
		Horizon 3 (A2B) CapEx total		
	SH20B elements	Construction costs		
		Property costs		
		Horizon 3 (SH20B) CapEx total		
	Horizon 3 CapEx total			
Horizon 4		Construction costs	A2B	
		Property costs	A2B	

[138] Early demand assessments from MSM models indicated that 35% of the RTN demand at Botany was from A2B, and 65% from Eastern Busway, so this is the split of costs.

[139] Portion attributable to SWGP

Cost details			P50 cost estimate
	Horizon 4 CapEx total		s7(2)(b)(ii) Prejudice to commercial position
Horizon 5	Construction costs	20Connect	
	Property costs	20Connect	
	Horizon 5 CapEx total		
CapEx total			

16.5.2 Operating and ongoing expenditure

This section gives the maintenance, renewal and operating costs incurred across the life of the SWGP.

Maintenance costs

Annual maintenance costs have been assessed at s7(2)(b) per lane km per year based on recent records available from the Auckland System Management alliance. This has been applied to all additional lanes in the 20Connect project and the A2B route, which are expected to require similar maintenance.

A2B also incurs a maintenance cost for each station. This maintenance cost is, per station:

- Botany Station = s7(2)(b) annually, split proportionately between A2B and Eastern Busway
- Airport Terminal and The Quad station excluded as these costs will be incurred by Auckland Airport
- All other stations = s7(2)(b) per year.

Maintenance costs are incurred annually from the first operational year of each horizon.

Renewal costs

A resurfacing renewal cost has been assumed at a cost of s7(per m² of additional pavement following 25 years. This has been applied to all additional pavement area.

Renewal costs for each horizon are expected to be incurred 25 years after the infrastructure for that horizon has been completed, for all permanent, long-term infrastructure.

Public transport operating costs

The following points note the general assumptions for the operating cost estimates.

- 21-hour span of service of the A2B service, 4 hours of peak service level operation, 17 hours of off-peak service level operation
- Annualisation factors, 250 working weekdays per year, 115 weekend days/public holidays
- Layover/recovery rate[140] of +10% (ie the layover time is an additional 10% of the return trip runtime).

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[140] A layover rate of 10% is standard for regular diesel buses. It is unclear if/how this might change with an electric fleet.

The incremental cost for each horizon is incurred each year, with a step change in 2048 to reflect the increase in service levels around that time.

16.6 Benefits

Table 16-3 describes the benefits estimated for the SWGP.

Table 16-3: Benefit descriptions

Benefit (section)	Description	Source
Standard public transport-related benefits		
Public transport user benefits	Reductions in journey time and improvements in journey quality for existing and new public transport users.	MSM model outputs used to estimate reduction in generalised cost of travel. EEM value of time parameters were used to monetise benefits.
Public transport reliability benefits	Reductions in the variability of journey time for public transport users of the A2B service.	The public transport reliability benefit is estimated based on the methodology for car reliability benefits in the EEM.
Health benefits from walking to stations	Increased public transport use increases walking to and from stations/ stops, resulting in some health benefits.	Demand outputs from the MSM model used to estimate additional walking trips to and from public transport. EEM values used to monetise resultant health benefits.
Standard road user benefits		
Road user benefits	Primarily from increased road capacity and some mode shift due to the new cycling facilities. Includes travel time savings, vehicle operating cost, crash reduction, driver frustration, and trip reliability benefits. A decongestion benefit could result from reduced congestion due to mode shift caused by the project.	MSM and SATURN model outputs used as appropriate to estimate reduction in generalised cost of travel for drivers. ACM used to estimate additional benefits from mode shift to cycling. EEM value of time parameters used to monetise benefits.
Vehicle emission cost reduction	Mode shift from car to public transport reduces private vehicle emissions affecting the environment and human health. Road improvements typically increase vehicle travel and emissions. Shifting from diesel to electric buses reduces the emissions from public transport operations.	For A2B, demand outputs from the MSM model used to estimate reduction in car emissions. EEM values used to monetise benefits. For highways, vehicle emission cost reductions calculated as 4% of calculated vehicle operating costs, as specified in the EEM.
Standard benefits for active modes		
Cycling travel time benefits	Reductions in journey time for cyclists using new cycling facilities. Travel time savings may arise from a more direct route and/or reduced wait times at intersections. Travel time cost savings also arise from increased attractiveness of the route.	ACM used to estimate travel time benefits and demands for cyclists.

Benefit (section)	Description	Source
Health and environmental benefits of new walking trips from new walking facilities	New shared paths result in new pedestrian trips, resulting in some health and environmental benefits.	Benefits estimated based on the estimated average daily number of pedestrians using each section of new shared path to be constructed.
Health benefits from new cycling facilities	New cycling infrastructure induces additional cycling, which results in increased physical activity and corresponding health benefits.	ACM used to estimate health benefits from collective increase in total distance cycled by new and existing cyclists.
Safety benefits from new facilities for cyclists and pedestrians	New cycle and pedestrian infrastructure results in improved safety and reduced crash risk.	ACM used to estimate safety benefits from new or improved cycling infrastructure for cyclists. Pedestrian safety benefits estimated based on a reduction in crashes.
Wider economic benefits		
Agglomeration benefits	Reduced journey times between firms and workers results in higher economic productivity.	MSM model outputs used to estimate reduction in generalised cost of commuting and work purpose trips. EEM procedures used to estimate change in productivity within zones. MRCagney's Urban Productivity Database used to estimate value of agglomeration benefits.
Imperfect competition benefits	Reduced journey times for work purpose trips result in an additional saving due to the price-cost margin between travel costs and prices charged to customers.	MSM model outputs used to estimate reduction in generalised cost of work purpose trips. EEM values were used to estimate added imperfect competition benefits.
Tax wedge on increased labour supply	Reduced journey times for commuting trips enable some people to enter the labour market. This results in an additional benefit associated with the taxes that they pay on labour income.	MSM model outputs used to estimate reduction in generalised cost of commuting trips. EEM procedures used to estimate change in labour market participation. 2013 Census and MRCagney's Urban Productivity Database used to estimate value of labour supply benefits.

16.7 Evaluation results

This section gives the evaluation results of the full SWGP.

Table 16-4 presents cumulative costs and benefits to Horizon 4 and Horizon 5 including all preceding horizons. Horizon 4 includes the full A2B infrastructure and SH20B upgrades, while Horizon 5 adds the infrastructure for SH20 and SH20A.

Table 16-4 shows that the present value of projected benefits is substantially larger than the present value of projected costs; each horizon has a BCR greater than 2. The best estimate of the full programme BCR is 3.0. The first year rate of return (FYRR) for Horizon 4 and Horizon 5 cumulative results is 0.002.

Table 16-4: Cost benefit analysis of recommended SWGP staging option

Costs/benefits		**Horizon 4 (Full A2B + SH20B)**	**Horizon 5 (Full SWGP)**
Project Costs (PV, $millions)			
Construction costs		s7(2)(b)(ii) Prejudice to commercial position	
Land costs			
Maintenance costs			
Renewal costs			
Operating costs			
Pre-implementation costs			
Total project costs			
Project Benefits (PV, $millions)			
Public transport-related benefits	Public transport user benefits	s7(2)(b)(ii) Prejudice to commercial position	
	Public transport reliability benefits		
	Health benefits from added walking to stations		
Road user benefits	Road user travel time benefits		
	Vehicle operating cost benefits		
	Crash reduction benefits		
	Vehicle emission benefits		
	Reduced driver frustration benefits		
	Trip reliability benefits		
Active mode benefits	Cycling travel time benefits		
	Health and environmental benefits from walking facilities		
	Health benefits from cycling facilities		
	Safety benefits from cycle facilities		
	Pedestrian safety benefits		
	Decongestion benefits from active mode shift		

Costs/benefits		Horizon 4 (Full A2B + SH20B)	Horizon 5 (Full SWGP)
Wider economic benefits	Agglomeration benefits	s7(2)(b)(ii) Prejudice to commercial position	
	Imperfect competition benefits		
	Tax wedge on increased labour supply		
Total project benefits			
Cost-benefit measures			
Net benefits (PV, $millions)		s7(2)(b)(ii) Prejudice to commercial position	
Benefit-cost ratio			

16.8 Sensitivity tests

The economic assessment presented above involves various assumptions that have been detailed throughout this assessment. Table 16-5 shows the sensitivity tests and the impact of each of these assumptions.

Table 16-5: Sensitivity testing of programme economics

Test type	Assumptions	Horizon 4 BCR	Horizon 5 BCR
Base assumptions		2.5	3.0
Evaluation parameters	Standard evaluation period 4% discount rate, 40-year evaluation period	1.7	2.0
	Previous EEM parameters 6% discount rate, 40-year evaluation period	1.3	1.5
Costs	95th percentile cost	2.2	2.6
Horizon timing	Early: construction for Horizons 1-4 begins in 2023, for Horizon 5 in 2024	2.3	2.8
	Delayed: all horizons delayed by 5 years	2.7	3.2
Wider economic benefits	No WEBs (unrealistic)	2.1	2.5
	-25%	2.4	2.9
	+25%	2.6	3.1

Test type	Assumptions	Horizon 4 BCR	Horizon 5 BCR
Health benefit from walking to PT	Assume average walk at each end of trip is 200m (instead of 500m)	2.4	2.9
Reliability benefit	-15%	2.4	2.9
	+15%	2.5	3.0

Wider economic benefits (WEBs)

A +/-25% of the WEBs was to capture the level of certainty attached to the WEBs component. An additional 'no WEBs' sensitivity test was included for completeness; however, it is noted that this programme is expected to generate WEBs – given how it improves access to two designated metropolitan centres and the Airport precinct, and the only uncertainty relates to the magnitude of these WEBs.

The resulting BCRs ranged from 2.1 to 2.6 (Horizon 4) and 2.5 to 3.1 (Horizon 5) showing that the results are not especially sensitive to WEBs.

Sensitivity test summary

The programme cost-benefit assessment is relatively insensitive to almost all of these assumptions. Despite this, care has been taken to ensure the most appropriate assumptions for each of these tests have been included in the base economic assessment.

It can be seen that under every test the BCRs remain above 1.0. The values are below 2.0 only for the 40-year evaluation period test.

The new Monetised Benefits and Costs Manual (MBCM) parameter of a 4% discount rate and a non-standard 60-year evaluation period are reasonable for this programme, with horizons coming online between 2025-2040. A 40-year evaluation period is particularly inappropriate, as the delivery of the programme would only be half completed by the time Horizon 5 is expected to be implemented, and would therefore not provide enough opportunity for benefits to recoup the costs of that horizon.

16.9 Summary

The assessment found a programme BCR of 3.0, with sensitivity tests of evaluation parameters (discount rate and evaluation period) resulting in a BCR of 1.5-3.7. The BCR for the programme up to Horizon 4 (excluding highway improvements on SH20 and SH20A) is estimated at 2.5.

Construction costs account for 72% of costs for the full programme. Land acquisition and public transport operating costs account for a similar share of project costs, at around 12% of total costs.

Road user travel time benefits comprise the largest proportion of total benefits, at 48%, followed by agglomeration benefits contributing 12%. Other benefits contributing more than 5% each include public transport user benefits, public transport reliability benefits, vehicle operating cost benefits, and driver frustration benefits.

Sensitivity tests showed the BCR is meaningfully sensitive to the assumed discount rate and evaluation period. The base assumptions (4% and 60 years) are considered most appropriate for this programme, with later horizons only becoming operational 15-20 years into the evaluation period, such that a 40-year evaluation period would be too short.

17 Assessment profile

The assessment profile considers how addressing problems identified in the strategic case with the preferred option aligns with the results sought under the GPS in terms of safety, access and environment. Value for money is demonstrated through the economic assessment which shows the benefit-cost ratios. The Waka Kotahi Investment Assessment Framework[141] (IAF) was used to rate the SWGP, and its principal components.

Results alignment focuses on the problem, issue or opportunity being considered.

The IAF for 2018-2021 considers that any rapid transit investment that “enables a substantial increase in access to social and economic opportunities for large numbers of people along dedicated key corridors and enables transit-oriented development” should be considered “very high” in its rating.

This business case has presented evidence that:

- There are significant issues with travel choice and potential for improvement in access to social and economic opportunities
- The scale of population, employment and travel demands is large
- Opportunities exist to influence high density development at Metropolitan Centres (linked to the Auckland Plan 2050).

17.1 Public transport

The IAF criterion for public transport, rapid transit and transitional rail improvements is “enables a substantial increase in access to social and economic opportunities for large numbers of people along dedicated key corridors and enables transit-oriented development” noting that “Rapid transit improvement proposals need to demonstrate that they will substantially increase the movement of large numbers of passengers on dedicated key major metro corridors”.

This business case has shown that the increase in access will be substantial (Section 15.9.2), the numbers of people/passengers will be large (Section 15.9.1) and that significant transit-oriented development will be enabled (Section 15.2.11) alongside this major metropolitan corridor between Auckland Airport and Botany.

Against the IAF criteria for Results Alignment for public transport improvement activities, the problem being addressed is therefore **very high** for Results Alignment. This ranking should cover the SH20B investments necessary for the rapid transit service, as well as the A2B route and its various stages.

A **very high** results alignment means that the rapid transit components are automatically ranked as Priority one.

17.2 State highway

The state highway investments in Horizon 5 can be assessed separately. Within the Regional, local road and state highway improvements category, access to opportunities, enables transport choice and access, and is resilient - Liveable cities priority has a high ranking if an activity meets one or more of the following:

- supports high priority elements in agreed integrated land use and multi-modal plans

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[141] Investment Assessment Framework for the 2018–21 National Land Transport Programme

- addresses a significant gap in access to new housing in high growth urban areas
- addresses a significant resilience risk to continued operation of key corridors
- makes best use of key corridors that prioritise multi-modal use and freight
- provides significant operational efficiencies to reduce the costs of meeting appropriate levels of service without impacting benefits adversely.

While the SH20 and SH20A elements of the SWGP can apply to many of the criteria, the major justifications for the **high** ranking are "*addresses a significant resilience risk to continued operation of key corridors*" and *"makes best use of key corridors that prioritise multi-modal use and freight*" (see Section 5.2.3).

With a **high** results alignment and a BCR for Horizon 5 of 3.0, the priority is 4/5.

18 Financial case

This section describes the Financial Case for the A2B Rapid Transit and 20Connect projects as part of the SWGP. Refer to the Commercial and Management Cases for governance arrangements related to management of delivery of scope of the SWGP.

The analysis described in this Financial Case assumes interventions will be delivered in line with the assumed SWGP staged approach (see Section 15.6 and Appendix E for the assumed Staging Strategy) as per the Economic Case. Costs have been assigned to assumed future years however these dates may change as investment drivers are reviewed going forward as outlined in the Management Case which would result in changes to the cash flow profile.

All costs reported in this Financial Case are undiscounted and exclude inflation and escalation. For clarity, where costs for A2B are documented these include all costs associated with the project works on the SH20B segment of the corridor.

18.1 Programme delivery costs

The following sections describe the capital and operating costs of the A2B Rapid Transit and 20Connect projects as part of the SWGP. The cost sharing arrangements between AT and Waka Kotahi are shown in Section 18.3.

18.1.1 Capital costs

Cost related assumptions and base values used in the analysis are summarised as per the Economic Case. Delivery capital cost estimates were provided by Construction Consulting Group, in accordance with Waka Kotahi's 'Cost Estimation Manual' (SM014). Delivery cost risk was estimated by the Aurecon team, utilising a Monte Carlo risk analysis based on the project risk register, providing an estimated P50 cost estimate for the SWGP (refer Appendix J for the risk adjusted estimate). A parallel estimate was undertaken by Alta. AT has adopted a more conservative P95 risk amount for construction costs (based on AT's Cost Estimation Manual guidance (20 percent risk), compared to the results under the Monte Carlo assessment. This more conservative approach for P95 cost is considered appropriate due to the SSBC phase level of design undertaken to date. The SH20B section of the A2B route and SH20 components have adopted the Monte Carlo P95 assessment.

Property costs were produced by AT (internally) and by Align Consultants on behalf of Waka Kotahi. Property costs for the programme have been estimated at [redacted] (P50 including AT admin), without considering any disposals (property costs are gross costs). Refer to Appendix J for further detail.

The costs have been split into project horizons, using the plans of the recommended option and in alignment with the scope of the Staging Strategy.

SH20B cost split and other cost sharing principles are discussed in Cost Sharing (Section 18.3).

AT administration costs of 5.7% have been applied against AT's share of project costs.

The apportionment of total estimated pre-implementation costs associated with "Route Protection and Resource Consent" activities is defined in the Commercial and Management Cases. The balance of pre-implementation costs is applied to Horizons 3, 4 and 5 delivery costs for detailed design and delivery pre-implementation related activities. Refer to separate Horizon 2 cost estimate for pre-implementation costs.

18.1.2 Ongoing operations and maintenance costs

Operations and maintenance expenditure (OPEX) for the recommended option have been estimated per the Economic Case. These include costs related to delivery of the A2B service (costs under the PTOM model) as well as for infrastructure costs.

Public transport services operations costs

The public transport services operations costs are shown in Table 18-1 below.

Table 18-1: Public transport services operations costs ($M, p.a.)

Horizon / Service	Opening	Vehicle	Headway, min	Before 2028 ($M, pa)	Before 2048 ($M, pa)	2048 and beyond ($M, pa)
Horizon 1 AirportLink* (separate SSBC)	2021	Standard electric bus	10 min base headway, all day	s7(2)(b)(ii) Prejudice to commercial position		
Horizon 2 A2B medium term premium bus service	2025	Articulated vehicles	10 min base headway (7-8 min in peak)			
Horizon 3 A2B Rapid Transit service	2030	Articulated vehicles	10 min base headway (5 min in peak)			
Horizon 4 A2B Rapid Transit service	2035	Double-articulated vehicles	Extrapolated between: 2028 - 10 min base headway (5 min in peak) and 2048 - 5 min base headway (3 min in peak)			

*The 5-minute base headway for Horizon 4 is a conservative assumption used for the purposes of economics. Elsewhere, 10-minute base headways have been assumed.

*Horizon 1 forms part of the Short-term Airport Access Improvements SSBC, and operating costs shown represent AirportLink services, which are the do-minimum and are not part of this SSBC. The A2B premium bus service operating costs in Horizon 2 are shown gross of any deductions resulting from replacing the AirportLink service.

Vehicles progress from standard electric bus (AirportLink) to A2B articulated and double articulated vehicles over time. Due to higher demands during Horizon 4, more frequent services are needed, therefore OPEX costs increase. During Horizon 5 there is no change to OPEX costs from Horizon 4.

Maintenance costs

Maintenance costs are shown in Table 18-2. Maintenance costs include station operating costs as well as an annual infrastructure maintenance cost.

The assumptions for maintenance costs are as follows:

- AT and Waka Kotahi cost share as per capital cost split assumptions
- Incurred annually from the first operational year of each horizon
- Maintenance costs are additional to AT / Waka Kotahi Horizon 1 costs assumed in prior SSBCs
- Annual road maintenance costs have been assessed at s7(2)(b) per lane km per year for both AT and Waka Kotahi
- AT's maintenance costs include station operating costs as well as infrastructure maintenance costs (ie pavement maintenance)
- Station maintenance costs assumed as follows:
  - s7(2) annually for Botany (but only 35% incurred by A2B, with 65% by Eastern Busway, as per patronage forecasts)
  - s7(2 for all other stations.

Table 18-2: Maintenance costs ($M, p.a.)

Horizon	AT Maintenance costs $M, pa (additional to Horizon 1)	Waka Kotahi Maintenance costs $M, pa (additional to Horizon 1)
Horizon 2	s7(2)(b)(ii) Prejudice to commercial position	
Horizon 3		
Horizon 4		
Horizon 5		

Renewal costs

Renewal costs, shown in Table 18-3 below, are primarily carriageway resurfacing that is anticipated to occur 25 years after the first operational year of the relevant horizon.

The assumptions for renewal costs are as follows:

- Costs split between AT and Waka Kotahi as per capital cost split assumptions
- Cost estimates developed include an upgrade to the existing and additional pavement areas for the 20Connect and for the A2B route.

Table 18-3: Renewal costs ($m)

Horizon	AT	Waka Kotahi
Horizon 2	s7(2)(b)(ii) Prejudice to commercial position	
Horizon 3		
Horizon 4		
Horizon 5		

18.2 Cash flow

This section summarises capital, property, operational and maintenance expenditure requirements to deliver the outcomes under each staging horizon. Capital costs are shown by the components within each horizon necessary to deliver the infrastructure improvements required for SWGP.

The P50 total cost for SWGP (all Horizons) is s7(2)(b) including AT's administration fees.

The P50 total costs for A2B (up until Horizon 4), with AT and Waka Kotahi proportions, are shown in Table 18-4 below. The P50 property costs for A2B total s7(2)(b) (excluding AT administration).

Table 18-4: A2B cumulative (up until Horizon 4) P50 costs

Organisation	Costs, P50 Estimate ($M, undiscounted)	
	Excl. AT 5.7% admin	Incl. AT 5.7% admin
AT	s7(2)	
Waka Kotahi	s7(2	
Total	s7(2)	

Table 18-5 below shows the A2B and 20Connect costs by project phase and horizon, with AT and Waka Kotahi proportions.

Table 18-5: A2B / 20Connect costs by project phase and horizon, P50 Estimate ($M, undiscounted)

Phase / Horizon	Costs, P50 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Route Protection and Resource Consents	s7(2)(b)(ii) Prejudice to commercial position			
Early Property Acquisition				
Property Acquisition (Horizon 3-5)				
Horizon 2 Construction				
Horizon 3 Construction				
Horizon 4 Construction				
Horizon 5 Construction				
Sub Total AT (excl. 5.7% admin cost)	s7(2)(b)(ii) Prejudice to commerci			
Sub Total Waka Kotahi				

Phase / Horizon	Costs, P50 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Total (excl. 5.7% admin costs)	s7(2)(b)(ii) Prejudice to commercial position			
AT 5.7% admin cost				
Total (incl. 5.7% admin cost)				

Note that as per the staging methodology, Horizon dates are when the new level of service outcome is made available to the customer. This means the actual construction activities to provide for each Horizon outcome occur prior to the Horizon opening dates.

The assumed construction duration ahead of levels of service being delivered or opening of each new stage is as follows in Table 18-6 below. It is to note that the timings are indicative and may be reviewed in the future in accordance with the adaptive gateway review approach (see Management Case in Section 20).

Table 18-6: Construction timeframes

Horizon	Construction Period (years)	Construction Duration	Opening Year
Horizon 2	2	2023 – 2025	2025
Horizon 3	4	2025 – 2029	2030
Horizon 4	5	2030 – 2035	2035
Horizon 5	4	2035 – 2039	2040

Table 18-7 provides a breakdown of P50 cash flow by activity, horizon and programme partner.

Table 18-7: Costs and cash flow by activity, horizon and programme partner ($M p.a., undiscounted, P50)

Horizon / Phase	Activity	ORG	Cash flow ($M p.a., Undiscounted, P50)																				Activity Total P50
			RLTP 2021-31 period ($m)										RLTP 2031-41 period ($m)										
		Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39	39/40	Activity
Route Protection and Consents	Route protection and resource consents	AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]																			
	Route protection and resource consents	WK																				
Early Property Acquisition	Early property acquisition	AT																				
Horizon 2	Pre-implementation	AT																				
	Construction medium term premium bus service – Manukau to Botany Bus Priority and Stations	AT																				
Horizon 3	Pre-implementation	AT																				
	Pre-implementation	WK																				
	Property acquisition SH20B	AT																				

Horizon / Phase	Activity	ORG	Cash flow ($M p.a., Undiscounted, P50)																			Activity Total P50
			RLTP 2021-31 period ($m)										RLTP 2031-41 period ($m)									
		Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39	39/40	Activity
	Property acquisition SH20B	WK	s7(2)(b)(ii) Prejudice to commercial position [redacted]																			
	Property acquisition	AT	[redacted]																			
	Property acquisition Botany Station Stage 2 (A2B)	AT	[redacted]																			
	Construction SH20B	AT	[redacted]																			
	Construction SH20B	WK	[redacted]																			
	Construction Manukau Station Road, Ronwood and Davies Avenue.	AT	[redacted]																			
	Construction Puhinui Rail Overbridge	AT	[redacted]																			
	Construction Lambie Drive	AT	[redacted]																			
	Construction Botany Station Stage 2 (A2B)	AT	[redacted]																			
	Pre-implementation	AT								17												17

Horizon / Phase	Activity	ORG	Cash flow ($M p.a., Undiscounted, P50)																			Activity Total P50
			RLTP 2021-31 period ($m)										RLTP 2031-41 period ($m)									
		Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39	39/40	Activity
Horizon 4	Property acquisition	AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]																			
Horizon 4	Construction Puhinui Road	AT																				
Horizon 4	Construction Great South Road and Te Irirangi Drive	AT																				
Horizon 5	Route protection and resource consents	WK																				
Horizon 5	Pre-implementation	WK																				
Horizon 5	Property acquisition	WK																				
Horizon 5	Construction SH20 / SH20A	WK																				
AT Total Per Year		AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]																			
Waka Kotahi Total Per Year		WK																				
AT Sub-Total RLTP 2021-31 / 2031-41 (excl. AT 5.7% admin)		AT																				

Horizon / Phase	Activity	ORG	Cash flow ($M p.a., Undiscounted, P50) RLTP 2021-31 period ($m)										RLTP 2031-41 period ($m)									Activity Total P50
		Year	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38	38/39	39/40	Activity
	AT 5.7% admin	AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]																			
AT Total RLTP 2021-31 / 2031-41 (incl. AT 5.7% admin)		AT	[redacted]																			
Waka Kotahi Total RLTP 2021-31 / 2031-41		WK	[redacted]																			
TOTAL RLTP 2021-31 / 2031-41			[redacted]																			
AT Total excl. AT 5.7% admin		s7(2)(b)(ii) Prejudice to commercial position [redacted]																				
AT 5.7% admin		[redacted]																				
AT Total		[redacted]																				
Waka Kotahi Total		[redacted]																				
TOTAL		[redacted]																				

Figure 18-1 below shows the P50 cash flow over the delivery of the A2B and 20Connect projects.

Key

Early activities to enable delivery of A2B (Stage 3 & 4)
- A2B Route Protection/Consents - [redacted] (AT [redacted] WK: [redacted]
- A2B Early Property Acquisitions - [redacted] (AT)

Stage 2 – Pre-rapid transit A2B bus service
- Pre-implementation* [redacted] (AT)
- Construction - [redacted] T)

Stage 3 – A2B rapid transit (Pukaki Creek Bridge, SH20B, Manukau)
- Property acquisition - [redacted] (AT: [redacted] WK: [redacted]
- Pre-implementation* [redacted] AT: [redacted] WK: [redacted]
- Construction - [redacted] (AT: [redacted] WK: [redacted]

Stage 4 – A2B rapid transit (Puhinui Road and Te Irirangi Drive)
- Property acquisition - [redacted] (AT)
- Pre-implementation* [redacted] AT)
- Construction - [redacted] (AT)

Stage 5 – SH20A and SH20 improvements
- 20C Route Protection/Consents - [redacted] WK)
- Property acquisition - [redacted] WK)
- Pre-implementation* [redacted] WK)
- Construction - [redacted] WK)

**Pre-implementation includes preliminary & detailed designs, resource consents, consultation etc.*

s7(2)(b)(ii) Prejudice to commercial position

[redacted]

Figure 18-1: A2B / 20Connect P50 cash flow, undiscounted

The P95 total cost for SWGP (all Horizons) is s7(2)(b) [redacted] including AT's administration fees.

The P95 total costs for A2B (up until Horizon 4), with AT and Waka Kotahi proportions, are shown in Table 18-8 below. The P95 property costs for A2B is s7(2)(b) [redacted] (excluding AT administration).

Table 18-8: A2B cumulative (up until Horizon 4) P95 costs

Organisation	Costs, P95 Estimate ($M, undiscounted)	
	Excl. AT 5.7% admin	Incl. AT 5.7% admin
AT	s7(2)(b)(ii) Prejudice to commercial position [redacted]	[redacted]
Waka Kotahi	[redacted]	[redacted]
Total	[redacted]	[redacted]

Table 18-9 below shows the A2B and 20Connect costs by project phase and horizon, with AT and Waka Kotahi proportions.

Table 18-9: A2B / 20Connect costs by project phase and horizon, P95 Estimate ($M, undiscounted)

Phase / Horizon	Costs, P95 Estimate ($M, undiscounted)			
	AT	Waka Kotahi	Sub Total (excluding AT 5.7% admin)	Total (including AT 5.7% admin)
Route Protection and Resource Consents	s7(2)(b)(ii) Prejudice to commercial position [redacted]	[redacted]	[redacted]	[redacted]
Early Property Acquisition	[redacted]	[redacted]	[redacted]	[redacted]
Property Acquisition (Horizon 3-5)	[redacted]	[redacted]	[redacted]	[redacted]
Horizon 2	[redacted]	[redacted]	[redacted]	[redacted]
Horizon 3	[redacted]	[redacted]	[redacted]	[redacted]
Horizon 4	[redacted]	[redacted]	[redacted]	[redacted]
Horizon 5	[redacted]	[redacted]	[redacted]	[redacted]
Sub Total AT (excl. 5.7% admin cost)	s7(2)(b)(ii) Prejudice to commercial position [redacted]			
Sub Total Waka Kotahi	[redacted]			
Total (excl. 5.7% admin costs)	[redacted]			
AT 5.7% admin cost	[redacted]			
Total (incl. 5.7% admin cost)	[redacted]			

18.3 Cost sharing

AT and Waka Kotahi have identified cost sharing principles for the next route protection and resource consent phase and have developed a draft Memorandum of Understanding (refer to Commercial and Management Cases). AT and Waka Kotahi have agreed to equally share set-up costs and project management across the programme 50/50. Other costs will be pro-rated based on the extent to which they are required to support the different applications lodged by each organisation. This results in an overall approximate cost split of 75/25 for AT and Waka Kotahi respectively.

AT and Waka Kotahi have also identified cost sharing principles for the purposes of the SSBC. These cost share principles are summarised in Table 18-10 below and will be formalised as part of governance agreements.

Table 18-10: Cost sharing principles summary

Items	Cost sharing principles (AT / Waka Kotahi)
Programme set up and project management cost	50/50
SH20B property costs split based on designation areas	50/50
SH20B pre-implementation costs pro-rated on basis of total cost share for construction and property costs	70/30
SH20B construction costs apportioned based on physical works areas	Approx. 30/70

Auckland Airport will fund everything within their road controlling authority boundary, including resource consents and all infrastructure.

It is noted that Botany Station will be delivered in two stages. Stage 1 by Eastern Busway Alliance by 2025; Stage 2 as part of A2B Horizon 3 (2030). Costs related to Botany Station have been included and have been split as agreed 35% to A2B and 65% to the Eastern Busway project based on patronage attributed to each.

Cost sharing and management of the delivery of the SWGP is discussed in the Management and Commercial Cases of this SSBC.

18.4 Funding availability

The following sections discuss current funding considerations for AT and Waka Kotahi. It is noted that the ATAP, RLTP and the NLTP are all currently being updated. The below commentary is based on current plans.

18.4.1 Airport to Botany Rapid Transit (AT / Waka Kotahi)

The ATAP identifies the A2B project as part of its Rapid Transit Network – identifying Horizon 1 and 2 upgrades as the corridor's "highest priority sections"[142], and the remainder of the corridor a key "future priority". ATAP indicates $8.4 billion dollars of investment in the Rapid Transit network, which includes the "Airport to Botany (Airport-Puhinui section)" upgrade.

[142] ATAP, April 2018, Page 23

The RLTP identifies the A2B project in its funded programme, allocating $78.5M NZD across its 10-year horizon from 2018 to 2028, as illustrated in Table 18-11.

Table 18-11: RLTP 2018-2028 (nominal values including inflation, $M)

Funding / Cost Period	RLTP Funding[143] ($M)
2018/19	11.6
2019/20	30.3
2020/21	36.6
Remainder Decade 1	-
Future Decades	-
TOTAL	78.5

AT internally has assumed **~$10.7M** of this is allocated to the A2B programme for development of the SSBC as identified in this business case, as well as 'route protection and CAPEX', with the remainder attributable to the STAAI project (Horizon 1), including Puhinui Station, Puhinui and Lambie Drive bus priority, and Māngere cycling improvements. No other funding sources are currently identified. Note that the RLTP unfunded capital programme shows an indicative cost of the A2B project (Progressing BRT from Botany to the Airport via Manukau) at "$258.2M".

The ATAP identifies SH20A and SH20B as part of a proposed future strategic road network and identifies SH20B ("Eastern Airport Access") as a key upgrade to be complete "by first decade"[144]. ATAP indicates $3.8 billion dollars of investment in the strategic road network, which includes the "Eastern Airport Access" upgrade.

This business case is seeking additional funding to cover the estimated costs of several future A2B project phases, including:

- A2B route protection and resource consents
- Horizon 2 - A2B premium bus service, Manukau to Botany bus priority and interim stations.

Future funding applications will seek funding for:

- Early property acquisition to support route protection (due to the separate funding process that applies)
- Horizon 3 - Airport to Manukau section with targeted busway infrastructure and stations in Manukau, Puhinui Station Stage 2 rapid transit bridge and the commencement of the A2B rapid transit service
- Horizon 4 - Manukau to Botany section including Puhinui Road.
- Operational costs associated with new A2B services and any changes to local bus network services. These will be sought separately via future updates to the RLTP, ahead of their opening or route changes. Any changes to existing services should seek to align with the expiry of PTOM contracts where feasible and appropriate.

143 Funding values as per NLTF allocations found here on 02/03/2020: https://nzta.govt.nz/planning-and-investment/national-land-transport-programme/2018-21-nltp/nltp-snapshot-and-tables/regional-and-activity-tables/?group=region&state=current&dataType=NLTF&r%5B12%5D=1&a=1

144 ATAP April 2018, page 30

At the time of writing, AT is developing a submission to secure funding in the upcoming 2021-2031 RLTP period for anticipated A2B costs. Identified critical path costs are for the route protection and resource consent phase and early property acquisition costs, as per the Consenting Strategy and Property Strategy to ensure the effective future delivery of the overall SWGP. The approach to delivery of the programme and urgency of these activities (and hence criticality of funding these activities) is discussed further in the Commercial and Management Cases.

18.4.2 20Connect (Waka Kotahi)

Table 18-12 summarises the estimated future costs (undiscounted, unescalated) of the 20Connect project matched against the current timing and funding allocations for the project in the National Land Transport Programme (NLTP).

Table 18-12: Existing funding envelope ($M, undiscounted, 2019)

Funding / Cost Period	NLTP Funding[145] ($M)
2018/19	10
2019/20	29
2020/21	69
Remainder Decade 1	0
Future Decades	354
TOTAL	462

Operational cost considerations for future capital investment will need to be considered in future NLTP allocations to account for associated infrastructure maintenance and operations costs.

[145] Funding values as per NLTF allocations found here on 02/03/2020: https://nzta.govt.nz/planning-and-investment/national-land-transport-programme/2018-21-nltp/nltp-snapshot-and-tables/regional-and-activity-tables/?group=region&state=current&dataType=NLTF&r%5B12%5D=1&a=1

PART D READINESS AND ASSURANCE

19 Commercial case

19.1 Introduction

This Commercial Case addresses the commercial deliverability of the joint SWGP, with a focus on the A2B and 20Connect projects. The Commercial Case has been written jointly for the two projects at a programme level due to their interrelatedness for delivery. The Auckland Airport Precinct Improvements project is also part of the programme but is the responsibility of Auckland Airport and is not the direct focus of this commercial case.

The Commercial Case covers the deliverability of the programme and is made up of the following parts:

- Delivery risks
- Consenting strategy
- Property strategy
- Procurement strategy.

Delivery staging, consenting and property strategies are detailed in separate Technical Notes (see appendices). The main elements of these as related to commercial deliverability are summarised here. The procurement strategy is kept at a relatively high level at this stage with a focus on the immediate route protection and resource consents phase and Horizon 2 pre-implementation phase, while retaining flexibility for subsequent delivery phases.

The Commercial Case relates closely to the Management Case, which has also been prepared jointly at the programme level. The governance and project management structures set out in the Management Case provide a framework for managing the risks and uncertainties described here.

19.1.1 Physical project extents and asset owners within the programme

The physical extent of the A2B and 20Connect projects (infrastructure) and the associated asset owners are shown indicatively on the map below. The physical extents are relevant to the Commercial Case so are repeated here with a Commercial Case emphasis, although they are covered in other parts of the business case.

A2B runs in a long corridor from the Auckland Airport precinct in the bottom left of the map to Botany in the top right. Along the way it passes from the Airport precinct, along SH20B and over SH1 (Waka Kotahi state highway assets), and along local roads through Manukau and up Te Irirangi Drive (AT local road assets). A2B finishes at Botany Station, which will be an important interchange with the Eastern Busway. Near the eastern extent of the Airport precinct, the project crosses Pūkaki Creek, which is a significant area for iwi, particularly for programme partner Te Ākitai Waiohua who are signatories to the Eastern Access Agreement, as well as holding a Māori Reservation title across sections of the creek. The project also crosses KiwiRail track assets at Puhinui.

20Connect is physically contained to Waka Kotahi's state highway assets. It consists of capacity enhancements to SH20, SH20A and SH20B. Although the project relates physically to state highways, it overlaps and interacts with A2B, creating elements that are directly common to both projects.

Figure 19-1: Physical project extents and asset owners in the SWGP

19.1.2 For this commercial case SH20B is treated as part of A2B

- The SH20B components have historically been described as part of 20Connect. However, the SH20B improvements are required to enable the rapid transit benefits of A2B and vice versa. The SH20B improvements are discussed as part of A2B in this Commercial Case unless otherwise stated. This includes the ramp improvements at the SH20 / SH20B interchange.
- When 20Connect is described here it refers to the remaining improvements on SH20 and 20A, which primarily relate to private vehicle outcomes rather than rapid transit.

19.1.3 Route protection and resource consents phase

Given the very long-time horizons of the SWGP the Commercial Case is focussed on the immediate pre-implementation work, which mainly focuses on route protection and resource consents. Later stages are addressed in lower levels of detail and focus on options to retain flexibility to adapt as circumstances emerge.

Pre-implementation is typically defined as everything from the business case to a spade in the ground. Therefore, it is important to isolate the earlier pre-implementation activities. These are primarily the approvals (consenting) and property acquisition activities. Depending on the scope of these activities they are likely to include a relatively limited level of design work. Accordingly, detailed design is excluded from the scope of pre-implementation discussed in this business case.

This programme-level pre-implementation is distinct from the pre-implementation activities that will take place for individual projects and delivery stages. Detailed design activities will occur at these specific stages, to support their own pre-implementation and delivery. Similarly, some specific consenting activities may be required at the time of delivery.

19.2 The commercial strategy responds to the complexity in the programme

- The approach to delivering the programme is affected by its multiparty complexity:
- Three projects (20Connect and A2B as well as the Auckland Airport Precinct Improvements): Although the programme can in some senses be separated into the distinct project components, the delivery approach must also view them as a connected whole. The core of the programme, the A2B and 20Connect projects, are also closely related to the Auckland Airport Precinct Improvements project.
- Four programme partners: There are four programme partners to the SWGP – Te Ākitai Waiohua, AT, Waka Kotahi, and Airport leading to the need for strong governance and co-ordination.
- Interrelated networks and infrastructure: The projects relate to each other in terms of the strategic transport outcomes (within one network), the infrastructure that they share and the services that will run on them.
- Multiple infrastructure asset owners: The programme's transport corridors cover three asset owners (who alongside Te Ākitai Waiohua make up the programme partners), being AT (local roads), Waka Kotahi (state highways), and Auckland Airport (Airport precinct). This, combined with the network interrelatedness, necessitates a focus on coordination among all parties.
- Multiple designation holders: Each of the three infrastructure owners is also a Requiring Authority and either holds or is enabled to apply for designation over or along its infrastructure corridors. This is likely to require dual leads or supporting roles in seeking approvals where infrastructure overlaps.

- Multi-year (decade) programme: The current programme staging plan spans up to three decades beyond 2040. This long horizon requires prioritisation of near-term activities that can be planned now, and deliberate flexibility and option retention for medium- and long-term programme components, particularly because of the potential uncertainty generated by COVID-19. An adaptive approach to investment management over time to manage uncertainty is set out in the Management Case in Section 20.
- Multiple funding sources: The programme's shared components will require agreements on cost sharing among the three RCA investment partners.
- Several of these aspects relate to and influence the governance arrangements (asset ownership, legal rights, funding), covered in the Management Case. Funding issues also relate to the Financial Case.
- The multiparty nature of the programme has underpinned the consenting, property and procurement approaches. These are described below.

19.3 Timing and staging of programme delivery

A SWGP staging strategy has been developed to address the identified problems and opportunities in the programme within the currently understood constraints of Government funding envelopes.

The staging strategy does not intend to prescribe the exact delivery method for the SWGP, and recognises that specific stages and delivery methods may change depending on various interactions with other projects (eg City Centre to Māngere Light Rail, Auckland Manukau Eastern Transport Initiative etc.), capital and operating budgets, etc.

The strategy proposes a likely and realistic staging outcome over five staging horizons consisting of the following:

- **Horizon 1 (under construction, opening 2021)** – Short Term Improvements and 'AirportLink' Service. Provision of State Highway 20B improvements as part of the SH20B Early Improvements SSBC, and a new "AirportLink" bus service between the Airport and Manukau as part of the STAAI SSBC. Also includes the upgrading of Puhinui Station, walking and cycling improvements along Puhinui Road and Lambie Drive, and the Māngere Cycling Scheme. This stage is underway now and is not covered by this commercial case.
- **Horizon 2 (2025)** – Medium term premium bus service - service led solution consisting of extension of current bus service through to Botany, tying in with completion of Botany Station (as part of the Eastern Busway). Infrastructure investments including interim and permanent stations and some bus priority lanes between Manukau and Botany, corridor works within Manukau town centre, improved access and intersection priority.
- **Horizon 3 (2030)** – opening of the A2B rapid transit service, supported by targeted infrastructure. This includes:
  - The A2B running way alongside SH20B and rapid transit infrastructure for A2B between the Airport and the SH20/SH20B interchange
  - The repurposing of existing bus lanes on SH20B for vehicle lanes and widening of SH20B to four lanes (online at-grade)
  - Walking and cycling infrastructure along the A2B rapid transit corridor.
  - Southbound motorway ramp connection from SH20B to SH20,
  - Bridge over rail at Puhinui
  - In addition, Auckland Airport are required to complete related infrastructure works within the

Airport precinct for Horizon 3, including any increase in multi-modal capacity across Pūkaki Creek Bridge and through to the Airport, following a review by the four programme partners.

- **Horizon 4 (2035)** – Full A2B Rapid Transit service and infrastructure. Includes completion of A2B infrastructure along the full project corridor with final station designs, upgraded bridge over SH1, and full station access improvements.
- **Horizon 5 (2040)** – 20Connect infrastructure fully implemented, completing the SWGP ultimate solution. Infrastructure focused on completion of 20Connect (SH20/20A upgrades): SH20 widened to six lanes between SH20A and SH20B interchanges, SH20 widened to eight lanes between Māngere Bridge and SH20A, south facing SH20A to SH20 interchange ramp connection.

The staging strategy provides the critical timeframes for consenting, property and procurement. The full Staging Strategy is included in Appendix E.

19.4 Delivery risks and opportunities

19.4.1 Risk register and opportunities

A risk register (Appendix I) has been produced for A2B and 20Connect through three risk workshops involving staff from both Waka Kotahi and AT. The register is a live document and should be maintained and updated throughout the life of the projects.

The register identifies risks and opportunities at the project and programme level, outlines cause and consequence, notes established controls in place, notes connections to other risk items, and assesses threat and opportunity level. Future risk analysis work will include cost consequence modelling.

The key strategic opportunity identified by the SWGP is:

- The four programme partners working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge and infrastructure within the Airport RCA area.

The key strategic risks identified in the risk register are:

- The register presently excludes risks that may be associated with the works related to the Auckland Airport and airport precinct.
- Reaching agreed funding and cost sharing arrangements among the three investment partners / road controlling authorities (AT, Waka Kotahi and Auckland Airport).
- Funding availability, prioritisation and approvals risks between the three RCA investment partners:
  - Funding availability for the three investment partners. This includes prioritisation for A2B through the RLTP, 20Connect through the NLTF, and for both projects via the ATAP update processes currently underway. Particularly the priority elements to be progressed in the short term – the route protection and resource consents phase and Horizon 2 pre-implementation and implementation. For Auckland Airport, allocation of resources through its capital investment planning processes.
  - Local share funding availability for operational costs for new services during future RLTP updates.
  - Funding and governance approvals for the three investment partners present a potential delay risk to the route protection and resource consents procurement and overall lodgement timeframes.
- Property acquisition programme risk due to acquisition delay, including delay and cost increase resulting from new land development along the A2B corridor during the project timeframe

- Programme and cost implications of scoping impacts and reaching agreement with third party utility owners
- Managing interfaces with adjoining projects, the existing transport network, and land usage
- Engagement and stakeholder management. There is likely to be significant public interest. Coordinated engagement and stakeholder management is essential.
- Uncertainty in the traffic growth and land usage assumptions used in the modelling, given the long-time horizon of the programme and rapid growth in Auckland
- Uncertainty in traffic growth, population projections, and Airport activities due to COVID-19 in the medium to long term
- Procurement risks, including market capacity
- Governance structures and alignment and role clarity among programme partners
- Project management capacity among delivery agencies

The approach to risk management is described in the Management Case (Section 20), which contains a suite of processes and governance arrangements to mitigate these risks and mitigations are also detailed in the Risk Register in Appendix I. Third party utilities and interface risks are expanded on below, and specific risks are touched on in the consenting and property sections.

19.4.2 Third party utilities

There are several utilities that intersect with the project area that have the potential to be impacted by the proposed works. A lack of engagement with utilities represents a risk to the approvals process and to delivery. A third-party utilities engagement strategy is required.

There are several utilities providers within the SH20B A2B corridor:

- Watercare (watermain, wastewater)
- Spark New Zealand Limited (Southern Cross Cable Fibre Optic)
- Chorus Limited (fibre optics)
- Transpower New Zealand (electricity transmission)
- Vector Limited (electricity and gas transmission, communication, streetlights)
- Vodafone New Zealand (communication)
- NZ Refining Limited (petroleum pipeline)
- Wiri Oil Services Limited (jet fuel pipeline)
- Watercare, Wiri Oil Services Limited and NZ Refining Limited have designations in place adjacent to or overlapping Waka Kotahi's state highway designations.

There has been engagement with most of these utility owners (excluding Wiri Oil Services) as part of the SH20B Early Improvements that are currently in delivery.

Further engagement with these utility and network operators will be critical to project delivery and will form part of the Route Protection and Resource Consent Phase. Processes and procedures for engagement are set out in the National Code of Practice for Utility Operators' Access to Transport Corridors and the Government Roading Powers Act (GRPA, 1989). Cost sharing arrangements and approaches to reaching agreements are provided in the Code of Practice and under the GRPA.

Works affecting utilities, particularly lifeline utilities, require long lead times to allow agreement to be reached with the utility owners and to settle cost share arrangements. There is sufficient time within the delivery programme to reach these agreements if this is well planned for.

19.4.3 Interfaces with adjoining projects

Interfacing projects include:

- Auckland Airport Precinct Improvements (AAPI)
- Eastern Busway, interfacing directly at Botany
- City Centre to Māngere (CC2M) Light Rail and terminus facilities at the Airport
- Supporting Growth (land use changes, South Auckland)
- Airport Taskforce and Southern Connections
- KiwiRail third and fourth main at Puhinui Station
- Connected Communities in Manukau Centre and Great South Road
- Panuku and Kāinga Ora's urban regeneration and TOD projects within Manukau
- Manukau and Māngere Cycling
- Safe and Healthy Streets South Auckland
- Panuku and Kāinga Ora's Manukau City Centre and Wiri redevelopment plans – following the principle of 'dig once', but also to help ensure the success of the plans
- Take account of and support as appropriate the third main route protection and delivery linked to Puhinui Station, BRT overbridge and Bridge Street walking and cycling
- Extension of Puhinui Station rail platforms to accommodate 9-car trains
- Waikato rail services

These interfacing projects are referred to in the consenting strategy but are not explicitly assessed. They will need to be carefully monitored and managed. This should be a focus of the governance processes and connections should be made with governance in the interfacing projects.

19.5 Consenting strategy

Consenting (obtaining the necessary approvals under the Resource Management Act) is a fundamental precursor and enabler for the projects' delivery. The Consenting Strategy provides a set of recommendations for the consenting approvals process and inform this Commercial Case.

Given the various shared components of the programme, a Joint Consenting Strategy was prepared for A2B and 20Connect (Appendix L). The consenting strategy:

- Assesses the statutory approvals required to enable A2B / 20Connect
- Evaluates a wide range of Resource Management Act (RMA) tools (six options) and process pathways (five options) to authorise the projects
- Assesses the risks and benefits of the pathway options, and
- Recommends a preferred consenting pathway.

The strategy splits the required consenting into two parts: 20Connect (excluding SH20B), A2B from Botany to Puhinui station, and A2B from Puhinui to the Airport boundary (Orrs Road).

This split reflects the expected delivery timing (20Connect – Horizon 5 - will be delivered much later) and the sensitivity and complexity of the required A2B approvals (the Puhinui to Airport section of A2B being most complex).

The A2B section within the Airport's designation boundary and RCA area and the importance of coordination with the wider consenting process are also considered. However, the strategy does not relate to Auckland Airport's RCA area and associated designation. Auckland Airport will produce a separate consenting strategy for approvals required within these areas.

19.5.1 Approach to consenting

Based on the Consenting Strategy recommendations, the following approach will be taken to gaining the RMA approvals:

- Approvals will not be sought for 20Connect (Horizon 5) in the route protection and resource consents phase (excluding the SH20B components, which are required for A2B). The consenting strategy notes that:
  - The SH20 and 20A interventions for 20Connect are not required in the short or mid-term horizon – they are potentially in the second- or third-decade delivery horizon.
  - Authorising these elements with potentially significant property acquisition and environmental (including cultural) impacts is high risk, and likely contentious given the challenges justifying property acquisition in the immediate or near term.
  - Furthermore, the RMA framework (tools and processes to authorise the project) may have fundamentally changed by the time these aspects of 20Connect progress to the route protection and resource consents phase.
  - Unless the project delivery horizon is significantly accelerated (to short or mid-term), authorisation is not recommended.
- Approvals will be sought for A2B (Horizons 3 and 4) in the route protection and resource consents phase.
- AT will lead the A2B approvals application process (excluding the Airport section) for the route protection and resource consent phase, with support from Waka Kotahi where required. The recommended consenting pathway is:
  - To authorise A2B via integrated Notice of Requirements (NoRs) and associated regional plan resource consents with Requiring Authority and consent holders of the applications reflecting the designation holdings between Waka Kotahi and AT.
  - To lodge as a single, integrated application consisting of NoR packages that reflect staged service and infrastructure delivery while enabling management of procedural risk (ie appropriately distributing network benefits and adverse effects etc).
  - Waka Kotahi will seek alteration to the Waka Kotahi designations to support A2B and to accommodate the widened SH20B state highway corridor through to the Manukau Memorial Gardens and the overlap of the SH20B and SH20 designations for SH20B to SH20 ramp.
- Where there are shared facilities or maintenance obligations (eg stormwater infrastructure) consideration will be given to a shared approach between parties.
- Both the Notices of Requirement (NoRs) and the regional resource consents will be sought in parallel, with applications for the AT, Waka Kotahi and Auckland Airport components lodged together in a coordinated matter. The parties will seek a joint hearing for the NoRs and regional resource consents.
- Consents will be sought through the 'traditional' consenting pathway of application to the consent authority (Auckland Council). The consenting strategy notes:
  - NoR is considered the more favourable planning approval approach given it generally provides for longer-term and more flexible protection than a resource consent or plan change. In addition, a designation cannot be altered by anyone else, unlike provisions of a plan, and is a transparent

approach for the public to identify where future land may be acquired (unlike a resource consent which may not show up in a due diligence review on a property purchase).

  - Determination by the consent authority allows greater ability to negotiate with Auckland Council as the decision maker in relation to the ultimate conditions of the designation and resource consents. This may allow for issues to be resolved with Auckland Council and any submitters prior to the hearing. This strategy has the benefit of still retaining the alternative pathway option of direct referral to the Environment Court.

- Auckland Airport will obtain approvals for works within its RCA area. As per the risk register, it is important that the project is approached from an integrated one network perspective, requiring that the Auckland Airport and AT/Waka Kotahi applications occur together in a coordinated way.
- In parallel to RMA approvals, the four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

Furthermore, the following approaches will be taken to route protection and resource consents:

- The level of design in the route protection and resource consents phase will be sufficient to obtain the approvals but will not include detailed design for implementation. Detailed designs will be procured for the delivery pre-implementation for each stage.
- The design and associated consent conditions should be approached so as to maximise flexibility for the delivery stages. As construction methods are not currently known, generic construction methods should be assumed, ideally allowing a 'worst case' needs approach (ie, greatest flexibility).

The route protection and resource consents activities will be scoped to reflect these needs (see Section 19.7 below). A provision for flexibility should be treated as a key outcome of the consenting process.

Horizon 2 consenting

A separate resource consent application will be lodged as part of the Horizon 2 pre-implementation. This will be separate from the wider Route Protection and Resource Consents Phase which addresses Horizon 3 and Horizon 4.

The resource consent application lodged for Horizon 2 will be prepared separately due to most Horizon 2 activities being permitted within AT's road corridor. This means that no property acquisition is required for Horizon 2 (meaning that NoRs are not required) and there is a limited scope to the consents required (only stormwater and possible tree-related consents). To avoid the risk of these smaller-scale consents being delayed by a lengthy and complex route protection process, they are proposed to be de-coupled to ensure Horizon 2 can still be consented and delivered in a timely manner.

19.5.2 Consenting risks and opportunities management

The Consenting Strategy identifies a range of risks and opportunities. These include the traditional risks related to environmental effects and will be managed through the preparation, application and hearings process itself.

The following opportunities relate to the consenting phase:

- Opportunity for review of the capacity of the Pūkaki Creek Bridge: The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

The following strategic-level risks relate directly to the implementation:

- One of the highest risks is achieving the holistic integration of SH20B connection to and from the Airport Precinct and demonstrating a 'one-network' approach to the statutory decision-makers (via integrated engagement, authorisation and delivery). This includes coordination with the Auckland

Airport consenting strategy.

- The A2B project is currently unfunded (funding is currently being sought under the RLTP). To support lodgement of the NoR, the project needs funding for early property acquisition to support the route protection phase due to the risk of early property requests from property owners due to hardship, or any objections to the NoR made to the Environment Court or made via the PWA from a property perspective. Advancing NoR(s) involving property acquisition without at least funding for property acquisition for route protection is a risk from a s185 RMA, PWA process and a s168(1) RMA financial responsibility perspective. Early property acquisition funding allocation for A2B has been sought via the RLTP.
- There is the inherent risk with determination by consent authority that a decision could be appealed to the Environment Court where submissions are received. This would add time to the consenting programme and has been allowed for in the estimate of route protection and resource consents phase duration.
- There is an immediate need to progress with the joint route protection and consents phase, to be initiated by mid-2021 with the aim of lodging a Notice of Requirement (NoR) by end of 2022. It is important that route protection is started as soon as possible as there is a 40m Unitary Plan building setback on SH20B that currently protects the route for rapid transit – and the majority of the proposed A2B facility fits within this protected area s7(2)(b)(ii) Prejudice to commercial position [redacted]

The first three of these risks require management through the consenting strategy and governance arrangements, and funding applications.

19.6 Property acquisition strategy

The works required for both A2B and 20Connect will impact a substantial number of privately and publicly owned properties.

AT will lead the property acquisition for A2B, with support from Waka Kotahi in some sections (see sections 19.6.1 and 19.6.2 below). AT has developed a Property Acquisition Strategy for A2B[146], which currently identifies 401 property interests (129 full properties and 272 partial interests) to be acquired within the AT RCA area, and 20 property interests (two full properties and 18 partial interests) to be acquired on SH20B, which will be a shared responsibility between Waka Kotahi and AT. The Property Acquisition Strategy for A2B provides a breakdown of the potentially impacted properties, identifies the risk profile for each acquisition and puts a strategy in place to manage high risk parcels.

Waka Kotahi has completed a 20Connect Property Strategy for SH20 and SH20A and has developed estimated costs for acquisition[147]. Waka Kotahi has identified 73 properties directly impacted by the state highway upgrades proposed as part of the recommended option. Of these, 55 will require partial acquisition whilst 18 will require full acquisition. However, due to the long timeframe before recommended implementation, and the fact that route protection is not being progressed at this time, property acquisition for this section is not immediately recommended.

[146] The A2B Property Acquisition Strategy can be found in Appendix M-1

[147] The 20Connect Property Strategy can be found in Appendix M-2

19.6.1 Approach to property acquisition

The Public Works Act (PWA) provides local authorities and the Crown (and their delegates) with the statutory authority to acquire land either by negotiation or compulsorily for a public work. The PWA acquisition powers are closely connected with the Resource Management Act consenting processes. The compulsory property acquisition process typically takes place after all required consents for the use of the land have been granted, or a designation has been confirmed by a Requiring Authority. The designation provides a basis for the subsequent acquisition of land needed for the works and may warrant partial land acquisition, or full property acquisition. However, property negotiations can commence earlier, in particular in the case where there is a willing seller.

The A2B property strategy is focused on the Horizon 3 and 4 stages, which require 421 property purchases. No property is required for Horizon 2, the medium term A2B solution.

The A2B property strategy recommends that an early acquisition budget be established to fund potential acquisitions commencing in FY2023/24 when the route protection Notice of Requirements will be advanced subject to funding. This provides both an opportunity for willing seller willing buyer acquisitions, as well as managing risks associated with any objections to the NoR made to the Environment Court (s185) or via the PWA. These PWA processes and mitigation compensations create additional budget requirements for the project, and this is also recognised in the strategy. Early property acquisition funding allocation for A2B has been sought via the RLTP.

Waka Kotahi would have to acquire properties within its state highway designation (if using the PWA). This would affect properties required to expand the SH20/20B interchange and properties required to enable widening or relocation of the state highway. Overall, property acquisition will be managed and undertaken by each party – AT and Waka Kotahi - based on land impacted by each Requiring Authority.

19.6.2 Approach to property costs

Route protection and resource consents phase – Cost Evaluation Panel

During the Route Protection and Resource Consents phase a Cost Evaluation Panel will be established. This will be made up of 3 members – with 1 independent member. The cost evaluation panel will assess the cost estimates provided by the professional services and legal providers. They will evaluate the value of each component and reconcile / confirm each party's cost share based on the above principles.

Dispute resolution and escalation procedures are proposed as per Figure 19-2.

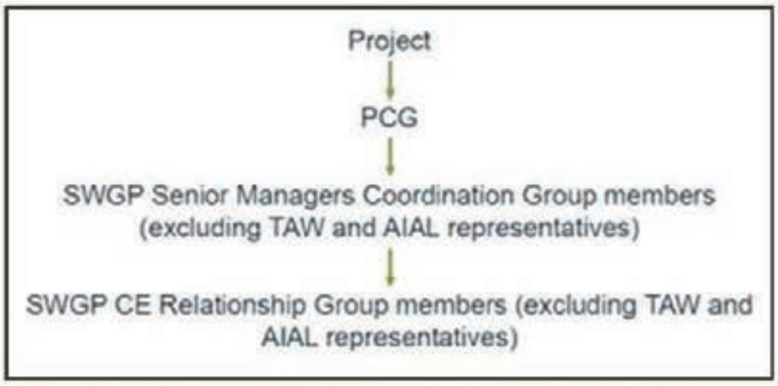

Figure 19-2: Route protection and resource consents phase - dispute resolution and escalation procedures

19.6.3 Property acquisition risks and mitigation

The following property acquisition risks and mitigations are crucial to property delivery:

- Landowner expectations may see various opponents to A2B and cause delays to the PWA compulsory acquisition process. Acquisition delay risk should be mitigated through early engagement with affected property owners, early enablement of open market purchase (through funding availability).
- The property workstream should closely monitor progress in the consenting workstream with relation to the station designs and implications from this for any additional property acquisition.
- The SH20 Property Strategy has assessed that there is only moderate risk of development adjacent to SH20 because the majority of property is already developed.
- There is an immediate need to progress with the joint route protection and consents phase, to be initiated by mid-2021 with the aim of lodging a Notice of Requirement (NoR) by the end of 2022. It is important that route protection is started as soon as possible as s7(2)(b)(ii) Prejudice to commercia [redacted] the majority of the proposed A2B facility fits within this protected area. s7(2)(b)(ii) Prejudice to commercial position [redacted]
- Early consultation with potentially impacted property owners to understand acquisition risks, particularly around cost escalation when the land acquisition is affecting the operation of business, and the timely application of the acquisition process under the PWA will also help improve programme certainty.
- Procurement and delivery risk can be managed through careful programming, prioritising detailed design on high risk properties, where a number of landowners affected.
- The Consenting Strategy and Property Strategy should be aligned to ensure properties are acquired in time to meet the construction start date.
- Once an NoR is lodged, there is the potential landowners may seek early property acquisition under s185 of the RMA via the Environment Court for hardship or other reasons. A2B has sought to establish an early property acquisition budget to manage this potential risk through the RLTP. Additionally, engagement and consultation with directly affected landowners during the next phase is another way to manage property related risks. An updated Consultation Plan and Property Strategy will be prepared during the next phase, which will further identify and manage stakeholder engagement and associated risks.

Further detail on these risks and mitigations is outlined in the A2B Property Acquisition Strategy (Appendix M-1)

19.7 Approach to procurement

The focus of this commercial case is on procurement of route protection and resource consents activities for A2B and the Horizon 2 pre-implementation phase, while preserving optionality for procurement of the later delivery stages.

Later delivery implementation stages are subject to future Implementation Business Cases as set out in the Gateway Funding Approach outlined in the Management Case (Section 20). However, some initial indications of procurement options are provided below.

19.7.1 Route protection and resource consents phase services

Scope of the route protection and resource consents phase

The route protection and resource consents services will cover:

- RMA planning, both specialist technical (including specific discipline and expert witness expertise) and legal to support the approvals applications as per the consenting strategy
- Infrastructure design sufficient to support the statutory approvals process
- Stakeholder engagement and communications support (with organisational ownership of consultation and communications remaining with AT and Waka Kotahi)
- Programme and project management.

The specific scope of work will be developed as part of the procurement process. The professional services will be engaged under a single contract to serve the integrated needs of AT and Waka Kotahi (legal services may be procured separately, but also to serve the integrated client team).

The route protection and resource consents phase will not include specimen or detailed design work for the delivery stages. This work will be procured as part of the pre-implementation for the individual stages and will be scoped to meet the requirements of the particular procurement approaches taken to each. Limited exceptions where project design is progressed to a more detailed level may include areas where it is prudent to reduce property risk.

All property purchase for A2B will occur during pre-implementation, but only a small proportion will occur during the route protection and resource consents phase. Most property will be purchased during later parts of pre-implementation (eg detailed design) once designation has been approved. Both Waka Kotahi and AT have internal property acquisition teams. Due to the scale of the property acquisition programme, external support will need to be procured. This has been included in the overall property cost estimates.

Timeframes for route protection and resource consents

Scoping of procurement of professional services is expected to begin in November or December 2020 following endorsement of the business case by the AT and Waka Kotahi boards. A competitive tender would take around 5 to 6 months, including approvals, with 3 to 4 months in parallel to develop tender documents, giving an end to end procurement timeframe of 9 to 10 months. On this basis, route protection and resource consents professional services are expected to be engaged by July 2021, dependent on governance and funding approvals.

The route protection and resource consents activities are expected to take 24 to 32 months in total (excluding appeals), allowing for a year to prepare and lodge the applications, 12 months for the notification, hearings and to secure a decision, and up to 12 months for potential Environment Court appeals processes. Given this timeframe, Notices of Requirement and regional consents are then expected to be granted between late 2023 and mid-2024.

s7(2)(b)(ii) Prejudice to commercial position

[redacted]

This timeframe fits the current procurement and delivery timeframes for Horizon 3 infrastructure (2030 completion).

Funding and governance approvals present a potential delay risk to the route protection and resource consents procurement and the delivery timeframes. Delays will have potential knock-on effects throughout the programme, with potential to delay the service delivery as far out as 2030 (Horizon 3) and loss of benefits to customers.

Procurement options for route protection and resource consents

It is expected that route protection and resource consents of this nature and scale would attract interest from tier 1 suppliers. However, the market may be resource constrained given other major infrastructure planning activities underway.

Route protection and resource consents services may be procured via:

- Competitive tender - A market sounding, and communication exercise should be conducted early to gauge interest and capability, to generate interest in bidding to provide the services, to determine the best timing to bring the procurement to market, and to allow suppliers time to prepare and plan. Procurement should proceed through a short-listing and interactive process.
- Direct appoint – An existing consultant or a consultant could be appointed directly to reduce procurement timeframes and cost.
- Procurement options will be further assessed via a Procurement Strategy to be prepared as part of the scoping of the route protection and resource consents phase to ensure value for money. This will be undertaken in accordance with each respective organisation's procurement processes.

Lead agency internal staffing support

AT and Waka Kotahi internal staffing will be established as part of the approvals process for the programme, with a focus on expertise to manage the planning approval process in the immediate route protection and resource consents phase. The ability of the agencies to staff the process (resource availability) should be taken into account in determining the final scope of services to be procured, particularly regarding project management and management of interfaces among advisors.

It is recommended that AT, as the lead agency, retains experienced project management staff on the project.

19.7.2 Horizon 2 pre-implementation

The scope of the Horizon 2 pre-implementation phase is proposed to include:

- Procurement for the pre-implementation phase, project development (scheme refinement/project-level optioneering etc.), detailed design, public engagement on the detailed design, resource consents, MSQA and procurement for the physical works contract
- An Implementation Business Case to unlock implementation funding.

Procurement options for the pre-implementation phase will be further assessed as part of the scoping phase to ensure value for money. This assessment will be undertaken in accordance with AT's normal procurement processes.

As set out in the Management Case (Section 20), a funding gateway has been indicatively programmed for early 2023, at which point a funding approval covering physical works and fleet and service procurement will be sought. This will give sufficient time to construct the medium term infrastructure and to procure the service and fleet for delivery in 2025. By July 2023, there should be a good indication of the potential impact of COVID-19 on demand and the source and quantum of OPEX funding required, which will influence the level of service delivery in 2025.

19.7.3 Infrastructure procurement

Procurement strategies for the specific infrastructure stages will be developed at the time of each stage. Procurement strategies for future implementation phases will be assessed by Implementation Business Cases as outlined in the Gateway Funding Approach in the Management Case (Section 20). These will be undertaken in accordance with each organisations' procurement procedures to ensure value for money.

Lead delivery agency will be selected to match the stage

Indicatively, the lead delivery agency is likely to vary for each stage depending on the affected asset ownership and delivery focus:

- Horizon 2 (Medium term premium bus service): AT led, reflecting public transport services focus and relationship to the Eastern Busway project at Botany Station (Stage 1)
- Horizon 3 (Targeted infrastructure construction):
  - Waka Kotahi led SH20B component, with AT support, reflecting heavy infrastructure focus and significant state highway interaction
  - AT led Puhinui Station Stage 2 rapid transit bridge, A2B corridor in Manukau and Botany Station Stage 2.
- Horizon 4 (Full A2B Rapid Transit service and infrastructure): AT led with Waka Kotahi support, reflecting public transport services focus with some state highway interaction
- Horizon 5 (20Connect): Waka Kotahi state highway project.

Waka Kotahi involvement is recommended for infrastructure works that affect the state highway assets. This includes direct works on the assets (improvements), traffic management requirements and working in live traffic environments on state highways, and where the activity poses risk to the state highway operation and asset condition.

Delivery model options

Several delivery model options are available for each horizon stage and should be selected based on their suitability to the particulars of each stage. The options range across the traditional delivery options with increasing complexity and scale and variation in the nature of risk allocation between client and contractor:

- Measure and value
- Design and construct
- Alliance
- Other options that might be considered include early contractor involvement or public private partnership (PPP).

The horizons under the current staging strategy are each different in their works requirements, complexity and scale. It is likely that a mix of the above options would be appropriate. For example:

- Parts of the Horizon 2 works are relatively simple and might be procured and delivered under measure and value type arrangements
- Horizons 3 and 4 contain more complex and larger scale infrastructure which may be better suited to an integrated design and construct approach or alliance approach, which can provide benefits such as better certainty in cost, and/or a high level of knowledge transfer between participants.

- Within horizons the works may be delivered in smaller packages using a mix of models or could be packaged together to achieve scale and to reduce interfaces and to reduce the project management burden on the delivering agency. In this case the design and construct or alliance delivery models, which are better suited to scale and complexity, might be used.

The model should be considered based on careful assessment of the outcomes sought and the added complexity and cost. Within the current staging strategy PPP may not be appropriate but might be given consideration as an option for accelerating funding and delivering project benefits earlier. Early contractor involvement is not thought to be required at this stage given the lead-in times to each of the stages.

Detailed procurement strategies should be developed for each delivery stage as part of future Implementation Business Cases. These should take account of the particular characteristics and needs of the stage, including complexity, risk, interfaces, and client capability and preferences.

Flexibility should be retained to manage changes to delivery staging

As discussed above, the staging strategy was developed to reflect the currently assumed funding constraints while seeking to deliver the benefits of the programme as best possible. These assumptions are subject to change and, given the long-time horizon, it is likely that actual staging will differ in some way.

A lifting of the current constraints could result in various alternative delivery scenarios. These should be allowed for across all dimensions of the implementation strategy to avoid limiting the programme to a narrower future options path.

Although a longer time horizon is one of the possible alternative futures, there is less need from a delivery perspective to incorporate planning flexibility to deal with this outcome. Delayed delivery would mean either delay within the existing staging strategy ('stretching the plan') or potentially a more fragmented version of this staging ('drip feeding the plan'). Either of these can be managed within the existing staging plan.

The scenarios that need to be accommodated are where delivery is accelerated, including the full acceleration scenario where funding is made available to deliver A2B (or the full programme) as soon as possible. Full acceleration is a bookend scenario and it is helpful to consider what flexibility would be required to ensure this outcome is not precluded. Flexibility for the intermediate acceleration cases would be enabled by accommodations for full acceleration.

Timing flexibility

If the funding constraint was removed, the key remaining absolute constraint on delivery timing would be the consenting processes (including stakeholder engagements). Under existing statutory process this has a likely minimum period of around two years from start, to approximately mid-2023.

Although the two years for the consenting process is unlikely to be shortened, in an acceleration scenario this time can be used as to make necessary preparations for delivery.

Other timing constraints include:

- Property acquisition – full acquisition would take 2 – 5 years
- Stakeholder and partner agreements, including with third party utilities
- Interfaces with other projects and land use developments
- Governance agreement among programme partners.

If delivery is accelerated it can be programmed around some of the other constraints, such as property and utilities. It is important to note that an acceleration strategy that relies on programming is likely to require the procuring agency to accept some additional long-stop risk in relation to relieving the particular constraints (eg, achieving final property purchases).

Delivery model flexibility

The remaining requirement for flexibility is to ensure that delivery options are not precluded. An acceleration scenario would alter the complete package of works, which would potentially change the assessment of best delivery model.

In particular, if the programme components became aggregated due to an acceleration this would create scale and introduce new options for overall management of risk, delivery components, and programme. Acceleration and aggregation may also introduce new risks or complexities, particularly if the timing issues noted above needed to be managed. These factors would suit the larger scale models, such as Alliance.

Flexibility focal points

The focal points for retaining flexibility are:

- Consenting, in particular the designation boundaries and consent conditions should be set in the least restrictive way possible so as to enable future timing and delivery options, including innovation in design and construction.
- Governance, in particular ensuring that the programme partners are able to respond and adapt to changing circumstances, and that the risk and opportunity management processes are robust and support informed strategic decision making.
- Interfaces with other projects, in particular continuing to liaise with projects along the corridors to understand their delivery programmes and the implications of these for the ability to accelerate SWGP components and for opportunities to reassess the staging to respond to opportunities for efficiencies in delivery (for example through coordinated or co-delivery under a dig-once approach). Continuing to engage with Kāinga Ora, Panuku and other Central and Local Government organisations in Manukau to identify opportunities to align project timing is important.

19.7.4 Transport services and vehicles procurement (A2B only)

The horizons in the staging strategy will see an increasing quality of rapid transit service. In particular, services will be extended in Horizon 2 to better serve Botany and new bus rolling stock may be procured to run on the upgraded infrastructure in any of the A2B horizons (H2, H3, H4).

Procurement of new services or extension to existing service contracts needs to be cognizant of the importance of maintaining quality of the existing services (including the Airport services delivered in the Horizon 1 short-term Airport access improvements). The broad outcome of supporting and sustaining mode shift must be retained.

The procurement considerations for Horizons 2, 3 and 4 are:

- Services
- Rolling stock.

Changes to services will need be made as either new contracts or extensions to existing contracts. Flexibility should be retained to ensure the Public Transport Operating Model (PTOM) contracts relevant to the corridor can be flexed commercially for Horizon 2 services expansion or the renewal of these contracts should be timed for the expected timing of new services. A number of local bus services are also proposed to be realigned to connect with A2B stations along the corridor in H3 or with Eastern Busway's Stage 1 opening of Botany Station in 2025.

A rolling stock procurement strategy will be prepared closer to the timing of rolling stock procurement. This will need to be coordinated with the infrastructure design requirements to ensure integration of services with infrastructure (and potentially for stabling of large buses).

The introduction of new rolling stock will be a considerable commercial change to the services (assuming asset ownership and capital cost amortisation is retained in the service contract). It may be appropriate that the operating contract be renewed at this time to account for this change and to retain commercial tension. Consideration will need to be given to appropriate ownership of the rolling stock fleet given that it is expected to be made up of new rolling stock specifications that may at that time be unique within the broader bus network and be specific to the A2B rapid transit infrastructure. Further, legislative requirements and specifications for rolling stock will also require further consideration closer to procurement.

20 Management case

20.1 Introduction

This Management Case addresses the delivery roles and governance approach for SWGP. As with the Commercial Case, the Management Case has been written for the full SWGP. The Airport Access Improvement Project (AAIP), which is the responsibility of Auckland Airport, is also part of the programme and is addressed in this Management Case.

The Management Case is made up of the following parts:

- Delivery roles
- Governance arrangements, including supporting agreements and risk management and assurance framework
- Route Protection and Resource Consent Phase delivery structure and programme
- Horizon 2 delivery structure and programme
- Staging, project development and Investment Management
- Benefits realisation plan
- Next steps to address key risks
- Opportunities.

For the purposes of this business case, the Route Protection and Resource Consent Phase includes the activities required to prepare the programme for implementation. These are primarily the approvals (consenting, including notices of requirement), property acquisition and design to support these activities. As options for the implementation phases of the SWGP may include design and construct or alliance models, Route Protection and Resource Consent Phase is defined as all activities prior to procurement of these implementation models.

The Commercial Case has concluded that the Route Protection and Resource Consent phase will focus on the rapid transit component of the programme and the SH20B section. The SH20 and SH20A components of the SWGP will be delivered in the final staging horizon. For the purposes of this Management Case, the rapid transit delivery includes the necessary AAIP and SH20B route components (as illustrated in Figure 20-1). Because the A2B rapid transit route incorporates these components it necessarily requires that the Management Case considers the roles of the several organisations that are connected to these components.

Figure 20-1: SWGP sub-projects in the context of the Management Case (the A2B rapid transit route includes all SH20B upgrades and upgrades on Auckland Airport land)

20.1.1 Timeframes and focus of the management case

A SWGP Staging Strategy (Appendix E) has been developed to address the identified problems and opportunities in the programme within the currently understood constraints of Government funding envelopes and to provide a practical and efficient implementation pathway. The staging strategy does not intend to prescribe the exact delivery method for the SWGP and recognises that specific stages and delivery methods may change depending on various factors and interactions with other projects (eg CC2M rapid transit, Eastern Busway etc). The conditions under which investment would be made (similar to triggers) could include capital and operating budgets and organisational responsibilities and priorities. To manage uncertainties, constraints and interdependencies over the lifecycle of the programme and associated investment risks, an Investment Gateway Approach has been developed and is discussed further in Section 20.5.2.

Given the long timeframes in the programme, it would not be appropriate or meaningful to try to set out detailed governance arrangements for the later stages at this time. This Management Case largely focuses on the two near-term phases to be progressed, which include the Route Protection and Resource Consent Phase and the Horizon 2 Pre-implementation Phase. This is illustrated in Figure 20-2. It also sets out a proposed Investment Management Approach to monitor and manage investment timing and risk over the course of the programme.

The governance and risk management arrangements need to be able to respond flexibly to changes in the staging if and when they occur. These arrangements will also need to evolve over time to suit the differing needs of each stage.

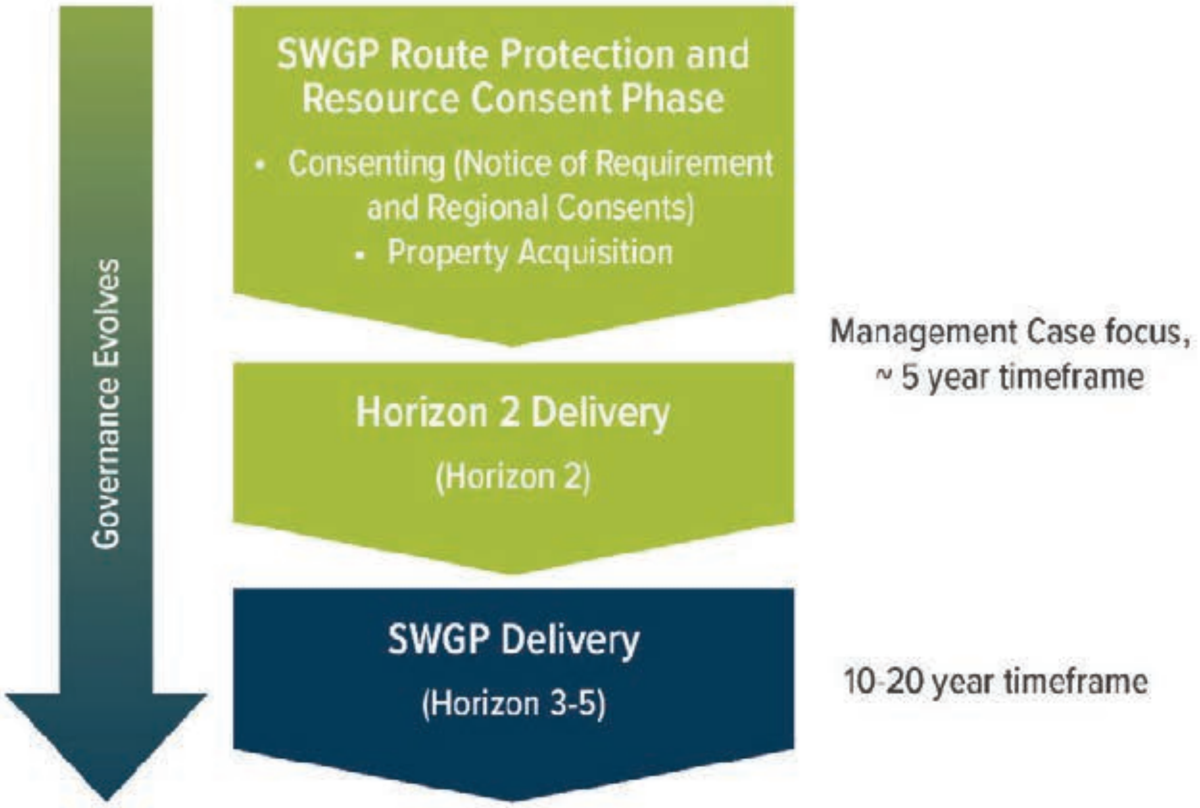

Figure 20-2: The Management Case is focused on the Route Protection and Resource Consent Phase and Horizon 2 Pre-implementation stage

20.1.2 The complexity in the programme affects the management approach

The SWGP is complex in relation to its scale, with the number of parties involved and the programme duration is long, including specifically:

- Critical role of programme partners including Te Ākitai Waiohua, Auckland Airport, AT and Waka Kotahi
- A mix of rapid transit and highway improvements as well as Airport precinct enhancements
- Interrelated networks and infrastructure
- Multiple operational systems and operating entities
- Three infrastructure asset owners
- Multiple Requiring Authorities (designation holders)
- Multi-year (decade) programme
- Several funding sources.

These aspects relate to and influence the governance arrangements (asset ownership, legal rights, funding) and the proposed dynamic approach to managing the programme.

20.1.3 The roles of programme partners affect the governance arrangements

There are four programme partners to the SWGP – Te Ākitai Waiohua, AT, Waka Kotahi, and Auckland Airport. Their roles and the importance of coordination among the partners are key considerations in designing the governance arrangements. Their roles in the Route Protection and Resource Consent Phase for A2B (excluding Horizon 5) are discussed below.

The three Investment Partners and road controlling authorities (RCA) are AT, Waka Kotahi and Auckland Airport. They will fund the projects within the SWGP. They have agreed to lodge Notice of Requirement (NoR) and consent applications with Auckland Council at the same time and seek a joint hearing.

Te Ākitai Waiohua

Te Ākitai Waiohua have a strong association with the Puhinui area as part of a broader cultural landscape that incorporates physical and historical sites or features of significance. Te Ākitai Waiohua (under the Pūkaki Māori Marae Committee) are signatories to the Eastern Access Agreement in relation to Pūkaki Creek Bridge and are the identified holders of the Māori Reservation within Pūkaki and Waokauri Creeks.

Te Ākitai Waiohua are programme partners in the SWGP and have been integral in developing the SSBC including the initial identification of ILM problem statements, benefits and investment objectives, options assessment and development of joint governance arrangements for the programme. The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge. Te Ākitai Waiohua will be part of the Route Protection and Resource Consent Phase; inputting into the different assessments undertaken and helping to further refine the components of the scheme (with a particular focus on the Puhinui precinct and Pūkaki Creek).

Auckland Airport

Auckland Airport is the RCA for the transport network within their designation that connects to SH20B at Orrs Road. Auckland Airport will prepare and lodge regional resource consent applications and will be the consent holder for any infrastructure within the Airport Precinct.

Auckland Transport

AT is the RCA for local roads east of the SH20 / SH20B motorway interchange and will be the requiring authority and resource consent holder for any infrastructure within this area. The Consenting Strategy has also determined they will be the requiring authority for any rapid transit designation along SH20B.

AT will lead the preparation of the necessary NoRs and regional consents and for the full A2B route (including SH20B widening) with support from Waka Kotahi.

Waka Kotahi

Waka Kotahi is the RCA for SH20B and will be the requiring authority and resource consent holder for any state highway infrastructure within this area. Waka Kotahi will support AT in the preparation of the necessary NoRs and regional consents for the full A2B route. Waka Kotahi will progress the 20Connect Horizon 5 NoRs and regional consents separately in the future.

Delivery of the AT and Waka Kotahi components of the Route Protection and Resource Consent Phase

AT and Waka Kotahi have agreed the following in relation to the delivery of the AT and Waka Kotahi components of the Route Protection and Resource Consent Phase:

- Professional Services to support the NoR and regional consents applications will be engaged and managed by AT with support from Waka Kotahi
- While the consenting and NoR applications for AT or Waka Kotahi will be prepared by a single coordinated team, the applications will be lodged by the appropriate requiring authority on the basis of who will own and operate the facilities enabled by the designation or consents
- Property acquisition will be managed and undertaken by each party (based on land impacted by each requiring authority's NoRs). The property acquisition teams will need to co-ordinate activities to achieve a consistent approach
- Responsibility for design, consenting and construction related to the Stage 1 Botany Station and for lodging the required NoR and resource consent applications will sit with AT's Eastern Busway project team and will not form part of the Route Protection and Resource Consent Phase. The consenting undertaken by Eastern Busway will also designate for Stage 2 of Botany Station.

The lead agency for implementation delivery is likely to vary for each stage depending on the affected asset ownership and delivery focus. For example, Horizon 2 delivery (the first after the Route Protection and Resource Consent Phase and Horizon 2 pre-implementation) is expected to be led by AT, reflecting the public transport services focus and the modifications to local roads.

20.2 Governance arrangements

The proposed governance arrangements for the programme is set out below. These will be reviewed and may develop further following input from specialist advisors and as the programme progresses.

The governance arrangements for the SWGP must support the following:

- Enable coordination and joint decision-making on common interests among the programme partners, particularly for the critical path consenting activities
- Provide a point of escalation for risk that cannot be managed or mitigated at the component level
- Provide efficient and engaged oversight on behalf of each organisation's corporate governance
- Provide an approval pathway where programme partners' board approvals are required (ie decisions above delegations)
- Provide an assurance pathway to the programme partners' boards
- Provide governance-level coordination with interfacing projects.

20.2.1 Proposed governance structure

The governance structure recognises that coordination is essential to the success of the programme, especially in the Route Protection and Resource Consent Phase. The proposed governance structure is summarised in Figure 20-3 below.

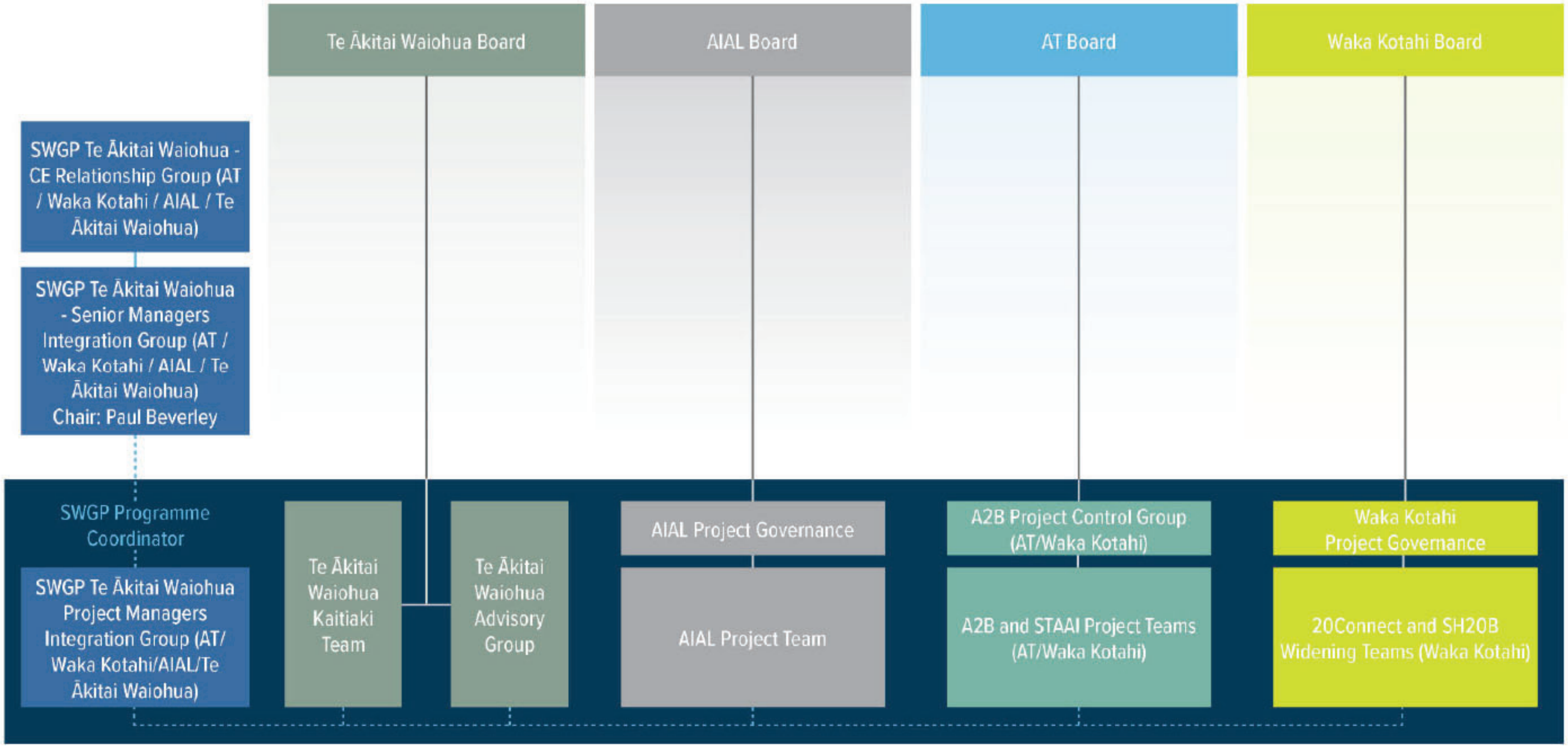

Figure 20-3: Proposed governance structure

Table 20-1: Governance forums summary

Meeting	Membership	Purpose	Governance Discussion Level	Meeting Frequency
SWGP Te Ākitai Waiohua - Chief Executives Group	Chief Executives from Te Ākitai Waiohua, AT, Auckland Airport, and Waka Kotahi.	This group will be a forum for meeting among the SWGP partners at the highest level. This is intended to strengthen the relationship and set common agreed direction among the parties to the Eastern Access Agreement. The group would be available as a forum to discuss roadblocks and agree on ways forward when needed. Matters from the A2B Project Team can be escalated to the SWGP CE Group through the SWGP Senior Managers Integration Group. The Chief Executive level designation reflects the relationship under the Treaty of Waitangi.	Rangatira ki te Rangatira	Once every 4 – 6 months or as necessary
SWGP Te Ākitai Waiohua - Senior Managers Integration Group Hui	Senior management representatives from Te Ākitai Waiohua, AT, Auckland Airport, and Waka Kotahi.	This group will be a forum for meeting among senior management representatives overseeing the various components of the SWGP and Te Ākitai Waiohua. This group will manage the relationships between the parties at a senior level and be the first point of escalation for any issues that arise at a project or programme level. The group will be responsible for co-ordinating activities between the parties and ensuring visibility of key issues but will not be a decision making forum	Governance Relationship Strategic issues	Once every 6 weeks
SWGP Te Ākitai Waiohua Project Managers Integration Hui	Te Ākitai Waiohua Advisors, Project Directors and Planning Leads from Waka Kotahi, AT, and Auckland Airport	This meeting will be the forum for day to day co-ordination of activities between the partner organisations. It will enable information sharing and planning for upcoming interactions. This group will develop material and agenda items to be taken up to the SWGP Senior Managers Integration group meetings.	Information sharing Co-ordination Agreeing information to go up to Senior Managers Integration Group	Once every 2 weeks
Te Ākitai Waiohua Advisory Group	Te Ākitai Waiohua Advisors	Consideration information and issues and providing advice to Te Ākitai Waiohua		
Te Ākitai Waiohua Hui	Te Ākitai Waiohua kaitiaki representatives	Regular monthly forum where project matters and issues can be tabled and discussed at a kaitiaki level. Feedback sought on proposed approaches.	Kaitiaki - feedback on detailed project information	Once per month

Meeting	Membership	Purpose	Governance Discussion Level	Meeting Frequency
A2B Project Control Group (PCG)	5 x AT and 1 x Waka Kotahi management representatives	The joint AT and Waka Kotahi Project Governance Group will direct the A2B project and provide oversight for the Route Protection and Resource Consent Phase and the associated professional services contracts, including the delivery, project management and commercial management of the professional and legal services.		Once per month
SWGP Road Controlling Authority Meeting	Project Directors from Waka Kotahi, AT, and Auckland Airport	This meeting will be the forum for day to day co-ordination of project management activities between the RCAs.		Once per week

In addition to the programme governance set out above, it is important that relationships are managed at a high level with other key stakeholders. Kāinga Ora and Panuku are key government sector stakeholders who are important because of the need for co-ordination of land use and transport outcomes in Manukau City Centre and the wider area. To facilitate the ongoing co-ordination, existing governance forums will be utilised. The Manukau Steering Group includes representation from AC, AT, Kāinga Ora, Panuku, and the Ministry of Housing and Urban Development. This will be the primary vehicle to ensure good co-ordination.

The Eastern Busway Alliance is tasked with obtaining statutory approvals for the ultimate Botany Station that will cater for A2B services. It will also construct Stage 1 of the station that will cater for the Horizon 2 A2B services. A2B is represented in the Alliance through representation in the Owners Advisory Group which informs the design. There will also be common members between the A2B and Eastern Busway PCGs. In this way, there will be good co-ordination of governance between the projects.

20.2.2 Agreements required to support governance

A number of agreements between the programme partners have been identified to support the governance arrangements and delivery of the programme through the Route Protection and Resource Consent Phase:

- Relationship Agreement between Te Ākitai Waiohua, AT, Waka Kotahi, and Auckland Airport
  - Documents how the programme partners will work together collaboratively on the SWGP
- Heads of Agreement (HoA) between AT, Waka Kotahi and Auckland Airport
  - Sets out governance, coordination, dispute resolution, escalation and engagement arrangements
  - Confirms intent to complete infrastructure within the Airport precinct contemporaneously with Horizon 3
  - Details future funding processes
- Route Protection and Resource Consent Agreement between AT, Waka Kotahi and Auckland Airport
  - Formalises the HoA above
- A Memorandum of Understanding (MOU) between AT and Waka Kotahi
  - Documents how AT and Waka Kotahi will jointly undertake their components of the Route Protection and Resource Consent Phase
  - Details the project level governance arrangements, decision-making processes, and dispute resolution and escalation procedures
  - Details cost sharing arrangements
  - Documents joint 'best for programme' decision-making principles
  - Confirms that each party retains decision-making for scope, standards and conditions related to elements of the transport infrastructure and operations that they will own and maintain.

Note that the above list is not exhaustive. other governance agreements may be required as the programme develops.

20.2.3 Risk management and assurance framework

The Commercial Case sets out the key strategic delivery risks for the programme as identified in the risk register (see Appendix I), and these documents should be referred to for detail of the risks and dependencies. Most of the strategic risks are matters that need to be addressed via the governance arrangements. In particular (but not limited to):

- Funding and cost sharing arrangements
- Addressing future uncertainty, particularly in relation to COVID-19
- Opportunity for review of the capacity of the Pūkaki Creek Bridge: The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge. This includes coordinated consenting in relation to infrastructure within the Airport RCA area.
- Managing interfaces with other major projects and programmes, the transport network and land development
- Coordinated stakeholder engagement.

A disciplined, structured and documented risk management framework will be established. This will enable identification, documentation and reporting of risk consistently and comparably.

The risk management framework will:

- Establish a purpose-driven risk identification process focussed on the programme's critical success factors and targeting those risks that can impede the realisation of success
- Establish ongoing risk monitoring and reporting processes at the project level, beginning with the Route Protection and Resource Consent phase
- Establish requirements for reporting project risk up to the programme-level governance
- Design in cultural enablement within operational teams to ensure risks are elevated early
- Establish thresholds and reporting requirements for programme-level risk reporting to programme partners' Boards.

The outcome of the risk framework should be that risks are actively identified and managed throughout the programme lifecycle. The risks identified in the business case (current risk register) will be carried and managed through the Route Protection and Resource Consent stage and then into the future project stages.

AT's internal Risk Management Process (as outlined in the Project Risk Management Handbook) and Programme Management Framework (2015) processes, or any subsequent revisions will be applied.

20.3 Proposed route protection and resource consents phase delivery structure and programme

20.3.1 Delivery structure

The SWGP Route Protection and Resource Consent Project Team (covering the project outside of the Auckland Airport designation) will be led by AT with support from AT and Waka Kotahi staff and from professional services providers. This project team will lead interfaces with external parties as required to achieve the Route Protection and Resource Consent tasks. These will include interfacing with related projects and developments, with third party utilities, and with affected stakeholders.

Waka Kotahi will have an Interface Manager within the project team to provide connection back to Waka Kotahi's internal teams. This would be similar to the Owner Interface Manager role used in Alliance projects.

AT will engage the consultant team and manage the professional services contract. Waka Kotahi will provide input where relevant via the Interface Manager / project team. AT and Waka Kotahi will agree a cost-share mechanism to allocate professional services costs between the organisations, which will be detailed in the MOU (refer to Section 20.2.2 above).

Due to the different legal requirements associated with Crown and local government property acquisition processes, each organisation will undertake their own property acquisition for assets that they will designate and own. However, the property teams will ensure a coordinated and consistent approach programme wide.

Stakeholder management and communications expertise would be engaged as part of the external professional services package. Responsibility and overall leadership of stakeholder management and communications would be retained by the client organisations.

An indicative structure for the Route Protection and Resource Consent delivery team is illustrated in Figure 20-4. This indicates the major discipline areas, not staff numbers. Other disciplines may be required, and the team is likely to involve more staff than roles shown in Figure 20-4. The Waka Kotahi Interface Manager may be one of the internal experts (such as the Waka Kotahi RMA Planner). Specialists across AT will provide expert advice over the course of the project, or form part of the integrated project team, including (but not limited to):

- Māori Engagement
- Risk Management
- Health and Safety
- Urban Product
- Spatial Management
- Procurement and Contract Management
- Funding and RLTP
- Road Safety
- Design Standards.

The final structure and make-up of the delivery team will be decided through final scoping of professional services requirements and through the engagement of those services.

Construction and statutory approvals for Botany Station will sit with AT's Eastern Busway project team.

Auckland Airport will engage its own legal and professional services suppliers and will lodge its own applications for facilities within its designation, concurrently with AT and Waka Kotahi's joint application. There will be close day-to-day contact and coordination between the rapid transit route Project Team (led by AT) and the Auckland Airport Project Team.

The four programme partners will work together to agree a way forward for several processes, in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

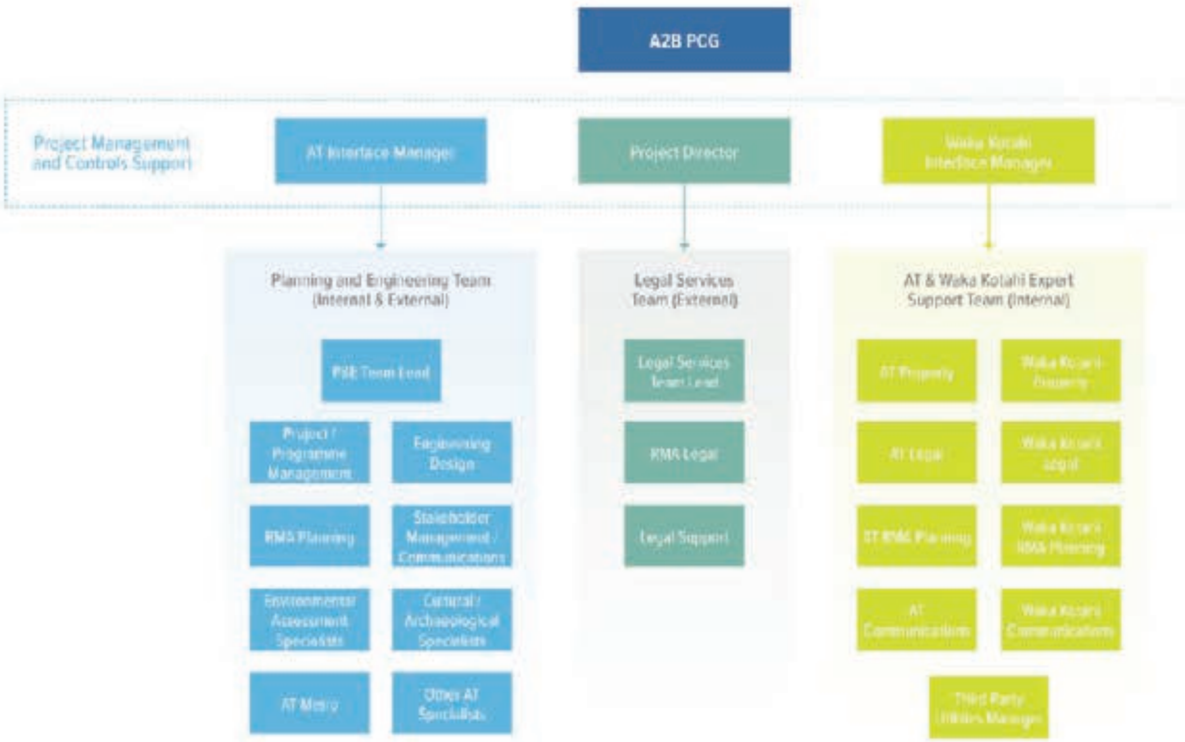

Figure 20-4: Indicative SWGP Route Protection and Resource Consent Phase delivery team structure (showing discipline areas)

20.3.2 Route protection and resource consent phase programme

The SSBC recommends that in order to ensure the programme can be delivered, that the route is protected as an early action. The following are the proposed conditions and dependencies for the route protection phase:

- Auckland Airport, Waka Kotahi and AT confirm funding for route protection
- The four programme partners are working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge and infrastructure within the Airport RCA area.

There are a number of drivers pushing the Route Protection and Resource Consent Phase programme forward, including:

- An existing 40m development setback along the SH20B corridor currently restricts property development in the area, however this setback is set to expire and reduce to 10m s7(2)(b)(ii) [redacted] is lodged s7(2)(b)(ii) Prejudice to commercial position [redacted]
  - The current indicative consenting programme shows procurement and professional services contract award in early to mid-2021 with a mid to late 2022 lodgement, leaving very little programme 'float' ahead of January 2023
  - Property acquisition is preferred to be completed ahead of procurement for the delivery phase to de-risk scope, cost and programme uncertainties
- Maintaining reputation, relationship and programme alignment with interdependent programme partners.
  - There is a risk of damaging the significant partnerships and reputation for programme partners if the Route Protection and Resource Consent Phase is delayed or put on hold
  - It is desired that an ability to achieve alignment with transit-oriented development investments being made by other government agencies and private sector in Manukau
  - There is a need to achieve design co-ordination with KiwiRail's 3rd and 4th Main project at Puhinui
- Maintaining SWGP momentum will increase efficiency and avoid sunk costs.
  - Maintaining momentum avoids the risk of re-work inherent in a stop-start approach
  - Long lead-in times to secure planning approvals and manage any appeals (2024+), complete property acquisition (400+ properties) and procurement for construction mean that momentum is desirable
  - Significant reinvestment would be required to realign Te Ākitai Waiohua, Auckland Airport, AT, and Waka Kotahi in the future should the programme slow or pause.

These programme drivers present a risk, but also an opportunity to achieve value for money outcomes, with the commencement of Route Protection and Resource Consent Phase activities.

An indicative programme for the Route Protection and Resource Consent stage is shown in Figure 20-5 for the period until the end of 2023, by which time NoRs and Regional Resource Consents are expected to have been secured.

The programme assumes that the business case approvals process will be completed by the fourth quarter of 2020. The programme is dependent on application documentation preparation and hearings timing. If the decision is taken to the Environment Court on appeal the process may be extended by up to 12 months. The procurement and start of Horizon 3 delivery is unlikely to begin until after any appeals process is complete, making the timing of these activities dependent on the finalisation timing of the consenting process.

Property purchase will be undertaken as statutorily required following the lodgement of the NoR applications. More intensive property acquisition will be undertaken once funding for the construction activities is confirmed.

The route protection programme is also interdependent on the four Programme Partners working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

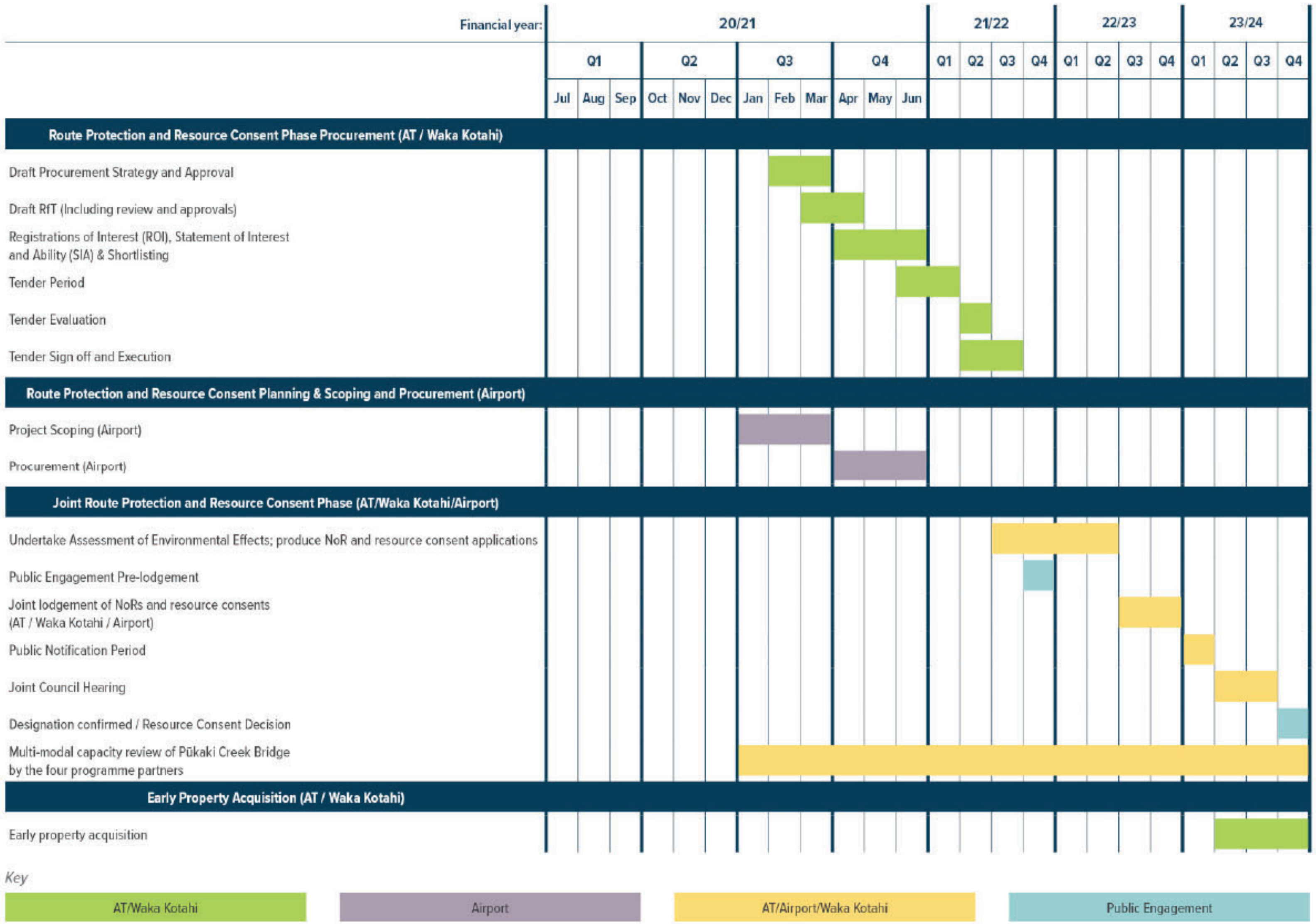

Figure 20-5: Indicative programme for the Route Protection and Resource Consent Phase stage

20.4 Proposed Horizon 2 delivery structure and programme

20.4.1 Horizon 2 Pre-implementation scope

The SSBC recommends the extension of the Horizon 1 (AirportLink) service from its proposed eastern terminus at Manukau to Botany via the proposed A2B route, supported by kerbside stations and intermittent transit and bus lanes to be operational in 2025(to align with the opening of Botany Station).

It is proposed that following the SSBC, there is an immediate commencement of project development scheme refinement/project-level optioneering), detailed design, public engagement on the detailed design, consenting, MSQA and procurement for Horizon 2 implementation.

In addition, the inclusion of the rapid transit corridor through Manukau City Centre (expected as part of Horizon 3) is identified as a potential inclusion in Horizon 2 should the integration with redevelopment of transit-oriented land uses in the Manukau City Centre be considered an appropriate response. Progress with transit-oriented development by Government agencies and any potential opportunities for early implementation of the RTN corridor through Manukau should be monitored through ongoing relationships with delivery agencies and considered in the Implementation Business Case for Horizon 2.

20.4.2 Horizon 2 Pre-implementation programme and funding

The indicative programme for Horizon 2 is set out in Figure 20-6 below.

Following detailed design a Gateway Review (refer to Section 20.5.2 below) will indicatively occur in early 2023 prior to the implementation phase. This gives sufficient time to construct the medium term infrastructure and to procure the service and fleet for delivery by 2025. By July 2023, AT should also have a good indication of the impact of COVID-19 on demand and the source and quantum of OPEX funding – which will influence the level of service proposed and currently programmed 2025 opening date. The proposed funding gateway timing seeks to align with the development of future RLTP and RPTP updates where OPEX funding for Horizon 2 should be sought.

Fleet and service procurement should also seek to align with existing PTOM contract expiry timeframes.

The Investment Gateway to unlock implementation funding for Horizon 2 will be different from future Horizon 3 to Horizon 5 funding gateways:

- Less time elapsed since SSBC completion
- Much lower capital cost
- Greater level of design and pre-implementation completed before gateway.

As part of the Gateway Review and funding process, AT will need to update this SSBC's commercial and management case to reflect the outcomes of the pre-implementation phase for Horizon 2 with further Implementation Phase detail. An Implementation funding application will be prepared at this time for physical works costs, fleet and service procurement. It is proposed to award professional services contracts for the pre-implementation phase separable portions to allow the scope to be stopped if implementation or OPEX funding is not granted.

Implementation of the Horizon 2 scheme is an AT responsibility.

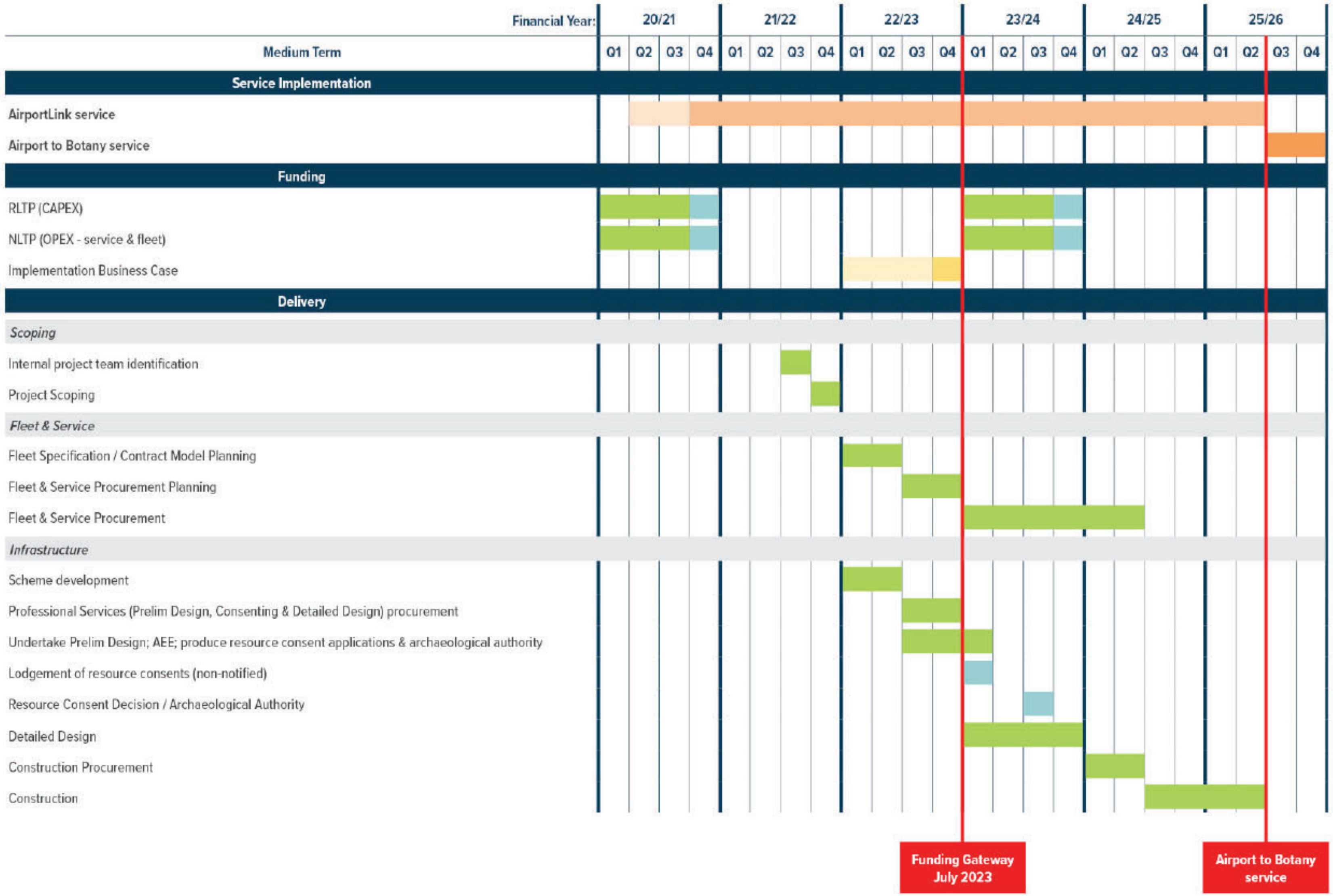

Figure 20-6: Indicative programme for Horizon 2

20.5 Staging, project development and investment management

20.5.1 Investment Management Approach overview

The SWGP proposes to deliver a step-change series of investments over a period of around 20 years, which together form the recommended option within this SSBC. While the entire programme is required to deliver the full investment benefits and resolve the problems identified in the ILM, a staged delivery was identified as the appropriate implementation method (Appendix E).

To manage uncertainties, constraints and interdependencies over the lifecycle of the programme (refer to Uncertainty Log in Section 4.9.1) and associated investment risks, an Investment Gateway Approach unique to the SWGP has been developed. This establishes an adaptive and responsive framework to manage and monitor the timing of investment decision-making over the course of the SWGP. This dynamic approach to investment risk management recognises the uncertainties generated by a large and complex programme that has short, medium- and long-term stages of investment. It also provides flexibility to consider changes in underlying conditions, interdependencies, constraints and forecasts, including uncertainties related to COVID-19. This will ensure robust decision-making closer to the time of investment for future programme phases.

In summary, this process:

- Identifies how the agencies progress to the ultimate outcome over time
- Is a method to manage uncertainty into the future, particularly in light of uncertainties generated by COVID-19
- Is a flexible approach to moving horizon timings and components between horizons
- Provides appropriate checks and balances to ensure there is an optimised right-sized investment made at the right time
- Is managed through a series of Gateway Reviews
- Provides a framework for development of future phases.

The Investment Gateway Approach includes the following elements:

- Investment Gateway Approach Principles
- Programme Staging Intent and Proposed Outcomes
- Gateway Reviews – overall timing and process
- Investment Drivers - to be managed and monitored
- Investment Gateway Reporting and Monitoring – timing and process.

These are further described in the following sections.

20.5.2 Investment Gateway Approach Principles

A series of principles guide the Investment Gateway Approach for the SWGP:

1. **Entire programme implementation is necessary to fully realise benefits and outcomes** - The SSBC recommends the entire programme is required to be implemented to resolve the problems and realise the benefits and outcomes identified. The assumption is that the

programme in its entirety is progressed – provided outcomes generated are tracking generally in accordance with expectations.

2. **Flexible and efficient programme packaging, staging and delivery to respond to uncertainty** - Monitoring and staging is intended to ensure that the programme is delivered in the most efficient manner. (in this case "efficient" can mean most logical in terms of connections to other projects, minimising disruption, reducing costs and re-work, delivering scale and performance commensurate with need). Packaging of horizon elements is flexible and able to respond to changes in underlying assumptions and timing ('investment drivers').
3. **Investment leads with mode shift and behaviour change outcomes** - The programme is mode-shift and behaviour change driven. As a result, investment needs to be leading – with the balance that it is still efficient (not too leading) and recognising that dependencies are not always in the control of the transport agencies.
4. **Proposed approach needs to provide flexibility** - Monitoring is to be forward looking, monitoring trends in performance and progress in dependencies and investment drivers. Regular programme monitoring provides the flexibility to adapt programme timing, which may indicate that it is appropriate to shift elements forward or back for implementation.

20.5.3 Investment Management Approach methodology

The overall methodology for the proposed Investment Management Approach includes:

- Gateway Reviews to review stages prior to investment
- The Gateway Reviews will be documented in Implementation Business Cases
- The Gateway Reviews will utilise Investment Drivers to determine investment timing
- Regular reporting and monitoring to programme governance on selected Investment Drivers to inform timing of Gateway Reviews
- Benefits Realisation Reporting as per standard practice will confirm the effectiveness of implemented stages.

20.5.4 Investment Management Approach framework and methodology

Gateway Reviews

A key component of the ongoing staging and decision making in respect of the SWGP is Gateway Reviews ahead of each major investment. This section outlines the proposed timing and scope of Gateway Reviews and the scope of the main input to the reviews, an Implementation Business Case. This explanation is provided as an indication of the proposed process and this will require more detailed clarification once the governance framework is established.

Gateway Reviews timing and scope

The commencement of each intervention or suite of interventions in the SWGP should be reviewed through a Gateway Review prior to the commencement of procurement and design. Figure 20-7 shows the potential times for these gateway reviews in G1, G2, G3, G4 and G5.

The gateway reviews will be undertaken prior to each tranche of large-scale investment and be endorsed by Waka Kotahi and AT Boards (or other delegations) prior to release of funding. The first Gateway Review is proposed for the Horizon 2 investment (G1) in 2022/23.

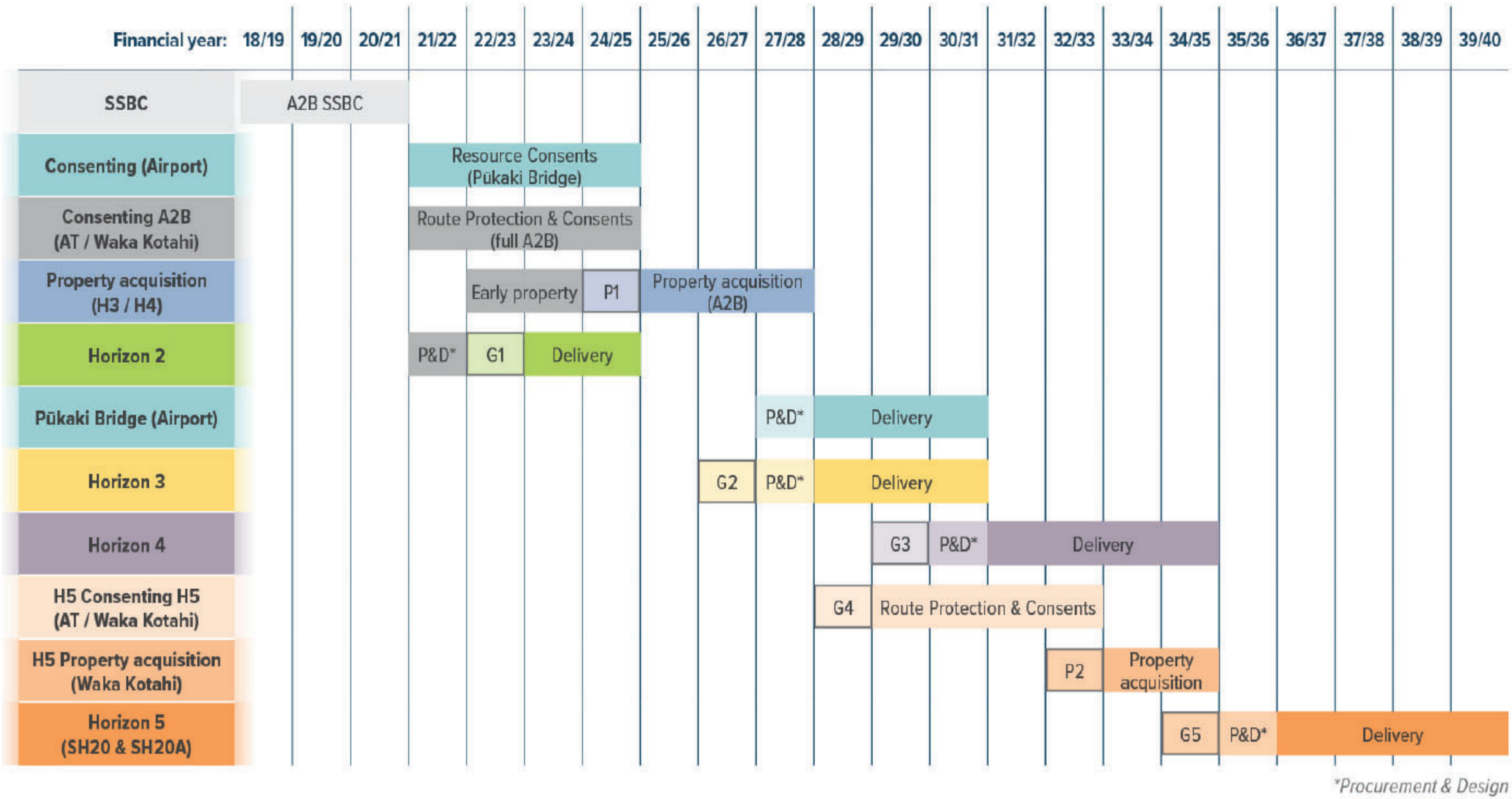

Figure 20-7: Proposed long term programme including gateway reviews

Implementation business case

The evidence to support a Gateway Review will be documented through an Implementation Business Case, generally consistent with the Treasury business case model. While the exact scope of the Implementation Business case will need to be developed, the expectation is that it will be based on the ongoing monitoring of conditions and dependencies and not a full update to this SSBC.

In short, the Implementation Business Case is expected to:

- Reconfirm the strategic context – confirming the conditions are similar to what was expected
- Confirm that the outcomes of each preceding horizon are being achieved generally in line with expectations
- Confirm the assumptions used to develop the SSBC and the Staging Strategy are still valid
- Confirm that interrelated projects and governance arrangements are in place and that the project is ready to progress.

The expected structure for the Implementation Business Case is generally as outlined below:

Strategic Case

- Reconfirm the strategic case as set out in the SSBC
- Confirm that the strategic context and the case for change remains unchanged and document/assess significant changes
- Review of key conditions, dependencies and benefit realisation monitoring
- Identify changes in underlying assumptions such as current and forecast population and employment growth, technology changes and assess significance.

Financial Case

- Updates to the Financial Case to reflect the latest capital and operating cost assumptions.

Economic Case

- Updates to cost estimates and economics for the preferred solution to confirm expected return on investment and value for money
- Confirmation of the preferred option and micro level option refinement. Note, it will not include the review of the strategic optioneering unless there has been a substantive change identified in the strategic case review that is likely to alter the assessment of alternatives
- Update investment profile assessment.

Commercial Case

- Develop the commercial case as appropriate for the proposed investment in future phases.

Management Case

- Develop the management case to focus on management and governance arrangements for the implementation of the proposed investment in future phases.

20.5.5 Programme components, staging intent and investment drivers

A series of 'Investment Drivers' have been identified which will be monitored and reported on within the Gateway Reviews and over time to manage the timing of future investment and to manage investment risk. These include the policy and strategic environment, forecasts, performance trends of prior implemented stages (including Benefits Realisation, Appendix D), programme dependencies and underlying conditions.

To assist with future reporting and monitoring of the investment drivers and reconfirmation of the staging strategy set out in this SSBC, the components of the A2B and 20Connect projects which comprise the overall recommended option have been identified. Further, the staging intent and outcomes and how these allow for risk mitigation is discussed.

Programme components

The SWGP is logically broken into elements for delivery (refer Appendix E Staging Strategy) shown in Figure 20-8. For the purposes of developing a cashflow and economic analysis for this SSBC, a single staging strategy with timing assumptions was developed (Appendix E) which involves implementing the project components in five delivery horizons. While the horizons identified in the SSBC are the baseline for programme delivery, a dynamic approach is planned, with each element of the programme having a suite of conditions and dependencies that will be assessed prior to a commitment to deliver.

The component parts of the SWGP for the purposes of staging and sequencing are:

- SH20B highway upgrade, rapid transit corridor and SH20B-SH20 southbound ramp
- Puhinui Station Bus Bridge
- Puhinui Road (east and west) RTN corridor
- Manukau RTN corridor
- Te Irirangi Drive / SH1 Bridge
- Te Irirangi Drive RTN corridor
- Botany Station
- SH20A-SH20 southbound Link
- SH20 widening (north of SH20B)
- SH20 widening (south of SH20B).

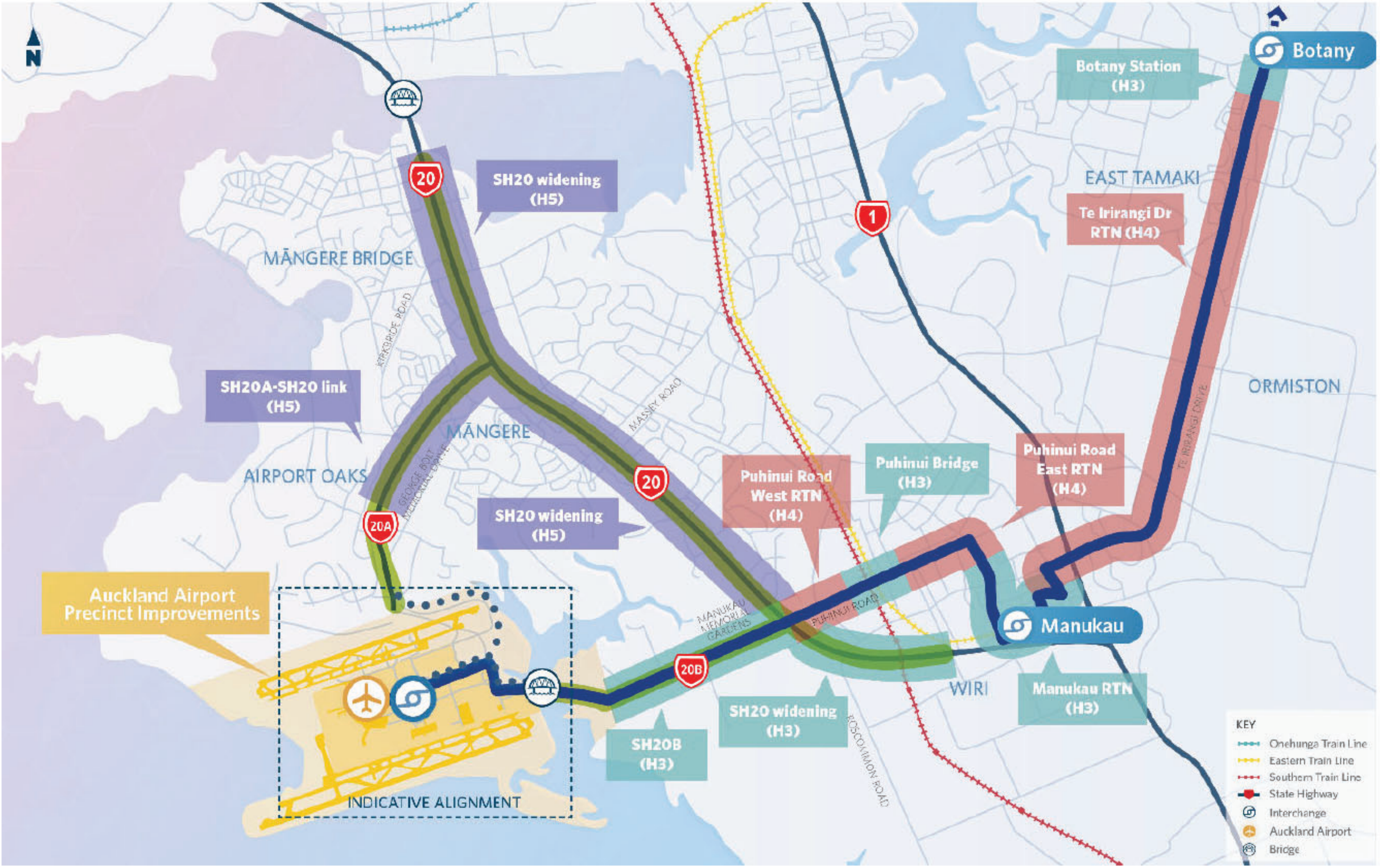

Figure 20-8: SWGP components and proposed horizons

Investment drivers

The investment drivers are forward looking to enable the programme to deliver on its mode shift strategy by leading transport choices, yet in an efficient manner.

The Investment Drivers will be a key input to the Gateway Reviews and Implementation Business Cases. Some of these Investment Drivers will be reported to the PCG on a regular basis as the programme progresses and inform the timing of Gateway Reviews.

There are four key aspects of the investment drivers that are proposed to be monitored and used to support decision making:

- **Policy and strategic environment** (Have organisational strategies and priorities changed?)
- **Forecasts** - updated forecasts as demand is realised and new forecasts are developed. *(Has expected demand changed?)*
- **Trends** in the performance of the system as implemented compared to those expected. *(Is the system performance tracking on, above or below expectations?)*
- **Dependencies and conditions** – critical or desirable interventions that would logically trigger concurrent investment is an element of the SWGP. *(Are there practical/integration drivers to act?)*

The proposed measures to monitor and report on under each of these four headings are outlined below. These may change over time as practice improves or additional considerations become relevant.

Investment Driver 1: Policy and strategic context

To determine strategic fit ahead of commencement of an Implementation Business Case. Refer to Table 20-2 for KPIs and measures.

Table 20-2: Policy and Strategic Context Updates

KPI	Measure	Agency	Notes
Land use strategy	Land use strategies and plans (Auckland Plan, Unitary Plan, major development/master plans)	Auckland Council	Any changes in requirements, direction etc.
Transport strategy	GPS	Government	
	ATAP	WK/AT	
	Regional strategies	AT/WK	

Investment Driver 2: Forecasts

Updated forecasts will be used as an indicator of the need for/timing of investment.

Over time, forecasts of land use and network performance will change. This will provide an ability to update the need for and timing of investment based on the most relevant information. Refer to Table 20-3 for KPIs and measures.

Table 20-3: Forecasts KPIs and Measures

KPI	Measure	Agency	Notes
Land use	Growth plans and forecasts	Auckland Council	Any changes in land use growth assumptions (timing, quantity. location)
Travel demands	Public transport patronage forecasts	AT/WK	Updated model outputs
	Traffic volumes forecasts	WK/AT	Updated model outputs
	Cycle/pedestrian forecasts	AT/WK	Updated model outputs

Investment Driver 3: Performance trends

Performance of the SWGP as it evolves, both ahead of implementation and following delivery of horizons should be monitored. This is not expected to determine staging and timing. The intent is to confirm that the performance of the programme is progressing generally in accordance with forecasts. In keeping with the mode shift strategy, there is a need to implement improvements ahead of performance issues becoming significant. This means thresholds will need to be adopted accordingly. For monitoring following implementation, there may be some overlap or synergies with the Benefits Realisation Plan and reporting (refer to Section 20.6).

This might have the following aspects:

- **Patronage** – is a key indicator of effectiveness of the investment.
  - Significantly higher demands and capacity issues may bring forward timing of stages or operational responses
  - Significantly lower demands than forecast may require a review of reasons and modification of the strategy.
- **Performance** – is a key driver of the investment and an indicator of its effectiveness
  - Reliability of the system– if this is significantly worse or better than expected, it may require modifications to the timing, sequencing and scope
  - Safety – changes in the environment (in a proactive sense eg new intersections/developments) and in actual safety outcomes may warrant changes in the timing, sequencing and scope.

Refer to Table 20-4 for KPIs and measures.

Table 20-4: Performance KPIs and measures

KPI	Measure	Agency	Notes
Usage	Ridership	AT	A2B service. Monitor trends. Is ridership growing generally in line with expectations?
	Traffic volumes	WK	Selected links. Including local network Change in volumes from base (to identify redistribution)
Network performance	Journey time reliability (traffic)	WK/AT	Selected, indicative links or journeys – identify early stages of issues and potential responses
	Service reliability	AT	A2B service – identify early stages of issues and potential responses
	Customer Feedback	AT	Public Transport focus (but could be all modes)
Safety	Safety assessment (forward looking)	AT/WK	Takes into account planned changes in network conditions. Intent is to be forward looking
	Safety perception (PT)	AT	Focus on personal safety – assessments and/or surveys
	Crashes/incidents	AT/WK	Crashes and personal security incidents

Investment Driver 4: Dependencies and conditions

Dependencies and conditions have been established in the SSBC (Appendix E Staging Strategy). The dependencies identified are those that can reasonably be identified at this time. Experience suggests that over time, these will change. The SSBC has identified dependencies and likely conditions that apply to each section of the route. This has given rise to a likely implementation sequence which is expressed in the Staging Strategy for the purposes of a developing a programme.

The sequence and timing of elements could change depending on whether or when expected outcomes or progression of related projects occur. Relationships with delivery teams and agencies and progress with each dependency should be actively managed and reported to the Programme Control Group to inform preparation for next steps. These should be proactive, and measures initiated early in the planning phase through development agreements or similar.

This will require ongoing, active management of relationships and joint programmes with relevant agencies and projects.

Refer to Table 20-5 for KPIs and measures.

Table 20-5: Dependencies and Conditions

SWGP Element	Dependency	Agency	Notes
SH20B	Pūkaki Bridge	Auckland Airport	Auckland Airport commitment to work together with Te Ākitai Waiohua/AT/Waka Kotahi in relation to a review of the multi-modal

SWGP Element	Dependency	Agency	Notes
			capacity of the Pūkaki Creek Bridge and infrastructure within the Airport RCA area, as per the Relationship Agreement.
Puhinui Bridge	NIMT fourth main	KiwiRail	Decision from KiwiRail to implement.
Manukau Section	High density land use and public realm development	Kāinga Ora, GPG, MoE, Panuku	Commitment by relevant parties to land use and public realm projects and execution of a form of delivery agreement.
Botany Interchange	Delivery of Eastern Busway	AT	Delivery efficiencies and disruption minimisation through joint delivery to be assessed.

Timing of reporting on investment drivers

The Investment Management Approach framework in Table 20-6 sets out a proposed reporting and monitoring framework to manage and monitor investment timing. This may be adapted over time to respond to changing practice and processes.

Table 20-6: Proposed reporting and monitoring framework

No.	Reporting and monitoring	Timing
1	**Gateway Reviews** – to support implementation funding applications and confirm timing of investment	Documented in Implementation Business Cases
2	Investment Driver 1: Policy and strategic context	At each Gateway Review, documented in Implementation Business Case
3	Investment Driver 2: Forecasts	At each Gateway Review, documented in Implementation Business Case
4	Investment Driver 3: Performance trends	Annual monitoring report – reported back to programme governance
5	Investment Driver 4: Dependencies and conditions	Annual monitoring report – reported back to project governance at each Gateway Review, documented in Implementation Business Case
6	**Annual monitoring report** – including Investment Driver 3: Performance trends and Dependencies and conditions	Annually – reported back to project governance
7	Baselines for the Investment Drivers	Developed after SSBC endorsement

No.	Reporting and monitoring	Timing
8	**Benefits Realisation Plan** reporting and monitoring – as per normal – to understand benefit realisation. There may be some synergies and overlaps as performance of a staged programme will include ex post monitoring of earlier stages. Refer to Section 20.6.	Following implementation of stages

20.6 Benefits realisation and monitoring of conditions for investment

A Benefits Realisation Plan (BRP) has been prepared for the SWGP (see Appendix D). The BRP maps the identified problems and investment objectives for the sub-projects to performance measures that can be used to test how the objectives are being met. This mapping is shown in Appendix A.

The BRP includes the proposed methodology for performance measure capture, baseline data and expected results.

The performance measures provide a framework for post-implementation monitoring. The BRP is a living document that will be reviewed and updated over time as required to remain current with the delivery of the programme. The BRP developed for STAAI provides the reporting and monitoring of Horizon 1's benefits. The benefit realisation of earlier phases is one of many factors to consider in terms of investment in the future phases. There are overlaps between investment driver measures proposed to support the gateway reviews and associated monitoring and reporting, and those that are included in the BRP. This is a potential synergy.

A lesson learnt review process should also be established to feed learnings from this project back into the project development and delivery lifecycle. SWGP is an example of a complex multi-party urban project. These sorts of projects are becoming increasingly common in our major cities and further scale and complexity can be expected in the future. The experience gained through SWGP offer valuable lessons for future work.

To ensure effective management of the benefits realisation monitoring process, benefits management should be included in the governance and delivery management plans of the A2B Rapid Transit and 20Connect SSBC. Table 20-7 summarises who is responsible for each horizon and the associated BRP review and update.

Table 20-7: Programme partner responsible for each horizon and associated BRP review/update

Horizon	Programme partner
Horizon 1	Auckland Transport / Waka Kotahi
Horizon 2	Auckland Transport
Horizon 3	Auckland Transport / Waka Kotahi
Horizon 4	Auckland Transport
Horizon 5	Waka Kotahi

20.7 Next steps to address key risks and opportunities

The following items need to be progressed to address key risks:

- Finalisation of agreement(s) among the programme partners mentioned in Section 20.2.2
- Progression of funding applications for immediate phases
- Development of procurement documentation for the Route Protection and Resource Consent Phase
- Ongoing engagement with Mana Whenua through the Southern Table
- The following items need to be progressed to address key opportunities:
- The four Programme Partners working together in relation to a review of the multi-modal capacity of the Pūkaki Creek Bridge.

Other next steps include:

- Agreeing service level outcomes for the RTN within the Auckland Airport section of the RTN corridor
- Preparation of a Third-Party Utilities Engagement Strategy, including roles and responsibilities for engagement. To date some engagement has occurred with most utility owners in the SH20B section of the A2B corridor as part of the STAAI project. Given that Horizon 2 implementation is expected to be led by AT it may be appropriate for AT to lead this engagement
- Local and Central Government collaboration, including alignment with proposed (and existing) Kāinga Ora and Panuku developments along the A2B corridor. Together identifying opportunities for:
  - Collective public engagement
  - Improved connectivity between developments and A2B stations
  - Sharing infrastructure eg stormwater facilities
  - Sharing design narratives.

20.8 Opportunities

Over the development of the SSBC, a number of opportunities have been identified that are recommended to be further progressed, including:

- **Transit Orientated Development** - Working with other partners and stakeholders, particularly Kāinga Ora, Panuku and Auckland Council to unlock land use and transport integration value at stations and along the corridor (Appendix U)
- **Accelerated delivery of A2B within Manukau Centre** - To enable and catalyse urban regeneration in a socio-economically deprived area by aligning with surrounding development and TOD projects being progressed by Kāinga Ora, Panuku, other Central and Local Government entities and the private sector
- **Station access improvements** - comprising walking and cycling improvements in the walk up and cycling catchments of stations. These will further optimise investment in the A2B rapid transit corridor, improving multi-modal connectivity and access for residents and commuters. While strategic level station access options assessments have been undertaken as part of this SSBC (Appendix X), further concept design and cost estimates are recommended to be undertaken as part of the Horizon 3 Implementation Business Case
- **Customer experience and behaviour change** – a range of initiatives to support the roll out of each horizon should be developed in further detail as part of respective Implementation Business Cases

- **Integrated A2B urban design and landscape framework** – in partnership with programme partners and Mana Whenua Treaty Partners develop and deliver a shared vision for the area, through an A2B design framework that integrates:
  - Cultural narratives eg incorporation of cultural design themes similar to what is currently being applied to the Puhinui Station upgrade project, which is an early deliverable of the A2B project
  - Te Aranga Cultural Landscape Principles or other Māori design principles as agreed with Mana Whenua
  - Landscape, urban design and ecological considerations, including:
    - Where possible, retention and incorporation of existing trees along the A2B corridor
    - Where possible, the natural and cultural landscape including native plant species, or flora and fauna with a specific connection to the area to be preserved in the design and long-term maintenance of the project
    - Archaeological and heritage outcomes - including acknowledgement of sites and places of significance to Mana Whenua; appropriate iwi monitoring and accidental discovery protocols to be agreed with Mana Whenua
    - Stormwater design - seeking an integrated approach to the management and treatment of stormwater along the A2B alignment.

This is not a complete list of recorded opportunities. It will be updated and revised as the project is progressed

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