SHORT TERM AIRPORT ACCESS IMPROVEMENTS SSBC

Single Stage Business Case Report

Auckland Transport

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Executive Summary

Context and Principal Findings

The Short-Term Auckland Airport Improvements Single-Stage Business Case (STAAI) is for the first stage of the Auckland to Botany (A2B) Rapid Transit Network (RTN) project which is being led by Auckland Transport (AT), alongside investment partners the Transport Agency and Auckland International Airport Limited (AIAL). It recommends the early construction of a Bus/Rail Interchange at Puhinui, revised bus services, local bus priority measures and a set of walking and cycling measures, mainly north of the Airport.

This business case has been prepared in parallel with the Transport Agency's SH20B Short-Term Single-Stage Business Case (SH20B SSBC) which is for the first stage of the 20Connect project. The SH20B SSBC recommends the introduction of transit lanes alongside SH20B between SH20 and the Airport. It was approved (subject to conditions) by the Transport Agency Board in December 2018.

There is considerable urgency for short-term improvements to access the Airport. Any available capacity on routes serving the Airport will be exhausted well within five years given the rate of growing demand. There have already been multiple occasions of major delays which have created headlines as gridlock has affected the Airport. In addition, with works on Dominion Road planned to start construction of the Light Rail (LRT) service between Māngere and the City Centre, the alternative public transport route via SH20B and Puhinui has added importance and urgency.

As well as the underlying growth in transport demand along the SH20B corridor, in 2021 Auckland is hosting two large international events - APEC 2021 Leaders' Week and the 36th America's Cup. Each event will bring substantial numbers of visitors and economic benefits. There is therefore an expectation from Central Government, the Transport Agency, AT and AIAL, that the proposed short-term improvements will be operational by 2020/2021.

The umbrella *Southwest Gateway Programme* has been agreed between the partners to encompass all the actions required to address the identified problems. The Southwest Gateway is a programme of three key transport projects to create a well-connected, efficient system that will provide choice and reliability for how people and freight travel around the southwest and southeast Auckland, including to and from the airport. The figure below shows how the investment partners are working together on the Southwest Gateway Programme.

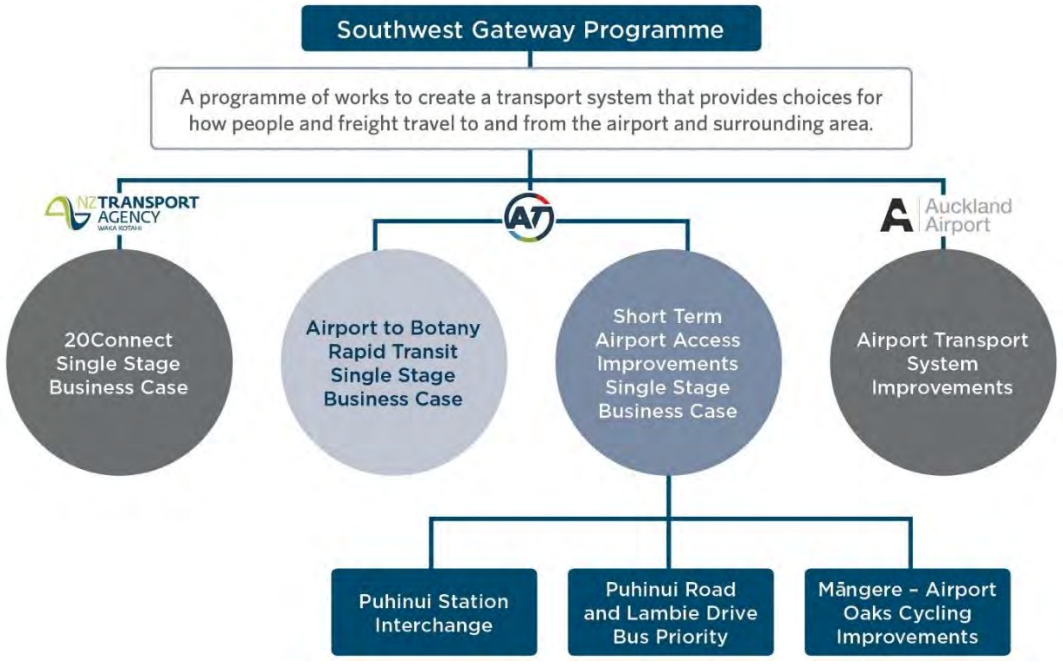

Figure 1 Southwest Gateway Programme

The problem statements agreed by the Southwest Gateway governance group are:

- Forecast growth in transport demand; inadequate capacity and congestion
- Declining access to employment and labour
- Unreliable travel times for the movement of people and goods
- Limited viable public transport options

Given the connected nature of the short-term projects and focus on customer journey experience a single suite of investment objectives was developed with investment and project partners.

Figure 2 Southwest Gateway Programme Investment Objectives

An earlier Programme Business Case identified a programme of investment that included influencing behaviour change, improved network management and increased capacity provision, including the use of technology, improvements to state highway infrastructure and public transport services and infrastructure. **Puhinui Interchange** upgraded station, local **bus priority measures along the Puhinui / Lambie corridor** and **walking and cycling improvements in Māngere** were included as an important package of measures within the responsibilities of AT.

This STAAI SSBC confirms the case for the Puhinui Interchange and the associated interventions and recommends necessary steps to deliver these projects. All measures will contribute to the required outcomes in the context of overall objectives and policies set out in the various Auckland Council and AT strategies and in the latest Government Policy Statement on Land Transport (GPS)[1]. The STAAI study area is shown below.

[1] Government Policy Statement on Land Transport 2018/19 – 2027/28 NZ Government, 1 July 218

Figure 3 STAAI study area

The interfaces and interdependencies between this SSBC and the other recommendations currently under investigation and implementation are critical. Notably, the SH20B SSBC, the full A2B business case and the main 20Connect business case.

The joint Central Government – Auckland Council initiative, ATAP 2018, contains a specific section on Airport to Botany via Manukau including SH20B:

"Rapid transit from Airport to Manukau, and on to Botany links together southern and eastern Auckland and will provide an important link to the rail network at Puhinui.

"A fast, frequent and reliable rapid transit service would deliver the following benefits:

- Improve access to southern Auckland's two major employment areas (Manukau and the airport)
- Provide a link for air passengers to the city centre and the south via a transfer to rail at Puhinui
- Improve transport options for the highly car dependent southeast Auckland
- Support major growth opportunities at key locations along the route, particularly around Manukau, Puhinui and Botany. Auckland Transport and NZ Transport Agency investigations have identified the highest priority section of this corridor is between the airport and a **major new interchange at Puhinui train station**."

"The planned State Highway 20B upgrade provides additional lanes dedicated to buses, high-occupancy vehicles and freight, delivering the first stage of this priority section."

"Extending this immediate upgrade further east to connect Puhinui, Manukau and Botany is a future priority, although some targeted bus priority measures in the nearer term are likely to be required to provide fast and reliable travel." (p. 23) **[emphasis added]**

Project Development and Preferred Options

Short term options described below were developed to respond to the STAAI programme investment objectives:

1. Upgrade Puhinui Station to create a new interchange to allow bus/rail connections;
2. Provide new or improved bus services to and from the airport, including a new direct and frequent service between the Airport, Puhinui and Manukau;
3. Provide bus priority measures and walking and cycling improvements along Puhinui Rd and Lambie Dr to enable a reliable 10-12-minute bus journey between the Airport and Puhinui, and 22-26 minute bus journey between the Airport and Manukau;
4. Provide new cycle facilities in the Māngere area, building on the existing cycle network, to provide improved cycle connections between the Māngere residential area and its neighbouring Airport Precinct employment zones; and
5. Support the successful uptake of the above by encouraging and enabling behaviour change.

Multi-criteria analyses were used to assess options against the agreed objectives.

Puhinui Interchange

For the Interchange it was important to develop and understand the Ultimate Design - what form the Interchange should take as part of the A2B RTN - then consider the upgraded Interchange, as the Early Deliverable or initial stage. This approach would ensure that any investment in the short-term would contribute to the longer-term result.

The Ultimate Design chosen was a Rapid Transit Bridge with new station building incorporating a concourse at the current station location. The 'Straight Rapid Transit Bridge' was identified as the preferred RTN alignment and progressed to concept design.

The Early Deliverable is planned to be the first stage of a high-quality interchange, with an enhanced architectural design similar to that of other high-quality public transport interchanges in the Auckland region, such as Ōtāhuhu and Panmure Stations. This reflects the design philosophy and clear customer preference for a high-quality facility to support the behaviour and mode change intended by the wider A2B Project.

The initial phase involves the construction of an enclosed concourse above the railway line with access to rail platforms and an at-grade bus interchange via lifts and escalators either side. Modelling prepared by Auckland Forecasting Centre forecasts a 200% increase in patronage during peak periods in the opening year due to the upgraded facility and the new express airport bus service.

Figure 4 Puhinui Interchange Developed Design: Exterior view (West)

Figure 5 Puhinui Interchange Design: Interior view

Short-term Bus Network

The recommended short-term bus network includes:

- A new express shuttle route between Manukau, Puhinui and the Airport, supported by a reduced Route 380 (a Frequent Service bus retained between Onehunga, Māngere Bridge and the Airport) and improved crosstown bus links serving the town centres of the southwest (a Frequent Service between Onehunga, Māngere, Papatoetoe and Manukau).
- Two local Frequent Service buses extended to serve the Airport from Botany-Ōtara-Papatoetoe and Sylvia Park-Ōtāhuhu.
- A new express service between New Lynn-New Windsor and the Airport.

Figure 6 Recommended short-term bus network

Bus Priority Measures

Full bus priority measures along Puhinui Road between SH20 (east of the interchange) and Lambie Drive, and along Lambie Drive to Cavendish Drive are also recommended, which in combination with the short-term programme infrastructure improvements can provide an effective 'express' service pattern and be delivered within the project timeframes. As this is dependent on the outcome of the planned public engagement process, the hours of operation will be confirmed during detailed design.

The recommended level of priority would require separated walking and cycling facilities along Puhinui Road as wide bus lanes are not compatible with an effective express arrangement and also cannot be delivered in the short-term given the width of Puhinui corridor.


KEY
Bus Lane
SUP
On-Street Cycle Lane
New Signalised Crossing
Proposed Cycle
PUHINUI RD
Existing Signalised Intersection
VERDI ST
KENDERDINE RD
CAMBRIDGE TCE
WALLACE RD
YORK RD
WYLLIE RD
CHESTNUT RD
RAYMOND RD
GRAYSON AVE
RANFURLY RD
PLUNKET AVE
CLENDON AVE
MILAN RD
Connects with SH20B SUP
PUHINUI RD
Existing Signalised Intersection
Existing Signalised Intersection

Short-term Cycle Improvements

To the north of the Airport, short-term cycle improvements (STC) – which will also serve pedestrians – were identified for:

Scheme	Short Term Cycle Improvement Area
1	Jordan Road
2	Jordan Road/Kirkbride Intersection
3	Bader Drive to Robertson Road
4	Orly Road to McKenzie Drive via Bader Drive.
5	Kirkbride Road to Māngere Bridge

The five identified schemes are presented in the map below.

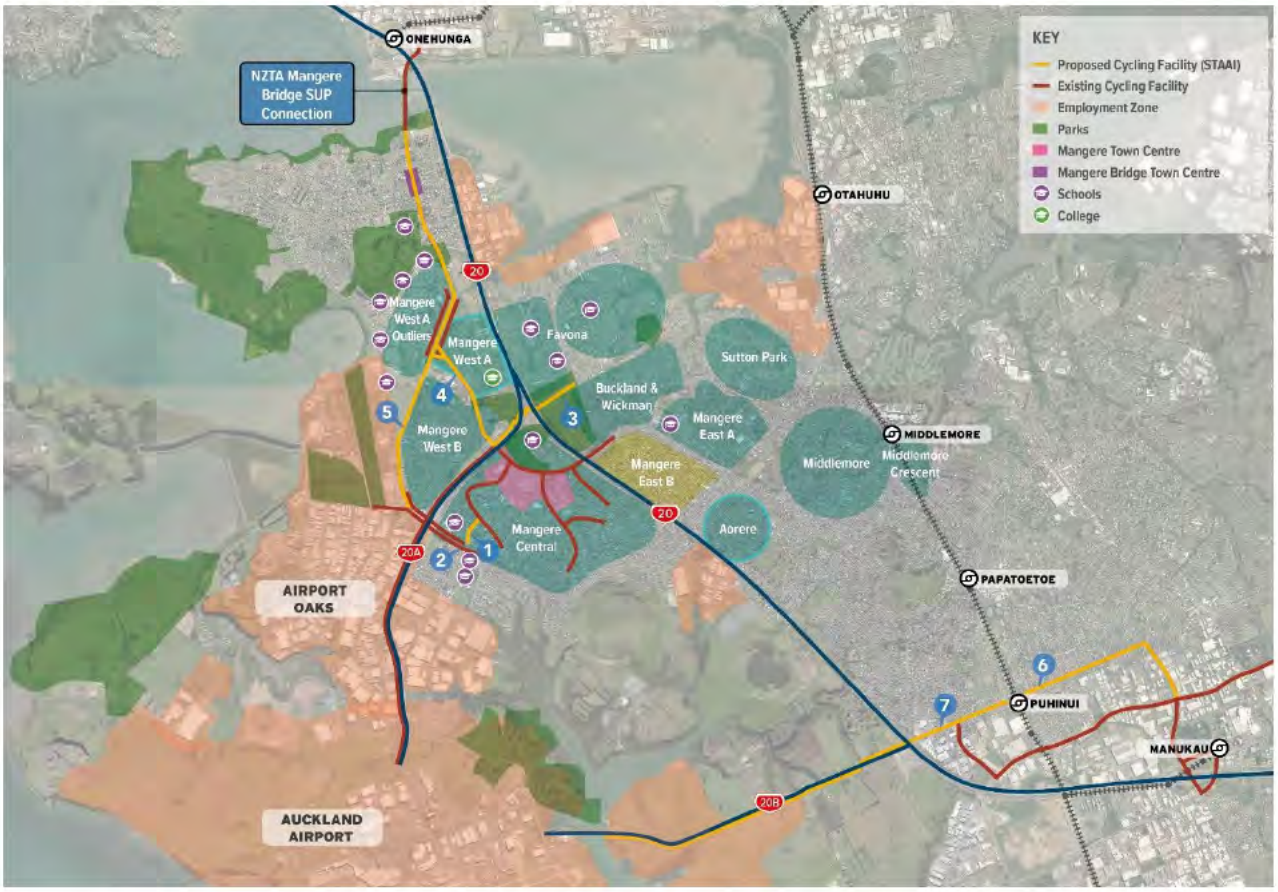

Figure 8 Auckland Cycle Network – Existing and Proposed

Costs

A breakdown of the STAAI programme cost is show in the table below.

Short-term Airport Access Improvement Programme	Construction Cost
Puhinui Interchange	s7(2)(b)(ii) Prejudice to commercial position
Puhinui Road and Lambie Drive Bus Priority	
Māngere cycling improvements	
Behaviour Change / Travel Demand Management (TDM) Initiatives	
5.7% Auckland Transport Funding Admin Cost	
Total Short-Term Airport Access Improvements Programme Cost	

The total programme costs for the Puhinui Interchange Puhinui Road and Lambie Drive bus priority Mangere cycling improvements and supporting programme wide travel demand management is ncluding contingency. The current allocation in the RLTP for the STAAI programme is $67,8m – The current capital expenditure budget enables the delivery of the priority elements of the programme, being the upgrade of Puhinui Station; new or improved bus services to/from the airport; travel demand management initiatives and priority measures along Puhinui Rd/Lambie Dr.

The recommended improved cycle connections between Māngere and the airport cannot be funded at this point, however the project team will proceed with the detailed design phase of this project to obtain more robust cost estimates and help inform future programme funding decisions.

The new bus services will have an annual operating cost s7(2)(b)(ii) Prejudice to per annum in 2018 dollars partially offset from a financial perspective by an additional per annum in fare income.

The total short-term airport access improvement programme cost, which includes a 5.7% Auckland Transport Funding Admin Cost, is s7(2)(b)(ii) Prejudice to commercial position

Cost Benefit Analysis

The cost benefit analysis applied to the Interchange, bus services, local bus priority and cycling improvements. The estimated benefits exceed the costs of the recommended option, with a resulting BCR of 1.4. Sensitivity tests resulted in a range of BCRs between 1.3 and 2.0. These results indicate that the economic position of the recommended option is robust. The methodologies and results were endorsed by the Transport Agency's expert economics peer reviewer. Sensitivity tests indicate that the programme BCR will be impacted should the Mangere Cycling Improvements not be delivered. The resultant programme BCR will reduce to 1.1 if Mangere is not delivered.

Consenting Strategy

A robust Consenting Strategy (Attached at Appendix G) was prepared to identify all potential resource consent triggers and the preferred consenting approach for Puhinui Interchange This was used to inform the preparation of the resource consent application for Puhinui Interchange, which required resource consent as a restricted discretionary activity under the AUP(OP). The consent application was lodged with Auckland Council in April 2019 and resource consent was granted on a non-notified basis in May 2019.

Development of the detailed design for the supporting short-term improvements (discussed in Section 8.11.3), is anticipated to alter elements of the consented design for Puhinui Interchange. The resource consent will be updated through a s127 to incorporate the design changes for the supporting short-term improvements that directly and indirectly support the operational functionality of the proposed Puhinui Interchange.

Property Acquisition Strategy

There are no substantial property acquisition requirements within the Early Deliverable stage of the Project. The land to the west of the KiwiRail corridor, where the bus interchange is located, is unformed legal road. There is potential conflict with the entry so the driveway to a Kohanga Reo will need to be relocated.
On the east side of the KiwiRail corridor, the station, potential emergency access and canopy encroach on land currently held by LINZ. The land is being acquired by KiwiRail. There will be lease/access arrangements to be entered into with KiwiRail.

Constructability and Procurement Strategy

The Interchange involves a significant vertical-build within the operational rail environment, presenting complex access constraints in terms of health and safety and in ensuring that operations continue with minimum disruption.

In addition, the project programme required efficient procurement to leverage the input and innovations of the physical works contractor as early as possible and allow early/enabling works to be efficiently initiated as required. An informal market sounding of AT Tier 1 Panel members and other contractors with prior experience of similar projects indicated that appetite to tender for the Puhinui Interchange project was robust.

The following sourcing/procurement contract models were considered:

- Traditional
- Contractor Design and Build
- ECI.

After consideration, the AT project team recommended pursuing an ECI procurement as likely to achieve the best overall outcome for this project subject to market engagement to gauge the contractor appetite for an ECI procurement. Tenders were evaluated on quality attributes along with fixed preliminary and general (P&G) and margin percentages. Then initial Stage 1 pre-construction phase is on a cost-plus P&G and margin basis, with sub-trades tendered during the detailed design phase. The ECI contract was awarded in March 2019.

Technical Assessment – Supporting Improvements

Consenting Strategy

A robust consenting strategy has been developed for the Supporting Short-Term Improvements. Multiple options for obtaining statutory approvals under the RMA have been described and assessed in the Consenting Strategy (Appendix G). The consenting strategy recommends:

- The preferred consenting approach is for AT to separate the Puhinui Road and Mangere packages from each other during the planning process to avoid potential delays between the two;
- All necessary resource consents for the Puhinui Bus Priority Improvements lodge an integrated (district and regional) resource consent application for the Puhinui Road Bus Priority Improvements through the traditional Council process to obtain the necessary RMA approvals required. The design requires the removal of 31 trees greater than 4m in height or 400mm in girth pursuant to Rule E26:A92 (restricted discretionary).
- On the assumption that AT can successfully obtain section 176(1)(b) approval from the Transport Agency and landowner approval from Auckland Council, the Mangere Cycleway Improvements are anticipated to be a permitted activity. A certificate of compliance (CoC) to confirm authorisation of these works is not considered necessary as there are no exceptional circumstances associated for the works.

The preliminary planning assessment of the Puhinui Road Bus Priority Improvements indicate that resource consent could be processed on a non-notified basis provided the adverse effects of the proposed street tree removal can be appropriately mitigated.

Procurement Strategy

The supporting short-term improvements involves the implementation of bus priority lanes, localised road widening and intersection improvements, and a combination of shared use paths and on-street cycling lanes along Puhinui Road, Lambie Drive and local roads in Mangere.

The project programme targets of end-2020 requires an efficient procurement approach to leverage the buildability input and innovations of the physical works contractor as early as possible and allow early/enabling works to be efficiently initiated as required.

Auckland Transport uses Physical Works Supplier Panels for the engagement of construction category contractors where the scope of work includes:

- Construction of roads including bridges, streetscape, and traffic signals;
- Construction of transport interchanges including car parks and busway stations/rail stations buildings; and;
- Up to 20% of the annual road corridor rehabilitation works.

Given the estimated value of works, a panel 1 contractor will be procured for the supporting short-term improvements

Schedule

The milestones in relation to STAAI Puhinui Interchange, Puhinui Bus Priority Lanes and Māngere Cycling Improvements are shown below.

Figure 7 STAAI Milestones – Puhinui Interchange, Puhinui Bus Priority and Māngere Cycling

All projects are targeting an early 2021 operational readiness date. In order to realise the benefits of the new bus service and route, the Puhinui Interchange and bus priority improvements need to be substantially completed to allow anticipated journey times and performance to be achieved. The Māngere Cycling Improvements project is minimally interdependent as the design and construction works will have no impact on the other projects. Homes Land Community (HLC) are delivering a range of neighbourhood developments in the Mangere area which will interface with some of the proposed STAAI Mangere Cycling schemes. Given that there needs to be a high level of alignment between AT and HLC in this area, further co-ordination with HLC will be undertaken during the detailed design phase.

Results Alignment

The business case has been assessed for its alignment in accordance with the latest Transport Agency Investment Assessment Framework (IAF) and guidance on *Developing an assessment profile*[2]. The IAF and guidance contain two factors: The *Results Alignment* which relates to the GPS and the *Cost Benefit Appraisal*.

GPS Results Alignment

The alignment with the GPS has four categories, from Low to Very High (VH). A project that meets at least one of the Public Transport, rapid transit and transitional rail improvements criteria below can be given a High rating:

Access – liveable cities[1]:

GPS Criteria	Alignment Description	Alignment rating
Criteon 1: Addresses a significant gap in level of service in accessing social or economic opportunities and makes a significant contribution	The STAAI will address the poor level of service of public transport to the Airport – a foremost economic driver in Auckland. Along with the complementary SH20B bus lanes, the Puhinui Interchange, local bus priority and new bus services are expected to make a significant contribution to changing the level of service to approach that of a rapid transit service. (see Section 6)	High
Criteon 2: Address significant gap in access to new housing in high growth urban areas	Address the significant gap in access quality between high growth areas to the south of Auckland and the employment area of the Airport (Sections 2.5.1 and 2.6.2). This gap can be partially addressed through the full suite of short-term measures as the connection at Puhinui between rail services serving the south and bus services using the SH20B bus lanes will enable effective public transport options for a substantial demand (Section 2.2).	High
Criterion 3: Supports agreed integrated land use, multi-modal plans and mode shift in major metros	ATAP is the agreed multi-modal plan for Auckland (Auckland is defined as a "major metro"). The Airport to Botany RTN including Puhinui is a named project in ATAP (See Executive Summary and Section 1.4.2). By definition, therefore, the project supports the relevant multi-modal plan. The Interchange, local bus priority and new services are designed to support mode shift as the earlier Supplementary Programme Business Case had demonstrated (Sections 1.1 and 3.2.3) that available road capacity will be exhausted within five years. The Southwest Gateway Programme had therefore emphasised mode shift in the short term (Section 1.6.2). As noted under criterion, 1 a shift to the public transport mode is expected as a result of the proposed short-term measures.	Supported
Criterion 4: Improves intermodal connectivity where this enhances the appropriate use of public transport	Intermodal connectivity will principally be enhanced directly by the Puhinui Interchange Intermodal connectivity will principally be enhanced directly by the Puhinui Interchange. The new bus services, local bus priority (and SH20B bus lanes) will enhance the effectiveness of the Interchange by providing a bus route with much enhanced priority and therefore speed and reliability.	High

As demonstrated above, the business case meets at least three of the specified criteria for a High rating and is supported by a fourth. The results alignment is therefore *High*.

[2] the Investment Assessment Framework for the 2018-21 National Land Transport Programme https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/2018-21-nltp-investment-assessment-framework-iaf/developing-an-assessment-profile-2018-21/#results-alignment

Cost Benefit Appraisal

The cost benefit appraisal value is *Low*, as it lies between 1.0 and 2.0 (see Section 8).

Overall Priority

Overall, therefore, the Priority Ranking is 5 (IAF page 11) as a project with a Results Alignment of High and a Cost Benefit Appraisal of Low.

STAAI Programme Benefits

The table below summarises the benefits and effectiveness of the Recommended Option in giving effect to the Project Objectives. This indicates that the integrated Recommended Option including the following elements is highly effective in meeting the Project Objectives.

- Additional and enhanced bus services providing access to more catchments and better frequencies
- A new bus-train interchange enabling a high-quality safe transport from train services to the direct bus link to the Airport and employment areas, significantly increasing the viable catchment for public transport use to the Airport area and faster journeys at lower cost from the City Centre
- New bus priority lanes providing faster journey times and greater reliability for bus services
- New cycle connections, improving safety and connecting gaps in the existing cycle network.

Table 0-1: Performance of the Recommended Option

Project Objectives	Measure/ KPI for Options Assessment	Performance
Project Objective 1: Provide more reliable and timely travel choices to and from Auckland Airport and surrounding areas	Extent to which option contributes to reliable travel times to and from Airport.	▪ Provides 22 buses per hour in peaks to the Airport area, up from 6 per hour (excluding Skybus) ▪ Increases bus routes for people to access the Airport and surrounding area from 1 to 5. ▪ More direct connection between Manukau, the rail network and Airport with an increase fro 4 to 6 buses per hour at peaks. ▪ Reduces actual peak travel time by bus from Manukau to the Airport from 66 mins to 22 mins. ▪ Significantly reduces variability in journey time in bus passengers between Manukau and the Airport (via rail connection) from 30 mins on a 35 minute trip.
Project Objective 2: Improve people's access to employment, education and social opportunities	Extent to which option improves people's access to employment, education and social opportunities	▪ Directly connects the rail network and its catchments with a high frequency route to the Airport and the Airport's key employment zones. ▪ Directly connects the Manukau Bus Intrerchange with a high frequency route to the Aairport and the Airport's key employment zones – enhancing access to these jobs to the catchments served by buses calling at Manukau. ▪ Provides 3 routes serving the Ascot employment zone – up from 1. ▪ Direct, high frequency connection between Manukau, a major Metropolitan Centre and location for two tertiary campuses and the Airport. ▪ Direct cycle routes to known locations of Airport area employees in Mangere and Papatoetoe.

Project Objectives	Measure/ KPI for Options Assessment	Performance
Project Objective 3: Provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Extent to which option could provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	▪ Provides a purpose-designed interchange of quality to enable bus-train transfer at Puhinui. ▪ An interchange design that provides for future RTN alignment. ▪ A design of the Puhinui Interchange that has been influenced by iwi and reflects local values and identity.
Project Objective 4: Integrate with and get increased value from existing and planned transport investments.	Extent to which option integrates with and gets increased value from existing and planned transport investments.	▪ An interchange at Puhinui makes optimial use of Auckland's recent and proposed investments in its rail network (electrification, new trains, increased frequencies, service extensions) for access to the airport. ▪ Commencing the direct airport RTN service at Manukau enables effective use of the new Manukau Bus Interchange as a hub for airport journeys from local routes in South and East Auckland. ▪ Increased services on SH20B from 4 to 6 with a direct link to the wider region via Puhinui Station will utilise NZTA's proposed investment in new bus lanes on SH20B. ▪ New cycle connections in Mangere and Papatoetoe connect gaps in the cycle network, enabling complete journeys and better use of the existing network. ▪ The Puhinui Interchange is deisnged to accommodate a future RTN bridge as part of the Long Term Airport to Botany RTN system.
Project Objective 5: Be operational by end of 2020/early 2021	Ability of the option to be operational by end of 2020/early 2021	▪ All elements of the Recommended Programme can be delivered by eary 2021.
While: ▪ Improving safety ▪ Delivering value ▪ Working towards the long-term outcomes ▪ Recognising and providing for the significant cultural values of Mana Whenua Waiohua within the Auckland Airport Area ▪ Improving customer journey experience.	▪ Improved safety for users through CPTED/interchange design ▪ Affordability of option in relation to other options. This includes potential redundant investment associated with designs. ▪ Extent to which the option can be staged with a long-term rapid transit service ▪ Extent to which the option contributes to an improved	▪ The Puhinui Interchange has been purpose designed to provide a safe environment. ▪ Separated cycle facilities will improve safety for cyclist on key routes. ▪ The design fully enables a long-term rapid transit service through the station design enabling a future bridge access for RTN. ▪ The Puhinui Interchange enables a high-quality journey experience through a legible, simple layout, fully covered and enclosed transfer space and quality information provision. ▪ Service frequencies are high at 6 per hour, fully prioritised enabling reduced wait times and reliable journey times.

Project Objectives	Measure/ KPI for Options Assessment	Performance
	customer journey experience through station design, quality and legibility of interchange and the likelihood of a timely transfer between rail and bus modes.	

A Benefit Realisation Plan has been developed by Auckland Transport and identifies agreed KPI's, baseline information and performance measures per objective.

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Puhinui Options Assessments Report

Appendix B2

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Appendix B3

Short Term Puhinui Bus Priority Improvements

Appendix B4

Short Term Māngere Cycling Improvements

Appendix C1.1

Puhinui Interchange Concept Design Report

Appendix C1.2

Puhinui Interchange Preliminary Design Report

Appendix C2

Puhinui Bus Priority Concept Design Report

Appendix C3

Māngere Cycling Improvement Concept Design Report

Appendix D1

Puhinui Interchange - Cost Estimate

Appendix D2

Māngere Cycling Improvements - Cost Estimate

Appendix D3

Puhinui Bus Priority - Cost Estimate

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Economic Evaluation

Appendix E2

Māngere and Puhinui Demand Assessment & Economic Evaluation Economic Assessment (Flow)

Appendix E3

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Appendix F1.1

Puhinui Interchange Project Risk Register

Appendix F1.2

STAAI-SSBC Puhinui and Māngere Project Risk Register

Appendix G

STAAI - Consenting Strategy Addendum 1

Appendix H

Puhinui Interchange Property Strategy

Appendix I

Puhinui Interchange Walking and Cycling Station Access Assessment

Appendix J

RTN Service Concept Technical Note

Appendix K

Puhinui Road Bus Priority vs Transit Lanes Technical Note

Figures

Tables

Glossary of abbreviations

Abbreviation	Term
A2B	Airport to Botany
AMETI	Auckland Manukau Eastern Transport Initiative
AIAL	Auckland International Airport Limited
ANOP	Auckland Network Operating Plan
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
ATOC	Auckland Transport Operations Centre
AUP	Auckland Unitary Plan Operative in part
BAU	Business as Usual
CCO	Council-controlled organisation
CIA	Cultural impact assessment
CMA	Coastal marine area
CVA	Cultural values assessment
DBC	Detailed business case
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban zone
GDP	Gross domestic product
GPS	Government Policy Statement on Land Transport
Heritage NZ	Heritage New Zealand Pouhere Taonga
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
IBC	Indicative business case
ILM	Investment logic map
JTOC	Joint Transport Operations Centre
KPI	Key performance indicator
MCA	Multi-criteria analysis
MOU	Memorandum of understanding
MRT	Mass rapid transit
NIMT	North Island Main Trunk
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
NoR	Notice of Requirement
ONRC	One Network Road Classification

Abbreviation	Term
PBC	Programme business case
RCA	Road controlling authority
RLTP	Regional Land Transport Plan
RLTS	Regional Land Transport Strategy
RMA	Resource Management Act 1991
RPTP	Regional Public Transport Plan
RTN	Rapid transit network
SH(#)	State Highway (number)
SHA	Special housing area
SOI	Statement of Intent
SSBC	Single-stage business case
SPBC	Supplementary programme business case
Transport Agency	NZ Transport Agency
TAIP	Transport Agency Investment Proposal 2018-2027
TFUG	Transport for Future Urban Growth
Trust	Te Ākitai Waiohua Settlement Trust
TSI	The Southern Initiative
WRR	Western Ring Route

Glossary of terminology

Abbreviation	Term
Airport to Botany (A2B)	The long-term single-stage business case for the Airport to Botany Rapid Transit Project. It is focussed on improving access to the Airport and surrounding areas by extending the Rapid Transit Network for people to travel to the city centre (via Puhinui) and the south and east (Botany). Led by AT in conjunction with investment partners the Transport Agency and AIAL
20Connect	The long-term single-stage business case, focused on state highway access to Auckland Airport (SH20, SH20A and SH20B) and the surrounding transport network in south-west Auckland. Led by the Transport Agency in conjunction with investment partners, AT and AIAL.
20Connect SH20B Short-Term	A single-stage business case focused on short-term state highway access to Auckland Airport via SH20B and the surrounding transport network in south-west Auckland. Led by the Transport Agency in conjunction with investment partners AT and AIAL.
AMETI	AMETI (Auckland Manukau Eastern Transport Initiative) Eastern Busway is a project led by AT that will create a dedicated, congestion-free busway between Panmure, Pakuranga, and Botany town centres.
Southwest Gateway Programme	The overarching programme of works comprising projects recommended from the Auckland Airport Access Supplementary Programme Business Case including: ■ 20Connect SH20B short-term single-stage business case (short-term intervention focus) ■ 20Connect single-stage business case (long-term intervention focus) ■ Short-Term Airport Access Improvements single-stage business case (short-term intervention focus, led by AT) – this business case ■ Airport to Botany detailed business case (long-term intervention focus, led by AT) ■ Airport transport system improvements (led by AIAL).
Supporting Growth – Delivering Transport Networks (Supporting Growth)	Supporting Growth in the South covers Pukekohe, Drury, Paerata and Takanini. The aim of this initiative is to develop transport networks to support Auckland's new housing and business areas over the next 30 years.
Auckland Airport (or Airport)	Referring to the physical location of the Airport, its infrastructure and associated facilities and services.

Supporting documents

Document	Author / Client / Date
Auckland Transport Alignment Project, April 2018	Auckland Transport Alignment Project, April 2018
Auckland Transport Alignment Project: Update to reflect faster growth	Auckland Transport Alignment Project, August 2017
Auckland Transport Alignment Project Recommended Strategic Approach	Auckland Transport Alignment Project, September 2016
Auckland Airport Access Programme Business Case* **The Programme Business Case (PBC) comprises the following documents:**	
**Note: The preparation of business cases is the Transport Agency's process for assessing the merits of proposed transport investments and for obtaining funding.* *A number of studies were initiated prior to the Transport Agency's adoption of the business case approach.* *The large body of work previously undertaken is considered to comprise the historical equivalent of a PBC for investigating access to Auckland Airport and the surrounding area. A further 'supplementary' PBC was prepared to build upon the findings of these studies, which extended the previous findings with a customer-led focus. It also developed an integrated and multi-modal recommended programme of interventions.*	
Auckland Airport Access Supplementary Programme Business Case	By Aurecon for Transport Agency, 26 September 2017, Revision 3
Auckland Transport Capital Review Committee Meeting Report	Auckland Transport, 14 June 2016
SMART Interim Business Case	By Jacobs for AT, September 2015
South-Western Multi-Modal Airport Rapid Transit (SMART) Interim Scheme Assessment Report	By GHD for AT, December 2013
South-Western Airport Multi-Modal Corridor Project - Phase 1 Summary Report	By GHD for AT, September 2011
Auckland Transport Board Agenda Item and Minutes of Stakeholder Steering Group	13 September 2011
SH20A and SH20B Strategy Study	By GHD for Transport Agency, AIAL, Manukau City Council and Auckland City Council (now Auckland Council), Auckland Regional Transport Authority (now AT), 2008

PART A – THE STRATEGIC CASE

1 Introduction

1.1 Overview

The Short-Term Airport Access Improvements SSBC is investigating the provision of an enhanced and integrated interchange at Puhinui on the North Island Main Trunk (NIMT), alongside upgraded bus services to the Auckland International Airport (Airport) and surrounding area. These services are likely to be using bus lanes on SH20B, on-road bus lanes between SH20 and Manukau via Puhinui Station and may include walking and cycling improvements and other public transport service changes that can be implemented quickly, e.g. to New Lynn.

This Auckland Transport (AT) business case is being developed in parallel with the Transport Agency's related SH20B Short-Term Single-Stage Business Case (SH20B SSBC) which is the first stage of the 20Connect project. That SSBC covers the likely early construction of bus lanes[3] along SH20B from the Airport to Puhinui. The interchange, enhanced services and bus lanes will be complemented by improved transport facilities within the Airport. This SSBC is being prepared in conjunction with investment partners the Transport Agency and Auckland International Airport Limited (AIAL).

The full upgrade of the public transport route from the Airport to Botany (A2B) is proposed to be an important element of Auckland's Rapid Transit Network (RTN) – defined in the Auckland Regional Public Transport Plan (RPTP)[4] as the highest level of provision. An RTN service "Botany to Auckland Airport" was flagged for investigation in the RPTP and subsequently included in the various Auckland Transport Alignment Project (ATAP)[5] iterations. The full A2B project is expected to be delivered in the medium-term (2030s). The bus lanes are specified in ATAP 2018 among its New Projects. ATAP and its content is described in Section 1.4.2 below.

The earlier Auckland Airport Access Supplementary Programme Business Case (SPBC)[6] identified a programme of investment across the Auckland region that included influencing behaviour change, improved network management and increased capacity provision, including the use of technology, improvements to state highway infrastructure and public transport services and infrastructure. The Airport to Botany RTN was included as an important component to serve customers between the Airport, Manukau and the north-eastern corridor to Botany. It also serves customers from the south and north who would use the heavy rail services to Puhinui where they could change to the new east-west RTN. The RTN services from the Airport to the City Centre, Manukau and Botany will deliver higher quality public transport serving these corridors, providing necessary alternatives to car travel given that the scale of future demand is likely to be well in excess of realistic road provision (SPBC, p. 21).

This SSBC confirms the case for an improved interchange at Puhinui with service changes and supporting active mode development and identifies the recommended activities to deliver the required outcomes identified in the SPBC and strategic transport and land-use planning documents. It assesses a range of alternatives and options to achieve the best customer outcomes, in the context of overall objectives and policies set out in the various Auckland Council and AT strategies and in the latest Government Policy Statement on Land Transport (GPS)[7].

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[3] Note that in this context "bus lanes" could also include variations such as HPV – high productivity vehicle – lanes to include freight vehicles and/or multi-occupied cars

[4] Auckland Regional Public Transport Plan 2015, p. 26

[5] Refer to 'Supporting documents' above

[6] Refer to 'Supporting documents' above

[7] Government Policy Statement on Land Transport 2018/19 – 2027/28 NZ Government, 14 March 2018

The interfaces and interdependencies between this SSBC and the other SPBC recommendations currently under various stages of investigation and implementation are critical. Notably, the SH20B SSBC, the full A2B business case and the main 20Connect business case.

1.2 Purpose of this Report

The purpose of this report is to:

- Identify the transport needs and problems of current and future customers who travel between the Airport precinct and the Manukau area and eastern and southern Auckland (and north to the city centre via the rail line) and who may use improved public transport services with an interchange at Puhinui
- Explore and assess a range of alternatives, options and activities which address the identified problems, provide value for money, meet investment partners' aims and can be delivered
- Evaluate a recommended option for investment that will best contribute to the defined outcomes and will be compatible with other short-term investments and with longer term options on the A2B RTN corridor and with 20Connect
- Describe the financial, commercial and management requirements to deliver the recommended option
- Provide for post-implementation monitoring.

1.3 Project Description

AT and its investment partners are investigating improvements to customer journey experiences and access to and from the Airport and the surrounding area, responding to the SPBC's recommended investment programme.

The majority of the recommended capital investment was targeted at providing two new RTN routes between the Airport and Auckland City Centre; and between the Airport, Manukau and Botany. In addition, a range of alternatives and options are being investigated to support the *Short-Term Airport Access Improvements SSBC*, with the goal of identifying a recommended option for implementation.

Recognising the urgent need to address the access problems currently experienced to and from the Airport area, the SPBC also recommended implementing more immediate improvements, primarily around public transport. This is termed the short-term programme and is the focus of this business case.

As part of the 20Connect SSBC process, the Transport Agency is investigating opportunities for short-term improvements on the SH20B corridor that will complement the proposals in this SSBC to provide increased travel choices, capacity, public transport priority and reliability that will enable behaviour change, with an implementation year of 2020/2021.

The *Short-Term Airport Access Improvements SSBC* study area is shown on Figure 1-1 below.

Figure 1-1: SH20B Short-Term Single-Stage Business Case study area

In 2021 Auckland is hosting two large international events - APEC 2021 Leaders' Week and the 36th America's Cup. Both events will bring substantial numbers of visitors and economic benefits to New Zealand's biggest city. There is therefore an expectation from Central Government, as well as by the Transport Agency, AT and AIAL, that the proposed short-term improvements will be operational by 2020/2021, particularly those between the Airport and Puhinui Station and an initial upgrade to the interchange.

1.4 Background

1.4.1 Auckland Airport Access Supplementary Programme Business Case

AT, alongside its investment partners, completed the SPBC in September 2017. The SPBC provided a recommended programme of investment comprising five stages to be implemented by 2017, 2018, 2020, 2028 and 2038.

An interchange at Puhinui is included in the 2020 programme alongside enhanced bus services, and bus lanes on SH20B (see Figure 1-2).

A comprehensive suite of customer-centric initiatives and actions was recommended to be delivered progressively over time (see Figure 1-3).

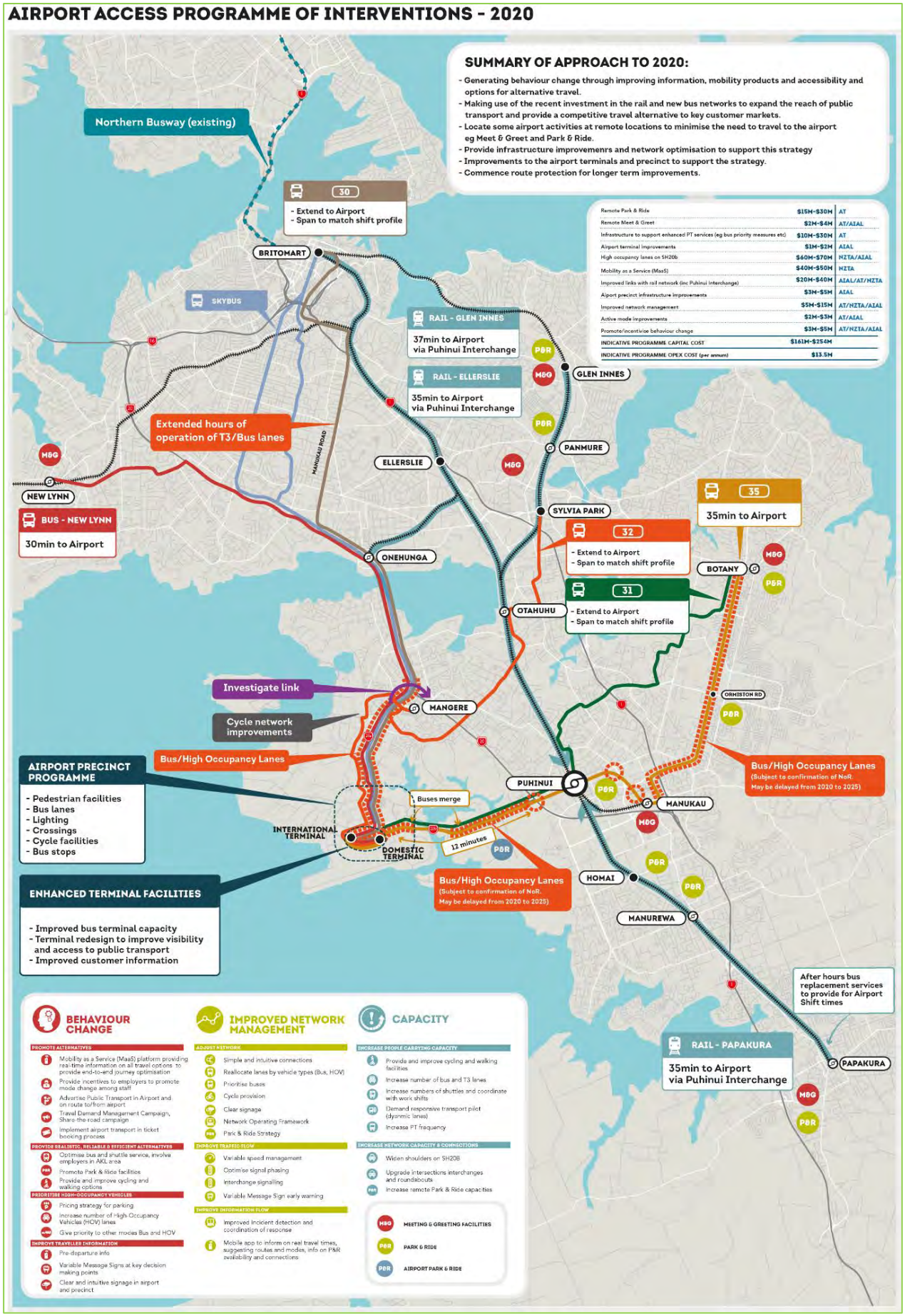

Figure 1-2: Auckland Airport Access Supplementary Programme Business Case recommended programme of interventions – 2020

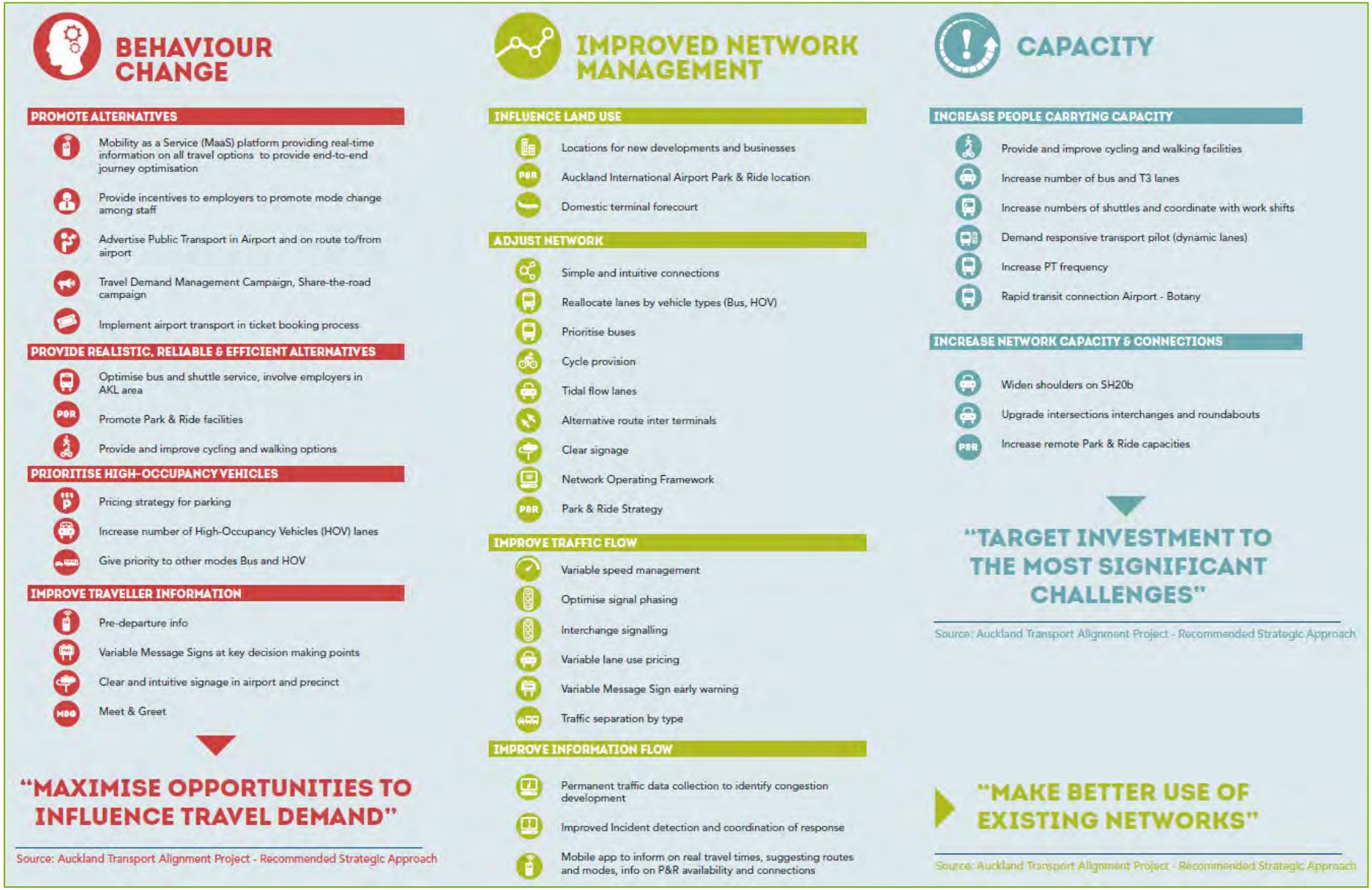

Figure 1-3: Auckland Airport access programme business case intervention themes and action groups

1.4.2 Auckland Transport Alignment Project

Over the past three years Auckland Council and the Government have progressively developed their aligned strategic approach on transport through the ATAP. The latest iteration[8] includes a recommended transport investment set of priorities (called the "ATAP Package") for 2018-2028 to reflect the Government's and Auckland Council's shared direction.

The ATAP report states that "The following objectives from the ATAP Terms of Reference place greater weight on the following priorities:

"i. Accelerating the development of Auckland's rapid transit network, particularly to unlock housing and urban development opportunities

ii. Encouraging walking and cycling and making these active modes safer for Aucklanders

iii. Delivering improvements in health, safety, the environment and access, including disability access

iv. Ensuring the indicative package delivers the best possible value for money, including broader non-monetary costs and benefits. (p. 11)"

ATAP 2018 contains a specific section on Airport to Botany via Manukau:

"The rapid transit corridor from Airport to Manukau and on to Botany links together southern and eastern Auckland and will provide an important link to the rail network at Puhinui.

"A fast, frequent and reliable rapid transit service would deliver the following benefits:

- *Improve access to southern Auckland's two major employment areas (Manukau and the airport)*
- *Provide a link for air passengers to the city centre and the south* ***via a transfer to rail at Puhinui***
- *Improve transport options for the highly car dependent southeast Auckland*
- *Support major growth opportunities at key locations along the route, particularly around Manukau, Puhinui and Botany. Auckland Transport and NZ Transport Agency investigations have identified the highest priority section of this corridor is between the airport and* ***a major new interchange at Puhinui train station.****" "The planned State Highway 20B upgrade provides additional lanes dedicated to buses, high-occupancy vehicles and freight, delivering the first stage of this priority section.*

  [emphasis added]

"For this investment to be effective, it will need to be complemented by upgrades to the transport network within the airport.

"Extending this immediate upgrade further east to connect Puhinui, Manukau and Botany is a future priority, although some targeted bus priority measures in the nearer term are likely to be required to provide fast and reliable travel. (p. 20)

One of the road projects in ATAP is the "Eastern Airport Access (State Highway 20B)". ATAP notes the State Highway 20B corridor "currently experiences severe congestion and because there are no bus lanes, buses also experience substantial delays and poor reliability. Further significant development in the corridor is also included in land use plans.

"This upgrade will provide an additional lane in each direction between Puhinui and the Airport, which is likely to be a bus/carpool/freight lane to maximise the productivity of the corridor and provide reliable travel for the most critical users. An upgrade to the SH20/SH20B interchange is also likely to be required.

"It is important for improvements along this corridor to be progressed as quickly as possible. Integration with the planned Puhinui bus/rail interchange is important to provide for reliable travel to and from the airport for parts of Auckland served by the rail network." (p. 26)

[8] Auckland Transport Alignment Project, April 2018

1.5 Investment and Project Partners

1.5.1 Investment Partners

The investment partners are organisations with intersecting roles and responsibilities, including influencing, managing or co-funding elements of the land transport system in the Auckland region (refer to Table 1-1).

Table 1-1: Investments Partners

Investment partner	Roles and responsibilities
Auckland Transport	AT designs, builds and maintains Auckland's roads, ferry wharves, cycleways and walkways, 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 the RCA for local roads.
NZ Transport Agency	The Transport Agency is the road controlling authority (RCA) for SH20, SH20A from its interchange with SH20 to the intersection of Verissimo Drive/ Landing Drive and for SH20B from the Puhinui Road interchange to its intersection with Orrs Road. These sections are designated as state highway.
Auckland International Airport Limited	AIAL as a private sector company operates Auckland International Airport, which consists of international and domestic terminal and cargo operations. AIAL is the RCA for the remainder of the SH20A route from Verissimo Drive/ Landing Drive known as George Bolt Memorial Drive. It is also RCA for the remaining section of SH20B, known as Puhinui Road, from Orrs Road to the Tom Pearce Drive roundabout. AIAL is responsible for the implementation of Auckland Airport Transport Strategy as part of Auckland Airport Master Plan.

1.5.2 Project Partners – Mana Whenua

Multiple Mana Whenua groups are recognised as having a significant connection and relationship with south-west Auckland. Many have important associations with the study area. Te Ākitai Waiohua, in particular, hold associations and relationships with the land and sea at the Airport and the surrounding area. The range of cultural, spiritual and historical values which may be held require further understanding and ongoing consideration in the SSBC, in partnership with Mana Whenua.

In order to further understand and recognise the values that Mana Whenua groups hold, the development of this SSBC seeks to confirm and reflect an ongoing relationship with these groups, both for the development of this SSBC and future project stages.

Given the sensitivity around multiple areas, the early dialogue with Mana Whenua that has been established and is ongoing, and is critical to the success of the wider Southwest Gateway Programme discussed in Section 1.6 below.

1.6 Southwest Gateway Programme

1.6.1 Overview

In 2018, AT, the Transport Agency and AIAL designated the collective suite of projects addressing Airport access to the east and south as "The Southwest Gateway Programme". It is seen as a suite of measures to create an integrated, 21st century transport system that provides choices for how people and freight travel to and from the Airport and surrounding areas. The programme aims "to connect communities and support growth by ensuring it's possible to move increasing numbers of people. The efficiency of freight will be improved by providing greater travel choice, improving safety and in turn improving accessibility to jobs, education and social opportunities, reducing congestion and providing health and environmental benefits".

Figure 1-4 below shows how the investment partners will work together to plan and deliver the investigations recommended as part of the Southwest Gateway Programme.

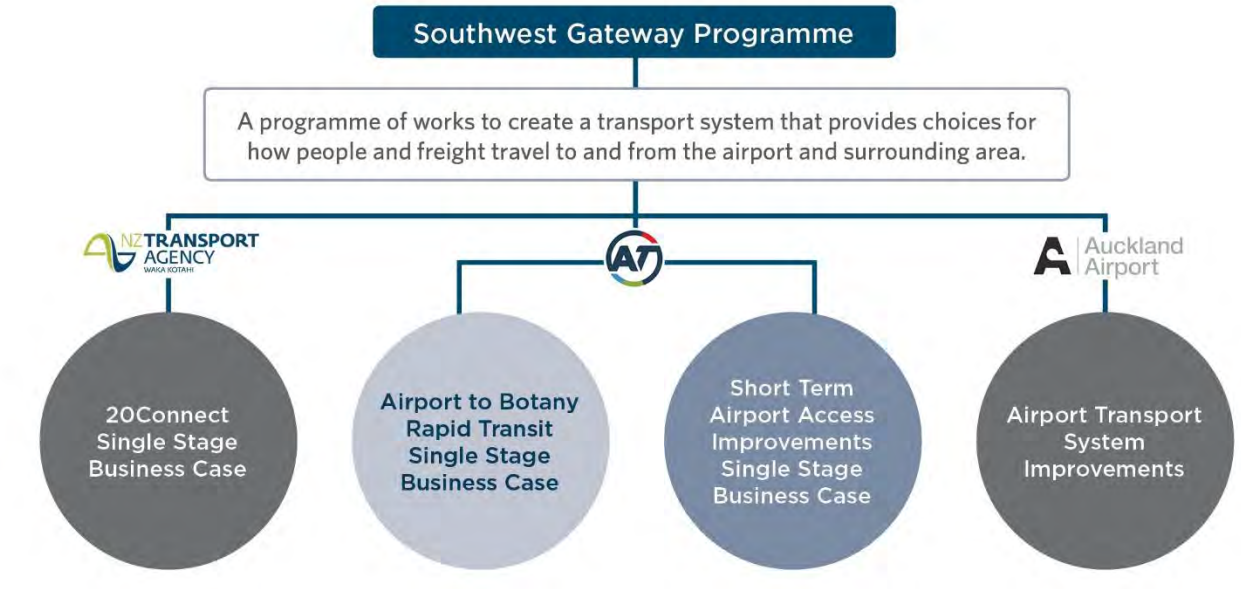

Figure 1-4: Southwest Gateway Programme

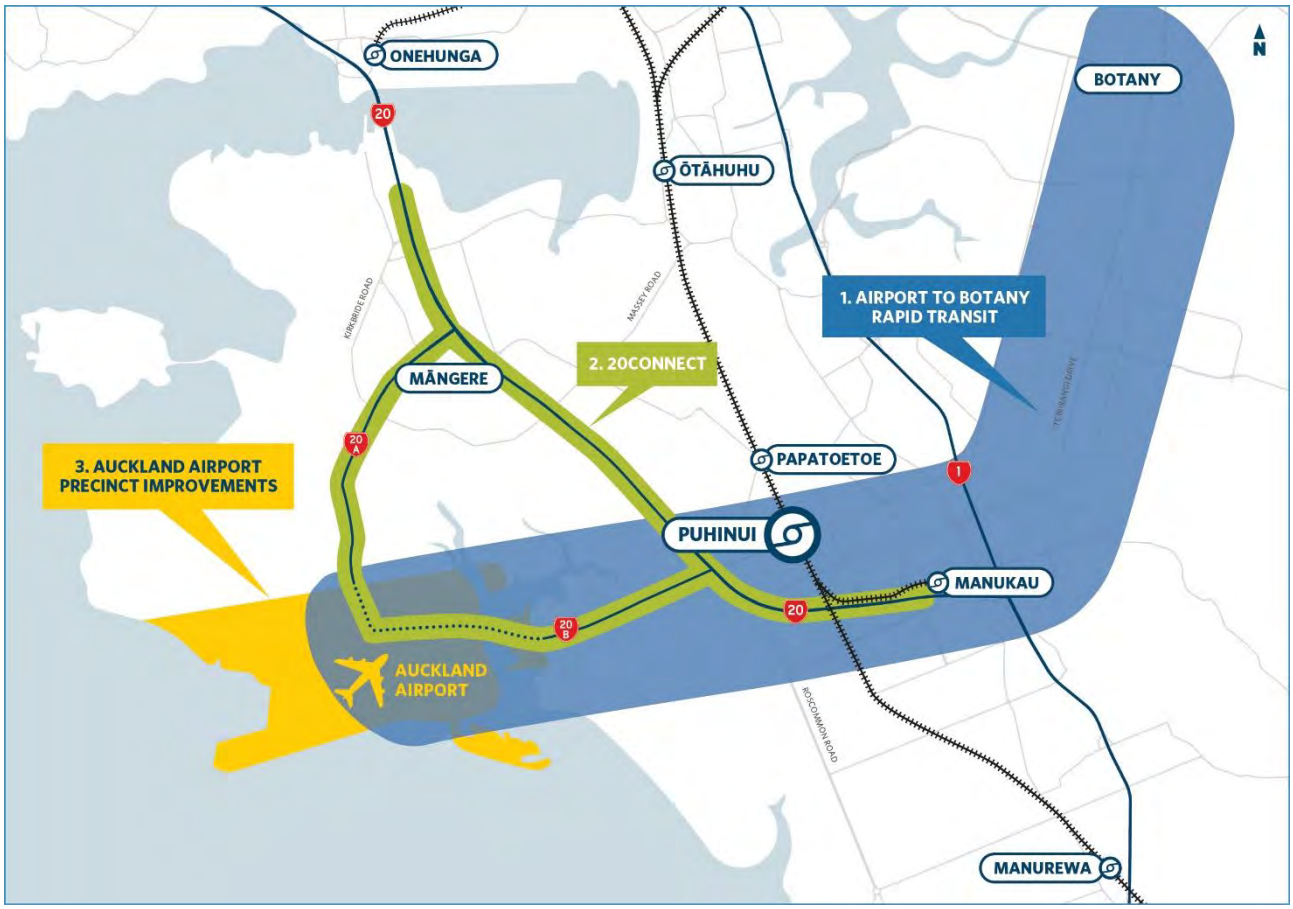

Figure 1-5: Southwest Gateway Projects

The ***Airport to Botany Rapid Transit Project*** led by AT will improve access to the Airport and surrounding areas. This is an area with limited access to quality public transport. This project will significantly improve transport choices, reliability, and journey times in the south and east areas of Auckland, as well as providing an important public transport link to the rail network at Puhinui.

It will identify how to:

- Provide a link for people to the city centre and the south and east via a transfer to rail at Puhinui
- Improve transport options for people in south and east Auckland
- Support growth opportunities at key locations along the route, particularly around Manukau, Botany and the Airport
- Improve access to south and east Auckland's major employment areas.

The ***20Connect*** project led by the Transport Agency will improve people's journey when travelling to and from the Airport and surrounding areas, identifying ways to improve journey reliability and provide more choices when travelling along the state highway network, whether it's walking, cycling, driving or catching public transport. Improvements identified on the state highway network will enhance the public transport system, cater for freight and cyclists and improve access to growth areas adjacent to the state highway.

The 20Connect project will develop a SSBC to identify ways to address these issues. Potential improvements that will be investigated will include:

- Improving the capacity and connections on, or alongside, the state highways for cars, trucks, buses and bicycles
- Optimising the existing network
- Providing more choices as to how people and goods travel to and from this area
- Identifying ways to influence the demand on the network.

Current issues identified include:

- It is difficult to estimate how long the journey to this area will take, this needs to be more reliable for both people and goods
- People have limited options as to how they travel to and from this area, people need to have more choice
- There is extensive growth planned is this area. This growth will increase the pressure on the state highways. The capacity, connections and management of the network needs to be improved to support the planned growth no matter how people choose to travel.

The ***Airport Transport System Improvements*** led by AIAL involves a programme of investment which enhances not only the transport network within the Airport precinct, but also integrates with the Transport Agency and AT's projects. Refer to section 2.8.8 below for further detail.

1.6.2 Short-Term Proposals

Within the overall Southwest Gateway strategy there is a set of initial proposals that may be advanced in the period to 2021, as shown in Figure 1-6: . This business case is principally concerned with the interchange at Puhinui, changes to bus services and supporting measures, including walking and cycling, that are the responsibility of AT.

The project partners have identified possible improvements that could be made to provide shorter term, more immediate benefits. These improvements will make the most of existing infrastructure and services to improve travel choices and journey experiences.

Figure 1-6: Short-term proposals and responsibilities

The Transport Agency led project, *SH20B SSBC*, has investigated short-term options relating to possible bus lanes along SH20B – including their extent and whether additional higher productivity vehicles could use them and additional opportunities for active modes (walking and cycling) within the state highway corridors.

AIAL is also investigating a range of transport improvements within the Airport precinct including:

- What is required to accommodate the proposed increase in bus service numbers connecting directly with the Airport terminals
- Ability to provide commensurate priority lanes within the Airport precinct area to continue the ones proposed on SH20B
- Providing an AIAL managed park and ride and staff car park facility on the south side of SH20B.

1.7 Single-Stage Business Case Approach

This report forms a SSBC, combining both indicative business case (IBC) and detailed business case (DBC) elements.

This SSBC supports the move to design for the preferred option. The business case has been prepared to support this option and includes an appropriate level of evidence to support the option over the alternatives assessed.

2 Strategic Case - Context

2.1 Geographical Context

The study area covers the locations expected to be primarily influenced by the transport opportunities expected from an interchange at Puhinui and improved bus services some of which may use SH20B bus lanes, both immediately and as part of a longer-term Airport to Botany RTN service, as shown in Figure 2-1. As such it runs from the Airport via Puhinui and Manukau to Botany, but also includes areas to the south and north that might be served by the interchange at Puhinui. The study area includes the areas of Māngere, Manukau, Papatoetoe, Wiri, Puhinui, Flat Bush, Botany and Manurewa. These comprise low density suburban areas, the denser Manukau metropolitan town centre, and other local town centres. The study area also provides several concentrated employment areas, notably with industrial and commercial activities, for example at East Tamaki and in the vicinity of the Airport itself.

The study area includes the associated road network in the area which currently, or in the future, will carry bus services. The NIMT railway line runs north to south through the study area, serving both passengers and freight. The Onehunga spur line is a connection for passenger transport services, as is the Manukau spur.

Cycling and walking networks are an important consideration in the development of an integrated, 'whole of journey' approach, including connections at Puhinui and direct links to the Airport precinct itself.

Figure 2-1: Short-Term Airport Access Improvements SSBC study area wider context

2.2 Customer Context

The following diagrams (Figure 2-2 and Figure 2-3) show customer one-hour peak hour flows to the Airport and Manukau, respectively, in 2026 illustrating the scale of demand from the north-east, east and south that could be at least partly served by an interchange at Puhinui and supporting public transport services and infrastructure.

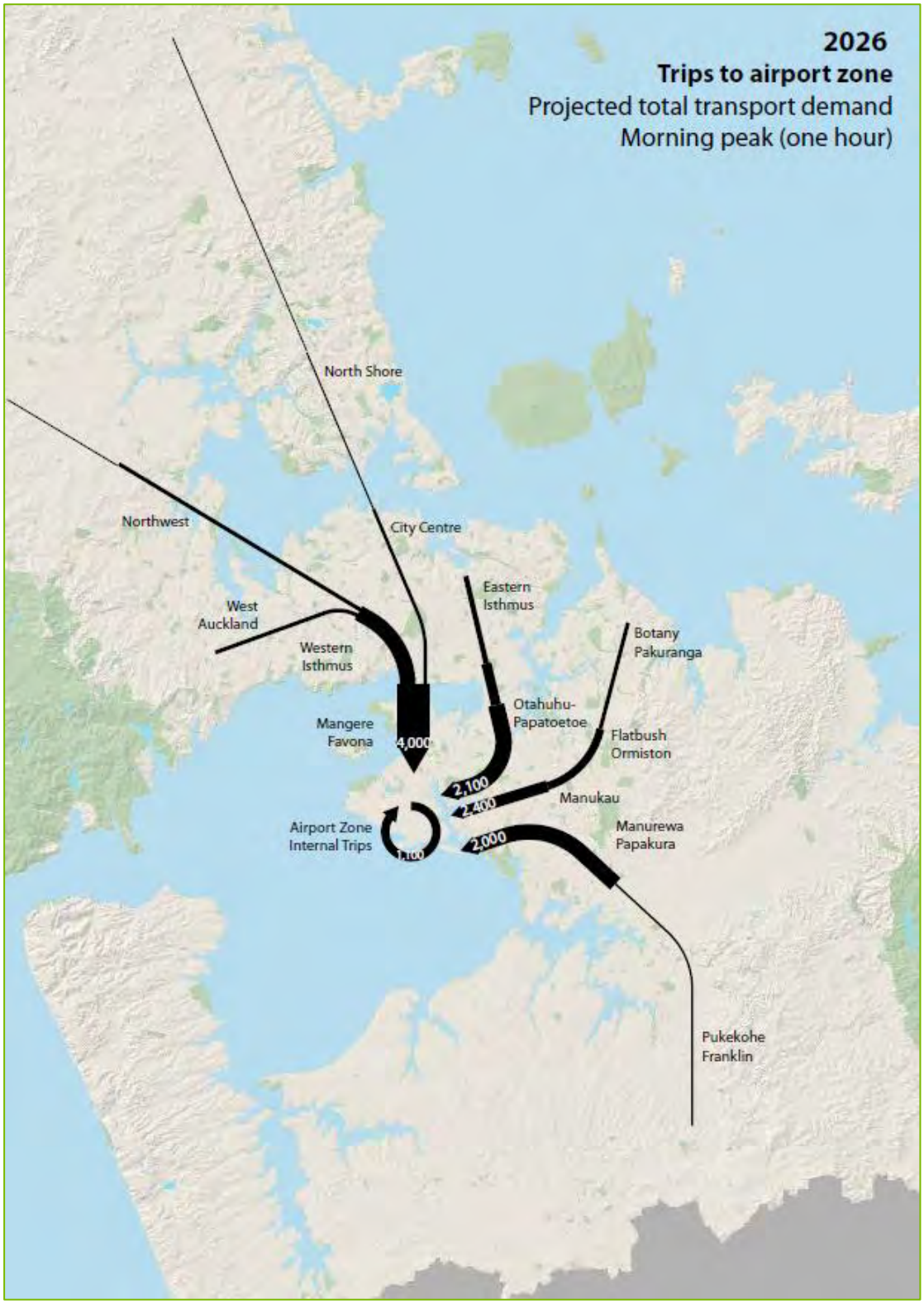

Figure 2-2: 2026 Trips to Airport Zone: Source AFC modelling

Figure 2-3: 2026 Trips to Manukau Central Zone: Source AFC modelling

The transport modes that are currently being used by customers to travel to and from Auckland Airport and the surrounding area include public bus, rail/ bus, park and ride, Sky Bus, taxi, cycle and private car.

The following graphic[9] in Figure 2-4 illustrates the dominance of car-based transport for the Airport, including taxi. It shows that most customers currently travel to the Airport by car or a related mode with public transport (excluding taxis and shuttles) around 10 percent and workers at only four percent.

AT had commissioned Customer Insight research to gain a deeper understanding of transport attitudes and behaviours associated with travelling to and from the study area; being Auckland Airport and the surrounding employment areas. This research, conducted in 2017 and 2018, involved focus group sessions and online surveys covering the main customer groups identified, being;

- Workers (office, shift)
- Auckland residents (business travellers and leisure travellers)
- Outside of Auckland Airport visitors (domestic and international).

The research incorporated an approach of both qualitative and quantitative to provide in depth understanding and ability to measure attitudes and behaviours.

Reporting of this research has indicated, and of particular relevance to the STAAI business case, that a reasonably high proportion of those customer groups surveyed (around 20-30 percent) would likely take a train to a new Puhinui Station and transfer to a bus to get to Auckland Airport and the surrounding areas.

Of the workers living in South Auckland who participated in the research some 56 percent would travel to the airport area via train and bus, transferring at a new Puhinui station. Some 30 percent of workers living in the east were also found to favour this public transport option.

The *Auckland Transport Auckland Airport Access Customer Research Report* is attached in Appendix A1.

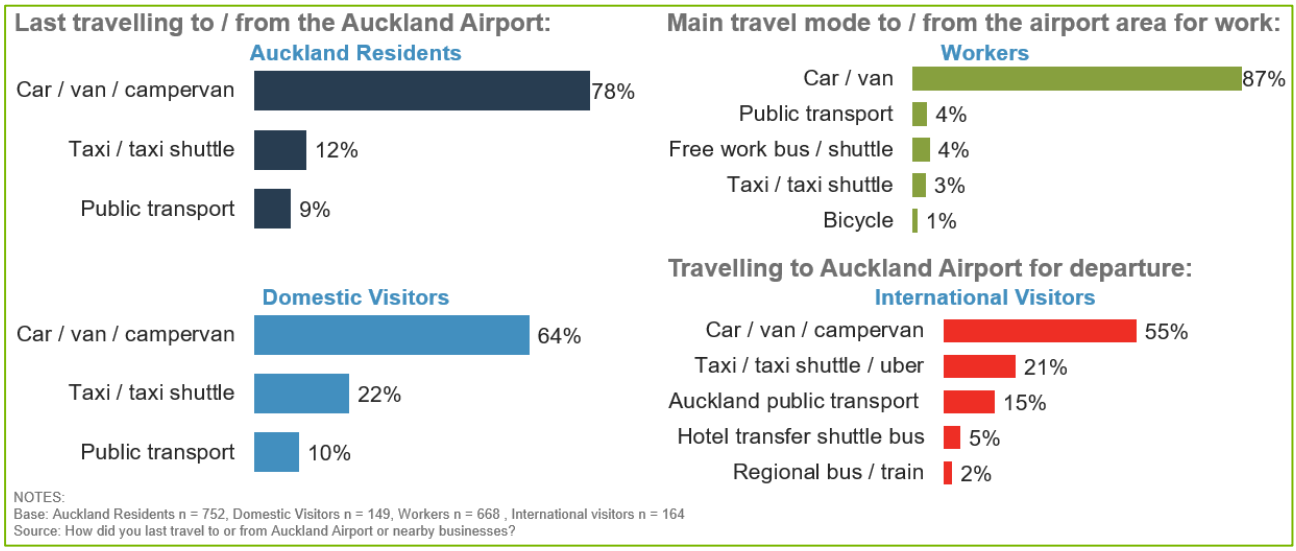

Figure 2-4: Mode of travel to Auckland Airport

2.3 Cultural Context

Te Ākitai Waiohua and potentially other Mana Whenua groups in the wider region hold significant cultural values and associations in the study area - including both land and sea, notably the nearby Puhinui Peninsula (located east of the Airport).

The existing understanding of the cultural context will be developed over time through further engagement with Mana Whenua. The following summarises what is currently known about the cultural context:

[9] Source: Auckland Transport Auckland Airport Access project Research report May 2018 Kantar TNS

- Māori have a long association with the Manukau area, which includes the Puhinui Peninsula. The Puhinui Peninsula is inextricably linked to the history, stories, whakapapa and mythology of Te Ākitai Waiohua
- The significance of the area is formally recognised in the *Eastern Access Agreement* (1991), which acknowledged that the construction of the proposed eastern access approach road and bridge to the Airport (Pukaki Bridge) would impact the ancestral land and waters, and cultural traditions of the people of Te Waiohua Pukaki. Further development of this road corridor is constrained by this agreement
- Pukaki and Waokauri Creeks have Māori reservation status, meaning they are held for the common use or benefit of the owners or of Māori. As a reservation, the land is afforded the protection of being "inalienable"[10] to the Crown
- Mana Whenua have sought protection of culturally significant sites and requested involvement in decision-making that has the potential to impact on these sites and the wider cultural landscape. They have previously indicated support for the objectives and policies for the Puhinui Precinct under the *Auckland Unitary Plan Operative in part* (AUP). However, they expressed reservations regarding the requirement for new stream crossings for transport infrastructure and associated effects on cultural values
- Nearby sites of note include Pukaki Marae, Te Pukaki Tapu O Poutukeka crater and the surrounding historic reserve
- There are many recorded archaeological sites and evidence of widespread occupation in the area by Mana Whenua during pre-European times.

The associations and values held by Mana Whenua require careful consideration in conjunction with ongoing engagement. Cultural Values Assessments (CVA) or other engagement and information sharing processes (as agreed with Mana Whenua) will assist with understanding the values they may hold in relation to any site or place potentially affected by any activities proposed by this business case.

2.4 Economic Context

2.4.1 Auckland International Airport

Whilst not exclusively serving customers of the Airport, the proposed interconnected improvements at Puhinui and the wider area in the short-term are expected to be a significant element of the strategy to better serve the Airport and its associated hinterland. Airports are a very special form of infrastructure, being critical to an advanced economy.

As stated in a recent report by PwC:

> *"…an economy that is heavily driven by high value add services requires connectivity between urban-based employees and firms.* ***This is most efficiently delivered by mass public transport and aviation links.*** *Failure to meet these needs in a timely manner stifles economic potential, reducing competitiveness and suppressing standards of living."*[11] (***emphasis*** added)

Similarly, an analysis of the role that airports play in a modern economy emphasised the catalytic effects:

> *"While a large part of airports' economic impact is associated with those that work within the sector and its wider supply chains, it is the wider catalytic impacts which set aviation apart from other industries. These are the wider economic activities which occur beyond the aviation sector, but which*

[10] 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.

[11] Better public transport. Better productivity. The economic return on public transport investment, PwC for (Australian) Tourism & Transport Forum.

are facilitated and supported by the connectivity that aviation delivers between localities, countries and world regions. Tourists can spend money in previously unreachable locations. Businesses can produce goods to be consumed in far corners of the world. Investors can set up new offices, call centres and factories exactly where they are needed."[12]

The Airport plays an important role in New Zealand's international tourism, with 23 international airlines and 35 destinations worldwide. 72 percent of all international visitors arrived via the Airport in 2017.

2.4.2 Scale of Current Operations and Development Plans at Auckland Airport

The Airport is a major operation, as well as the catalyst for wider economic effects. The Airport is the second largest airport in Australasia for international passengers and the second largest cargo port in New Zealand by value. In 2017, there were 19 million international and domestic passenger movements.

The Airport's role at a national level is significant. The generated and facilitated impact on Gross Domestic Product (GDP) is expected to grow from 18.9 billion dollars in 2006 to between 30.2 and 44.1 billion dollars by 2031. Auckland has an economy that is heavily dependent on the service sector – including tourism – making an efficiently operating airport with good access critical.

The scale of forecast passenger growth is set out in Figure 2-5 below.

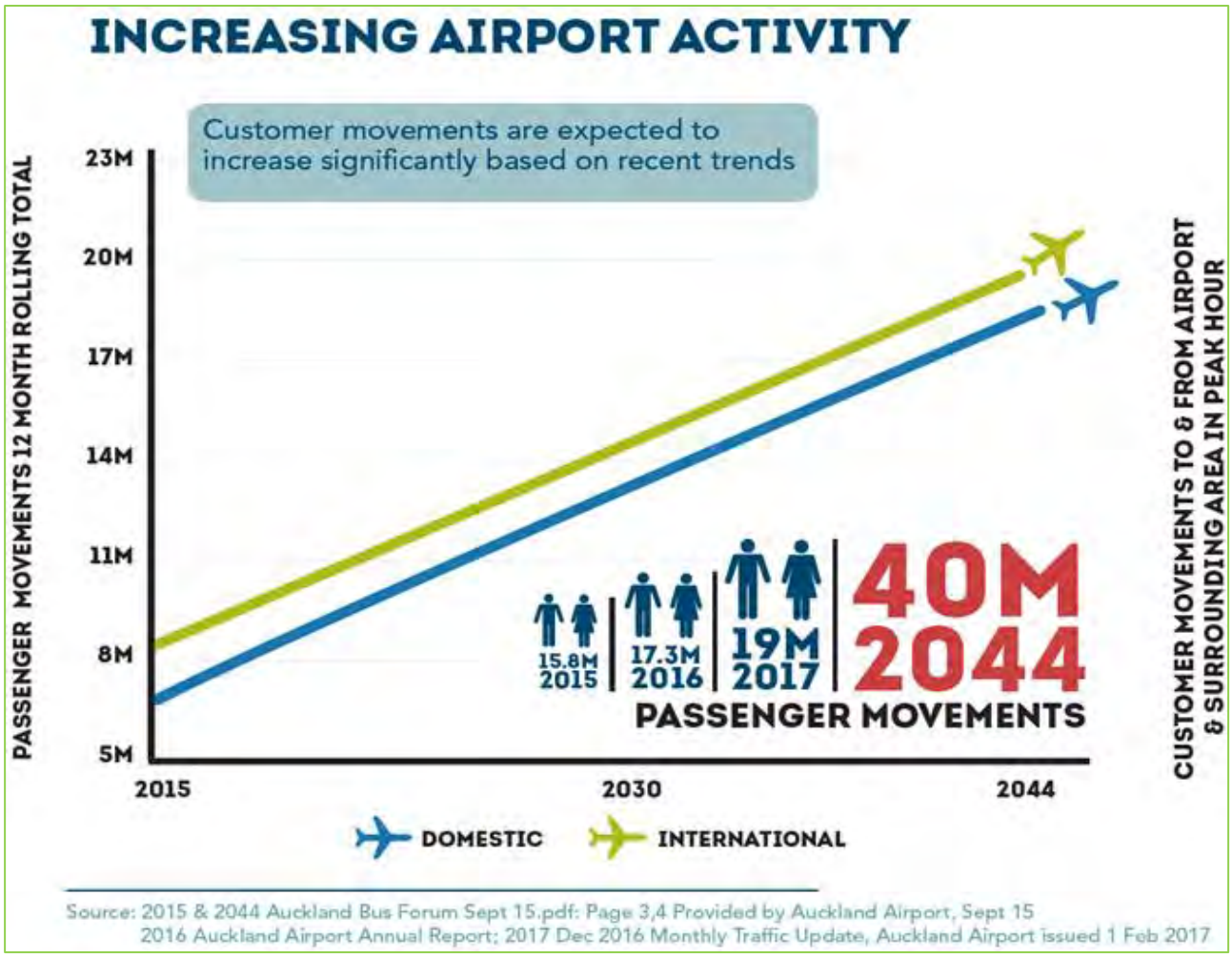

Figure 2-5: Increasing passenger movements and activity at Auckland Airport

[12] Importance of airports to a national economy: Airport Business, April 2015.

The Airport's master plan[13] outlines AIAL's 30-year vision for its future. A key element of the master plan is for the Airport to be a global hub for air travel in Australasia and the Pacific rim, enabling up to 27,000 more jobs, with passenger numbers expected to grow to 24 million passengers a year by 2025 and 40 million passengers per annum by 2044. This growth will result in significant pressures on the existing aeronautical infrastructure and land transport network.

To service this anticipated demand, the Airport's master plan (2014) recommends various infrastructure investments over the next 30 years (Figure 2-6).

The first phase of the Airport master plan of the development of a new combined domestic and international terminal will be completed within the next five years. The second phase includes a new runway located to the north of the current runway, which is to be completed within the next 10 to 15 years. The third and fourth phases of the development include the expansion of international and domestic piers and the extension of the northern runway.

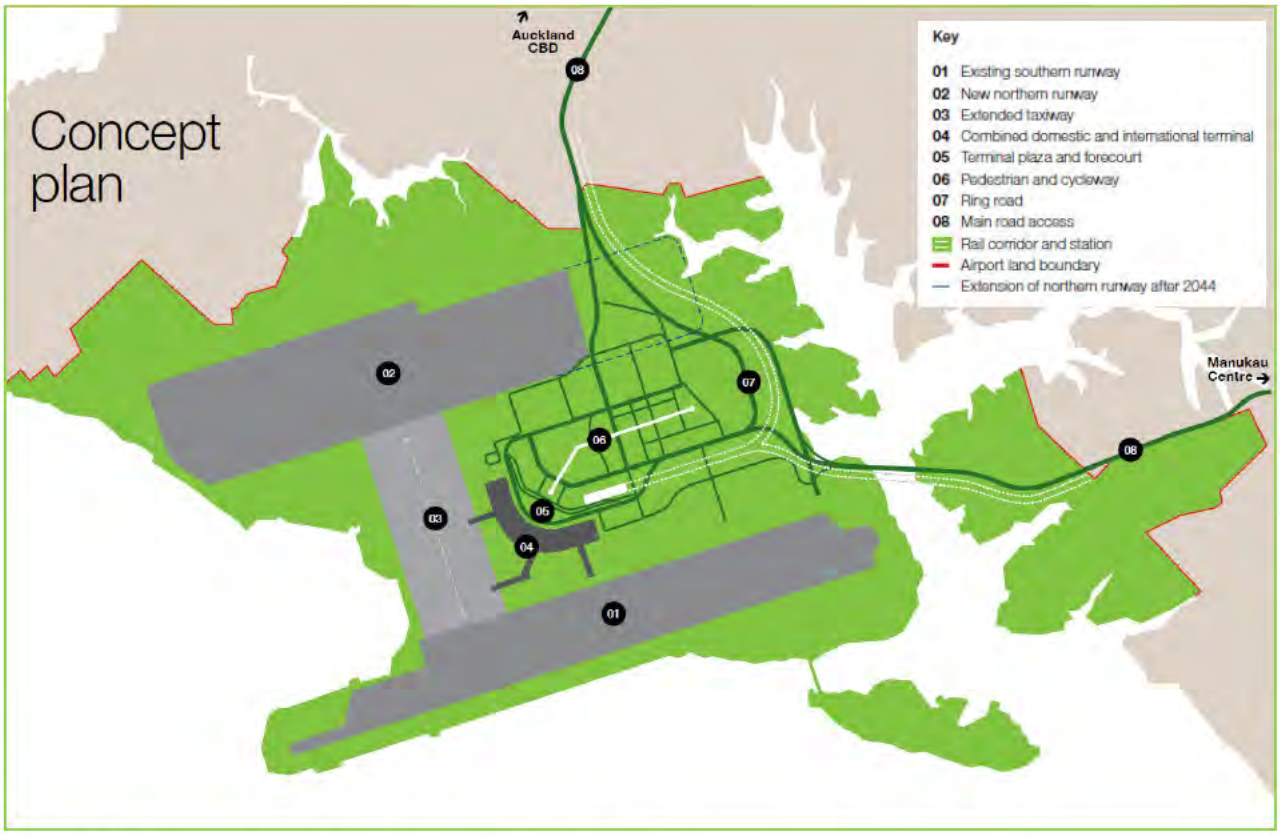

Figure 2-6: Auckland Airport master plan concept plan

To ensure that the Airport does not become capacity constrained, AIAL lodged a notice of requirement (NoR) to alter its existing designations for a second runway, which was publicly notified on 15 February 2018. The Notice of Requirement (NoR) seeks to extend the operational length of the previously designated northern runway by 833 metres and shift the proposed runway 72 metres north of its currently designated location. The extended length and separation distance between existing southern and proposed northern runways will provide increased capacity to the Airport's current operations and allow for greater operational flexibility. Figure 2-7: shows the location of the proposed second runway.

[13] Auckland International Airport Limited. Airport of the future: Our vision for the next 30 years. Accessed 22 March 2017, from https://www.aucklandairport.co.nz/downloads/aial-masterplan.pdf

Figure 2-7: Auckland Airport's proposed northern runway footprint

2.4.3 Auckland Airport's Wider Landholdings

There are currently more than 900 businesses located adjacent to the Airport, employing around 21,000 people, with approximately 12,000 employees based on the Airport's land.

The land surrounding the Airport itself which is owned by AIAL is called 'The District'. This area is growing into a hub which includes business, shops, accommodation and recreation facilities. The District is made up of The Landing Business Park, The Quad Office Campus and Cargo Logistics and Freight Hub. Figure 2-8 shows these areas.

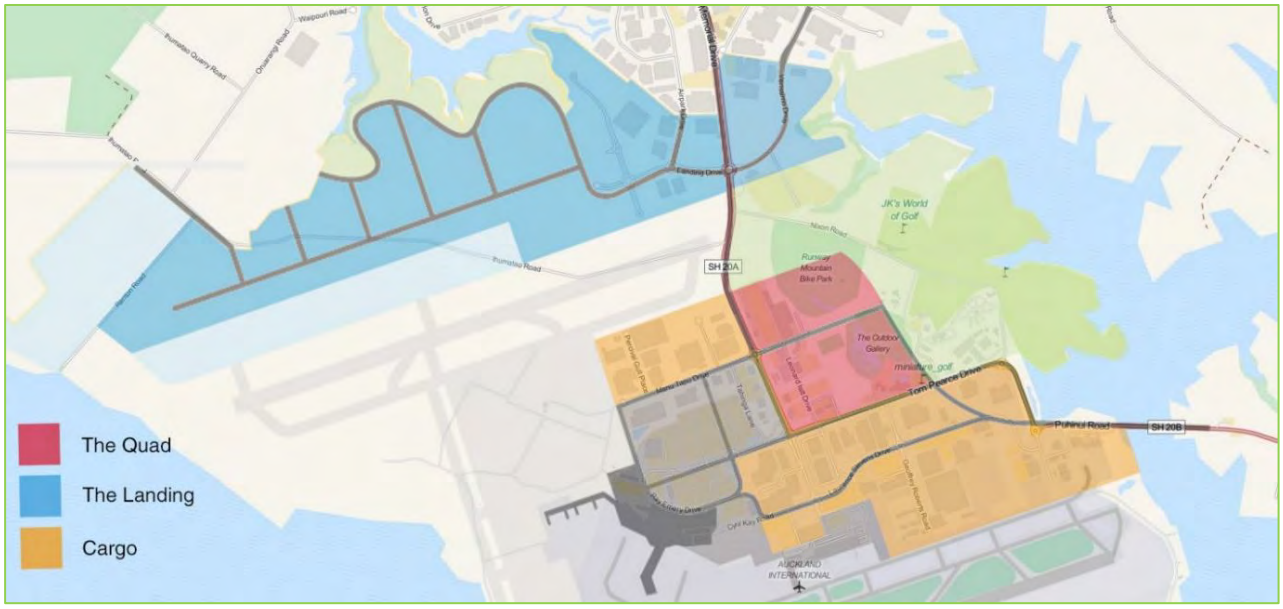

Figure 2-8: Auckland Airport's commercial development areas[14]

In the Airport's master plan, there are 308 hectares of land to be developed in The District. The Landing and The Quad have developments underway. With increasing numbers of businesses in AIAL's land holdings, it is anticipated that corresponding increases in traffic and travel demands to, from and within the area will follow, adding to the need for better public transport services, including for employee customers.

2.4.4 Economic Significance of Manukau Metropolitan Centre

Manukau is a business-dominated suburban area located at the intersection of the Southern Motorway (SH1) and the South-Western Motorway (SH20). It is an important economic centre within the region and is Auckland's main industrial hub. The Manukau Metropolitan Centre located within the Ōtara-Papatoetoe Local Board area serves almost half a million residents in the south Auckland market.

Employment and economic growth rates continue to be higher than the national average. Approximately 20 percent ($16 billion) of Auckland's GDP came from Manukau in 2015.

Manukau experienced higher than the national average economic growth of 5.2 percent in the Ōtara-Papatoetoe Local Board area in 2017, compared to 3.6 percent nationally. The largest contributors to economic growth between 2007 and 2017 were healthcare and social assistance services (743 jobs), followed by construction (536 jobs). The balance of growth consisted of public administration and safety, retail trade, financial and insurance services and other industries including transport, postal, warehousing and tertiary education. These sectors combined employ around 17,000 workers daily.

While land within the Manukau Metropolitan Centre and wider Manukau area is used for a variety of residential, commercial and industrial activities, various types of industrial and commercial businesses dominate. The largest industry sector is manufacturing (though it is declining), closely followed by the other growing commercial and assistance sectors.

The major employers in Manukau are various industrial and commercial businesses and healthcare services, reflected in zoning in the AUP (see Figure 2-9). For instance, approximately 49ha land to the south of Manukau Metropolitan Centre, a central location, is zoned for the Manukau Superclinic, which highlights the functional and economic importance of the facility to the local and wider community. The Manukau Institute of Technology

[14] Auckland Airport. Auckland Airport Property. Accessed 28th February 2018, from https://property.aucklandairport.co.nz/

and Auckland University of Technology are two notable tertiary education providers, attracting approximately 10,000 students.

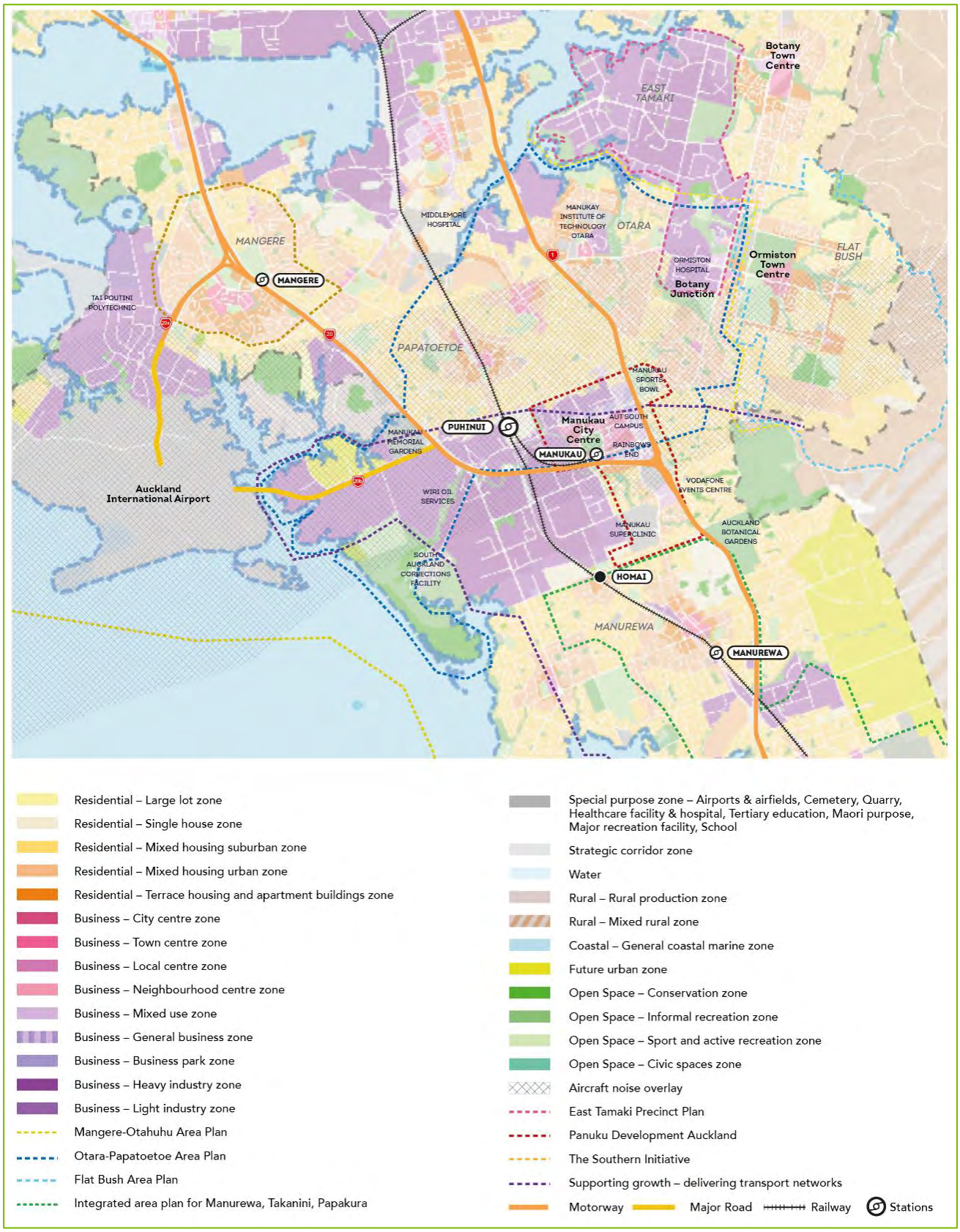

Figure 2-9: Manukau Metropolitan Centre in the Auckland Unitary Plan

The Manukau Metropolitan Centre is the largest retail centre in south Auckland and includes a district court, police station, council facilities, Rainbow's End and the Manukau City Westfield shopping centre. Westfield is an important part of Manukau's metropolitan centre as it acts as an employment and recreational hub facilitating the agglomeration of many smaller commercial businesses.

The intersection of the Southern and the South-Western Motorways defines the shape and location of land uses in Manukau. Many heavy industrial activities are located to the west of Manukau, on the southern side of the South-Western Motorway. Such industrial businesses include large-scale production plants for two of New Zealand's major breweries.

2.5 Growth in the Surrounding Area

The substantial growth and development projects and strategies planned for Manukau, south and east Auckland are summarised in Figure 2-10 below.

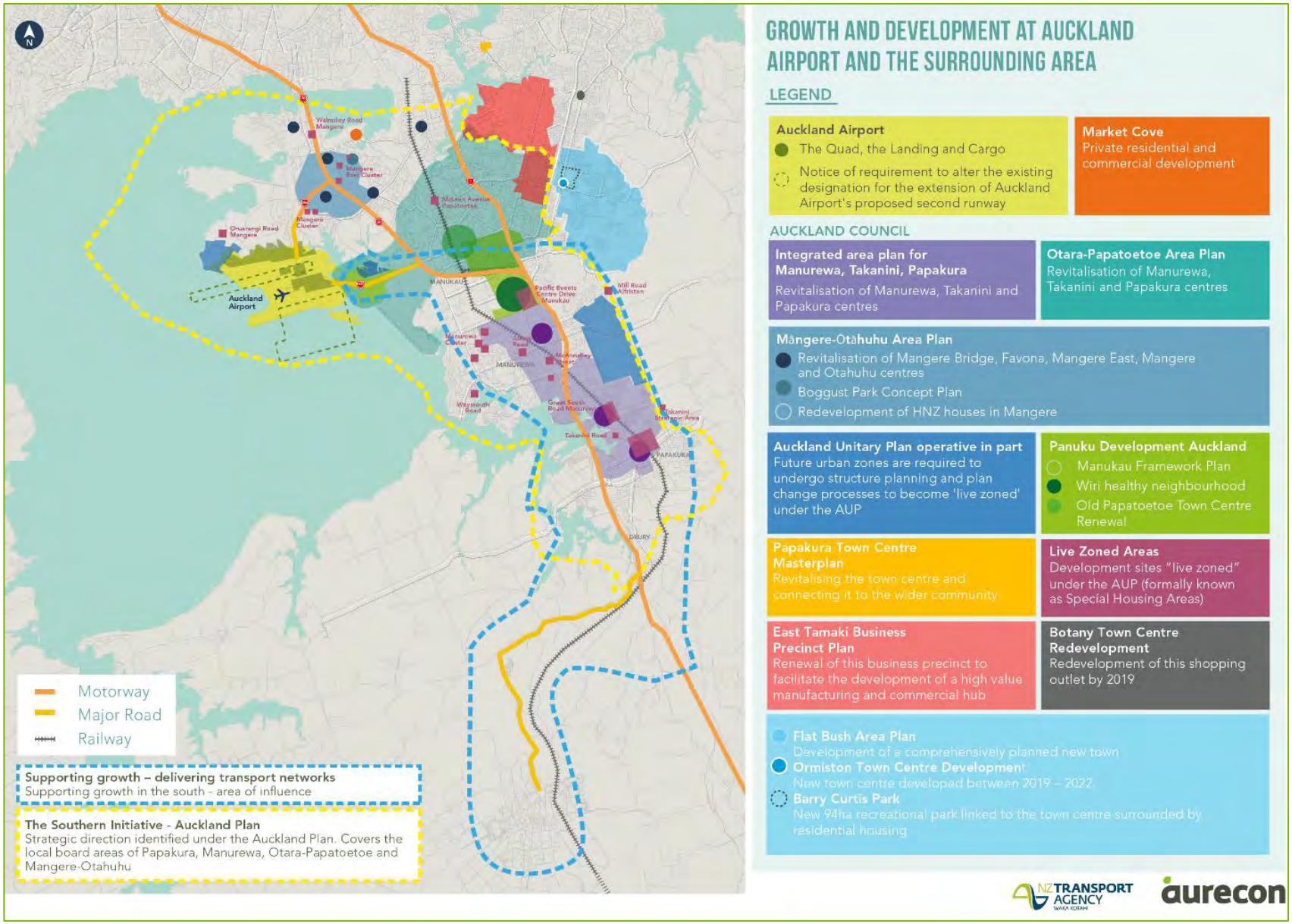

Figure 2-10: Growth and development at the Airport, Manukau, South and East Auckland

2.5.1 Manukau and South Auckland

Areas adjacent to the Airport are predicted to experience ongoing population and employment growth. Statistics New Zealand indicates by 2043 an increase of 32,200 people in the Ōtara-Papatoetoe local board area located east of the Airport, which includes the Manukau Metropolitan Centre.

The growth and economic importance of the area to the region will likely continue, with an estimated 400 ha of land currently available in the study area around the Airport for further industrial and commercial development. Additionally, there are currently three main Future Urban Zones[15] within the study area shown in the AUP planning maps which will enable further development.

Significant projects expected to affect Manukau's future include:

- **The Southern Initiative** (Panuku Development Auckland) – In collaboration with the Crown's Manukau Transformation Initiative includes a range of residential, commercial and transport urban regeneration projects, aligned with *The Auckland Plan*. As part of this, the Manukau Framework Plan was made operative in March 2017, which is a transformation project that covers 600 ha. The transformation of Manukau is a long-term project taking 20 to 25 years to complete. It includes the development of the Wiri healthy neighbourhood and housing supply with:
  - Replacement of 380 Housing New Zealand homes to create up to 1,180 new homes
  - Development of 400 new homes on the District Health Board site, 200 homes at the Barrowcliffe site and 900 homes on the Pacific Gardens Special Housing Area (SHA) site on Great South Road.

  The investment programme will significantly increase the density of Manukau, especially for residential purposes. Proximity to rapid public transport services to access employment and recreational opportunities is a core element of Manukau's transformation[16].
- **Puhinui Precinct and Southern Gateway** – The Puhinui Precinct (232 ha) provides for predominantly light industrial and airport-related activities and some large lot residential development. Includes the Southern Gateway Consortium proposed development south of SH20B
- **Supporting Growth** – **delivering transport networks** (formerly *Transport for Future Urban Growth* (TFUG)) southern growth areas (including Pukekohe, Drury, Paerata and Takanini). These areas could be substantial generators of customers for better public transport services to the Airport and surrounding area, including upgraded rail services (see Section 2.8.4)
- **Market Cove** – Residential developments in Favona (1,200 new dwellings), aligned with the AUP
- **Area plans** (Auckland Council) – Including Māngere-Ōtāhuhu Area Plan, Ōtara-Papatoetoe Area Plan and the Integrated Area Plan for Manurewa, Takanini and Papakura.

2.5.2 East Auckland

For the last 30 years, the East Auckland area has experienced rapid population and economic growth, changing from a greenfield area to the residential suburb of Auckland it is today. Land uses to the east are mainly low density residential served by town centres. To the west and south of Botany are the important industrial and commercial areas of Mt Wellington, Penrose/Onehunga and Highbrook/East Tamaki. These areas form part of the Auckland region's 'industrial belt'.

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[15] As defined in the Auckland Unitary Plan, Section H18.The FUZ is applied to greenfield land that has been identified as suitable for urbanisation. The FUZ is a transitional zone. Land may be used for a range of general rural activities but cannot be used for urban activities until the site is re-zoned for urban purposes

[16] Panuku Development Auckland, Transform Manukau: Renewal of Manukau Central – High Level Project Plan, 2016

The AUP designates Botany and Sylvia Park as Emerging Metropolitan Centres (second tier centres after the City Centre). This indicates these areas are expected to experience significant change over time – developing into more mixed-use centres and catering for an increased residential population.

Flat Bush (also known as Ormiston) is a 1,700-ha greenfield development area between Manukau and Botany and is one of the country's largest and most comprehensively planned new suburb developments. The transformation project is led by the council, in collaboration with the private sector. The area is forecast to be home to approximately 40,000 people by 2025 and includes a new town centre and five new schools.[17]

2.6 Urban Growth and Land Use Policy Context

2.6.1 Auckland Unitary Plan

The AUP establishes the regulatory framework for land use and development in the Auckland region, including the location and density of future housing and employment growth. It therefore influences where, when, and how population and employment growth will occur in the area surrounding the Airport. Refer to Figure 2-11 below.

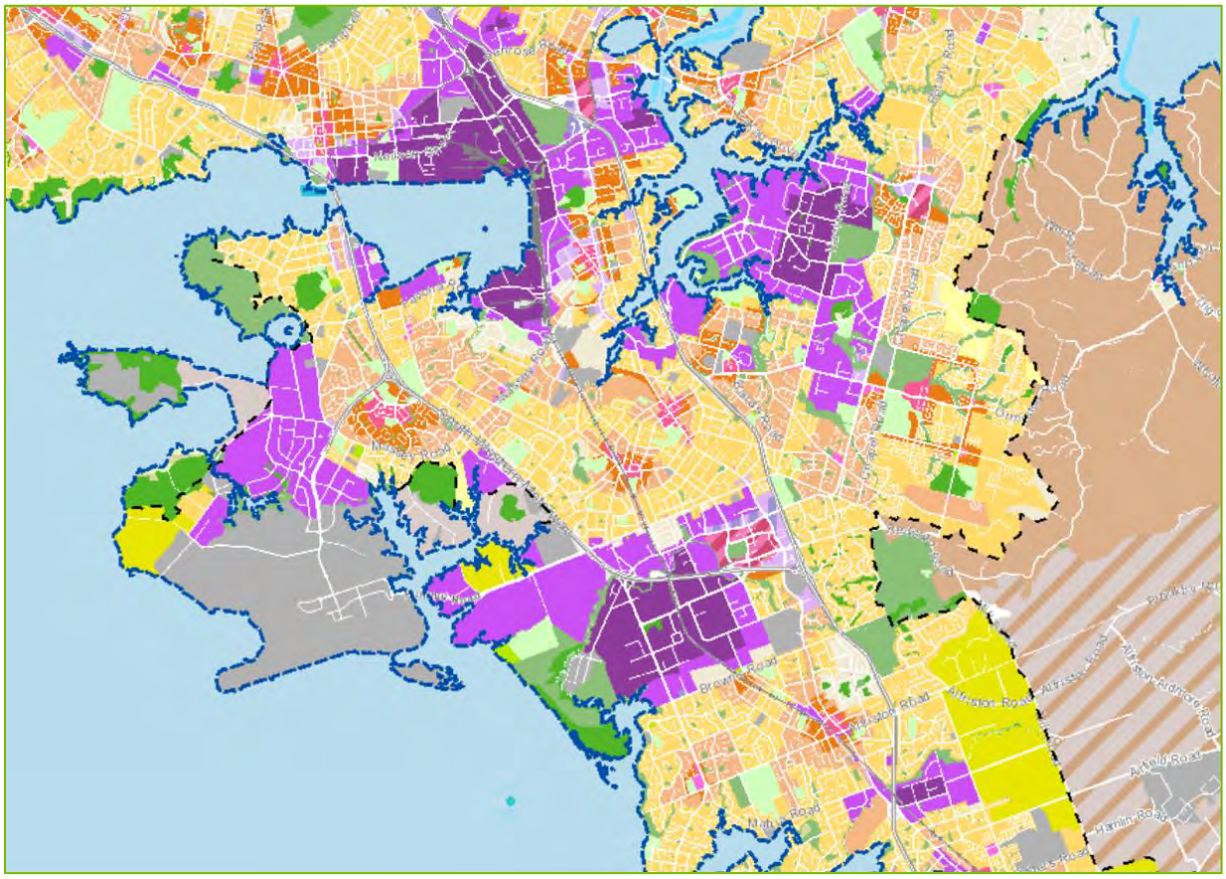


Figure 2-11: Auckland Unitary Plan

[17] Auckland Manukau Eastern Transport Initiative (AMETI), Auckland Transport, 1 November 2016, Version 3, Programme Update

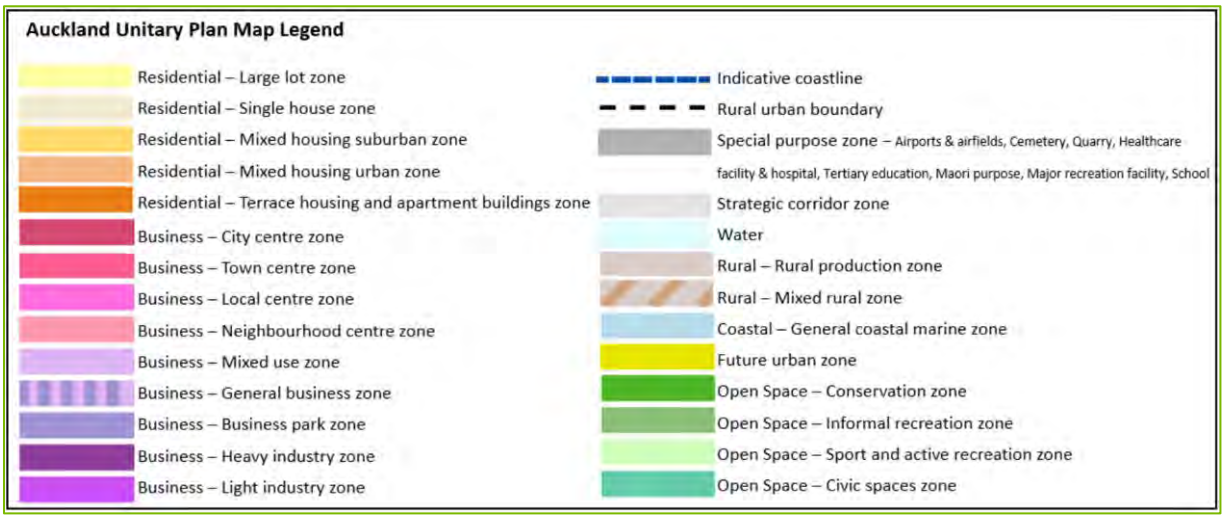


Figure 2-12: Auckland Unitary Plan Operative in Part zoning

Since becoming operative in part, the AUP has provided greater certainty from previous versions on rules and zoning that influence urban development, which includes:

- The Puhinui Precinct and Māngere Gateway Precinct will increase the level of development immediately adjacent to SH20B, and in the vicinity of SH20A
- The Future Urban Zone (FUZ) has been extended south to provide further development in areas, including Pukekohe, Drury, Paerata and Takanini[18]
- Residential zoning rules have been relaxed, enabling denser development both in new subdivisions and additional infill and redevelopment in the existing urbanised area. This has been achieved through changes that permit smaller lot sizes and more dwellings per site in residential zones, as well as 'rezoning' of some suburbs to allow for apartment buildings and terraced housing. Intensification is concentrated within Māngere, Papatoetoe, Manurewa, Ōtara, Otahuhu, East Tamaki and Flat Bush, with areas rezoned for apartment and terrace housing.
- As part of the Auckland Housing Accord, SHAs[19] were set up to speed up the supply of housing in Auckland. The SHAs in the study area are mainly located in FUZ, which are planned to deliver set amounts of new dwellings by a certain timeframe which differs depending on the facilities and utilities available. There are 12 SHAs in the study area.

During the development of the AUP, areas of 'up-zoning' to enable increased density to meet region-wide population growth forecasts have been incorporated into the version that is currently operative in part.

The combined effect of the AUP's zoning and associated proposed developments is to add significant pressure on the south-western transport system, where customers travelling on SH20, SH20A and SH20B and local roads, in cars or by bus will experience significant levels of increasing demand and associated delays, congestion and unreliability in their journeys. These effects emphasise the importance of providing alternative, non-road travel opportunities starting with improved bus services to the Airport, with greater priority and therefore reliability.

2.6.2 Future Urban Land Supply Strategy

A significant amount of land is planned for release in south Auckland. *The Future Urban Land Supply Strategy* (FULSS) determines the order in which around 50,600 future homes can be developed in largely greenfield

[18] The FUZ is applied to greenfield land that has been identified as suitable for urbanisation. The FUZ is a transitional zone and will remain in place until a structure plan and concurrent plan change re-zones the land to the appropriate urban zone (e.g. residential or business). Land may be used for a range of general rural activities but cannot be used for urban activities until the site is re-zoned for urban purposes.

[19] Auckland Council (2013). Special Housing Areas. Accessed 27 September 2017, from http://temp.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/housingsupply/Pages/home.aspx

areas in the south of Auckland. The original strategy was adopted in 2015. The subsequent AUP processes identified further development areas, causing changes to be made to the sequencing of land to be made ready for development over the next 30 years. The FULSS was refreshed in July 2017 to reflect these changes.

Greenfield areas in the south have been earmarked for urban growth, including 2,370 ha of 'live zoned' land in Pukekohe, Drury, Paerata and Takanini. This growth activity will generate increased transport demands that will directly affect the operation of the transport network.

Under the AUP, FUZ are 'live zoned'[20] via the preparation of a structure plan and a plan change to give effect to the zoning. However, the ability to live zone land is often largely dependent on the availability of critical infrastructure to support development, including transport.

2.7 Demographic Context

The study area is located within the Māngere-Ōtāhuhu, Ōtara-Papatoetoe, Manurewa and Howick Local Board areas of Auckland Council (Figure 2-13). Demographic information is available for these areas which gives some broad guidance to the make-up of the study area. Howick is included as some of the bus services proposed as part of this *SSBC* will connect eastern Auckland to Manukau and the Airport via Puhinui.

While the growth in the study area means that the characteristics of the local board areas are likely to change significantly over time, the current information is important as it demonstrates a consistent pattern of lower educational and employment levels leading to relatively low average incomes for three out of four boards. These characteristics emphasise the importance of ensuring better transport links to employment sources, such as the Airport precinct, that are not necessarily dependent on individual car ownership. The Howick Board territory is wealthier with lower unemployment. Access to the Airport from Howick may have a different emphasis, therefore, to provide an attractive alternative to driving for those who have more choices.

[20] "Due to the large scale of the future urban areas, structure plans will determine the appropriate staging and timeframes of subsequent plan changes to 'live zone' areas within the structure plan area to ensure the efficient and logical roll out of local infrastructure to these areas." Auckland Council. Ibid. Page 10.

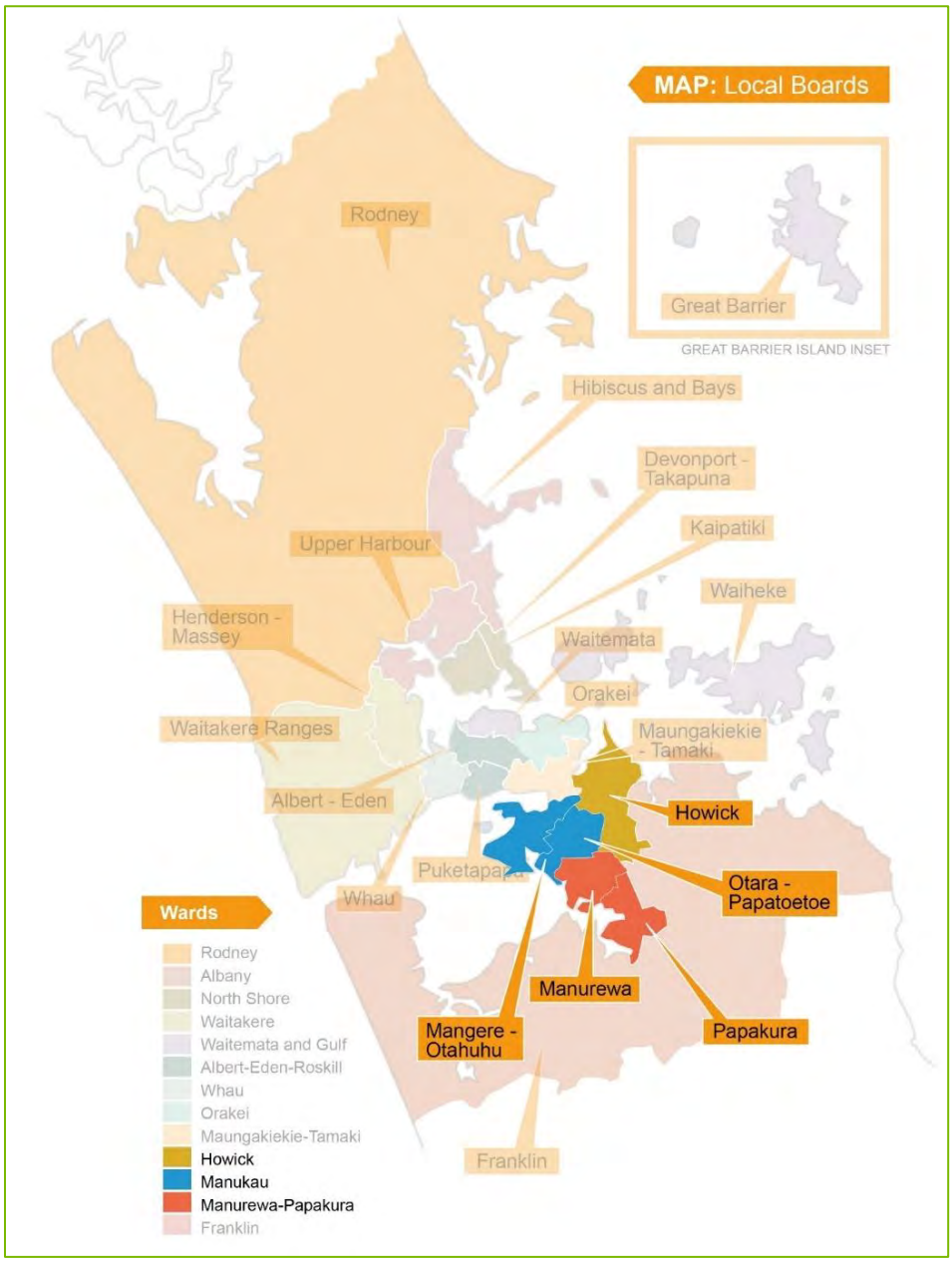


Figure 2-13: Auckland Council Local Boards and wards with study area boards highlighted 21

The information in Section 2.7.1 to Section 2.7.4 below comes from the 2013 census data and Auckland Council[22].

2.7.1 Māngere-Ōtāhuhu Local Board

This local board area is located on the upper reaches of the Manukau Harbour and embraces a mix of residential land (Māngere, Ōtāhuhu, Favona) and industrial and commercial land (around Ōtāhuhu) plus the Airport.

In the Māngere-Ōtāhuhu Local Board area:

[21] Auckland Council. Map of wards and local boards. Accessed 27 August 2017, from http://temp.aucklandcouncil.govt.nz/SiteCollectionDocuments/Wards%20and%20Boards%20Map.pdf

[22] Demographic and economic statistics from https://ecoprofile.infometrics.co.nz/Auckland

- The population was 81,100 in 2017 [23]. In the 2013 census 60.1 percent of the population identified as Pacific – the highest of all local boards. 39 percent of the resident population, were born overseas
- $59,900 Median household income– significantly lower than that for Auckland as a whole, at $76,500
- The proportion of formal education was low – 31 percent of all residents aged 15 and above received no formal education qualification
- In 2013 the unemployment rate was high at 15.5 percent of the population, compared with 7.1 percent of all of New Zealand and 6 percent for Auckland
- 30 percent of the local jobs in 2017 were in the transport, postal and warehousing sector. With the growth plans for the Airport, it is expected that the employment within this sector will increase further
- The Māngere-Ōtāhuhu area includes a mix of residential, industrial and commercial land, with the Airport being a major contributor of employment. The GDP per filled job in 2017 was $113,000, appreciably higher than the other boards.

2.7.2 Ōtara-Papatoetoe Local Board

This local board area includes the suburbs of Ōtara, East Tāmaki and Papatoetoe. Some farming land to the west is included as well as Puhinui Reserve on the shores of the Manukau Harbour.

Manukau city centre is the largest retail centre, while other retail and business centres include Hunters Corner, Ōtara and East Tāmaki.

In the Ōtara-Papatoetoe Local Board area:

- The population in 2017 was 87,800
- Ōtara-Papatoetoe is an ethnically diverse community, where 46 percent identified with a Pacific, and 31 percent with an Asian, ethnic group in the 2013 census. Of the resident population, 42 percent were born overseas.
- Whilst a net importer of labour, the unemployment rate was high at 14 percent of the population. The median household income in 2013 was $60,800 – appreciably lower than that for Auckland as a whole
- The proportion of formal education in the census was low – 29 percent of all residents aged 15 and above received no formal education qualification. Most schools are rated decile one or two
- Manufacturing and health care and social assistance are the two main industries contributing to GDP and employment.

2.7.3 Manurewa Local Board

The Manurewa local board area includes the suburbs of Homai, Manurewa, Wattle Downs, Weymouth, Clendon Park, Totara Heights and Randwick Park. It also includes the southern part of the Wiri industrial area. Totara Park, Mountfort Park, the Auckland Botanic Gardens and the Vodafone Events Centre are all in this local board.

The southern rail line runs through the centre of Manurewa, transporting commuters and goods, and servicing the inland Port at Wiri – a 15 ha depot connected with the Waitematā seaport by a rail exchange.

In the Manurewa Local Board area:

- The population was 94,500 in 2017

[23] Demographic and economic statistics from https://ecoprofile.infometrics.co.nz/Auckland

- In the 2013 census 25.3 percent of the population identified as Māori, 33.0 percent identified with a Pacific ethnic group, and 20.3 percent identified with an Asian ethnic group
- The 2013 median household income was a relatively low $67,800
- The census year unemployment rate was high at 13.3 percent of the population. The proportion of formal education was low – 28.2 percent of all residents aged 15 and above received no formal education qualification
- Manufacturing, wholesale trade, and public administration and safety are the three main industries. In 2017 32 percent jobs were in the highly skilled sector.

2.7.4 Howick Local Board

The Howick local board area includes the suburbs of Pakuranga, Howick, Bucklands Beach, Half Moon Bay, Cockle Bay, Farm Cove, East Tamaki and Botany Downs. Considerable new development is occurring in Flat Bush with a new town centre (Ormiston) expected to be completed by 2021.

The main business centres are located along Ti Rakau Drive, Botany Town Centre, East Tamaki and in the business park at Highbrook.

In the Howick Local Board area:

- In 2017 the population was 150,200
- In the 2013 census 8 percent of the population was Māori or Pacific – much lower than the other boards, 39 percent were Asian. Nearly half the population had been born overseas
- The median household income was $84,500, higher than the regional median of $76,500
- The census year unemployment rate of percent% matched that of Auckland as a whole
- Similarly, qualification levels were similar to the Auckland average of 17 percent, with slightly fewer residents (14 percent) with no qualifications. Most schools are rated decile seven to 10
- Manufacturing, wholesale trade, and rental, hiring and real estate services are the three main industries. In 2017 31 percent of jobs were in the highly skilled sector.

2.7.5 Socio-Economic Deprivation

The areas immediately surrounding the Puhinui Station have moderate levels of socio-economic deprivation, with higher levels found to the east at Otara before the less deprived areas of Flat Bush and Botany are reached (Figure 2-14).

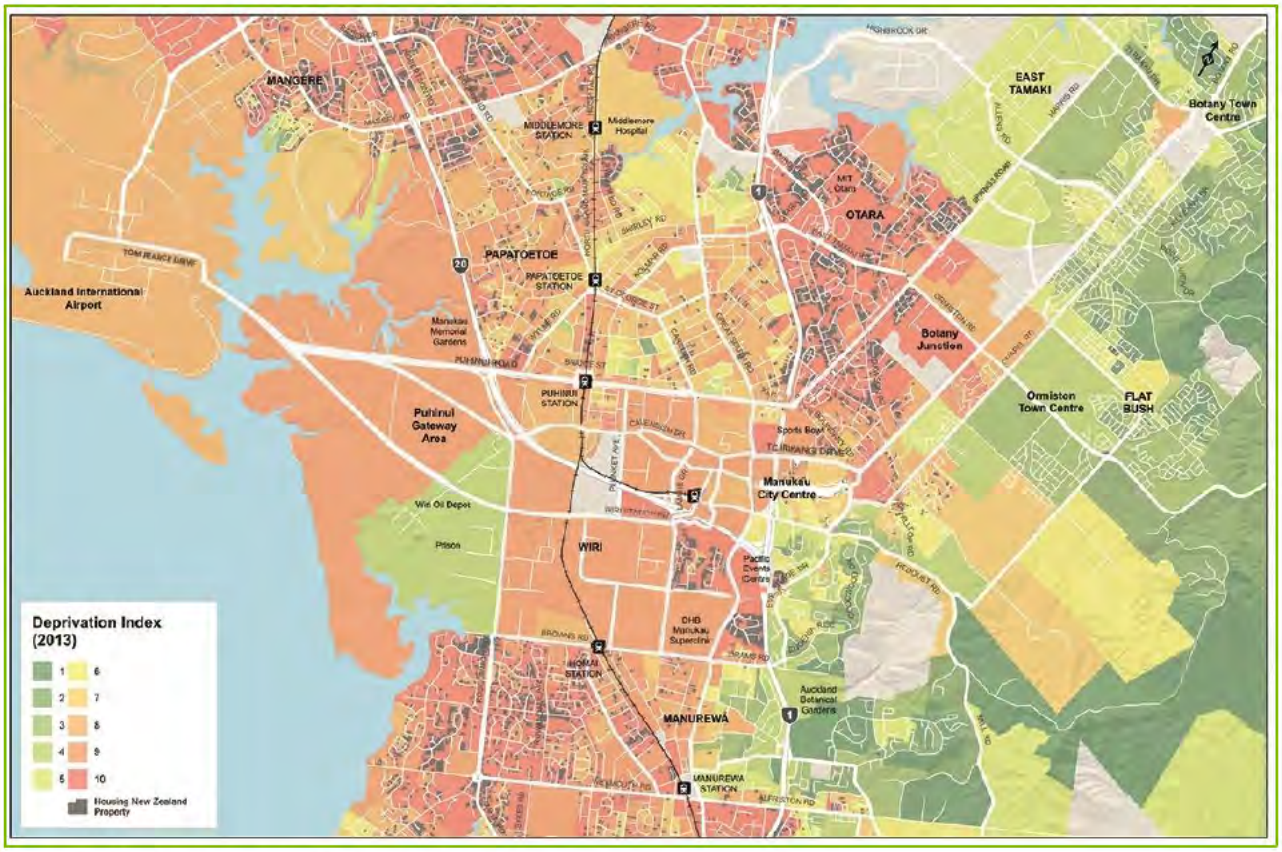


Figure 2-14: Socio-economic deprivation index

The differences between the areas in mode for commuting also show the contrasts, with Howick having the lowest use of public transport (bus/train) and the highest for private car/company vehicle at 72 percent compared to Māngere-Ōtāhuhu at 62 percent and Ōtara-Papatoetoe at 63 percent.

Table 2-1: Commuting mode – source: Census 2013

Board Area	Main means of travel to work					
	Private car	Company vehicle	Passenger	Bus/train	Walk/cycle	Other
Māngere-Ōtāhuhu	56%	6%	8%	5%	3%	22%
Ōtara-Papatoetoe	57%	6%	7%	6%	4%	20%
Manurewa	59%	9%	6%	4%	2%	20%
Howick	60%	12%	3%	3%	2%	20%

This means that it is important that the public transport facilities provided cater for a range of customers with differing needs – for some the opportunity to access employment will predominate while for others there may be more emphasis on choice and access to the Airport as air passengers or better-paid staff.

2.8 Transport Context

2.8.1 Study Area Strategic and Emerging Context

The strategic network includes:

- A state highway network made up of SH20, SH20A, SH20B and SH1 which provides access to the Airport and forms part of the national and regional state highway system.
- Proposed RTN corridors which form part of a connected suite of rapid transit corridors across Auckland in the next 30 years.

The forecast number of daily trips to and from the Airport will increase from 63,000 in 2017 to 140,000 in 2044. The majority of trips are presently taken by private cars; this is unlikely to change without substantially improved public transport and other alternatives.

2.8.2 State Highways

SH20, SH20A and SH20B are each classified as National, High Volume highways under the One Network Road Classification (ONRC). Their function is of high strategic importance in terms of their contribution to the economic and social wellbeing of Auckland. In particular, SH20A and SH20B perform an important connection to New Zealand's largest and busiest international airport and surrounding industrial area. SH20 also forms the southern-most section of the Western Ring Route (WRR). The state highway system forms the principal element of the transport system for most customers travelling to and from the Airport and the surrounding area.

SH20A is a four-lane expressway, which has recently been upgraded to motorway standard. It carried approximately 43,000 vehicles per day in 2016, of which, approximately seven percent were heavy vehicles.

SH20B is a two lane, undivided corridor with limited local access. In 2016, it carried approximately 27,000 vehicles per day, of which, approximately four percent were heavy vehicles.

SH20 is a four-lane motorway, connecting Manukau to the south with Waterview to the north. It carried approximately 74,000 vehicles per day in 2016, between the Puhinui and Massey Road interchanges, of which approximately 6 percent were heavy vehicles. Sixty-three percent of Airport customers use SH20A and 37 percent SH20B.

Figure 2-15 profiles the different types and percentages of customers who access the Airport and the surrounding area using the state highways. It demonstrates the variety of customers who may need to be attracted to improved public transport services using priority facilities to access the Airport.

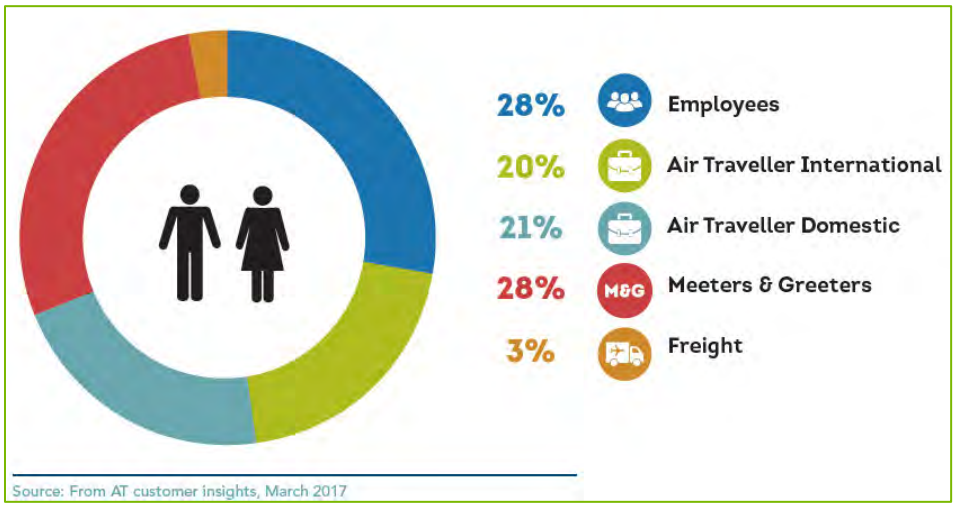


Figure 2-15: Customers of the state highway network who access Auckland Airport

2.8.3 Auckland Network Operating Plan

AT's Auckland Network Operating Plan (ANOP) 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 components of the state highway and multi-modal network have an important role to play in the South West's arterial network planning, assisting with a better balance between productivity, place and safety outcomes in the area, including through accommodating public transport services.

The central and south ANOPs shown in Figure 2-16 include the Airport, Puhinui and the surrounding area.

Figure 2-16: The Auckland Network Operating Plan in the study area

As part of the Southwest Gateway Programme, an Airport Access Network Operating Plan is being prepared. It will include priority weightings for each mode, detail for managing the network and guidance for project decisions to achieve alignment with the agreed objectives for corridors and intersections.

2.8.4 Rail

Key features of the rail network in the study area include:

- The NIMT railway line runs north to south through the study area, connecting Auckland's City Centre to Pukekohe (and ultimately with Wellington, across the North Island of New Zealand)
- The Manukau Branch is a 2.5 km spur railway line off the NIMT railway line south of Puhinui station, from Wiri to Manukau City Centre. The branch connects to the NIMT in the north facing direction only
- Stations in the study area located along the NIMT line include Manurewa, Homai, Puhinui, Papatoetoe, Middlemore and Ōtāhuhu. The Manukau Station is located on the Manukau Branch (Eastern Line)
- The railway lines are owned by KiwiRail, who also operate freight services and long-distance passenger services along the length of the NIMT
- Wiri Electric Train Depot is a maintenance and stabling facility located next to the NIMT line and the South-Western Expressway in Wiri
- To the north, the 3.6 km Onehunga Branch line diverges from the North Auckland Line (NAL) at Penrose, terminating at Onehunga. It is used for suburban train services. Earlier studies by AT[24] revealed the extremely high cost of extending this line to the Airport resulting in a decision by the AT and Transport Agency boards to discount the option[25].

In terms of passenger service and infrastructure upgrades, the electrification from Papakura south to Pukekohe is also being progressed (ATAP 2018 p. 19) with a higher service frequency and direct services between Pukekohe and Britomart.

2.8.5 Public Transport Services

AT's New Network for bus services in south Auckland was implemented in October 2016 (Figure 2-17). The New Network is based on a frequent connected service model that aims to enable public transport journeys between a wider range of origins and destinations by providing a small number of frequent routes that offer 'turn-up-and-go' levels of service, along with less-frequent routes to serve areas not directly served by frequent routes and interchange points that allow for easy and convenient transfers between services.

[24] SMART interim business case, June 2016

[25] AT recommended that bus-based and light rail options be developed in more detail and a value for money comparison undertaken. The Transport Agency Board agreed with AT that heavy rail be discounted from further consideration as a rapid transit option in this area due to its poor value for money, 10 June 2016 [Board paper 16/106/1029]

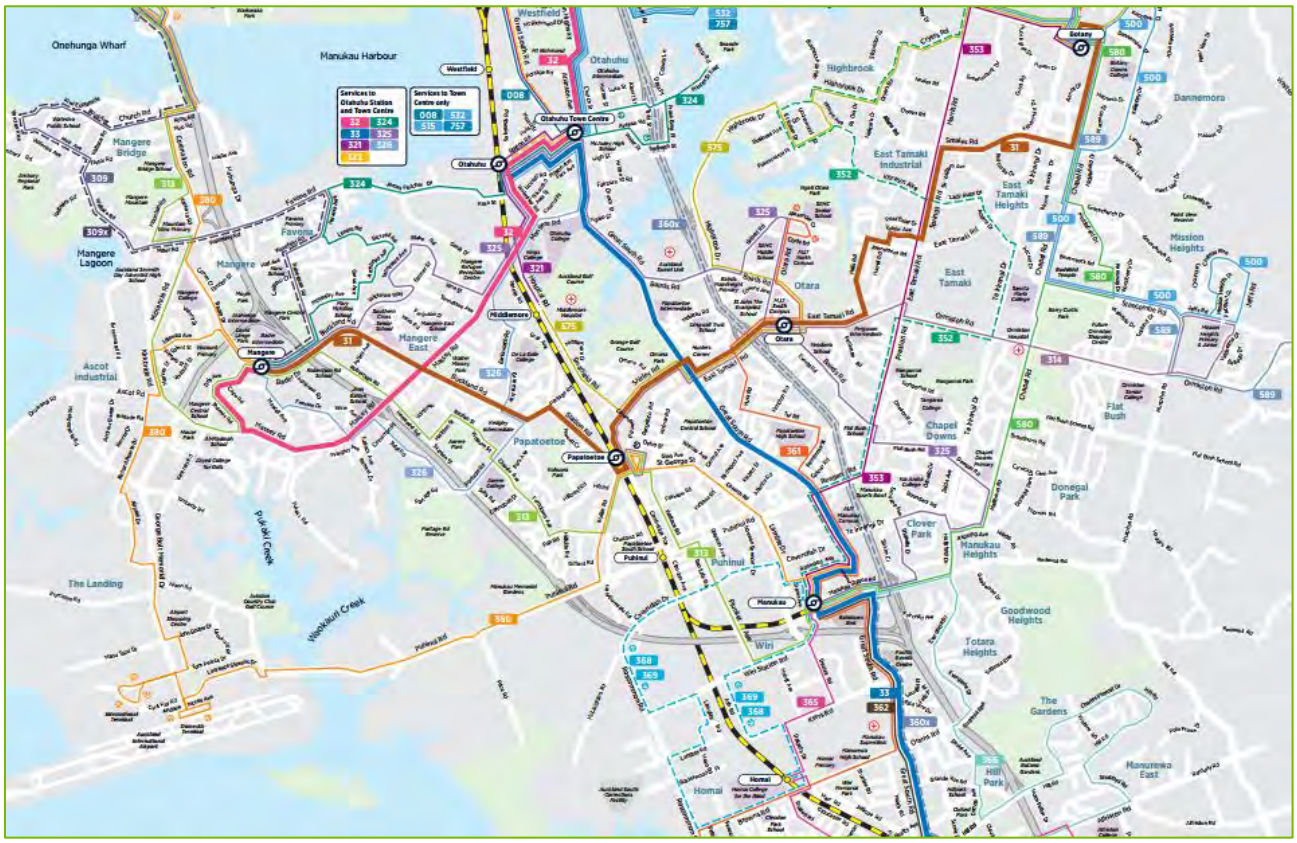


Figure 2-17: South Auckland New Network, August 2016[26]

Changes to this network is recommended by this business case to align with the planned upgrade of Puhinui Station.

Sky Bus uses SH20A between the Airport and Auckland's city centre. It carries approximately 780 inbound passengers and 600 outbound passengers per day. Sky Bus is a commercial service that has premium fares, and which runs every 10 minutes, all day. A new service to Albany, the North Harbour Express started operating in mid-2018.

The Airporter 380 uses SH20B between Manukau and the Airport. The Airporter 380 now runs a service every 15 to 20 minutes during the day, 7 days a week, 365 days of the year, between Manukau and Onehunga which travels via Papatoetoe Station and Onehunga Station. It serves the employment areas in the outer Airport precinct area. It takes a non-direct and relatively circuitous route, particularly between the Airport and Onehunga.

During 2017, prior to the change in service frequency from half-hourly, AT HOP data shows that total weekly patronage modestly increased from an average of approximately 10,000 to just under 11,000 total weekly trips over the course of 2017. In January 2018, the early success of the increased frequency of the 380 Airporter service is shown, with total weekly trips increasing by between 28 percent and 37 percent compared to the same time period in 2017 (excluding the holiday-affected first week).

[26] Auckland Transport.

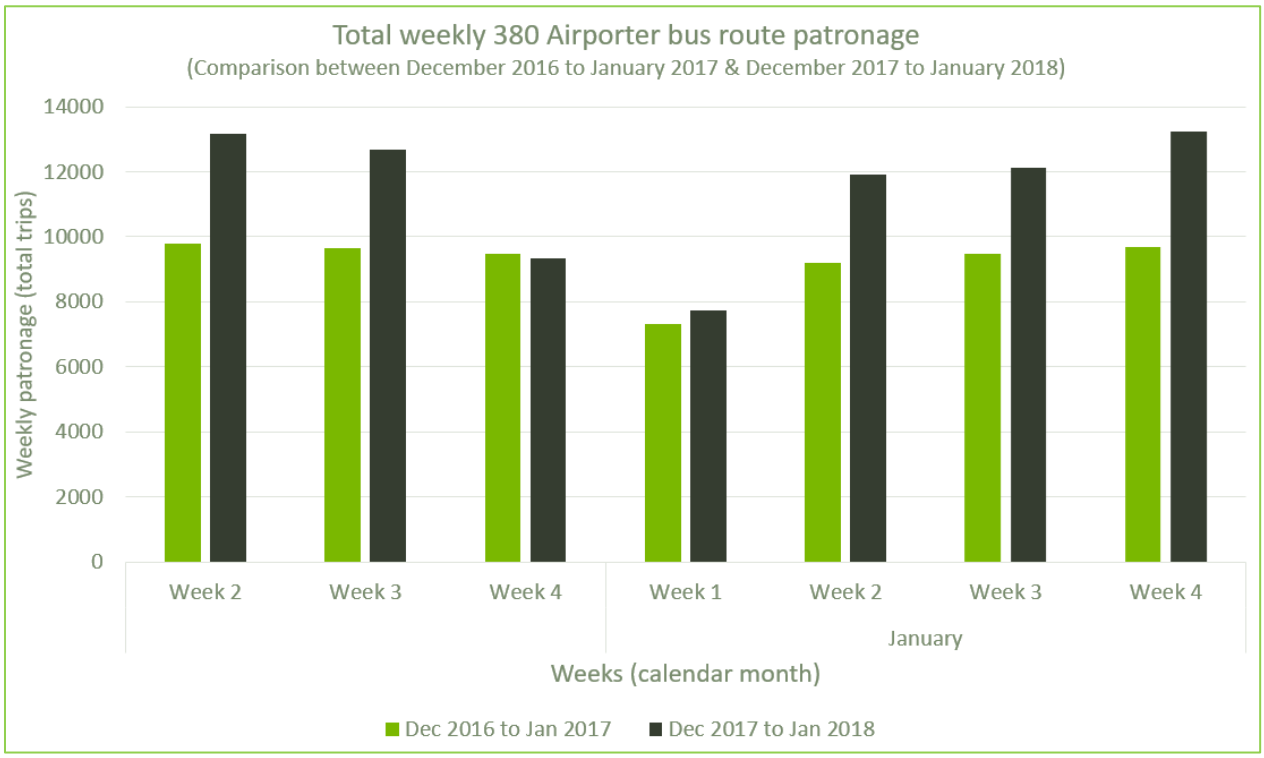


Figure 2-18: Total weekly 380 Airporter bus service patronage - comparison between December 2016 to January 2017 and December 2017 to January 2018[27]

The closest rail public transport services to the Airport are located on the NIMT line, several kilometres to the east of the Airport at Puhinui Station and the Manukau branch line that currently terminates at the Manukau metropolitan centre.

2.8.6 Future Mass Rapid Transit

As stated in the RPTP (p. 26), the RTN provides the highest level of public transport service and is focussed on moving people quickly, safely and reliably throughout the day. The *Rapid Transit Network Review Study,* of 2014, confirmed in 2015[28], had its starting point as the RTN proposed by the Auckland Plan. The Review (2014) focused on the levels of demand through identified corridors and used this demand assessment to make recommendations for the development of the RTN.

The *Auckland Plan* had identified proposed extensions to the RTN incorporating infrastructure and related services for both bus and rail. In the Airport to Botany corridor they were:

- Airport rail (both to Onehunga and to Manukau)
- Botany to Manukau Busway.

In the review, corridors were developed based on desire lines between centres, without being constrained to the existing or proposed transport networks. A corridor was classified where significant demand along the desire lines was expected. Those identified included the corridor between the Airport, Manukau, Flat Bush and Botany.

The strong demand towards the Airport through Manukau from the east and from Manukau itself suggested that a quality public transport connection had potential, though the timing and priority needed to be considered.

[27] AT Hop transaction data

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

The level of demand was not seen as sufficient to justify heavy rail between the Airport and Manukau with its high cost, difficult physical connection and challenge to introduce into the service pattern.

The review recommended a BRT service in the decade from 2031, between the Airport and Ellerslie via Manukau and Botany with high frequency, limited stops and higher running speed making use of the AMETI busway and on street bus lanes, see Figure 2-19.

Figure 2-19: Future Rapid Transit, 2nd Decade (2031). Source: Rapid Transit Network Review Study 2014

ATAP 2018 includes a commitment to a Light Rail RTN service on the city centre to Airport corridor noting (p.17) “Overall, there are significant benefits from delivering the whole Airport to City route in the first decade – specially to enable growth and shape Auckland’s urban form.”

2.8.7 Walking and Cycling Network

Although the area surrounding the Airport is relatively flat there is very little cycle infrastructure close to and within the Airport environs. The majority of roads within the immediate vicinity are strategic routes (SH20A and SH20B), with the remaining routes being local or collector roads that carry heavy volumes of traffic including relatively high proportions of heavy goods vehicles. Furthermore, there are plans for Airport redevelopment

and scheduled commercial development, which, without feasible alternative transport options, will lead to additional vehicle trips being added to a constrained network.

The area surrounding Puhinui Station is also relatively flat with a connected grid of streets, offering some benefits for people cycling for transport.

There are 1.5-metre-wide painted cycle lanes along Puhinui Road leading to the station without any protection from traffic. These cycle lanes are unlikely to be used by people who want to try cycling for transport due to a lack of safety because of the traffic conditions and street design. Puhinui Road carries 19,000 vehicles per day including 5.5% heavy goods vehicles (2015 count to the west of Wylie Road). The properties fronting Puhinui Road to the west of the station are predominantly residential, resulting in frequent driveways. There are large areas of commercial land use to the south that generate heavy goods movements, which have access from Puhinui Road.

The Puhinui Road cycle lanes connect to other on-road lanes to form a small network in this area. At the western end, on-road cycle lanes are provided on Noel Burnside Drive that connect with Cavendish Drive. Cavendish Drive is a four-lane road with a speed limit of 60km/hr. The cycle lanes are unprotected and narrow at 1.2 – 1.5 metres. This situation is replicated on Lambie Drive close to Cavendish Drive and Puhinui Road (although the middle section is single lane with parking provided), and again on Great South Road. All of these links provide access to commercial activity, and as arterial routes in this area they are likely to carry a large proportion of heavy goods vehicles.

Further afield, there are also painted cycle lanes provided on Station Road and on Buckland Road. The cycle provisions on Buckland Road, however, are intermittent and do not provide a continuous cycle route for people travelling to schools off Buckland Road or to Papatoetoe Station.

The cycle facilities around Puhinui Station may provide limited benefits for the confident users, but do not contribute to a cycle network for all ages and abilities. The absence of physical protection and spatial buffering from traffic means that these facilities are insufficiently safe and comfortable for everyday cycling. The cycle lanes are narrow and expose people on bicycles to unnecessarily high levels of conflict with fast-moving vehicles, particularly through intersections. Furthermore, like all painted cycle lanes, the facilities can be compromised by vehicles being illegally parked in them, especially where NSAAT are not present, forcing people on bicycles out into traffic. The existing and planned cycle route network is indicated below.

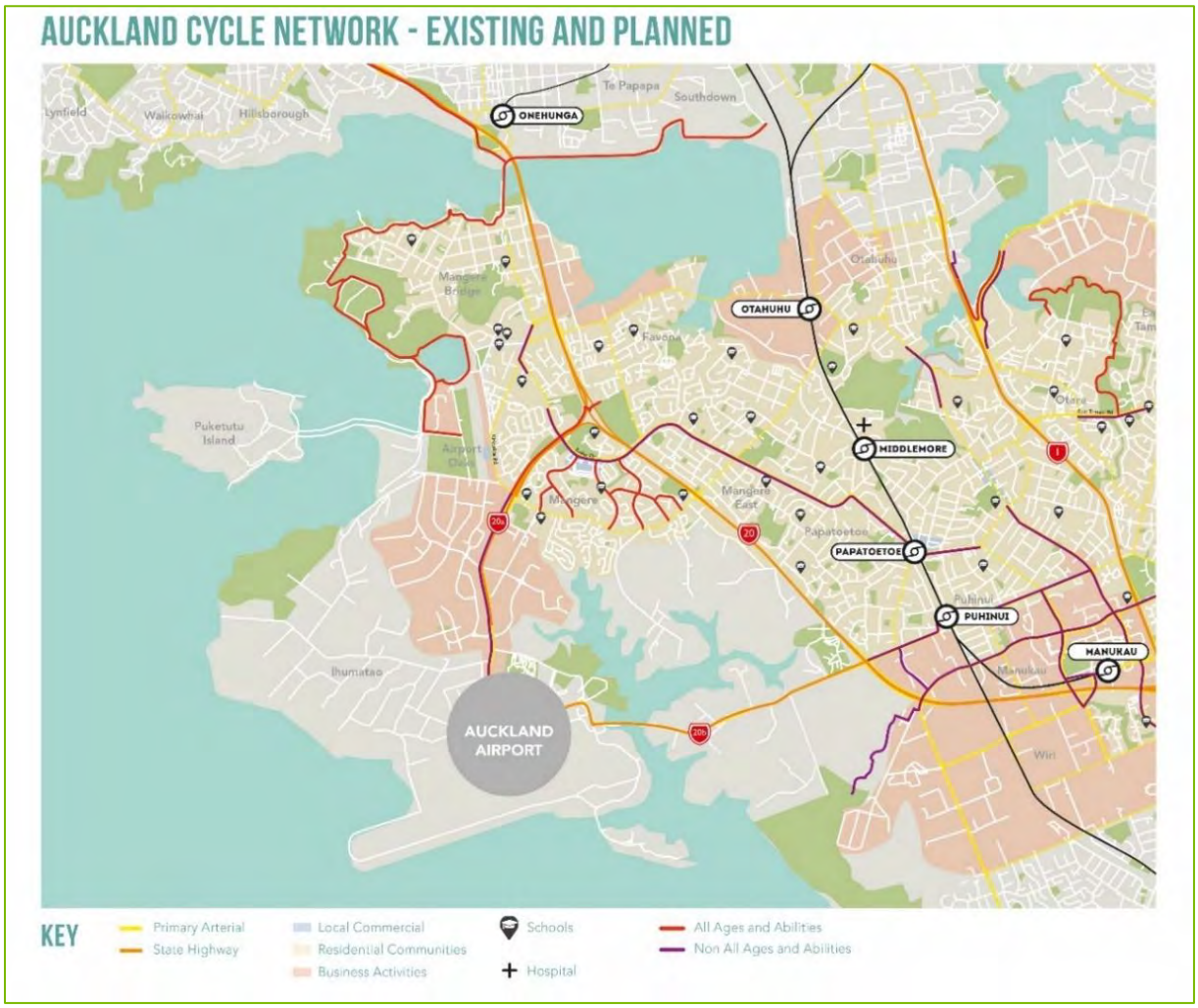


Figure 2-20: Existing cycling network[29]

Parks and reserves in this area have path networks, but an assessment has not been undertaken at this stage as to the utility and quality of the path networks for people riding a bicycle for everyday transport. For example, to the south of SH20B, accessible both from Price Road and the painted cycle lanes on Cavendish Drive (which then connect via a mixed traffic route), a shared path/mountain bike trail is provided for recreational purposes in Puhinui Reserve.

Potential short-term improvements being investigated.

A range of potential options to improve walking and cycling infrastructure aimed at supporting journeys by active modes to and around the Airport and its environs are currently being investigated by the Transport Agency and AT as part of the Southwest Gateway Programme. In addition, AIAL have also identified cycling projects within their land transport network (see Section 2.8.8).

2.8.8 Auckland International Airport's Land Transport Network

The Airport's land transport network and infrastructure provides for a complex range of modes, users and operators. These include:

- General traffic – visitors/ meeters and greeters
- Parking – long term, short-term and valet

[29] Updated Auckland Transport Southern Cycle Map

- Public transport via buses – AT and private companies
- Taxis and shuttles
- Rental cars/ motorhomes/ caravans – pick up and drop off
- Travel between terminals via buses
- Hotel transport
- Park and ride operators – pick up and drop off.

AIAL is making a substantial investment in its own network and currently has multiple improvement projects in development, illustrated in Figure 2-21. These include public transport services, parking facilities, improved pedestrian and cycle access and a roading network upgrades in and around the Airport.

To improve travel times around the Airport, AIAL have identified roading and transport upgrades to be fast-tracked on its own network. In addition to these works the Auckland Transport Operations Centre (ATOC) will optimise traffic signals to increase traffic flows at peak times on the state highways and Airport roads and publish additional Airport-specific travel time information.

Longer term projects include working alongside the Transport Agency and AT to deliver additional network capacity and to improve travel times on Kirkbride Road, George Bolt Memorial Drive, the Landing Drive and Verissimo Drive and SH20A. These new transport projects will help improve traffic flows and travel times around the Airport and help the Airport's transport network accommodate the increasing number of buses that will travel to and from the Airport – including from Puhinui - in the future.

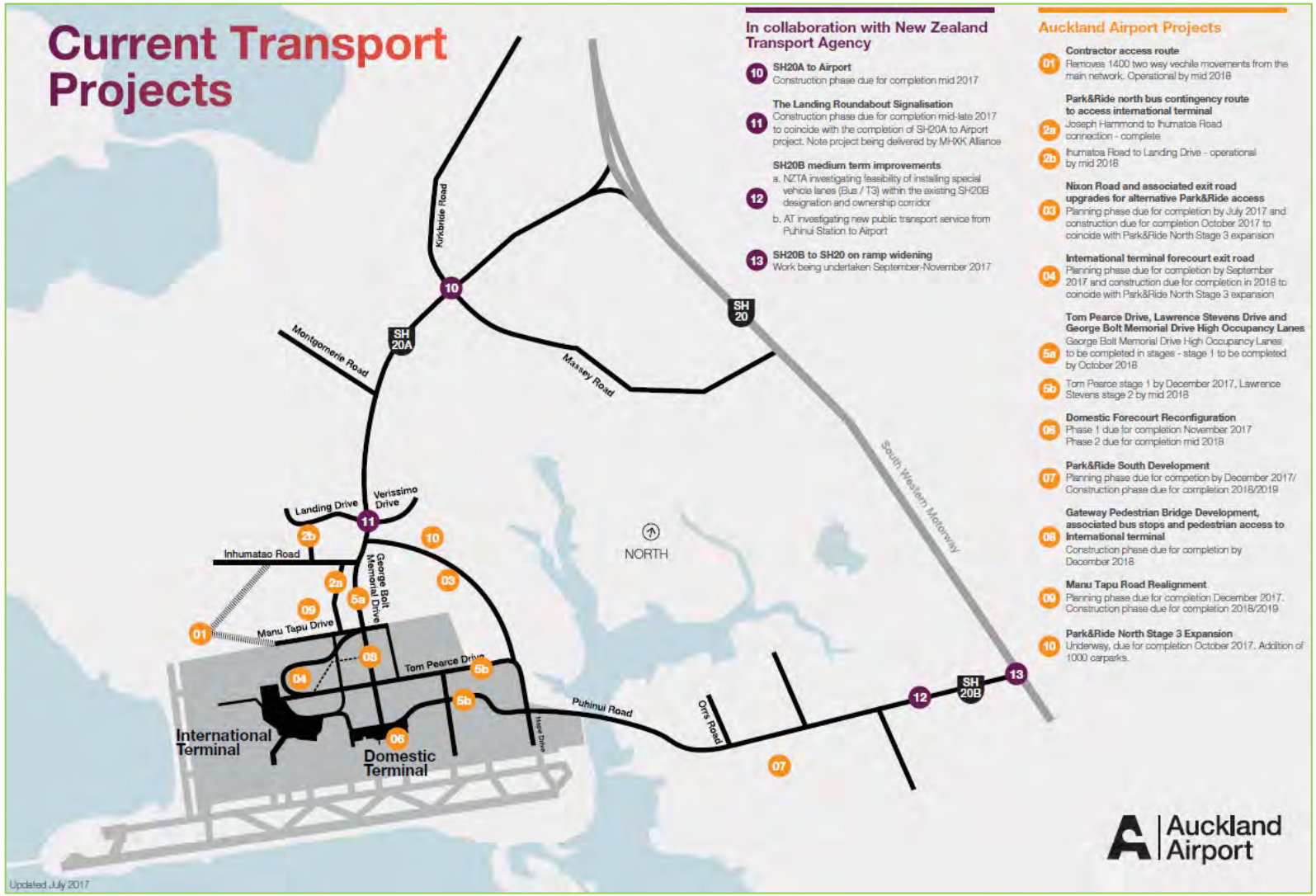


Figure 2-21: Auckland Airport proposed transport projects FY2017[30]

[30] Auckland Airport, Transport. Accessed 15 June 2018, from https://corporate.aucklandairport.co.nz/airport-of-the-future/transport

2.8.9 Evolving Role of Technology in Transport

There are emerging technologies in the form of autonomous vehicles, new ways to access to travel information and the way people can access of purchase travel and mobility. While many of these remain undefined at this time, there is also uncertainty as to the effect these technologies will have on the way people travel and the needs people will have from a service and infrastructure perspective. Five trends are discussed in Appendix A2. Given the timeframe for the short-term improvements, it is unlikely that the technology trends will be significant for this business case. They will be more relevant for long-term considerations.

2.9 Environmental Context

The environmental context is important to set the scene for the analysis of the potential environmental impacts of different options, their costs and any possible consenting and construction issues that may arise.

A high-level planning assessment of the relevant AUP maps, Council GIS data and Google map search in relation to the Puhinui to Airport corridor (Figure 2-22: to Figure 2-26:) identified relevant heritage, archaeology, cultural, recreational and social features within or immediately adjacent to the corridor.

It can be seen that very few features directly affect the immediate vicinity of Puhinui. The exception comes from the Auckland Council Cultural Heritage Inventory (CHI) which identifies three historic places clustered near the Puhinui Station: the Puhinui footbridge, Cambria Park Memorial, and a historic residential building on Wallace Road

Given the nature of the proposals no potential impact is anticipated that cannot be managed.

Figure 2-22: Overview of the study area context

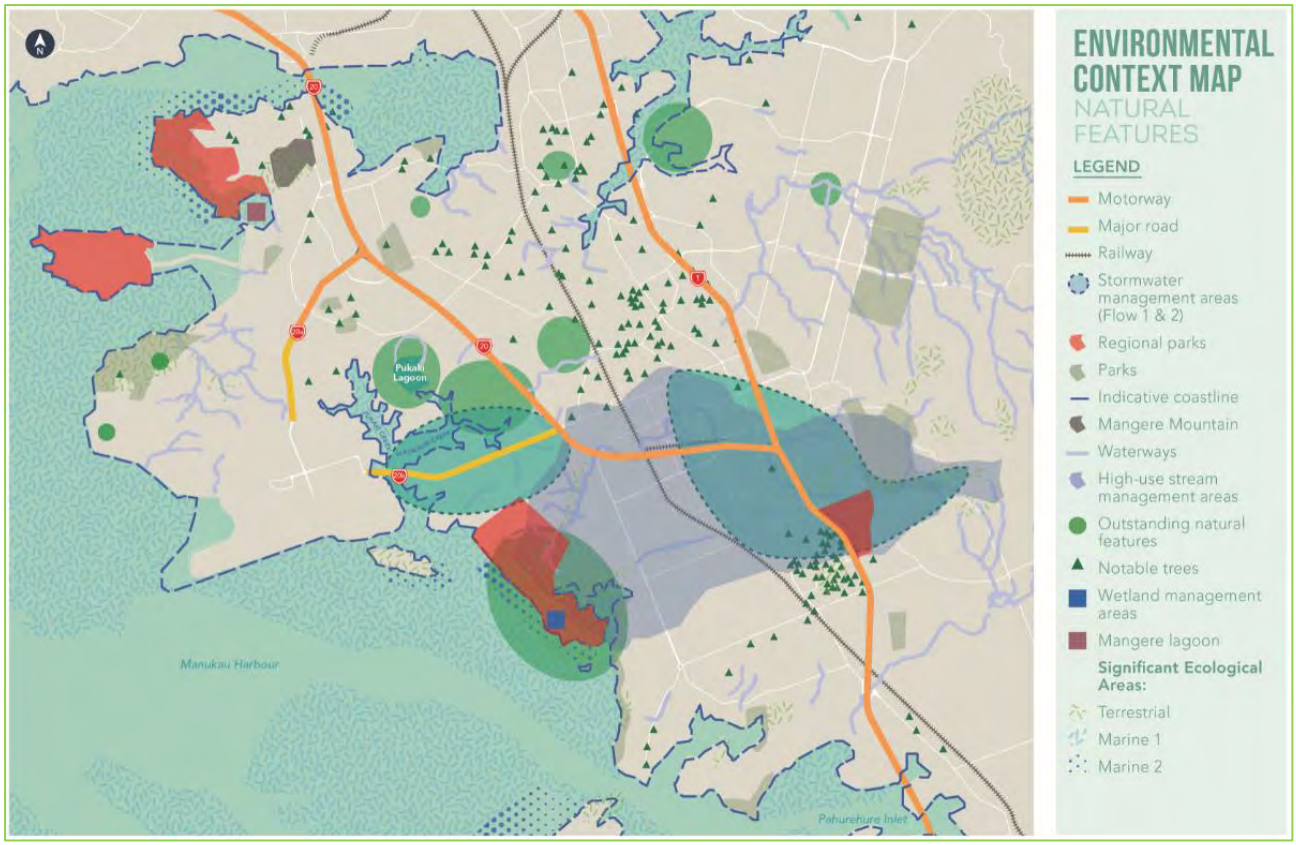


Figure 2-23: Natural features in the study area

Figure 2-24: Volcanic and geological features map

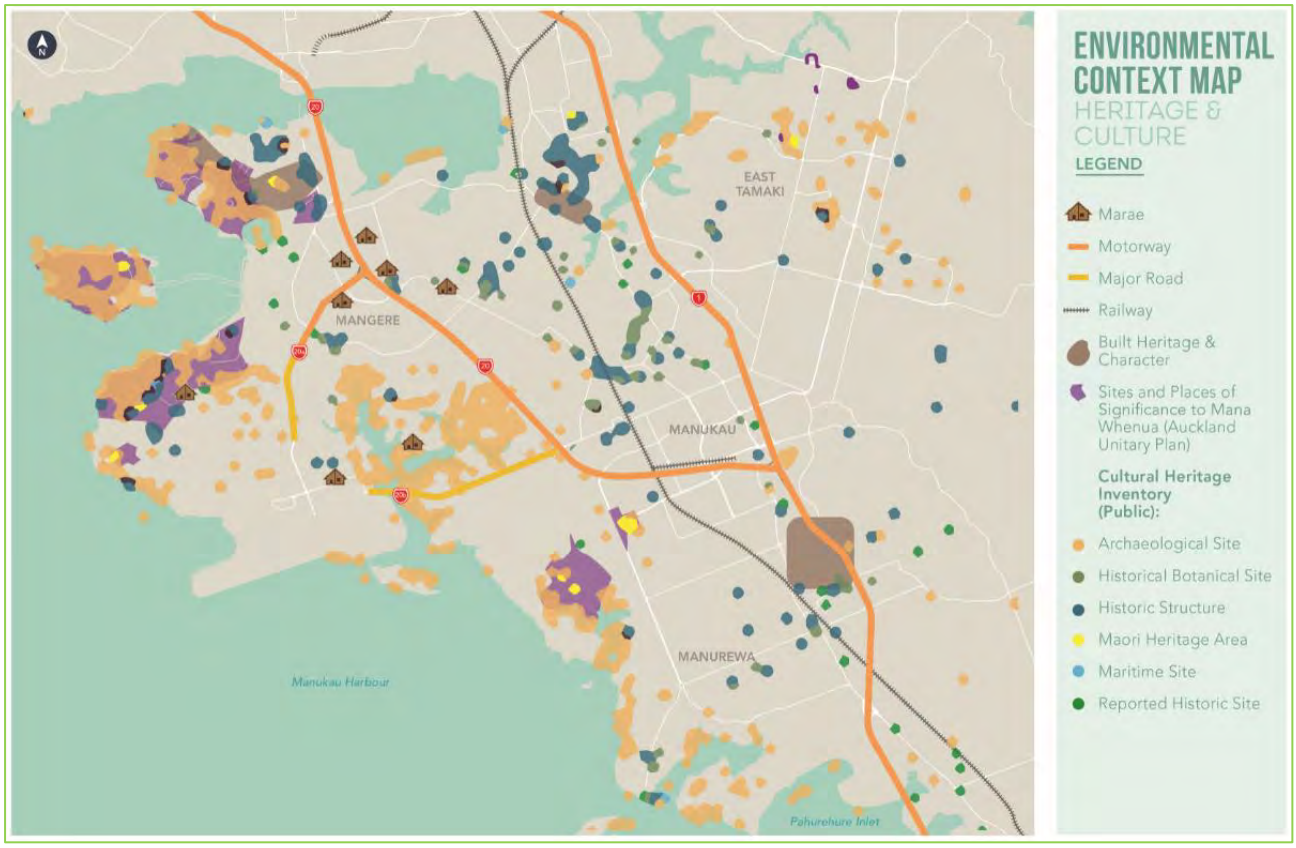


Figure 2-25: Heritage, archaeological and cultural features map

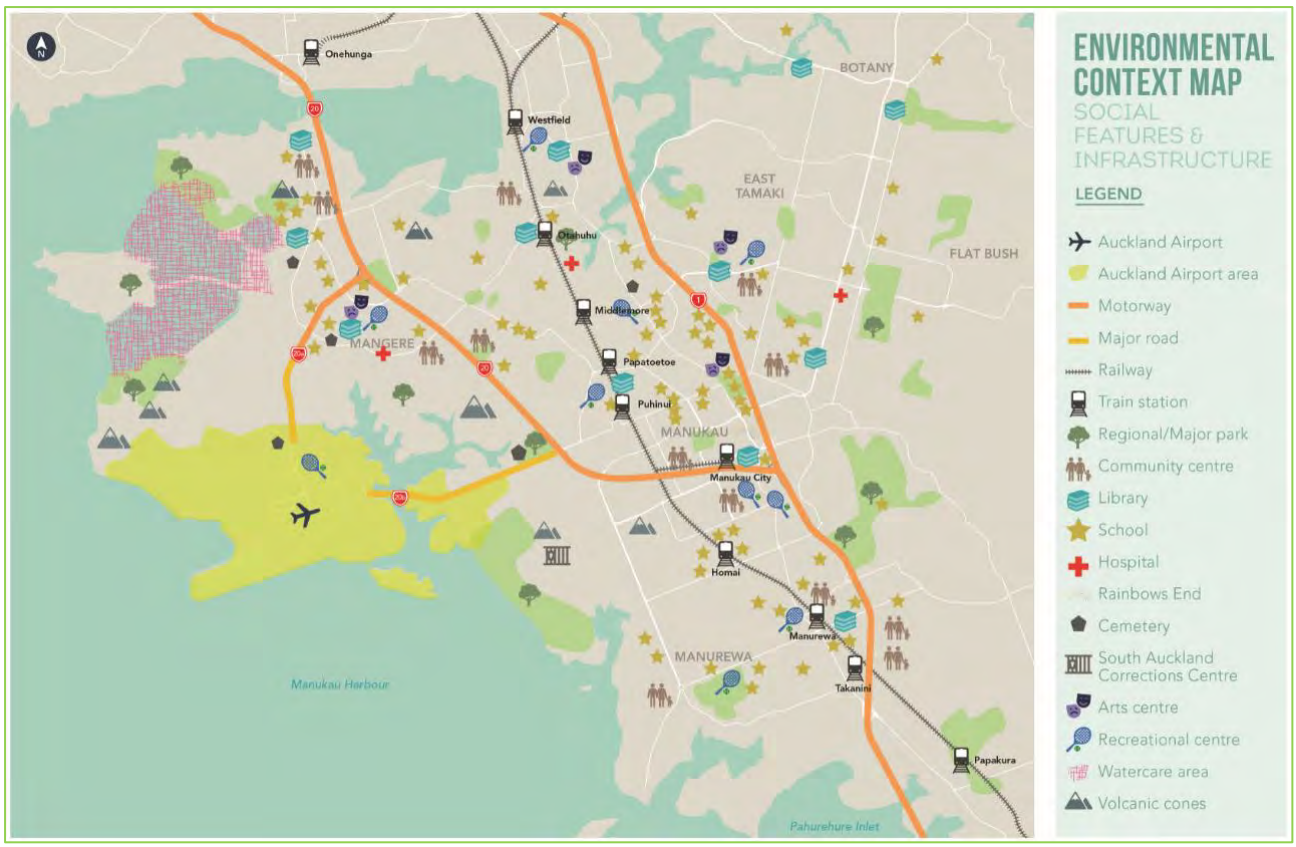


Figure 2-26: Social, cultural and recreational features map

3 Defining the Problems

3.1 Customers' Problems

As part of the development of the earlier SPBC, the investment partners, alongside key stakeholders[31] held a facilitated workshop to investigate customer needs and problems to focus on journey experiences to and from the Airport and the surrounding area.

The workshop identified customer groups, customer-specific problems and the benefits of investment. Profiles of specific needs and problems were developed for each group. The profiles were then refined into customer-specific problem statements, providing further focus to the issues for each group (refer to Figure 3-1). The outcomes of the workshop were added to, and tested against, input from AT's customer research. The problem statements identified in 3.2.2 reflect customer-specific problems.

Figure 3-1: Customer–specific problem statements

3.2 Investment Logic Map

For the 20Connect SSBC, stakeholders were invited to attend an investment logic map (ILM) workshop. The ILM workshop took place on 17 January 2018 and was facilitated by accredited facilitator Kaaren Goodall (Blue Rocket Consulting).

Invitees from the Transport Agency, AT and AIAL were requested to contribute ideas and views reflecting those of their represented organisation and departmental strategies. A final version of the ILM was agreed as shown in Figure 3-2.

[31] In attendance were investment partners the Transport Agency, AT and AIAL, as well as key stakeholders/ customers Auckland Council, NZ Post, Air New Zealand, and the Sustainable Business Council.

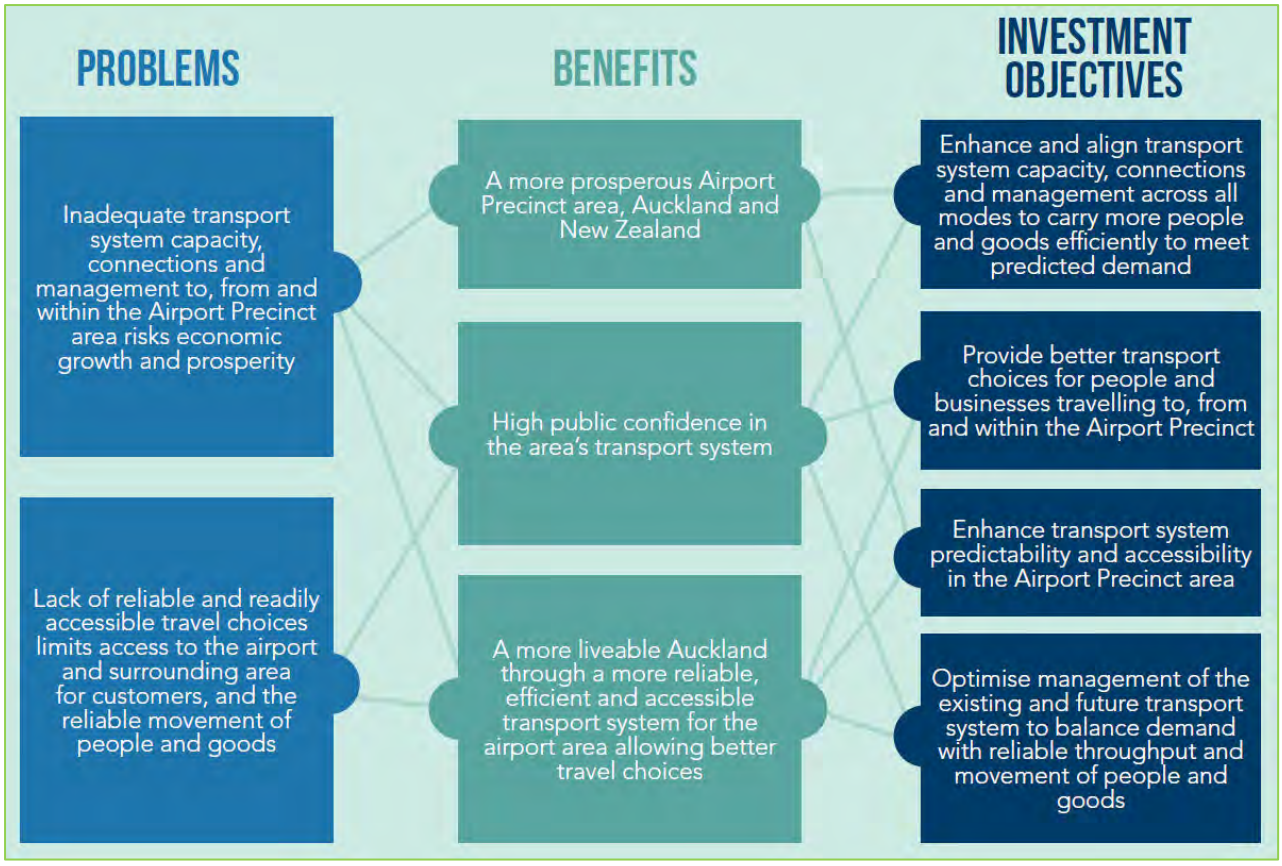


Figure 3-2: 20Connect single-stage business case Investment Logic Map

3.2.1 Short-Term Airport Access Improvements Investment Logic Map

Since the overarching long term 20Connect ILM was developed, the Transport Agency, AT and Auckland Airport have progressed the SH20B and Short-Term Airport Access Improvements SSBCs as part of the Southwest Gateway Programme. A suite of investment objectives has been developed and approved for the short-term projects with investment and project partners during collaborative meetings in April and May 2018.

Figure 3-3 summarises the revised ILM for the Short-Term Airport Access Improvements SSBC. Further details are provided in the following sections.

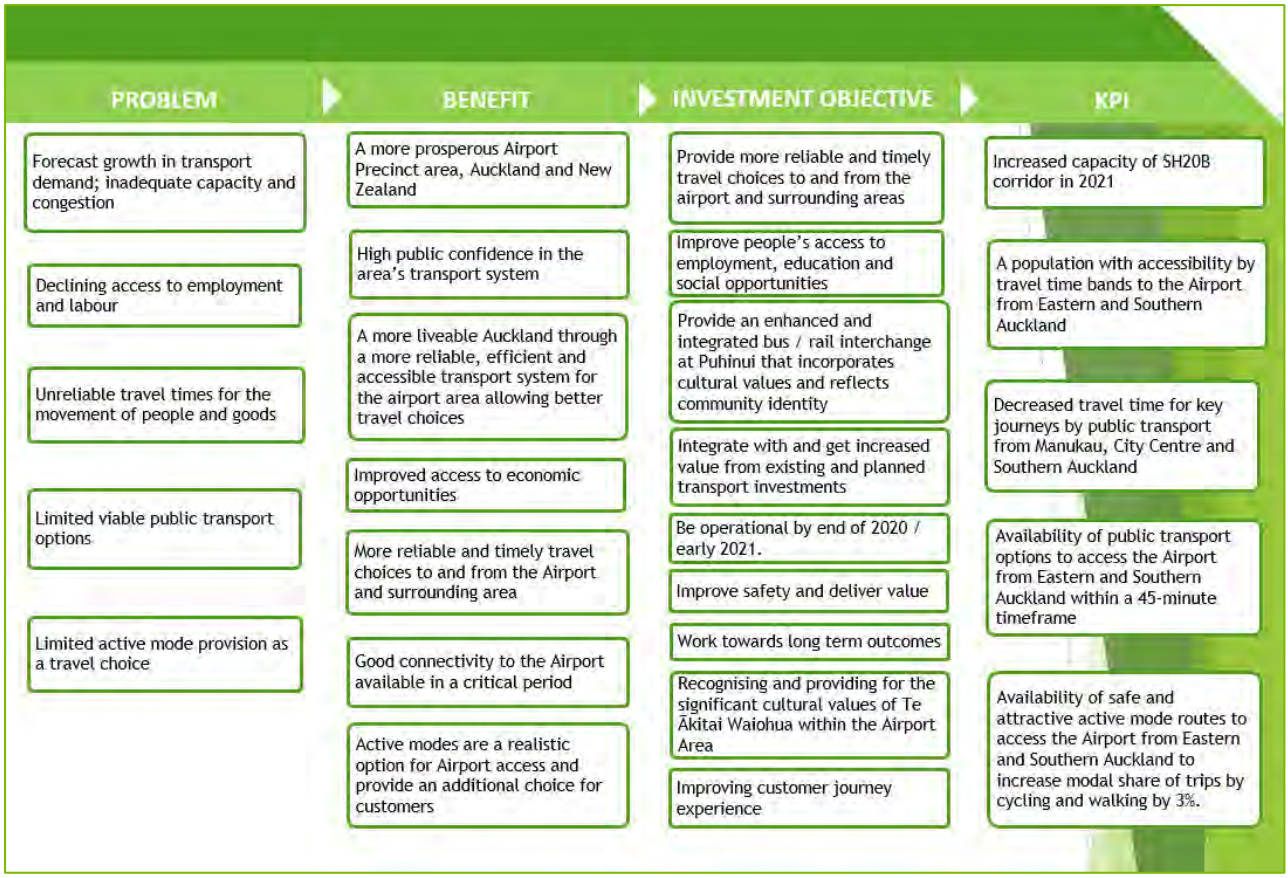


Figure 3-3: Short-term Airport Access Improvements Single-Stage Business Case Investment Logic Map

3.2.2 Problem Statements

The Transport Agency, AT and Auckland Airport have progressed the *Short-Term Airport Access Improvements and SH20B SSBCs* as part of the Southwest Gateway Programme (see Section 1.6). In the Programme "current issues" identified include:

- It is difficult to estimate how long the journey to this area will take, this needs to be more reliable for both people and goods
- People have limited options as to how they travel to and from this area, people need to have more choice
- There is extensive growth planned is this area. This growth will increase the pressure on the state highways. The capacity, connections and management of the network needs to be improved to support the planned growth no matter how people choose to travel.

For the purpose of this SSBC, therefore, the customers' problems and these Southwest Gateway Programme issues have been combined to give five problem statements:

- **Problem Statement 1:** Forecast growth in transport demand; inadequate capacity and congestion
- **Problem Statement 2:** Declining access to employment and labour
- **Problem Statement 3:** Unreliable travel times for the movement of people and goods
- **Problem Statement 4:** Limited viable public transport options
- **Problem Statement 5:** Limited active mode provision as a travel choice.

3.2.3 Forecast Growth in Transport Demand; Inadequate Capacity and Congestion

The current transport network has experienced continuing growth in trip demands and increasing reliance on the strategic networks for intra- and inter-regional travel. Employment growth combined with growing passenger and freight flows is projected to result in an increase in daily trips to and from the area from 63,000 currently to around 140,000 in the next 30 years.

The Airport's current and forecast rapid growth in passenger and flight numbers has a significant impact on transport demand. The 1,024,000 international passengers (excluding transits) in January 2018 was 10,000 more than the previous record set in December 2017, and 3.4 percent more than in January 2017. In addition, a new daily international passenger record was achieved at the Airport on 6 January 2018, with 39,600 international passengers travelling through the international terminal. In January 2018, international passengers averaged 33,000 per day, an average increase of 1,100 per day compared to January 2017[32].

Population and employment growth in future urban areas, particularly in the south around Drury, Pukekohe and Paerata, will lead to increased demand on the network in the future. Travel patterns are expected to generally follow already established land-use patterns, including planned growth and current dispersed patterns of regional employment.

Overall there is insufficient capacity to accommodate projected growth in transport movements to and from the Airport in the future.

The existing capacity of the state highway network has been compared against forecast demand. This highlights that within five years overall demand on SH20B will exceed capacity. In 2018, SH20B has already reached its theoretical capacity to meet predicted demands (see Figure 3-4), again emphasising the need for an alternative on this corridor – such as effective public transport.

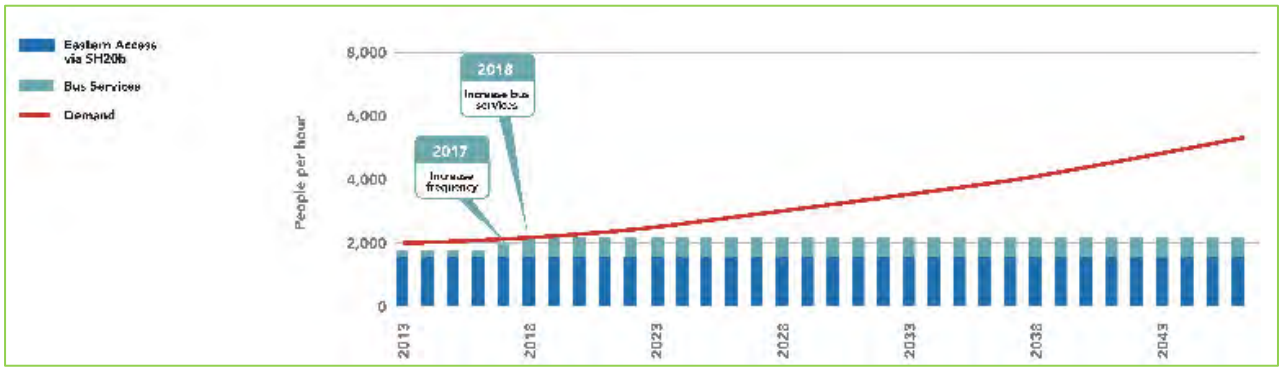


Figure 3-4: Peak hour capacity versus demand on SH20B

3.2.4 Declining Access to Employment and Labour

Ease of transport access to jobs is an important factor in liveability[33]. According to the *ATAP Foundation Report*, the wider Auckland region is projected to experience a deterioration in private vehicle accessibility and a subsequent increase in congestion up to 2036 (Figure 3-5 and Figure 3-6). This is anticipated to lead to little

[32] Auckland Airport (2018). January 2017 Monthly Traffic Update. Issued 2 March 2018.

[33] Defined in the Transport and Infrastructure Council, Australian Transport Assessment and Planning Guidelines, O3 Urban Amenity and Liveability as "The extent to which a place supports the quality of life, health and general wellbeing of the residents. The key attributes of a place that contribute to the quality of life are location, transport facilities and services. The quality of life is further enhanced by environmental sustainability e.g. access to natural and built environment (amenity) and low levels of pollution"

overall growth in accessibility by private vehicle until the 2030s. The role of public transport in providing access to employment grows throughout the period from 2013 to 2046, but with a slower rate of growth beyond the next decade.

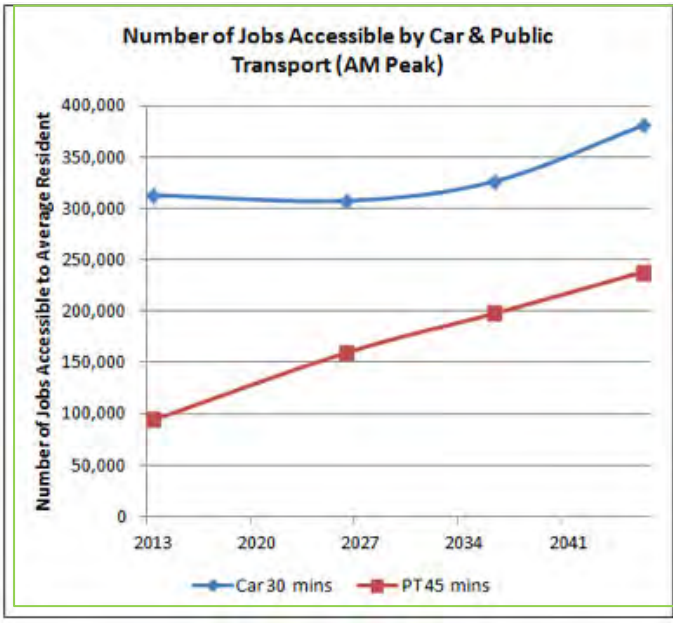


Figure 3-5: Number of jobs accessible by car and public transport from 2013-46 (AM peak)[34]

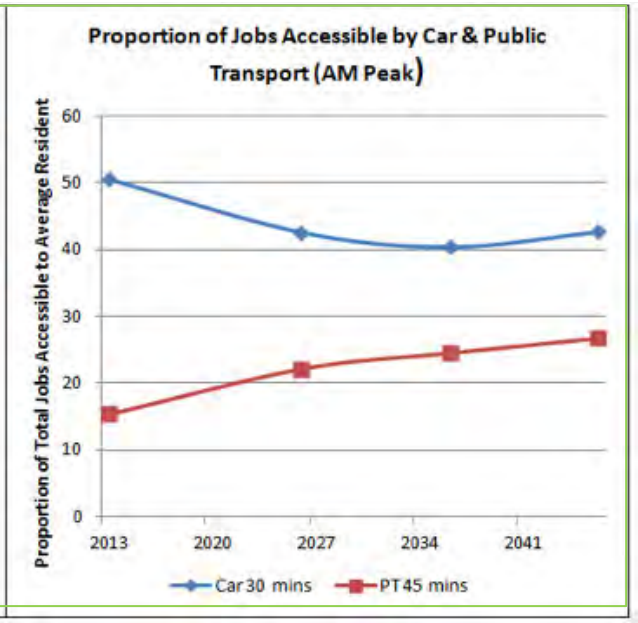


Figure 3-6: Proportion of jobs accessible by car and public transport from 2013-46 (AM peak)[35]

Projected changes in access to employment for residents living in the south, south-east and south-west of Auckland is mixed up to 2046. In the study area, it is evident that there are overall declines in access by 2038 for those seeking jobs in the Airport Precinct area.

As illustrated in Figure 3-7, between 2013 and 2026 there are forecast to be minor improvements in access to employment when travelling by car to the Airport and the surrounding area, with moderate declines in car access in the wider area (including future growth areas). Improvements in access to employment by public transport are generally modest during the period, with only isolated areas of significant increases.

There are forecast to be significant declines in access to employment by car to Airport and the surrounding area between 2013 and 2026. Meanwhile, the wider area of South Auckland (including future growth areas to the south, e.g. Pukekohe, Drury, Paerata and Takanini) is expected to experience moderate improvements access to employment by car owing to the committed improvements.

As seen in Figure 3-8, moderate improvements in access to employment by public transport are projected at the Airport and Māngere between 2026 and 2046, while minor improvements are expected in the area surrounding the Airport and the wider South Auckland area (including future growth areas to the south).

However, these figures show a significant unevenness to future employment accessibility and a growing polarisation of access to employment in the future. The areas which will experience relatively minor improvements in access to employment over time by private vehicle, such as the south-west of Auckland and east Auckland and notable declines in west and south Auckland. These are often the same areas where population growth is projected to occur. By 2046, Māngere and Māngere Bridge are anticipated to experience

[34] Refer to Auckland Transport Alignment Project (ATAP) Foundation Report for further information.

[35] Ibid

moderate declines in access to jobs by public transport, in addition to southern Supporting Growth areas Papakura, Drury, Ramarama, Paerata and Pukekohe.

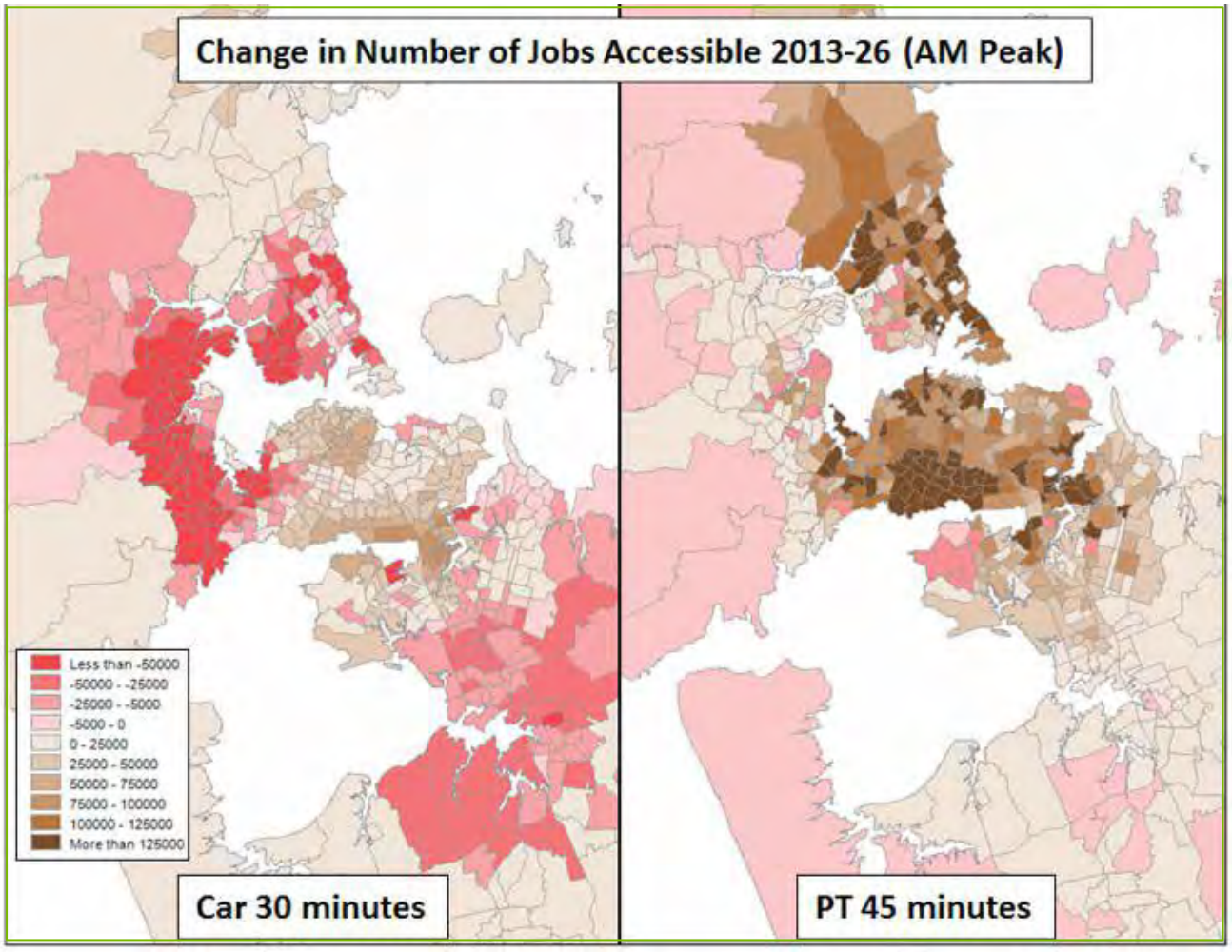


Figure 3-7: Change in number of jobs accessible 2013-26 (AM peak)[36]

[36] Ibid

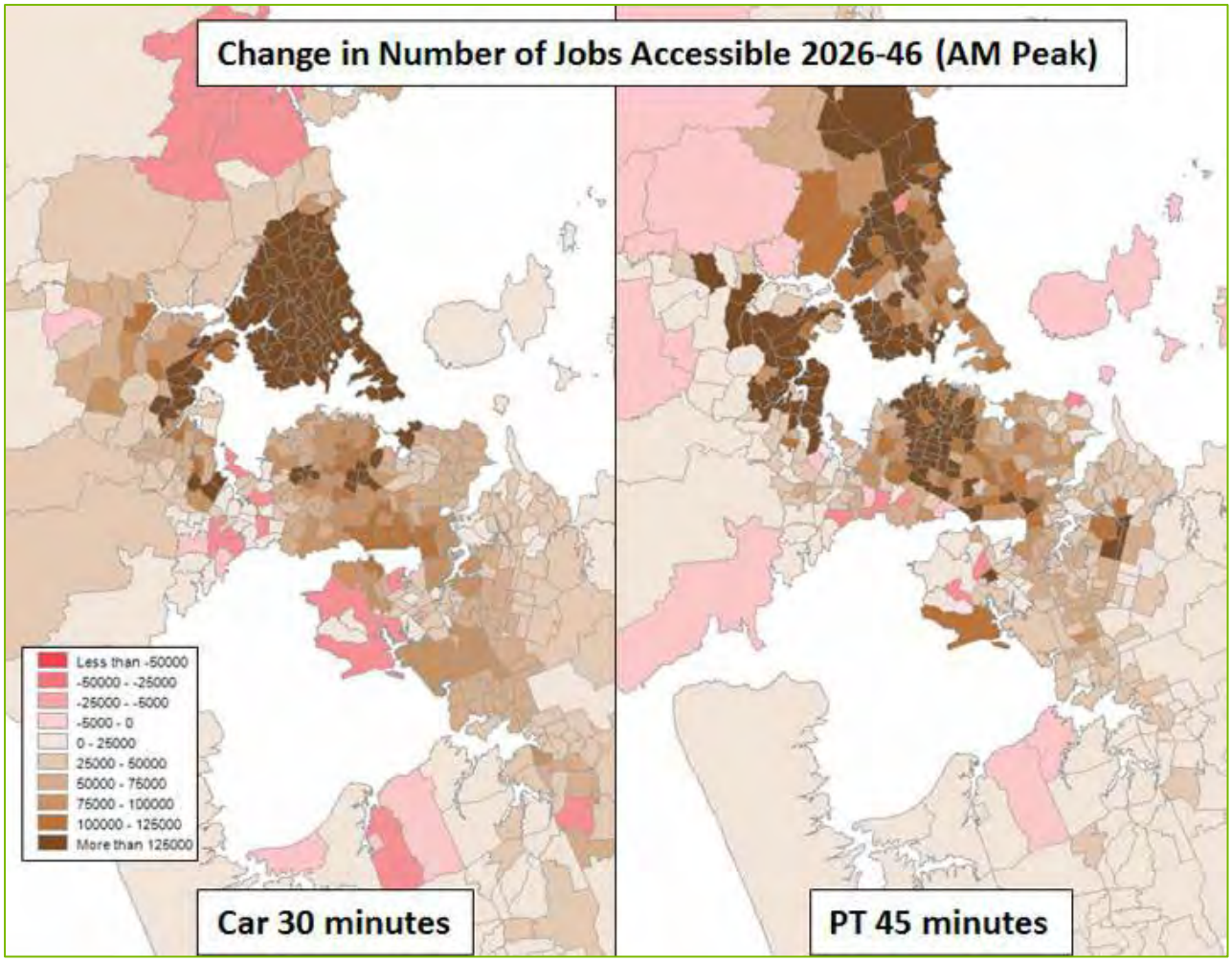


Figure 3-8: Change in number of jobs accessible 2026-46 (AM peak)[37]

The study area has a relatively high unemployment rate (see Section 2.7) when compared with Auckland as a whole. With the Airport and the surrounding commercial and industrial area located in Māngere-Ōtāhuhu, 29 percent of the local jobs during the 2013 Census were in the transport, postal and warehousing sector. With the growth plans for the Airport, it is expected that the employment within this sector will increase further, making the need for better connections and reliable access important from an employment and labour perspective.

3.2.5 Unreliable Travel Times for the Movement of People and Goods

The evidence gathered demonstrates that the current travel times are unreliable and subject to wide variability. This is especially seen during the morning and evening peaks, for all modes and particularly, for public transport during the evening peak travelling to the Airport.

Figure 3-9 overleaf shows trips from Botany and Papakura to the Airport by car have moderate travel time unreliability ranging between approximately 20 and 30 minutes. Travel times by car from Botany and Papakura to the Airport have a variance of around 20 minutes depending on the time of the day.

[37] Ibid

Figure 3-10 overleaf shows the public transport trips on the 380 Airporter bus from Onehunga and Manukau to the Airport have considerable travel time unreliability ranging between 80 and 90 minutes. The public transport trips have the highest travel times in the interpeak/PM peak.

Figure 3-11 overleaf shows trips from the Airport to Botany and Papakura by car have substantial travel time unreliability ranging between 25 and 50 minutes. Trips from the Airport to Papakura have high travel time unreliability, with a variance of around 50 minutes depending on the time of the day. Travel times by car from the Airport to Botany have a variance of around 35 minutes, depending on the time of the day. The longest travel times by car are in the PM peak.

Figure 3-12 overleaf shows the public transport trips from the Airport on the 380 Airporter bus to Onehunga and Manukau have significant travel time unreliability ranging between 60 and 85 minutes. Trips from the Airport on the 380 Airporter bus to Onehunga have high travel time unreliability with the highest travel times in the interpeak/PM peak.

Figure 3-9: Variability in car travel times to Auckland Airport[38]

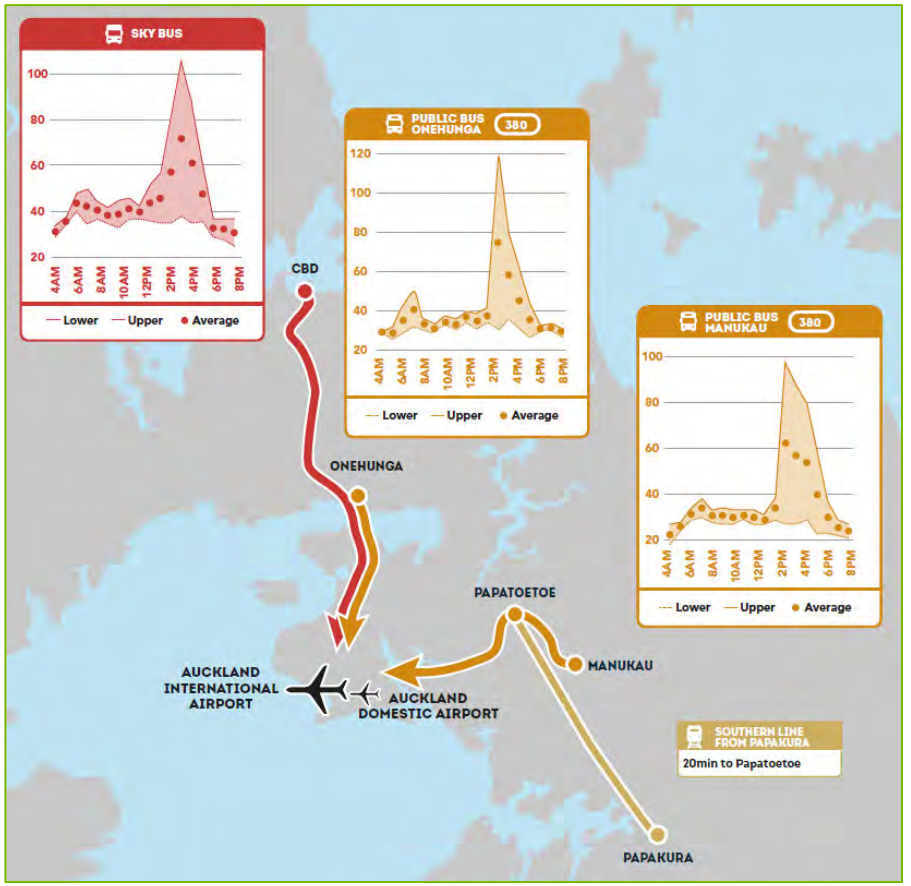


Figure 3-10: Variability in bus travel times to Auckland Airport[39]

[38] ATOC data (25.12.16 – 10.3.17) provided by NZTA on 15 March 2017.

[39] AT data for SkyBus and 380 Bus (1-22.12.16) provided by AT on 27 February 2017.

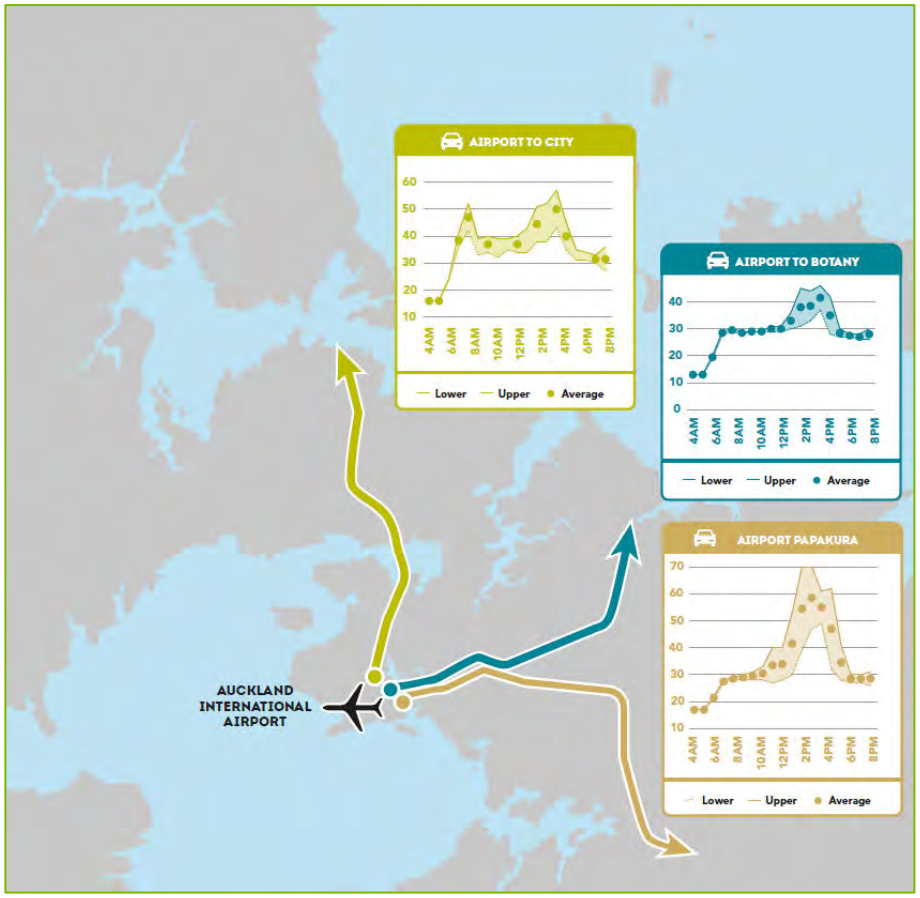


Figure 3-11: Variability in car travel times from Auckland Airport[40]

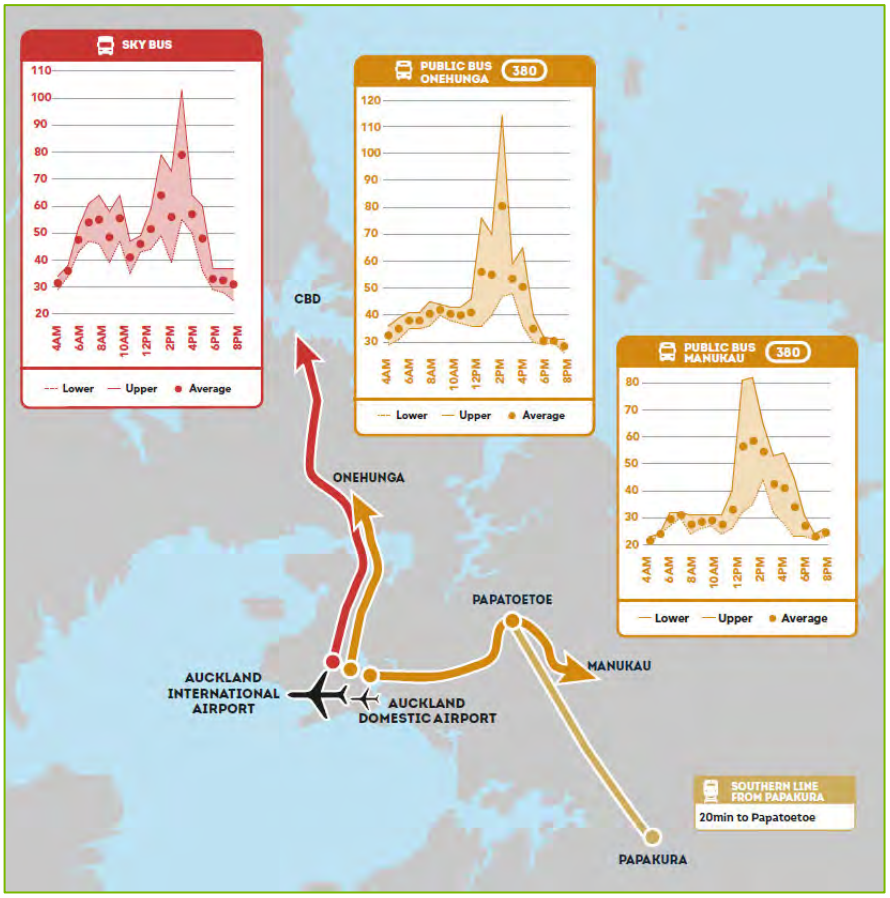


Figure 3-12: Variability in bus travel times from Auckland Airport[41]

[40] ATOC data (25.12.16 – 10.3.17) provided by NZTA on 15 March 2017.

[41] AT data for SkyBus and 380 Bus (1-22.12.16) provided by AT on 27 February 2017.

3.2.6 Limited Viable Public Transport Options

Across the Auckland region there are poor choices to access the Airport within a reasonable and reliable 45-minute timeframe by public transport or 30 minutes by car[42], particularly at peak periods. The vast majority of customers access the Airport via private motor vehicle, making up 64 percent of all journeys.

The limited coverage of the Auckland region by public transport to access the Airport, in comparison to travel by car, as illustrated in Figure 3-13:. The red areas in the figure highlight the areas of Auckland where residents and workers accessing the Airport area, without sufficient travel choices that are predictable and timely, therefore are more likely, or need to, use a car.

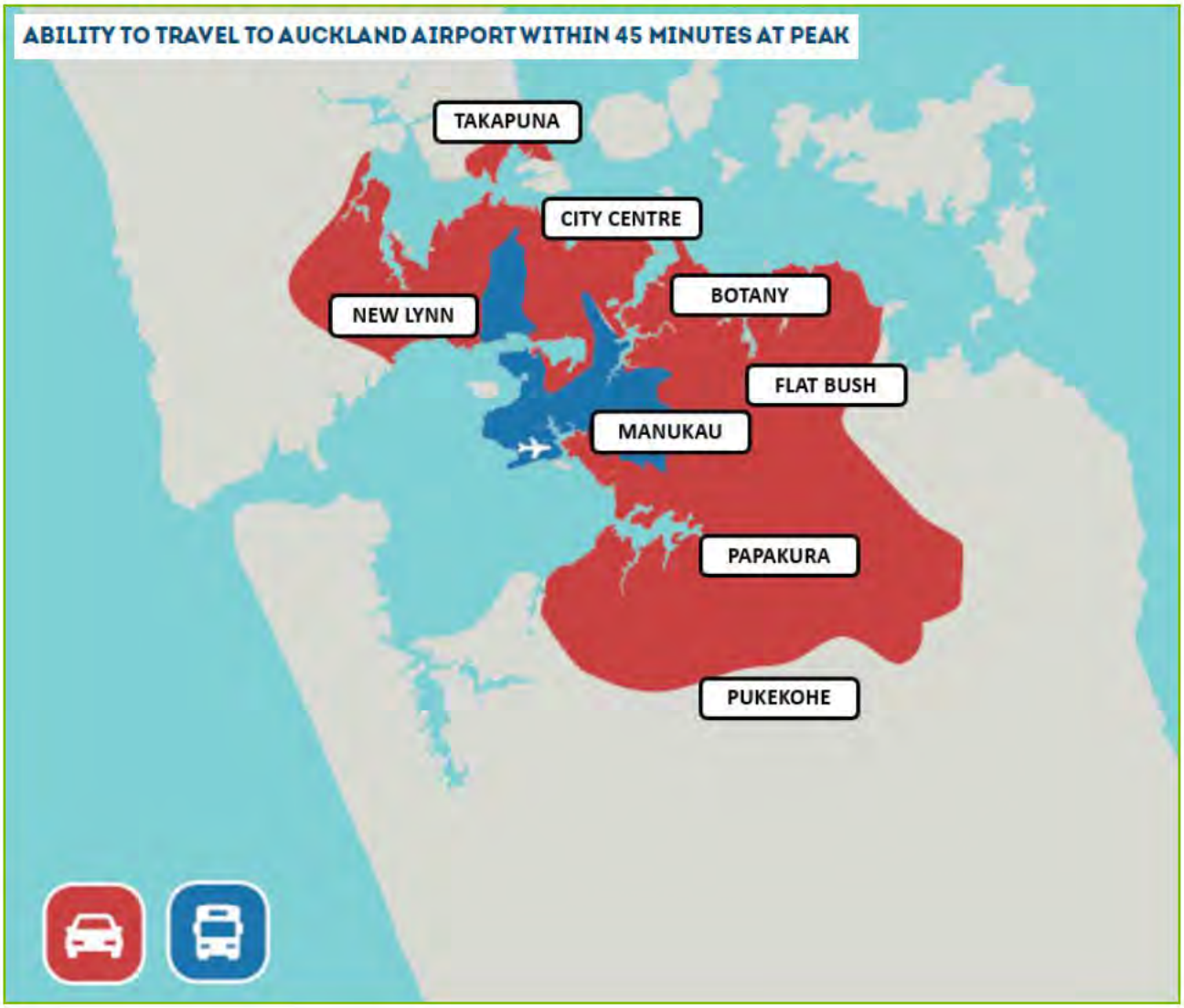


Figure 3-13: Limited travel choices to and from Auckland Airport within 45 minutes at peak periods

[42] ATAP 2016 provides a 45 and 30-minute indicator for travel by public transport and private motor vehicle respectively, to assess the number of jobs accessible to employees. These indicators are considered suitable for adoption as employees comprise a large proportion of customers accessing the Airport. As such, interventions which achieve this timeframe for employees will also benefit the wider range of customers who access the Airport. ATAP Recommended Strategic Approach, page 38.

AT's in-depth investigation into Airport customers' attitudes towards public transport use – and in particular their response to the proposals in the SPBC (Figure 3-14 below) - showed43 that some 81 percent (domestic visitors) and 88 percent (residents) would be prepared to consider using public transport. Among these a combined bus and train option was similarly rated to a bus only choice.

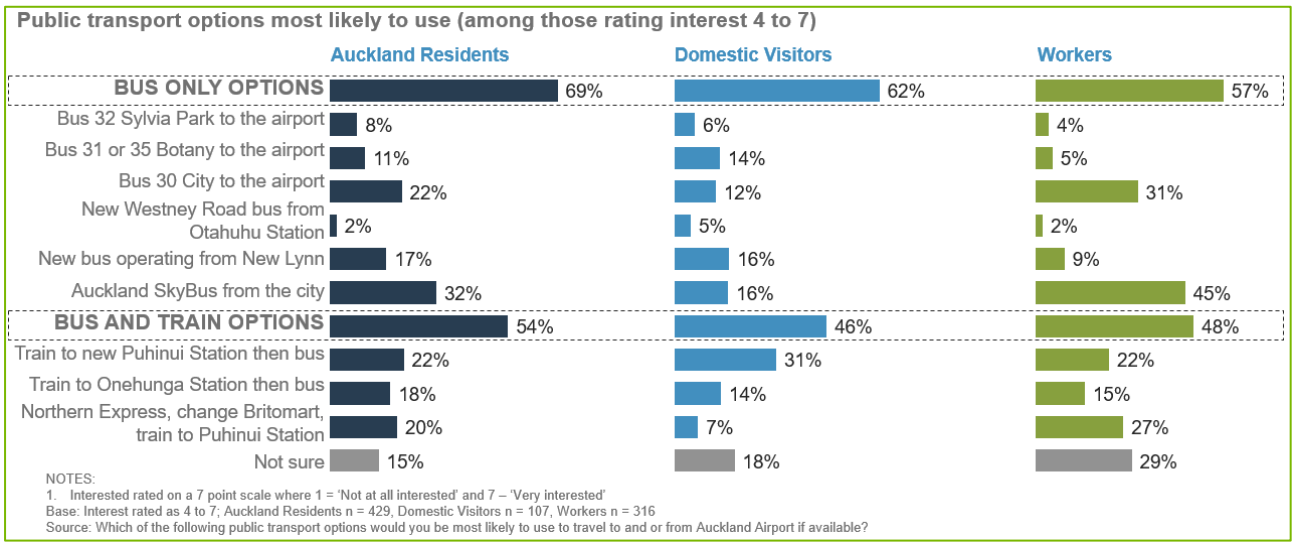


Figure 3-14: Customer interest in using public transport to and from Auckland Airport

3.2.7 Limited Active Mode Provision as a Travel Choice

The existing cycling network, shown in Figure 3-15: , has limited active mode provision in the area adjacent to the Airport and around Puhinui. Dedicated cycle lanes are provided on parts of SH20A, Bader Drive, Buckland Road, Cavendish Drive, Lambie Drive, Great South Road, Ormiston Road, Stancombe Road and parts of Flat Bush School Road. Shared paths are provided on some coastal routes, local roads and in reserves. There are no provisions for pedestrians and cyclists coming from the east and south of the Airport.

The existing and proposed walking and cycling network identified by both AT and within Auckland Council's area plans (refer to Section 2.5) has been summarised in Figure 3-15: below.

[43]Source: Auckland Transport Auckland Airport Access project Research report May 2018 Kantar TNS

Figure 3-15: Existing and proposed walking and cycling network in the study area

3.3 Short-Term Investment Objectives

Given the connected nature of the short-term AT and Transport Agency projects and focus on customer journey experience, a single suite of investment objectives has been developed to guide the development of the short-term options. The following short-term investment objectives were developed with investment and project partners at meetings on the 11 and 13 April 2018 and subsequent internal review sessions.

The investment objectives are as follows:

To:

1) Provide more reliable and timely travel choices to and from the airport and surrounding areas
2) Improve people's access to employment, education and social opportunities
3) Provide an enhanced and integrated bus / rail interchange at Puhinui that incorporates cultural values and reflects community identity
4) Integrate with and get increased value from existing and planned transport investments
5) Be operational by end of 2020 / early 2021.

While –

- Improving safety
- Delivering value
- Working towards the long-term outcomes
- Recognising and providing for the significant cultural values of Mana Whenua within the Airport Area, and
- Improving customer journey experience.

The combined short-term objectives were approved by the project partners at a project governance level during an Auckland Airport – Transport Management Collaborative Operations Group (TM COG) meeting held on 4 May 2018.

The options will be evaluated against the investment objectives in the multi-criteria analysis (MCA) evaluation undertaken as part of the options assessment.

3.4 Benefits of Investment

The potential benefits of successful investment that address the identified problem statements have been provisionally adopted as:

- **Benefit 1:** A more prosperous Airport Precinct area, Auckland and New Zealand (**30%**)
- **Benefit 2:** High public confidence in the area's transport system (**30%**)
- **Benefit 3:** A more liveable Auckland through a more reliable, efficient and accessible transport system for the airport area allowing better travel choices (**40%**).

The long-term business case has adopted the following benefits:

- Benefit 1: More equitable access to jobs, learning, social activities (35 percent)
- Benefit 2: Travel is easy and more affordable (15 percent)
- Benefit 3: Economic potential and opportunity is unlocked for all (30 percent)
- Benefit 4: Local taonga enhanced (10 percent)
- Benefit 5: Healthy, safe people (10 percent).

3.5 Key Performance Indicators

Key Performance Indicators (KPIs) were adapted from those for the long-term business case to be suitable for the short-term:

- KPI 1: increase in access to jobs by public transport 24/7
- KPI 2: A population with improved accessibility measured in travel time bands to the Airport from Eastern and Southern Auckland
- KPI 3: Decreased travel time for key journeys by public transport from Manukau, City Centre and Southern Auckland
- KPI 4: Availability of public transport options to access the Airport from Eastern and Southern Auckland within a 45-minute timeframe
- KPI 5: Availability of safe and attractive active mode routes to access the Airport to increase modal share of trips by cycling and walking by three percent[44].

Note that these KPIs and the identification of baselines will be further refined during the pre-implementation stage of the Project.

3.6 Constraints and Uncertainties

3.6.1 Constraints

The main constraint for the Puhinui interchange upgrade is likely to be the possible third or fourth main line for the NIMT through the station. The design needs to be approved by KiwiRail due to the proximity to their lines. The normal process is well understood however this may need to be adjusted for this particular project. There is a threat that they may require changes / alterations to the design prior to giving their approval. Works adjacent to / over the railway lines will have to be undertaken under closures (blocks) of the line which need to be booked a minimum of six months in advance and confirmed three months in advance. These will be cited as constraints to the Contractor in the Tender/ Contract documents. There is a threat that these significantly constrain the Contractor's proposed methodology.

The limited width of Puhinui Road is a constraint, as the removal of unrestricted on-street parking bays might be required to provide bus priority between Lambie Drive and SH20. Localised widening might also be required in specific sections should priority lanes be implemented, which might impact Pohutukawa trees along the corridor. Due to the timeframes associated with the project, no privately-owned properties can be affected by the short-term improvements.

There is a threat that if the Project is required to follow the BAU AT approval processes for the signoff of the design rather than a modified (shortened) process that this may prolong the programme. The current delivery programme does not have sufficient time to follow the BAU process.

3.6.2 Uncertainties

Table 3-1 shows some uncertainties that may influence the outcomes of this SSBC. The uncertainty log looks to address investment risk and demonstrates the need for close monitoring and management, with responses that are adaptive, while responding to change. Overall, due to the rapid scale and pace of growth in south-

[44] The proportion of Aucklanders who are cycling has increased by 3% from 2017 to 2018 as per Auckland Transport's *Measuring and growing active modes of transport in Auckland* report (2018). This percentage is also the proposed increase in cycling trips across the Auckland Region as per Auckland Transport's *Cycling Programme Business Case* (2017).

west Auckland – including air passenger numbers, and potential shifts in government and Council transport priorities, there remain many uncertainties that should be monitored over the progression of this business case.

Table 3-1: Uncertainty log

Factor	Time	Uncertainty	Impact	Comments
Factors affecting demand				
Pace and pattern of growth at Auckland Airport and the surrounding areas	Ongoing	More than likely	Significant	The pace of growing activity at Auckland Airport and the surrounding area, including increasing passenger numbers and new commercial and residential developments is uncertain. This requires careful monitoring of planning and construction timeframes to ensure the projected demand on the transport network is met by sufficient capacity.
Degree of travel time reliability that can be achieved across all modes for customers accessing the Airport and surrounding area	Ongoing	More than likely	Significant	Impacts the level of confidence customers have in the reliability of the transport network, particularly public transport. This in turn will likely impact the level of customer uptake of public transport services (patronage) Also impacts overall customer journey experience
Factors affecting supply				
New legislation and policy direction enforce the pace of travel behaviour change	Political timeframes – ongoing	Reasonably foreseeable	High	Central government policy may influence changes in infrastructure investment priorities (e.g. mode or other methods) to achieve policy goals. This may impact assumptions made about the strategic approaches investigated within the options assessment and their underlying assumptions.

3.7 Opportunities

The following items are considered opportunities which are recommended for further investigation with the investment and project partners and stakeholders:

- **Integrated multi-modal transport system:** Other transport projects are in progress within the study area that were also identified in the SPBC's recommended programme, notably the City Centre to Airport LRT project. This SSBC provides an opportunity to support an integrated multi-modal transport system
- **Behaviour change:** There are opportunities to promote and incentivise behaviour change at an accelerated rate to aid mode shift
- **Walking and cycling facilities:** Opportunity to improve the provision of walking and cycling facilities to increase connectivity to the public transport network and for direct access to the Airport
- **Bus service routes/ timetabling changes:** As part of the SPBC's recommended programme, AT are currently investigating bus service routes and frequencies. As part of this SSBC, further opportunities to connect employment areas, build on AT's current investigations and the existing New Network for bus services connecting at Puhinui and along SH20B to the Airport may be identified
- **Land use changes:** Opportunity to assist in promoting Auckland Council's Southern Initiative, supporting the ability to zone for higher density development in South Auckland, by improving accessibility, access to jobs and economic growth
- **Mana Whenua engagement:** There are opportunities to draw on best practice engagement and design frameworks which adopt a Māori worldview and holistically capture Mana Whenua inputs into infrastructure projects, for example the Mauri Model or Te Aranga Design Principles. Any adopted framework will be in discussion and agreement with Mana Whenua.

3.8 Alignment to Existing Strategies and Organisational Goals

A range of national and regional level strategies and organisational goals, including those held by the three investment partners have been reviewed to confirm this SSBC's alignment with their objectives in Sections 3.9 and 3.10 below.

In these strategies, the importance of promoting integrated public transport as part of an integrated transport network for the Auckland region is identified.

3.9 National-Level Strategies and Organisational Goals

3.9.1 Government Policy Statement on Land Transport

The GPS[45] sets the most-up-to-date national context for the business case. The GPS helps guide investment in transport by providing a longer-term strategic view of priorities in the transport sector. They include an overall focus of improving the land transport network by prioritising safety, access, environment and value for money. The GPS therefore sets the context for the business case, from the Government's perspective. Whilst the full document is therefore critical, certain sections are highlighted here.

"Auckland" and "public transport" are each specific topic areas under the Access Strategic Priority, where Access is defined "as people's ability to connect with people, goods, services and opportunities and thereby engage in economic and social activity."

In this context it is therefore important that the business case helps to deliver against the Access Objectives (pp. 12, 15) of: "A land transport system that provides increased access for economic and social opportunities" and "A land transport system that enables transport choice and access".

This transport access priority is stated to be about improving access to social and economic opportunities so that: cities are well connected, safe, accessible and liveable (p. 12).

The business case also needs to deliver against the Environment Strategic Priority with its objective: "A land transport system that reduces the adverse effects on the climate, local environment and public health" (p. 18), and against the Value for Money Strategic Priority: "A land transport system that delivers the right infrastructure and services to the right level at the best cost" (p. 20).

3.9.2 Transport Agency – National Land Transport Programme 2018 - 2027

The – National Land Transport Programme 2018 – 2027 (NLTP 2018-21) states that it will invest in expanding Auckland's rapid transit network.

"The wider plan is for an integrated rapid transit network. For example, the Auckland Airport area will have more options to travel between the airport, the city centre and the eastern suburbs.

"The Southwest Gateway Programme will build on the investment from the NLTP 2015-18 to improve access to Auckland International Airport and surrounding areas, including Airport to Botany Rapid Transit and 20Connect. These projects will provide more choices for people and freight in their travel to and from the airport and surrounding areas both in the short and longer term. Improvements may include bus priority along SH20B

[45] Government Policy Statement on Land Transport 2018/19 – 2027/28, 1 July 2018

to Puhinui rail station, an upgrade of the station, improved capacity and connections along SH20/A/B, interchange upgrades and rapid transit between Auckland Airport and Botany[46]".

3.10 Regional-Level Strategies and Organisational Goals

3.10.1 Auckland Transport Alignment Project

ATAP is a partnership between the Ministry of Transport, Auckland Council, AT, the Transport Agency, Treasury and the State Services Commission, recognising the importance of Auckland's economic success to the national economy. ATAP sets out a clear direction for the development of Auckland's transport system over the next 30 years. The 2018 iteration, described in Section 1.4.2 above, provides a set of clear directions for the business case both in terms of the preferred direction and the priorities for how the project may be developed and the need for strong integration with land-use.

3.10.2 Auckland Regional Land Transport Plan 2018 – 2028

The Auckland RLTP 2018 – 2028[47] is a plan of how transport delivery agencies (Transport Agency, AT, Auckland Council and KiwiRail) intend to respond to growth and other challenges facing Auckland over the next 10 years. It includes a 10-year prioritised delivery programme of transport services and activities for Auckland. It sets out an investment programme for Auckland.

The RLTP has a section (p. 38) on the Airport. It states that:

"Activities in this RLTP to improve access to and from Auckland Airport include:

- Provision of progressively enhanced rapid, high frequency bus services taking advantage of bus/high-occupancy lanes on State Highway 20B
- Upgrade of Puhinui rail station to provide high quality connections between rail and buses serving Auckland Airport
- Implementation of bus priority measures between Auckland Airport and Botany
- Eastern Airport Access ‐ upgrade to provide an additional lane in each direction between Puhinui and Auckland Airport to support bus, carpool, and freight movements, and an upgrade to the State Highway 20/State Highway 20B Interchange.

These will complement developments undertaken by Auckland Airport to improve pedestrian facilities, bus lanes and stops, lighting and cycling facilities within the Airport precinct."

Committed funding is shown on p. 61.

3.10.3 Auckland Transport - Statement of Intent 2016/17 - 2018/19

AT and Auckland Council develop a three-year *Statement of Intent* (SOI) each year. The AT Board identifies strategic themes which form the foundation of the SOI, and the three-year work plan and performance measures are centred on the themes.

The five strategic themes are:

- Prioritise rapid, high frequency public transport

[46]https://www.nzta.govt.nz/planning-and-investment/national-land-transport-programme/2018-21-nltp/regional-summaries/auckland/

[47] Auckland Transport (2018). *Auckland Regional Land Transport Plan 2018 – 2028.*

- Transform and elevate customer experience
- Build network optimisation and resilience
- Ensure a sustainable funding model
- Develop creative, adaptive, innovative implementation.

This business case seeks to deliver on these strategic themes by developing an improved interchange with associated measures to give higher frequencies and more rapid to public transport, greatly improve customers' experience and give greater certainty for public transport customers.

3.10.4 Auckland Transport - Regional Public Transport Plan (RPTP)

The updated *Regional Public Transport Plan* (RPTP) was released in. There is an emphasis on shifting the network pattern to a much stronger focus on integration between services to improve network efficiency and effectiveness. An interchange at Puhinui and more dependable public transport routes would help integration between rail and bus services.

3.10.5 Auckland Council - The Auckland Plan

The Auckland Plan is a long-term strategy for managing Auckland's growth and development over the next 30 years, which brings together social, economic environmental and cultural objectives.

Auckland Council undertook a refresh of the Auckland Plan and consulted on the revised draft plan in conjunction with the Long-term Plan 2018-28[48].

The Auckland Plan identifies the three major challenges facing Auckland:

- Population growth and its implications
- Sharing prosperity with all Aucklanders
- Reducing environmental degradation.

To address these challenges, the Auckland Plan is structured around six integrated outcomes that are spatially reflected in a development strategy.

The six outcomes are:

- Belonging and participation
- Māori Identity and wellbeing
- Homes and places
- Transport and access
- Environment and cultural heritage
- Opportunity and prosperity.

Transport contributes to achieving all six outcomes, with the strongest links to Transport and access. The Auckland Plan strategic directions and focus areas for the Transport and access outcome are set out in the table below.

Table 3-2: Auckland Plan Strategic Directions and focus areas

[48] See RLTP p. 13, 14

This SSBC anticipates improved bus/rail connectivity and improved bus services with greater priority. which should help support land use development, especially in the south, by enhancing connections to the Airport's employment areas.

3.10.6 Auckland Unitary Plan – Operative in Part

The physical growth envisaged in the Auckland Plan is governed by the district and regional plan rules contained within the AUP (refer to Section 2.6 above). Future growth at the Airport, Manukau and the surrounding areas can be seen through the AUP's zoning, encouraging significant light industrial/ commercial development on existing greenfield areas, in addition to enabling growth in Manukau as a Metropolitan Centre and increased residential densities in nearby suburban areas.

The anticipated future urban growth arising from AUP zoning means more travel options and connections to the Airport, its surrounds and to Manukau will be required, in order to ensure that the overall transport network offers more predictable journey times.

3.10.7 Auckland Council - Future Urban Land Supply Strategy

The *FULSS*, July 2017, describes the order in which land is supplied for development. The strategy applies to development in the FUZ over the next 30 years. A significant amount of land is planned for release in south Auckland. Increased transport demands generated by this growing activity will directly affect the operation of the existing state highway and local road network and the need to encourage mode shift to public transport and active modes.

3.10.8 Auckland International Airport Limited - Airport of the Future

In 2014, AIAL announced its 30-year vision, or masterplan, to build the 'Airport of the Future'. This includes significant expansion of the Airport's facilities to respond to forecast passenger growth.

The 'transport vision' includes a wide range of transport modes to provide Aucklanders and visitors with greater choice and flexibility. It proposes better public transport, better parking facilities, improved pedestrian and cycle access, and a better roading network in and around the Airport.

This SSBC will support AIAL's masterplan, both its overall outcomes sought, as well as those relating to transport.

Out of scope

3.10.10 Recent and Ongoing Projects

This section briefly describes some recent and ongoing projects that are changing the transport provision in and around the study area:

- **Manukau Bus Station**

  The new Manukau Bus Station (located next to Manukau Train Station) was completed in mid-2018. The bus station will form a hub within the new connected public transport network for south Auckland. It will improve passenger transfers and connections between bus-bus and bus-rail services. These will be supported by a network of connector routes running at regular 30-minute and peak time intervals, including local bus services from Manukau to Onehunga via Papatoetoe, the Airport and Māngere town centre.

- **Airport Taskforce - Auckland Airport/ ATOC**

  In response to growth in congestion around the Airport, a multi-agency Airport Taskforce was created in late 2016 to find immediate ways to improve journeys in and around the precinct. This collaboration included the ATOC which optimises traffic signals to increase peak flows at peak times on the state highway and airport roads. This involves monitoring entering/ exiting traffic flow, allocating capacity on dominant flows such as during staff shift changes, and publishing additional airport-specific travel time information. The initiative is continuing.

3.10.11 Projects Under Investigation

Transport project activities that may impact the transport network within the study area are:

- **Southern Gateway Consortium**

  Resource consent has been granted for construction of a new access (roundabout) onto SH20B from the Consortium's development site located to the south of SH20B. The Transport Agency and AIAL are considering the interface of this project with AIAL's proposed park and ride South facility located adjacent to the Southern Gateway project. This project also proposes a roundabout to provide access onto SH20B.

- **AT investigating improved bus services (frequency and routes) or new services to Auckland Airport**

  As part of the SPBC recommended programme, AT have undertaken studies to look at changes to existing Southern Network routes to connect residential areas with employment areas (including implemented increased frequencies of the 380 Airporter service. AT are also looking at any future updates required to the network resulting from interfaces with future Airport to Botany Mass Rapid Transit services. They are investigating whether there needs to be increased services and greater capacity. The review is due to be completed later in 2018 as part of the parallel Short-term Airport Access Improvements SSBC.

- **Southern Connections**

  AT is developing better transport options between town centres in South Auckland, including Māngere, Ōtāhuhu, and Sylvia Park. Southern Connections is a programme of improvements that includes new bus and transit lanes, bus stops, and walking and cycling facilities. Approval and funding have not yet been secured for Stage 3 of the project which will provide upgraded facilities for pedestrians, people on bikes, and public transport users along Massey and Māngere Roads.

- **South Auckland Network Optimisation**

  Investment in network optimisation including focusing on the south of Auckland (included within ATAP).

PART B – OPTION ASSESSMENT

This section of the business case describes the option assessment carried out. The four major components identified in the earlier work – the Supplementary Programme Business Case - as AT responsibilities, the Puhinui Interchange, enhanced bus services, local bus priority and walking and cycling – were able to be assessed separately using techniques and approaches appropriate for each.

In each case, options are described and assessed to determine their ability to contribute to achieving the objectives and the outcomes sought.

4 Puhinui Interchange Options

4.1 Context

For the Puhinui Interchange, the issues and option generated related to the local area and constraints, and to the long-term options. A multi-criteria analysis (MCA) was used to assess the options against the identified objectives from investment. A short list of options was selected to progress to the following stage.

4.1.1 Land Use

The area surrounding the Puhinui Station comprises medium to high-density residential and industrial land uses. The AUP identifies Mixed Housing (Suburban) and Mixed Housing (Urban) to the north, Single Housing to the east and west, and Light Industrial to the south-west (Figure 4-1: Site Overview – Auckland Unitary Plan

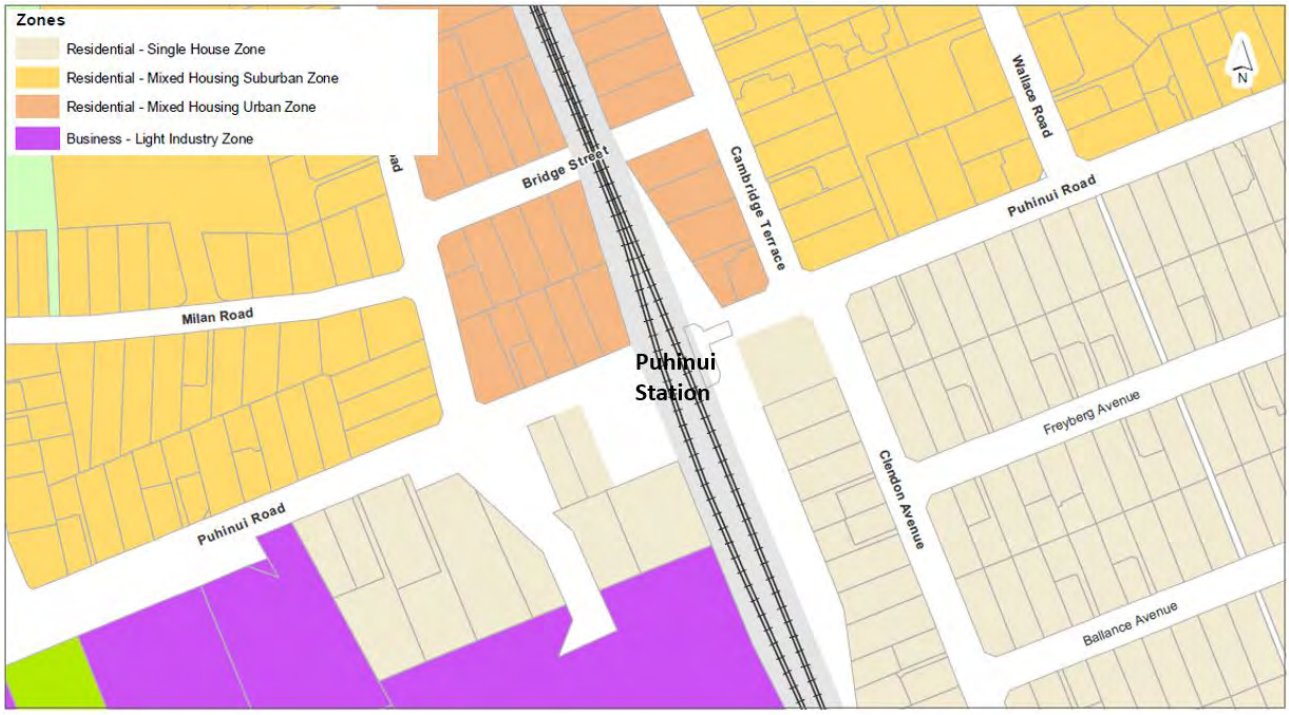


Figure 4-1: Site Overview – Auckland Unitary Plan

The land uses adjoining the station would be highly compatible with Transit Oriented Design (TOD) development in its vicinity.

4.1.2 Land Ownership

Puhinui Station is contained within parcels of land owned and occupied by KiwiRail and Auckland Council, as shown in the figure below.

Figure 4-2: Property owned by KiwiRail and Auckland Council

4.1.3 Site Constraints

A major constraint on the interchange is the presence of one of the largest bulk water supply pipelines in Auckland. The Hunua No.4 water transmission pipeline passes under the railway along Puhinui Road. The section of watermain under the tracks is encased in concrete with a cover (existing ground to the top of the concrete encasing) ranging from 0.63m to 2.0m within the rail corridor.

Watercare have advised the following clearances are required for the Hunua No.4 Watermain:

- Foundations to be designed to ensure no additional loading is imposed on the main
- If piles are proposed 2m horizontal and 1m then vertical clearance is required
- Piles within 5m of the main are to be drilled and not driven
- Vertical clearance of 5m above a manhole cover
- Minimum cover of 1.5m in the carriageway and 0.9m in the berm and footpath.

4.1.4 Rail Alignment

The existing rail alignment is fixed for the new interchange. Future changes or additions to the rail alignment must be space-proofed in the design of the Puhinui Interchange options as agreed by KiwiRail and AT (see Figure 4-3, Figure 4-4 and Figure 4-5). It is likely that third, fourth and even fifth mains will be added to the NIMT.

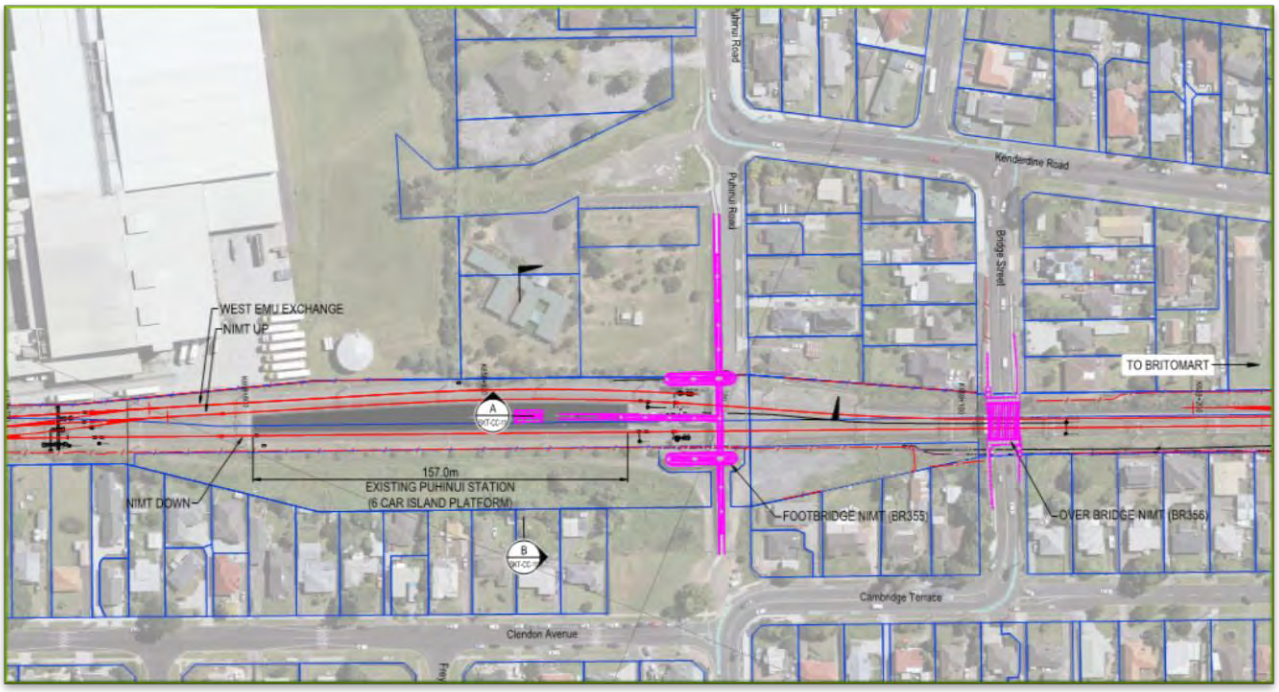


Figure 4-3: Puhinui Station - Existing Layout

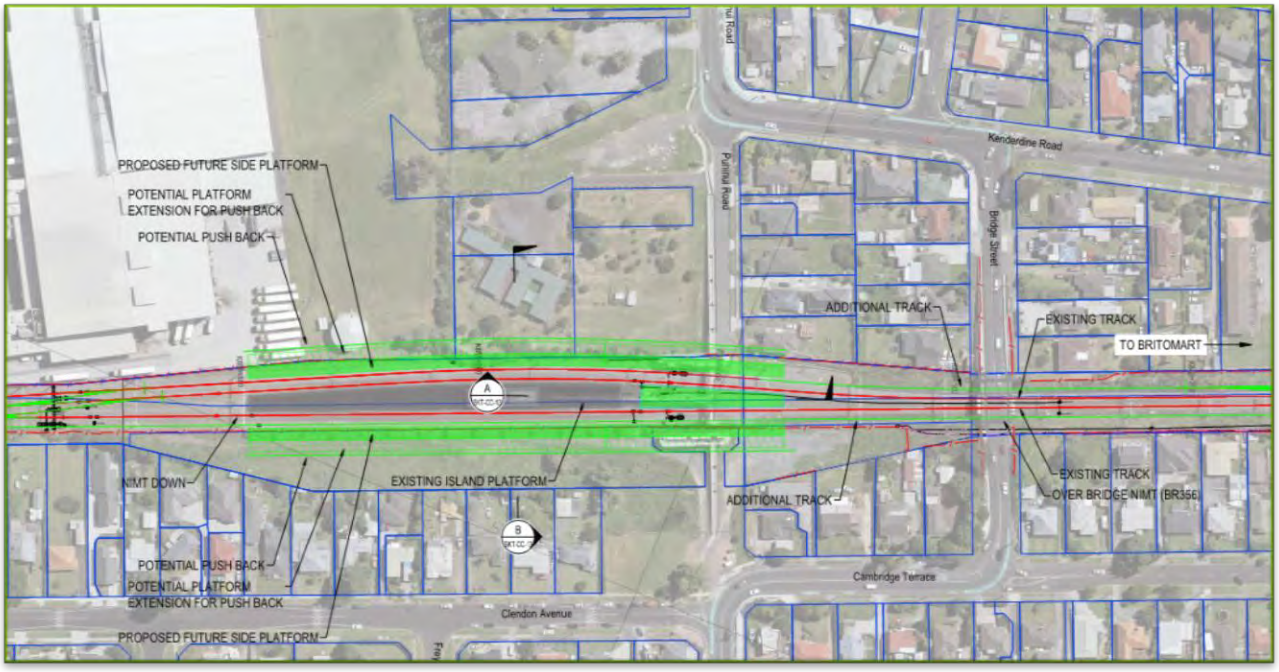


Figure 4-4: Layout of future proofing to rail corridor

Alignment design work for the additional mains is not in scope for the Puhinui Interchange design.

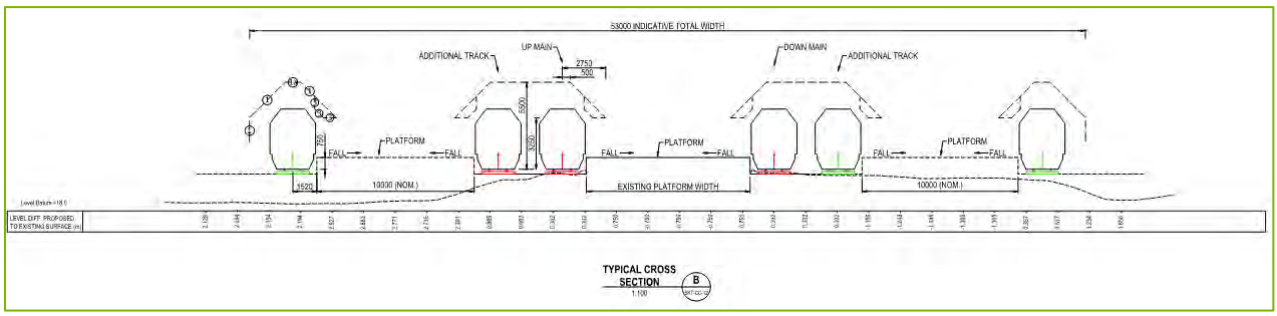


Figure 4-5: Cross section of Future proofing to rail corridor

All interchange options have therefore been developed for the future additional rail lines and platforms as indicated in the cross-section above. This includes two additional island platforms to the east and west of the existing platform. Each platform could be served by a fifth main, which results in a total envelope of 53m.

4.1.5 Functional Requirements

The proposed enhanced Rail/Bus interchange at Puhinui Station needs to enable the early implementation of a bus service between Manukau and Auckland Airport, with the station being future proofed for the long-term Botany-Manukau City-Auckland Airport RTN alignment. Because of the project timeframes and property acquisition requirements, the development of the interchange is split into two phases to support the Early Deliverables of the STAAI SSBC and the longer-term Airport to Botany Mass Rapid Transit SSBC.

The requirements of each stage were determined by AT interchange specifications[49] and backed by the customer preference information in Appendix A1. The options development and analysis then comprised different ways to meet these specifications.

The station is to be designed in two stages:

- Early Deliverable (to be completed by January 2021)
  - New station building and concourse incorporating an at-grade bus drop-off and pick-up area, kiss-and-ride, public entrance and modifications to the existing central island train platform for six-car train operations.
  - Alternatively, a lower cost upgraded pedestrian overpass, with an at-grade bus drop-off and pick-up area, kiss-and-ride, public entrance and modifications to the existing central island train platform for six-car train operations.
- Ultimate Deliverable (Stage 2) – Dedicated rapid transit bridge or underpass incorporating bus rapid transit or light rail platforms, additional train platforms and enhanced island platform for nine-car train operations.

Meeting the needs of the passenger is the most important aspect of station design – for example for safety and confidence in transfers. The way in which their perceptions and comfort are dealt with will be a major contribution to the overall success of the project.

The passenger experience needs were informed by AT's in-depth investigation into the Airport customers' attitudes towards public transport use – and in particular their response to a possible upgraded Puhinui Station. These reported attitudes were used as a reference for testing the options for the station, see Appendix A1.

[49] AT Public Interchange Design Guidelines Feb 2013, AT COP Section 20 Public Transport – Buses; and 21 Public Transport - Rail

Park and Ride

The Auckland Regional Park and Ride Programme Business Case (PBC) was finalised in July 2018 and outlines a strategic case for investing in Park and Ride as a fundamental component of Auckland's transport system. The PBC recommended a programme to address the regional problems with the existing provision of Park and Ride in Auckland, and progress investment for the next 10 years.

Park and ride facilities strategically contribute to decongestion in Auckland by intercepting private vehicle trips before they reach areas of significant congestion. A lack of a system approach and the historic provision of Park and Ride in the Auckland Region is resulting in demand exceeding supply. Well-placed Park and Ride facilities can increase access opportunities to the Rapid Public Transport network for users living and working beyond the existing extent of services. At locations with limited walking, cycling, or feeder bus services, Park and Ride can be an effective means of access to the RTN.

AT's Parking Strategy and the Park and Ride PBC states that Park and Ride facilities should be located in more peripheral locations. This approach improves access to the public transport network and reduces private vehicle trips to urban or congested areas. *Puhinui Interchange was evaluated based on location-specific matters during the development of the PBC and was not recommended for further investment as its location would likely offer little benefit to the transport system.* The evaluation criteria included strategic outcomes to reduce localised traffic congestion and provide the best use of council owned properties with development potential.

The recommended programme identified rail stations situated further south, Drury, Drury West, Paerata and Papakura, as Park and Ride locations. More potential regional Park and Ride locations serving the Airport to Botany Rapid Transit corridor will also be investigated by the Airport to Botany MRT SSBC.

The parking requirements for the interchange was confirmed in the Operational and Functional Requirements, which specified the provision of a Kiss-and Ride facility and limited short-term parking bays at Puhinui Interchange.

4.2 Options and Assessment Approach

The starting point for option development was the development of an Interchange specification. A long-list of possible options to respond to the specification and context set out above was developed and reported to AT in a separate Technical Note[50]. The options were reviewed by AT and the technical team for this SSBC, against the objectives, resulting in a short-list of options as discussed below. Options discarded during this investigation included a long-term at-grade interchange, a lowered Puhinui Road, and a 80 – 100m deviated raised structure.

The analysis of the short list for this SSBC was unusual in that the options being developed are those that will serve for the short-term, as required by the Southwest Gateway Programme and its partners and ATAP. The short-term options should, however, also take cognisance of the likely option for the medium and long-term. It was therefore necessary to advance these options sufficiently to inform the short-term.

The timeframes set by the governance group require the finalisation of the SSBC interchange option by October 2018 (bus network and priority sections to be completed by November 2018). This would have required the completion of the concept design for the interchange by August 2018 before the full A2B designs would have been complete and hence their development and assessment in this STAAI business case.

[50] Puhinui Station Scoping Investigation, Aurecon, 2016

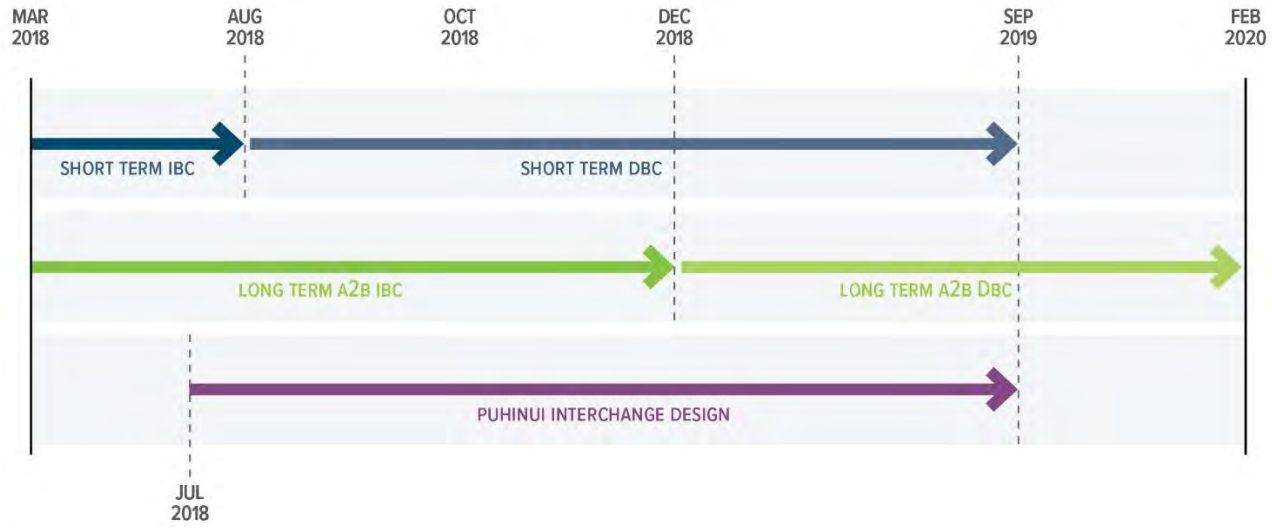


Figure 4-6: Puhinui Interchange Design Timeframes

4.2.1 Puhinui Station Options

A range of options were developed for Puhinui Interchange. These include “Early Deliverable” and “Ultimate Deliverable” designs, in line with the delivery programme.

- Potential Early Deliverable options were developed to assess the available options for an “upgraded interchange by 2021”. This included options that proposed limited upgrades to Puhinui by 2021, to allow for more flexibility to design and construct a new interchange when the rapid transit alignment is confirmed. These included:
  - Do Minimum
  - Option A, which included limited upgrades to Puhinui Station
  - Options 1 – 5, which is based on a high-quality upgraded interchange at Puhinui Station. These five options include:
    - An Ultimate Deliverable design – to assess how the potential long-term RTN alignments could affect the size and position of the early deliverable design. This included dedicated rapid transit bridges or an underpass incorporating bus rapid transit or light rail platforms, additional lateral train platforms and enhanced existing island platform for 9 car train operations. The design and location of a potential early deliverable concourse in these options will have to be futureproofed to allow for the future RTN connection. The indicative alignment of the RTN differs between the ultimate deliverable designs and is indicated in the figure below.
    - An “early deliverable” design comprising of either a low-cost option or a new station building and concourse incorporating an at-grade bus drop off and pick up area, kiss-and-ride, and public entrance.

Options are presented in this business case with the Long-Term Ultimate Designs first, followed by potential early deliverable options, which will form a stage of the long-term option.

Figure 4-7: Puhinui Station Options

4.2.2 Do-Minimum

The Do-Minimum scenario was included to be a reference case against which all Puhinui Interchange upgrade options were assessed. It represents the minimum level of expenditure or work that is required to maintain an

existing level of service. The Do-Minimum option maintains the status quo, but with a truncated 380 Airporter route service connecting Auckland Airport and Manukau via Papatoetoe Station as indicated in orange in Figure 4-7: . Currently the 380 Airporter service connects Onehunga and Manukau town centres via Auckland Airport and Papatoetoe Station. The do-minimum option is the base for assessing both the long-term and early-deliverable options.

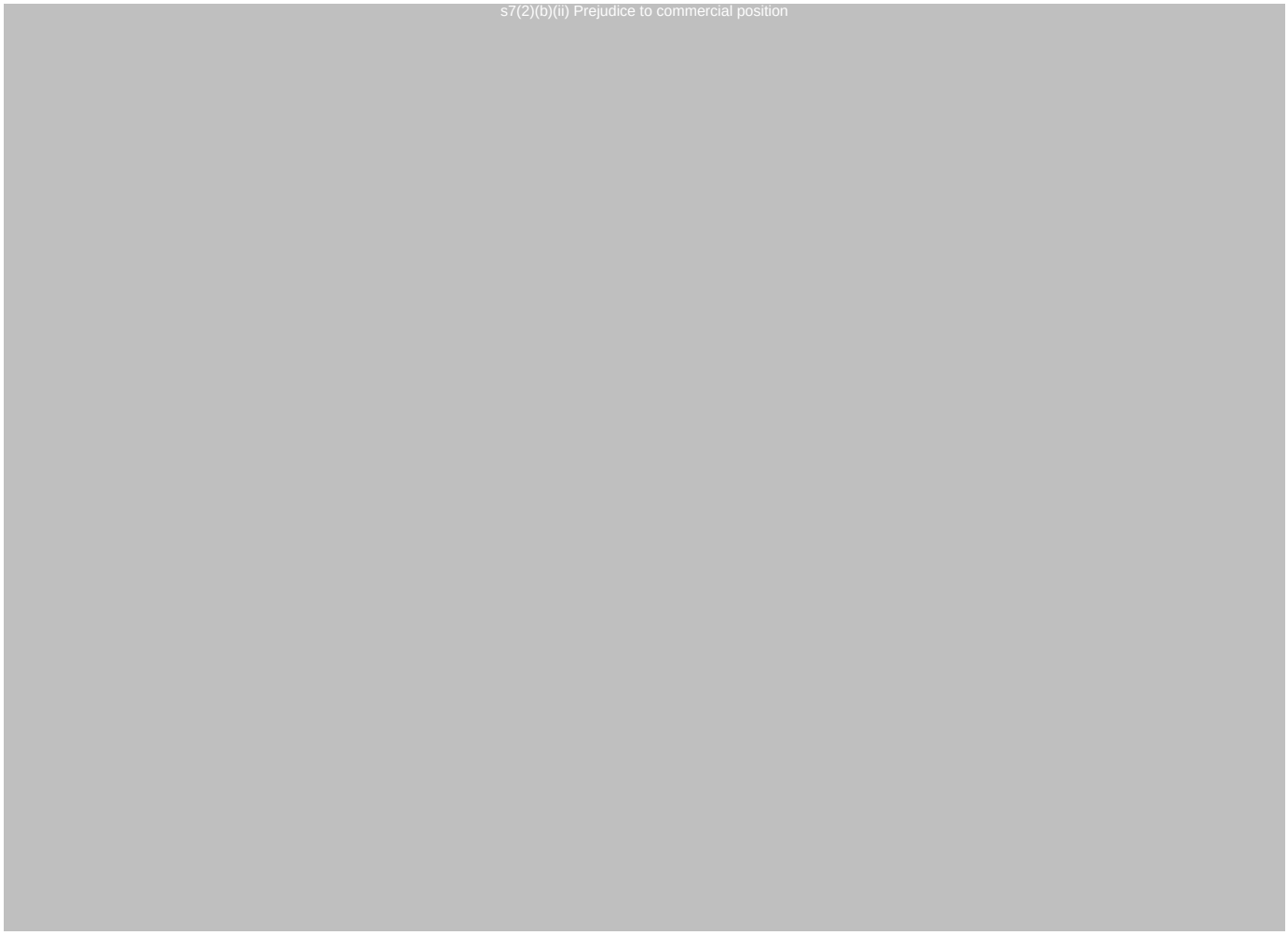
4.3 Long-Term Ultimate Design Options

4.3.1 Option 1: Widened Bridge Street Bridge

Ultimate Design

The objective of this design is to provide an option that does not require the construction of a new rapid transit bridge. The Ultimate Design includes a dedicated rapid transit line via the existing Bridge Street bridge.

The Ultimate Design for Option 1 includes a dedicated rapid transit line via Bridge Street. With both a median-running or a completely segregated rapid transit line, the existing Bridge Street bridge would be widened to accommodate the rapid transit. The proposed RTN services would travel via Puhinui Road/Bridge Street in the Ultimate Design and serve the bus stops provided to the west of the interchange in front of the rail station.



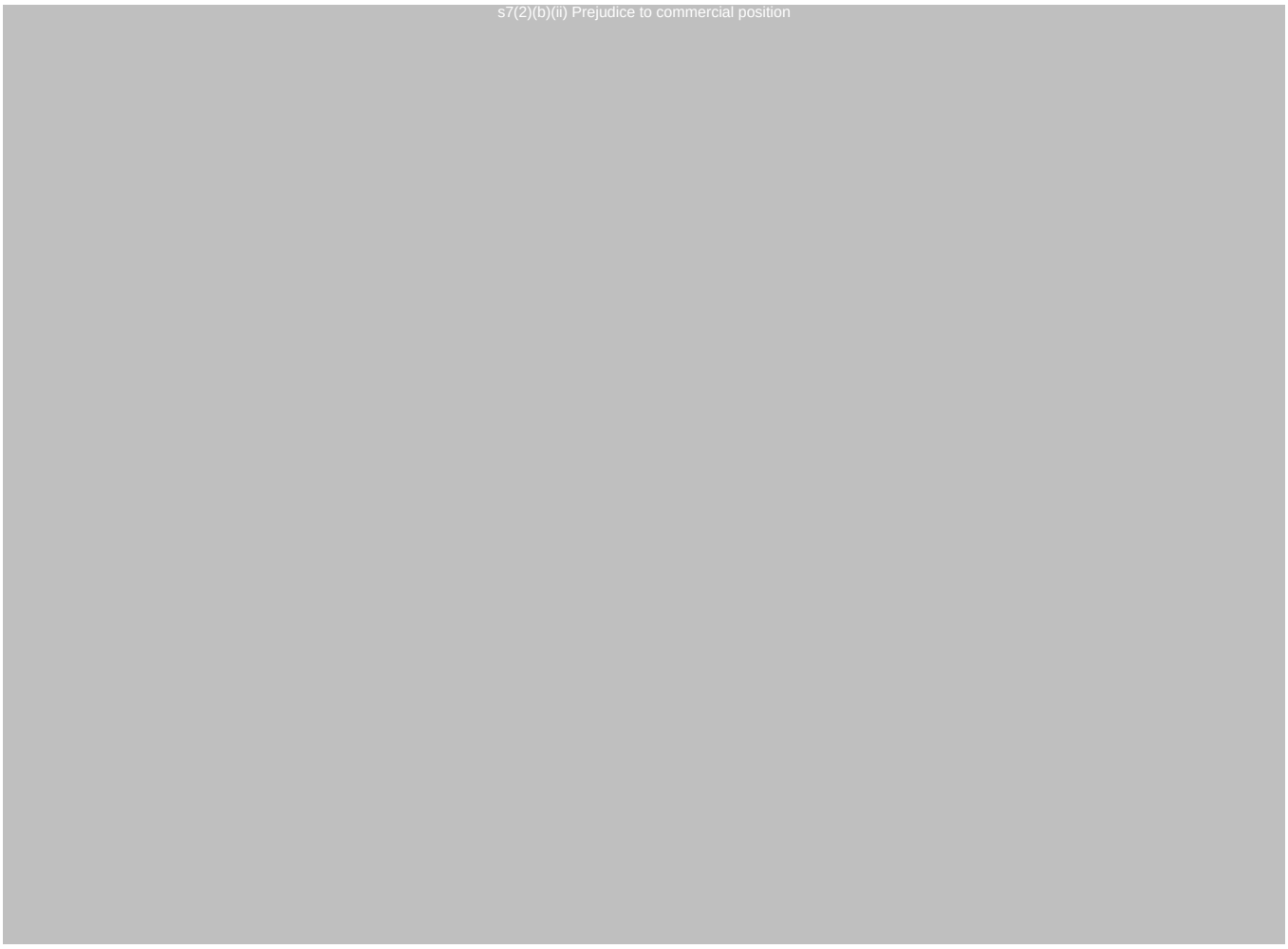
4.3.2 Option 2: Straight Rapid Transit Bridge

Ultimate Design

The objective of this design is to provide the shortest and most direct RTN connection across the railway line.

The Ultimate Design includes a dedicated rapid transit bridge to the south of Puhinui Road. The proposed RTN services would travel via a segregated rapid transit line on Puhinui Road and serve new stops provided on the bridge, to the north of the concourse. This would enable a seamless transfer from the new rapid transit platforms to the concourse. The Straight RTN Bridge is compatible with either a median-running or a fully segregated rapid transit line and would be slightly to the south of the existing Puhinui Road alignment.

The Early Deliverable bus circulation area would not be used by buses in the long-term. This space may be repurposed for additonal parking, kiss and ride, service and delivery vehicles access, pedestrian access , open public spaces or be re-zoned for retail, commercial or other land uses.

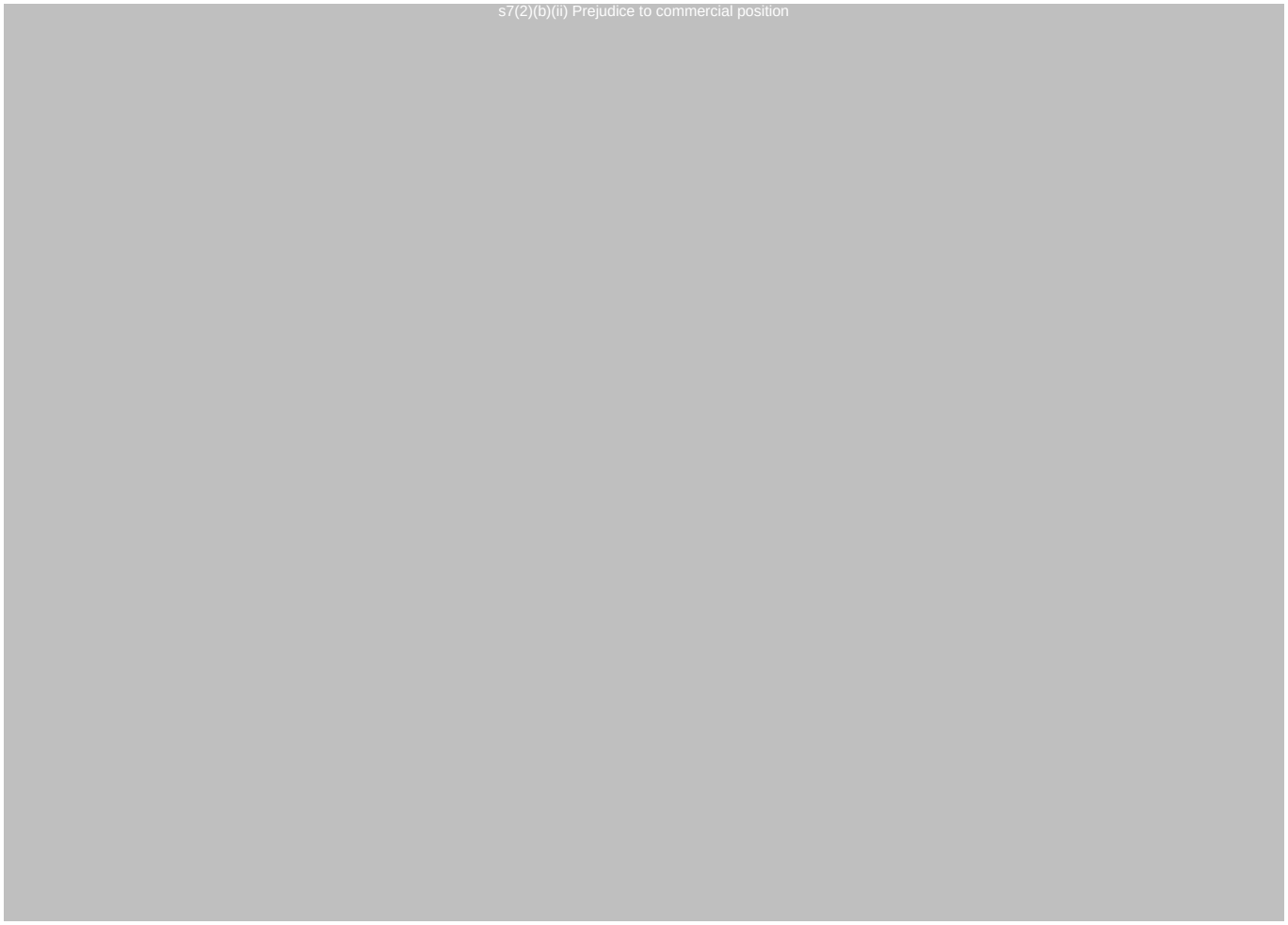


4.3.3 Option 3: Deviated Rapid Transit Bridge

Ultimate Design

The Ultimate Design in Option 3 includes a deviated dedicated rapid transit bridge to the south of Puhinui Road. The proposed RTN services would travel via a segregated rapid transit line on Puhinui Road, and serve new stops provided on the bridge, to the south of the concourse. This would enable a seamless transfer from the new rapid transit platforms to the concourse. The deviated RTN bridge is compatible with either a median-running or a fully segregated rapid transit line.

The Early Deliverable bus circulation area would not be used by buses in the long-term and could potentially be used for private vehicle and pedestrian access or be developed.



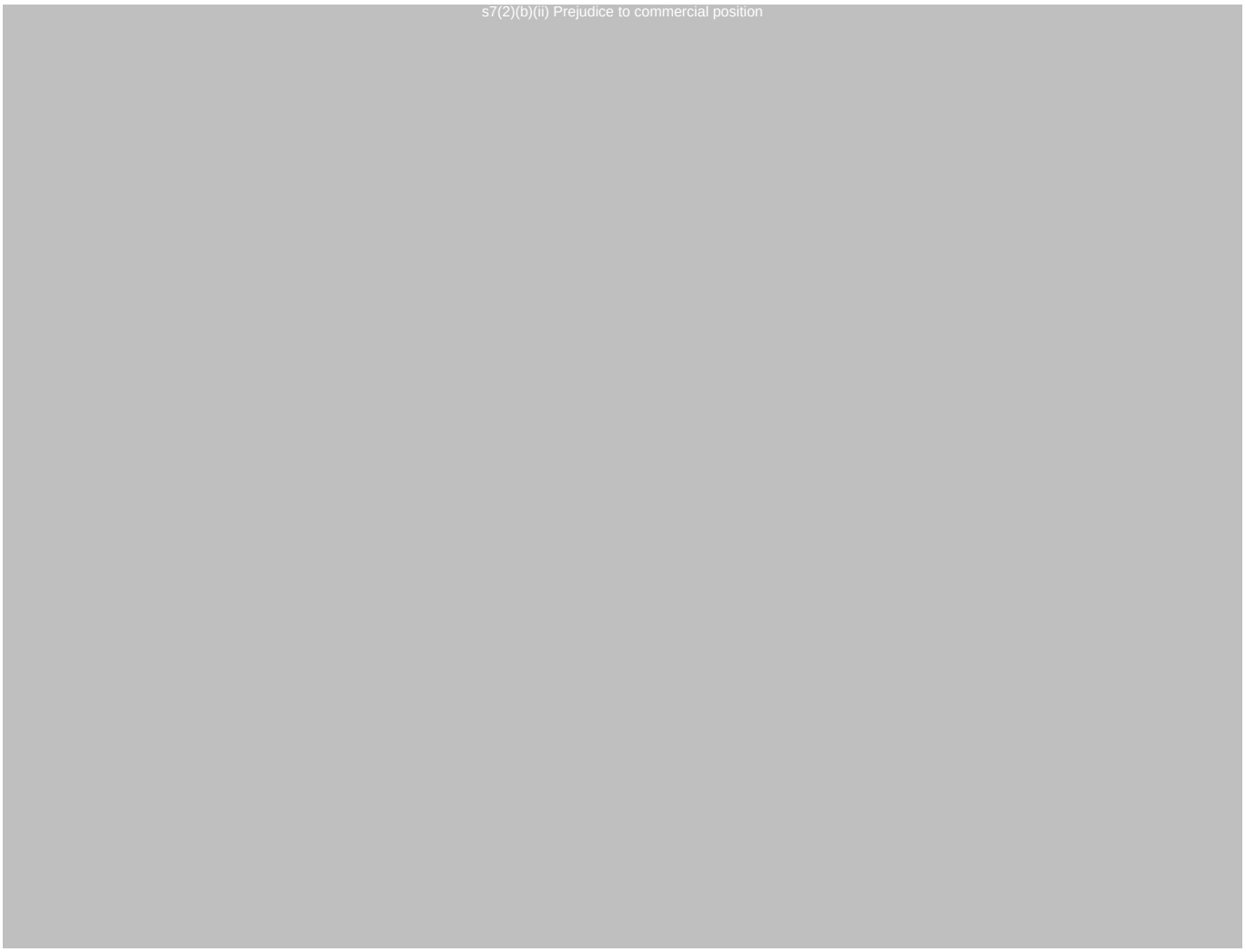
4.3.4 Option 4: Rapid Transit Underpass

Ultimate design

The objective of this design is to minimise the visual impact of the RTN bridge and still provide the RTN connection across the railway line.

With Option 4, the Ultimate Design includes a deviated dedicated rapid transit underpass to the south of Puhinui Road. The proposed RTN services would travel via a segregated rapid transit line on Puhinui Road, and serve new stops provided in the underpass. The RTN underpass alignment would be deviated to the south of the existing Puhinui Road alignment to minimise impact on the Hunua No.4 Watermain (see S. 4.1.4). Additional station elements and facilities such as ticketing/gate lines would need to be provided in this option given the multi-level layout of the Puhinui Station.

The Early Deliverable bus circulation area would not be used by buses in the long-term and could potentially be used for private vehicle and pedestrian access or be developed.



4.3.5 Option 5: Rapid Transit Bridge and Moved Rail Platforms

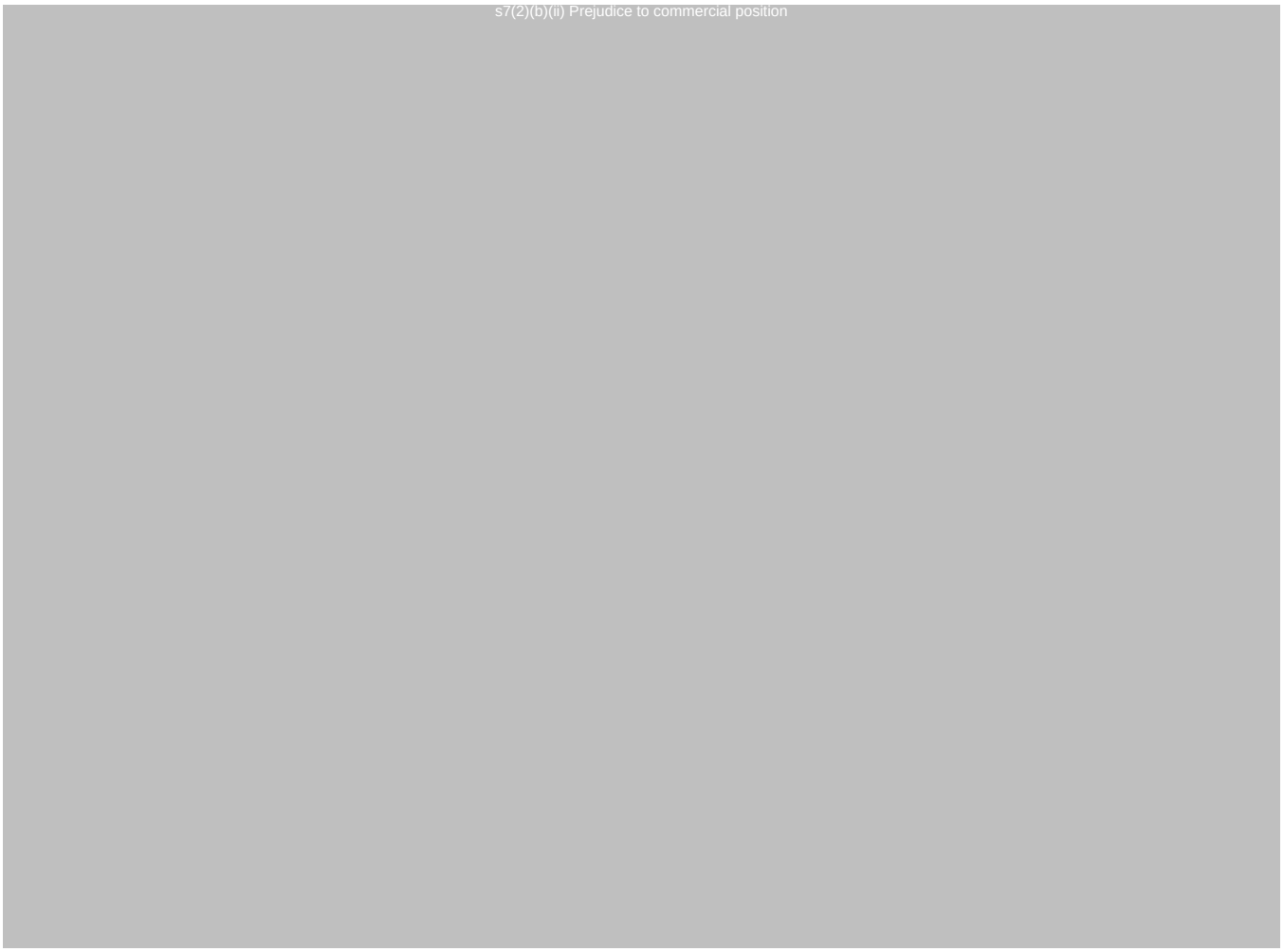
Ultimate design

The objective of this option is to enable the opportunity to provide a split concourse, which will eliminate the need for passengers to cross the rapid transit line. This will enable a seamless transfer from the new rapid transit platforms to the concourse.

The Ultimate Design in Option 5 includes a dedicated rapid transit bridge to the south of Puhinui Road. The proposed RTN services would travel via a segregated rapid transit line on Puhinui Road and serve new stops provided on the bridge, to the north of the concourse. This option also provides the opportunity for a split concourse, which would eliminate the need for passengers to cross the rapid transit line. This would enable a seamless transfer from the new rapid transit platforms to the concourse.

The straight RTN bridge is compatible with either a median-running or a fully segregated rapid transit line and would be slightly to the south of the existing Puhinui Road alignment.

The Early Deliverable bus circulation area would not be used by buses in the long-term and could potentially be used for private vehicle and pedestrian access or be developed.



4.4 Short-Term Early Deliverable Options

The development of the interchange will have to be split into two phases to support the Early Deliverables of the Short-Term Airport Access Improvements SSBC and the longer-term Airport to Botany Mass Rapid Transit SSBC.

The two Early Deliverable Options that is included in the assessment provides for:

- A low-cost option, with minimum improvement in the short-term
- A high-quality interchange with an at-grade bus interchange
- Both options can be staged with the Ultimate Designs.

4.4.1 Option A: Upgraded Pedestrian Overpass

Option A is a potential lower cost option for limited improvements to the existing Puhinui Station in the short-term (end of 2020/first quarter of 2021) but could potentially be a stage of the long-term upgrade.

In this option, the Puhinui Station is served by the new proposed Airport service, with new premium bus stops provided either side of the station on Puhinui Road.

It involves the upgrade of the existing pedestrian overpass to create a wider, safer and more user-friendly pedestrian walkway. This would include lighting, CCTV and other security improvements between the proposed on-street bus stops and the pedestrian walkway. Access to the existing Puhinui rail platform would be gained via the existing pedestrian ramp.

Figure 4-13: Option A: Upgraded Pedestrian Overpass

4.4.2 Early Deliverable Options 1-5

Early Deliverable Options 1 - 5 would each be the first stage of a high-quality interchange design, (i.e. the ultimate interchange, delivered over two phases) with an enhanced architectural design similar to that of other high-quality public transport interchanges in the Auckland region, such as Otahuhu and Panmure Stations. This reflects the design philosophy and customer information that a high-quality facility is required to support the behaviour and mode change intended by the wider Airport to Botany Project.

In each option, the initial phase involves the construction of an enclosed concourse above the railway line with access to rail platforms and an at-grade bus interchange via lifts and escalators either side. The main frontage

to the building would be from the western side of the railway corridor at Puhinui Road. An additional entrance is proposed on the eastern side - potentially used for private vehicle and pedestrian access. A bus circulation area would be provided to the west of the interchange with the bus stops situated in front of the rail station. A small number of car parking bays would be provided along with some 'kiss-and-ride' bays and private vehicle drop-off. The proposed bus route would travel via Puhinui Road/Bridge Street in this phase.

Figure 4-14: Options 1-5 - Early Deliverable

4.4.3 Capital Cost (Construction and Property Cost)

High-level capital cost estimates for each option were prepared by Truecost Limited. The estimates allowed for the construction of a new bus/train interchange on Puhinui Road. The rates and allowances were gathered from historic projects of a similar nature and market conditions or, where necessary, created using first principle rate build-ups that include materials, plant, labour and margin.

The capital cost estimates for the ultimate design of each option are indicated in the table below. (Early Deliverable design assumed similar in all options due to the available property footprint. All early deliverable options include an at-grade bus interchange with a station building and concourse).

Table 4-1: Summary of High-Level Options Estimate (P50) (Ultimate Design)

Option		Early Deliverable	Ultimate Design
Option 1	Widened Bridge Street Bridge	s7(2)(b)(ii) Prejudice to commercial position	
Option 2	Straight Rapid Transit Bridge		
Option 3	Deviated Rapid Transit Bridge		
Option 4	Rapid Transit Underpass		
Option 5	Rapid Transit Bridge and Moved Rail Platforms		

4.5 Assessment Framework

The options were assessed against a framework agreed to by the project stakeholders. The assessment framework was set up prior to the options being developed to avoid subjectivity. The table below gives the criteria used to assess the options. The criteria were generally assessed as being High (H), Medium (M) or Low (L), by colour coding.

Table 4-2: Assessment Criteria

Project Objectives	Measure/ KPI for Options Assessment
Project Objective 1: Provide more reliable and timely travel choices to and from Auckland Airport and surrounding areas	Extent to which option contributes to reliable travel times to and from Airport.
Project Objective 2: Improve people's access to employment, education and social opportunities	Extent to which option improves people's access to employment, education and social opportunities
Project Objective 3: Provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Extent to which option could provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.
Project Objective 4: Integrate with and get increased value from existing and planned transport investments.	Extent to which option integrates with and gets increased value from existing and planned transport investments.
Project Objective 5: Be operational by end of 2020/early 2021	Ability of the option to be operational by end of 2020/early 2021
While ▪ Improving safety ▪ Delivering value ▪ Working towards the long-term outcomes ▪ Recognising and providing for the significant cultural values of Mana Whenua Waiohua within the Auckland Airport Area ▪ Improving customer journey experience.	▪ Improved safety for users through CPTED/interchange design ▪ Affordability of option in relation to other options. This includes potential redundant investment associated with designs. ▪ Extent to which the option can be staged with a long-term rapid transit service ▪ Extent to which the option contributes to an improved customer journey experience through station design, quality and legibility of interchange and the likelihood of a timely transfer between rail and bus modes.
Feasibility and effects	Measure/KPI for Options Assessment
Affordability/ Cost	High level $ estimate of capital costs of physical works
	Qualitative assessment (H, M, L) of operational costs including both station maintenance costs and bus network operating costs
	High level $ estimate of property costs
Planning and Consenting	Likelihood of obtaining approval for proposed station development
Operational and Safety	Qualitative assessment (H, M, L) of bus and traffic operational risks
	Qualitative assessment (H, M, L) of traffic incl. pedestrian and cycle safety risk (incl. CPTED)
Operating Cost/Efficiency	Assessment of operational costs including both station maintenance costs and bus network operating costs.
Property Impact	Assessment of property impact and acquisition risk

Project Objectives	Measure/ KPI for Options Assessment
Stakeholder/Public	Qualitative assessment (H, M, L) of reputational risks arising from negative feedback from key stakeholders and the public incl. Mana Whenua
Environmental	Qualitative assessment (H, M, L) of environmental risks including Visual impact, Noise/Air Quality (construction and operations), water quality/ecological, heritage, contaminated land etc
Urban Design	Assessment of visual impact and CPTED. Review of impacts on surrounding streetscapes and properties and existing movement networks.
Engineering Feasibility	Assessment of constructability/complexity of station, including impact on major utilities.
RTN Integration/Future Proofing	Ability of design to be future proofed for future RTN (BRT and LRT)
Customer Experience	Impact of station design on customer experience. Across different modes of arrival, wayfinding, legibility, comfort and accessibility.

4.6 Options Assessment

4.6.1 Options Assessment Workshop

The Options Assessment Workshop was held with AT on 3 July 2018 to assess each of the options against the investment objectives and MCA. Pre-options assessment meetings were held with stakeholders on 29 June and 2 July 2018 to ensure a common understanding of the approach and criteria to be applied.

It was agreed at the Options Assessment Workshop that the following options should be eliminated for the following reasons:

- Do-Minimum (i.e. no change) would not meet any of the strategic goals, and would not address the problem statements, and should therefore be eliminated.

Ultimate Design Recommended Option

- Option A would deliver value but would not achieve the project objectives for a high-quality bus/rail interchange at Puhinui. This option would not be a significant improvement on Papatoetoe Station and therefore would not result in a modal shift/improved customer experience.
- Option 1 (Widened Bridge Street Bridge) is not suitable for LRT and would result in a 450m deviation per vehicle per trip per direction (for bus modes). This option would have a high capital cost, including property cost. It would not result in public transport efficiency or a high-level of customer experience.
- Option 4 (Rapid Transit Underpass) would have the highest cost. While the construction cost of the first phase of the Puhinui Station is comparable to other options, it cannot realistically be staged with the underpass option. This option would have environmental and engineering feasibility issues, with high risk associated with the Hunua No.4 Watermain and complex and difficult RTN underpass construction (owing to ground conditions).
- Option 5 (Rapid Transit Bridge and Moved Rail Platforms) would have a high construction cost as it requires moving the rail platforms north, widening of Bridge Street Bridge, and the construction of a rapid transit bridge (significantly higher than RTN bridge-only options). This option would also have a high property impact from moving the platforms.

The recommended programme demonstrated through the MCA and with agreement from project and investment partners and stakeholders, was a Rapid Transit Bridge connection. This connection could be provided in Option 2 (Straight Rapid Transit Bridge) or Option 3 (Deviated Rapid Transit Bridge). The next section covers the further refinement of the option choice.

Early Deliverable Recommended Option

Option A (low-cost early deliverable) would deliver value but would not achieve the project objectives for a high-quality bus / rail interchange at Puhinui. This option would not be a significant improvement on Papatoetoe Station and therefore would not result in a model shift / improved customer experience.

A high-quality bus-rail interchange that can be staged with the RTN bridge in the long-term is the recommended Early deliverable option. This includes a new station building and concourse incorporating an at-grade bus drop-off and pick-up area, kiss-and-ride, public entrance and modifications to the existing central island train platform for six-car train operations.

The MCA summary is provided in Table 4-3.

Table 4-3: Puhinui Interchange Multi Criteria Analysis Summary

	Criterion	Measure	Do Min	Option A		Option 1	Option 2	Option 3	Option 4	Option 5
Objectives	**1) Provide more reliable and timely travel choices to and from the Airport and surrounding areas**	Extent to which option contributes to reliable travel times to and from Auckland Airport.	High	High		High	High	High	High	High
	2) Improve people's access to employment, education and social opportunities.	Extent to which option improves people's access to employment, education and social opportunities	Medium	Medium		High	High	High	High	High
	3) Provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Extent to which option could provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Low	Low		High	High	High	High	High
	4) Integrate with and get increased value from existing and planned transport investments.	Extent to which options integrate with and get increased value from existing and planned transport investments.	Low	Medium		High	High	High	High	High
	5) Be operational by end of 2020/early 2021.	Ability of the option to be operational by end of 2020/early 2021	High	High		Medium	Medium	Medium	Medium	Medium
	While: **Improving safety,** **Delivering value,** **Working towards the long-term outcomes,** **Recognising and providing for the significant cultural values of Mana Whenua within the Airport Area, and** **Improving customer journey experience.**									
Feasibility/Effects	**Capital Cost**	**High level $ estimate of capital costs of physical works**		Low		Medium	Medium	Medium	High	High
		High level $ estimate of property costs								
	Planning and Consenting	**Likelihood of obtaining approval for proposed station development**		High		Low	Medium	Medium	Low	Low
	Property	**Assessment of property impact and acquisition risk**		Low		High	Low	Medium	Medium	High
	Operational and safety	**Qualitative assessment (H, M, L) of traffic operational risks**		Medium		Medium	Low	Low	Low	Low
		Qualitative assessment (H, M, L) of bus operational risks and issues								
		Qualitative assessment (H, M, L) of safety risks inc traffic/pedestrian and cycle safety								
	Operating cost/efficiency	**Assessment of operational costs including both station maintenance costs and bus network operating costs.**		Low		Medium	Low	Low	Medium	Low
	Environmental	**Qualitative assessment of key environmental risks including visual impact, noise/air quality (construction and operations), water quality/ecological, heritage, contaminated land etc**		Low		High	Low	Medium	High	High
	Urban Design	**Assessment of visual impact and CPTED. Review of impacts on surrounding streetscapes and properties and existing movement networks.**		Low		Medium	Medium	Low	Medium	Low
	Development Potential	**Assessment of potential future TOD/value capture opportunity**		High		High	High	High	High	High
	Engineering feasibility	**Assessment of Constructability/ complexity of station, including impact on major utilities.**		Low		Low	Medium	Medium	High	Medium
	RTN Integration/future proofing	**Ability of design to be future proofed for future RTN (BRT and LRT)**		High		Low	High	High	Medium	High
	Customer Experience	**Impact of station design on customer experience across different modes of arrival, wayfinding, legibility, comfort and accessibility.**		Low		Low	High	High	High	High

Table 4-4: Puhinui Interchange Multi Criteria Analysis

	Criterion	Measure	Do Min	Option A	Option 1	Option 2	Option 3	Option 4	Option 5
			Existing Papatoetoe Station	On-street bus stops with upgraded pedestrian overpass	Widened Bridge	Bridge Street Straight Bridge	Rapid Transit Deviated Bridge	Rapid Transit Underpass	Rapid Transit Bridge and moved rail platforms
Objectives	**1) Provide more reliable and timely travel choices to and from the Airport and surrounding areas**	Extent to which option contributes to reliable travel times to and from Auckland Airport.	New reliable public transport service between Manukau and Airport (and wider proposed network changes) is consistent across all options and does not affect station design/layout in the short-term.		New reliable public transport service between Manukau and Airport (and wider proposed network changes) is consistent across all options and does not affect station design/layout in the short-term.				
	2) Improve people's access to employment, education and social opportunities.	Extent to which option improves people's access to employment, education and social opportunities	While access to employment, education and social opportunities will be improved in all the options, the do-minimum and Option A would not result in a high-quality interchange, and as a result not promote the use of the new proposed public transport routes.		New reliable public transport service between Manukau and Airport (and wider proposed network changes) is consistent across all options and does not affect station design/layout in the short-term.				
	3) Provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Extent to which option could provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Does not achieve project objective	This option delivers value & is aligned with long-term outcomes but does not achieve this project objective	An enhanced and integrated bus/rail interchange can be achieved in this option.				
	4) Integrate with and get increased value from existing and planned transport investments.	Extent to which options integrate with and get increased value from existing and planned transport investments.	The existing Airporter route and Papatoetoe Station will not lead to increased patronage and modal share due to low quality and perceived safety issues	While new public transport service would serve Puhinui, it is unlikely to lead to increased patronage and modal share due to low quality and perceived safety issues	Option would contribute to achieving increased value from existing transport infrastructure (increased public transport patronage and modal share due to upgraded interchange and PT services				
	5) Be operational by end of 2020/early 2021.	Ability of the option to be operational by end of 2020/early 2021	Existing station can be served by new public transport services, with Puhinui upgraded at a later stage to incorporate an enlarged station that incorporates	This upgrade can be achieved by the end of 2020/early 2021 and be staged to incorporate an enlarged station that incorporates the RTN and additional rail platforms in future. This however does	An enhanced and integrated bus/rail interchange can be achieved by the end of 2020/early 2021 and be staged to incorporate an enlarged station that incorporates the RTN and additional rail platforms in future.	An enhanced and integrated bus/rail interchange can be achieved by the end of 2020/early 2021 and be staged to incorporate an enlarged station that incorporates the RTN and additional rail platforms in future.	An enhanced and integrated bus/rail interchange can be achieved by the end of 2020/early 2021 and be staged to incorporate an enlarged station that incorporates the RTN and additional rail platforms in future.	An enhanced and integrated bus/rail interchange can be achieved in the short-term but will result in a poor outcome long-term as the early deliverables cannot be staged with the underpass option. Option does not deliver long-term value	An enhanced and integrated bus/rail interchange can be achieved by the end of 2020/early 2021 and be staged to incorporate an enlarged station that incorporates the RTN and additional rail platforms in future.

	Criterion	Measure	Do Min Existing Papatoetoe Station	Option A On-street bus stops with upgraded pedestrian overpass	Option 1 Widened Bridge Street Bridge	Option 2 Straight Rapid Transit Bridge	Option 3 Deviated Rapid Transit Bridge	Option 4 Rapid Transit Underpass	Option 5 Rapid Transit Bridge and moved rail platforms
			the RTN and additional rail platforms in future.	not achieve the wider project objectives					
	While: **Improving safety,** **Delivering value,** **Working towards the long-term outcomes,** **Recognising and providing for the significant cultural values of Mana Whenua within the Airport Area, and** **Improving customer journey experience.**								
Feasibility/Effects	**Capital Cost**	**High level $ estimate of capital costs of physical works** **High level $ estimate of property costs**		Significantly cheaper than other early deliverable options, as this does not involve a concourse and does not impact property.	Significant additional property cost due to widening Bridge Street	Long-term, relatively lower property cost due to avoided direct property impact. One bridge structure for RTN and cyclists.	Long-term, additional property cost similar to Puhinui Road extents of Options 1 and 4. Separate structures for RTN and cyclists.	While construction cost of first phase of station is comparable to other option, it cannot realistically be staged with the underpass option. This option will have the highest cost (based on previous estimates prepared).	Higher cost due to significant property implications of moving the platforms, bridge street widening and relocated platform.

Criterion	Measure	Do Min Existing Papatoetoe Station	Option A On-street bus stops with upgraded pedestrian overpass	Option 1 Widened Bridge Street Bridge	Option 2 Straight Rapid Transit Bridge	Option 3 Deviated Rapid Transit Bridge	Option 4 Rapid Transit Underpass	Option 5 Rapid Transit Bridge and moved rail platforms
Planning and Consenting	**Likelihood of obtaining approval for proposed station development**		No station included in this early deliverable option. Works are readily consentable (by OPW and/or permitted activity or straightforward resource consent).	Early deliverable phase is similar to the other options. Readily consentable in the early term (construction effects and massing/form/ operation of the station will be key, potentially managed differently by RMA process used to authorise). Long-term deliverable phase requires significant take/impacting of property site access to facilitate Bridge Street widening. Obtaining written approvals (as part of property negotiations) will be key in timing/process of obtaining RMA approvals.	Early deliverable phase is similar to the other options. Readily consentable in the early term (construction effects and massing/form/ operation of the station will be key, potentially managed differently by RMA process used to authorise). Long-term deliverable phase considered more readily consentable and does not involve significant land take like other options. However elevated consent risk indicated due to visual impact/construction effects of bridge on residents north of the bridge. Design and access resulting from RTN along Puhinui Road TBC	Early deliverable phase is similar to the other options. Readily consentable in the early term (construction effects and massing/form/ operation of the station will be key, potentially managed differently by RMA process used to authorise). Long-term deliverable phase considered readily consentable but involves moderate land take/altered access (place of worship/properties along Puhinui Road) similar to Options 1 and 4. Design and access resulting from RTN along Puhinui Road TBC	Early deliverable phase is similar to the other options. Readily consentable in the early term (construction effects and massing/form/ operation of the station will be key, potentially managed differently by RMA process used to authorise). Long-term deliverable phase has additional consenting matters to manage - including significantly greater construction effects (noise/vibration) as a result of tunnelling and CPTED in the underpass. Otherwise involves moderate land take/altered access (place of worship/properties along Puhinui Road) similar to Options 1 and 3. Design and access resulting from RTN along Puhinui Road TBC	Early deliverable phase is similar to the other options. Readily consentable in the early term (construction effects and massing/form/ operation of the station will be key, potentially managed differently by RMA process used to authorise). Long-term deliverable phase rearranges platforms north, emergency egress structure on Bridge Street and delivers split RTN drop-off - moving structures and activity (and construction works) closer to northern residential receivers (including north of Bridge Street bridge, not identified on plans). Involves greater property take/altered site accesses compared to Option 1. Obtaining written approvals (potentially as part of property negotiations) will be key in timing/process of obtaining RMA approvals.
Property	**Assessment of property impact and acquisition risk**		Early deliverable has minimal property impact - located in rail corridor and immediately adjacent parcels of land (formed and unformed legal road and Council owned parcel east of the rail corridor - same as other options) and least construction works of all options	Early deliverable phase has similar property impact to other options (including construction areas). Long-term deliverable phase requires significant take/impacting of property site access to facilitate Bridge Street widening. high risk due to the number of properties to be negotiated.	Early deliverable phase has similar property impact to other options (including construction areas). Long-term deliverable property impact and acquisition risk is low due to limited property impacts	Early deliverable phase has similar property impact to other options (including construction areas). Long-term deliverable property impact and acquisition risk is moderate due to land take/altered accesses along Puhinui Road	Early deliverable phase has similar property impact to other options (including construction areas). Long-term deliverable property impact and acquisition risk is moderate due to land take/altered accesses along Puhinui Road (similar to Option 3 and this aspect of Option 1)	Early deliverable phase has similar property impact to other options (including construction areas). Long-term option involves land take either side of rail corridor (north of existing station and bridge st bridge) - therefore long-term deliverable property impact and acquisition risk is high due to significant land take (greater than Option 1 as involves split RTN)

Criterion	Measure	Do Min Existing Papatoetoe Station	Option A On-street bus stops with upgraded pedestrian overpass	Option 1 Widened Bridge Street Bridge	Option 2 Straight Rapid Transit Bridge	Option 3 Deviated Rapid Transit Bridge	Option 4 Rapid Transit Underpass	Option 5 Rapid Transit Bridge and moved rail platforms
Operational and safety	**Qualitative assessment (H, M, L) of traffic operational risks** **Qualitative assessment (H, M, L) of bus operational risks and issues** **Qualitative assessment (H, M, L) of safety risks inc traffic/pedestrian and cycle safety**		First phase deliverable has similar traffic operational/ safety risks. New pedestrian crossings either side of Puhinui Station.	First phase deliverable has similar traffic operational/safety risks. Increased general traffic and bus movements (including right turn into station across Puhinui Road). In the long-term the option would have significantly higher operational risks due to RTN alignment. (High risk associated with median-running bus rapid transit and light rail.	First phase deliverable has similar traffic operational/safety risks. Increased general traffic and bus movements (including right turn into station across Puhinui Road). In the long-term the option would allow for a clear separation between public transport and general traffic (drop/off, cyclists).			
Operating cost/efficiency	**Assessment of operational costs including both station maintenance costs and bus network operating costs.**		Short-term similar to other options (slight operation saving compared to other options), and efficient Rapid Transit connection in the longer term.	Short-term similar to other options, but higher operational cost in long-term due to an additional 450m deviation around Bridge Street and internal circulation.	Short-term similar to other options, and efficient Rapid Transit connection in the longer term.	Short-term similar to other options, and efficient Rapid Transit connection in the longer term.	Short-term similar to other options, and efficient Rapid Transit connection in the longer term. Significantly higher station maintenance cost should early deliverable concourse be kept in addition to underpass.	Short-term similar to other options, and efficient Rapid Transit connection in the longer term.
Environmental	**Qualitative assessment of key environmental risks including visual impact, noise/air quality (construction and operations), water quality/ecological, heritage, contaminated land etc**		Least extent of physical works and shortest construction period of all options.	All options will have key receivers where operational and construction effects need to be managed. The relative differentiators are closer proximity and/or additional receivers/proximity to prolonged construction/altered site access, etc. Long-term this option extends the physical works/RTN footprint further, increasing exposure to a greater number of receivers	All options will have key receivers where operational and construction effects need to be managed. The relative differentiators are closer proximity and/or additional receivers/proximity to prolonged construction/altered site access, etc. Long-term for this option the physical works/RTN footprint are relatively constrained, reducing (relatively) the exposure of receivers	All options will have key receivers where operational and construction effects need to be managed. Long-term the deviated alignment will locate construction and operational effects closer to residential receivers to the south of the existing platform and at Puhinui Road properties.	All options will have key receivers where operational and construction effects need to be managed. Long-term the underpass component of this option involves CPTED and noise/vibration (tunnelling) effects that do not exist with other options	All options will have key receivers where operational and construction effects need to be managed. Long-term the platform reconfiguration moves construction and operational effects and RTN drop off closer to residential receivers (north of the existing station and Bridge Street bridge)

Criterion	Measure	Do Min Existing Papatoetoe Station	Option A On-street bus stops with upgraded pedestrian overpass	Option 1 Widened Bridge Street Bridge	Option 2 Straight Rapid Transit Bridge	Option 3 Deviated Rapid Transit Bridge	Option 4 Rapid Transit Underpass	Option 5 Rapid Transit Bridge and moved rail platforms
Urban Design	**Assessment of visual impact and CPTED. Review of impacts on surrounding streetscapes and properties and existing movement networks.**		Minimal change to visual impact as only pedestrian bridge is upgraded.	Does not change the urban environment so neutral in terms of impact. Widening of existing bridge and road would have negative impact as follows: - land taken for the widening - loss of residential properties - busy road frontages with little pedestrian amenity. Poor outcome in terms of lack of public bridge improvements in retaining existing rail bridge.	Potential negative impact on station and neighbouring properties to north and hides station from neighbourhood behind the bridge structure. Entrance to station effectively under a bridge so poor-quality feel for entrance in this respect. Poor CPTED outcomes with lack of clear sightlines at entrances and obstructions from bridge supports.	Has a viaduct but presents the station face to the neighbourhood to the north better than straight bridge. For CPTED issues the bridge elements are hidden in the architecture so sight lines more advantageous as there are less standalone obstructions. New community bridge to north has strong neighbourhood connections visually with potential for public spaces with direct neighbourhood engagement.	Good visual connection across the site from station to neighbourhood. Still an aperture to go into so far as entrance points for an underpass is concerned so entrances have poor CPTED visibility. Underground environments typically have more compromises such as limited options for egress, poor lighting and general look and feel. Scope of impact less than viaduct in terms of the points of entry further down the length of the rd. and more bridge structures.	Similar to option 2 in terms of impacts. Centralised platform does provide better exit points for CPTED reasons. Small issue for light pollution given shifted platforms are closer to more houses.
Development Potential	**Assessment of potential future TOD/value capture opportunity**		Could be developed as any of the ultimate options, so good development potential	Landlocks the northern two identified sites in terms of vehicle access given the crossovers with bus traffic. Entry points are compromised by the RT route and site sizes by widening.	Good frontages to two northern sites. South west site access is through the car park/bus turning area, but aspect is same for all options.	Public linkages have improved the connectivity of the sites, activated along the Puhinui Road frontages with options for site access. Potential for good street activation by this axis extension of Puhinui Road with retail frontage potential.	Difficult access to south west corner site given adjacency to underpass for site access. Similar dead-end access to the south east site from the neighbourhood side. North site access still good.	Good frontages to two northern sites, south west site access is through the car park/bus turning area but same for all options. Similar to Option 2.
Engineering feasibility	**Assessment of Constructability/ complexity of station, including impact on major utilities.**		Simple construction, simple station layout	Simple construction, simple station layout (concourse short-and-long-term). Off-line construction for bridge street	More complex station, closer to Hunua No.4 Watermain. Similar projects of this nature have been completed recently.	More complex station due to deviated bridge, Reduced impact on Hunua No.4 Watermain.	High risk due to Hunua 4 watermain. Engineering feasibility (tunnel more complex, ground conditions, more difficult and complex)	More complex station, closer to Hunua No.4 Watermain. Station similar to other concourses. Two bridges need to be constructed
RTN Integration/future proofing	**Ability of design to be future proofed for future RTN (BRT and LRT)**		Option can be future proofed for future RTN (BRT and LRT) to ultimately ensure high quality interchange	Option is future proofed for future RTN, although widened Bridge Street will result in a 450m deviation per vehicle per trip per direction.	Option provides for a high-quality interchange and can be future-proofed for future RTN (BRT and LRT) to ultimately ensure high quality interchange	Option provides for a high-quality interchange and can be future-proofed for future RTN (BRT and LRT) to ultimately ensure high quality interchange	Option is BRT/LRT compatible in the long-term, but early deliverable is not compatible with long-term option	Option provides for a high-quality interchange and can be future proofed for future RTN (BRT and LRT) to ultimately ensure high quality interchange

	Criterion	Measure	Do Min Existing Papatoetoe Station	Option A On-street bus stops with upgraded pedestrian overpass	Option 1 Widened Bridge Street Bridge	Option 2 Straight Rapid Transit Bridge	Option 3 Deviated Rapid Transit Bridge	Option 4 Rapid Transit Underpass	Option 5 Rapid Transit Bridge and moved rail platforms
	Customer Experience	**Impact of station design on customer experience across different modes of arrival, wayfinding, legibility, comfort and accessibility.**		Early deliverable station would not improve customer experience. On-street stops, long walking distance with luggage, safety issues. Long-term this can be improved as option is compatible with all ultimate designs.	Longer journey time for bus customers to arrive at destination given route. Connectivity and access to platform poor for customer in station as they have to go up, go down and make a decision once on the linking bridge. Not intuitive wayfinding route.	Elevated concourse facilitates direct intuitive wayfinding. Local station access requires vertical transport to concourse. Community connection poorer as cut off from north so local access more onerous to platform, frontage reduced to west face only given bridge increases pedestrian distance to local entrance.	Same advantages as Option 2 but with stronger local interface with the north community bridge and more intuitive connection to station for locals.	Visual connectivity is poor compared to elevated concourse given subterranean environment. Light and quality of space contributes to disadvantages because of inevitable constraints on ability to have external visual references i.e. the goal is not always visible, so reliance of signage can be higher.	Slight advantage to Option 2 given position closer to platform centre. Unpaid community connection is not as strong.

Further detail supporting the MCA is provided in the Puhinui Options Assessment Report (Appendix B).

4.7 Refinement of Recommended Design

4.7.1 Introduction

Further development of the recommended option identified during the assessment workshop is reported in this section. The recommended Ultimate Design included either a Straight Rapid Transit Bridge to the north of the concourse, or a Deviated Rapid Transit Bridge to the south of the concourse. As part of the concept design development, the two bridge alignment options were compared and workshopped with AT stakeholders. Ultimately, the Straight Rapid Transit Bridge option was progressed to concept design level.

4.7.2 Phasing

The phased development approach was considered in both potential bridge alignment options. The Deviated Rapid Transit Bridge option requires additional public ramp/bridge infrastructure in the Early Deliverable as the existing pedestrian bridge would need to be demolished to accommodate the final location of the concourse and the new lift towers.

In the Straight Bridge Option, sections of the existing pedestrian bridge can be maintained during construction as it is not affected by the location of the new concourse. A new pedestrian bridge to the north of the concourse would be converted to a rapid transit platform in future, which would offer additional savings compared to the Deviated Bridge Option.

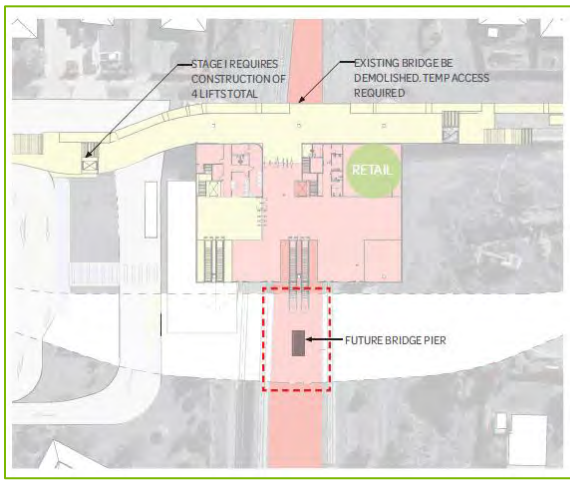


Figure 4-15: Early Deliverable - Deviated Rapid Transit Bridge

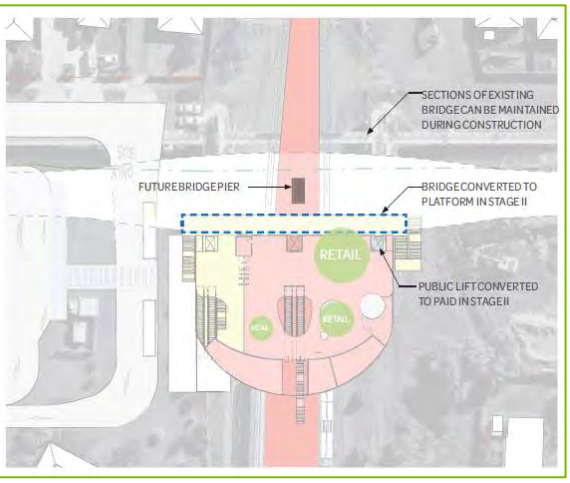


Figure 4-16: Early Deliverable - Straight Rapid Transit Bridge

4.7.3 Performance

Specific performance benefits were assessed for each design:

Safety and Community

The main performance requirements relating to safety and community are:

- The interchange must be safe for all users
- The safety of the area is improved by the presence of the interchange
- The interchange must provide identity for the area.

The Deviated Rapid Transit Bridge Option does not provide an ‘open’ entrance. The Straight Rapid Transit Bridge, however, provides greater safety and community connection, with an ‘open’ entrance with views

to/from neighbouring areas and pedestrian routes. The Customer Service Centre has 360˚ visibility over the entrance and public overbridge, which provides greater safety.

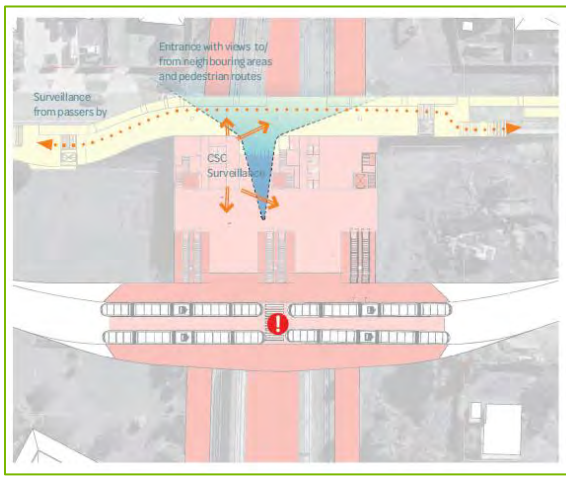


Figure 4-17: Safety and Community - Deviated Rapid Transit Bridge

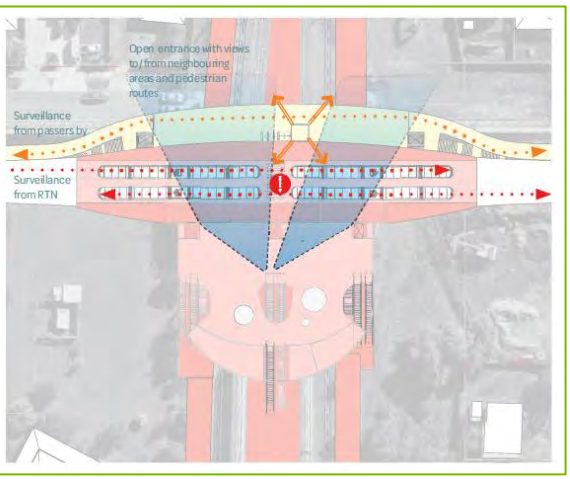


Figure 4-18: Safety and Community - Straight Rapid Transit Bridge

Clarity and Ease of Use

The principal performance requirements relating to clarify and ease of use are:

- Enable single fare movement for Airport to City connection
- Visual and direct connectivity between modes
- Minimum journey distance to change mode
- Minimise decision-making points.

The Deviated Rapid Transit Bridge would provide limited visibility from the public entry owing to support structures along the northern edge of the station. Visibility for train-bus connection is poor as customer have to face the opposite direction, while bus-train visibility is acceptable. Information attendants are disconnected from arrivals on rapid transit services in this option. Because of the location of the concourse, the Deviated Rapid Transit Bridge Option contains the RTN bridge pier which reduces the usable width of the central platform.

The Straight Rapid Transit Bridge provides greater clarity and ease-of-use as it provides high visibility of the station and all connections from the entry, RTN and public bridge. Movement through the station is linear and easy to understand. Support spaces are located on the southern edge of the station, away from entries and connections. Information attendants are visible at the entry for RTN arrivals, providing greater clarity and ease of use. Owing to the location of the concourse further south, the RTN bridge piers are located to the north of the rail platforms and would thus not impede the platforms. These differences are shown in Figure 4-19 and Figure 4-20.

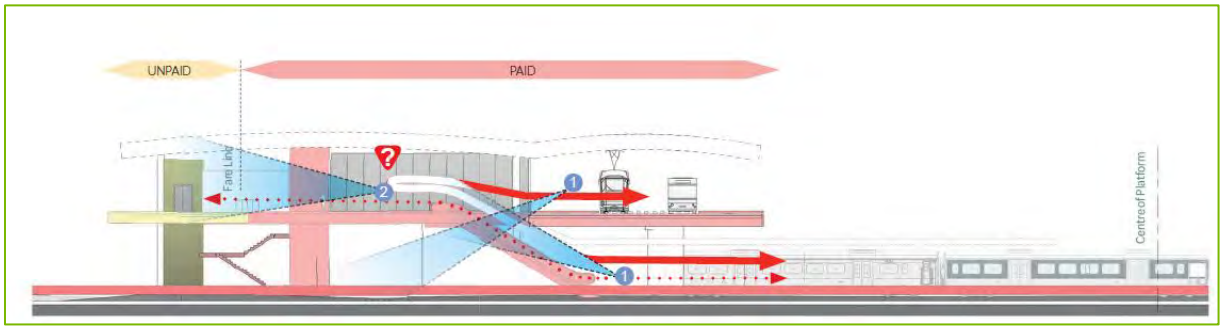


Figure 4-19: Clarity and Ease of Use - Deviated Rapid Transit Bridge

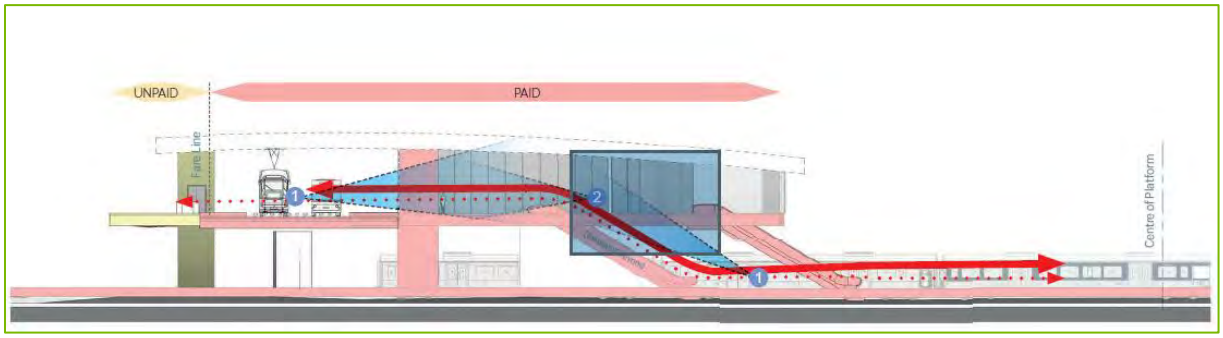


Figure 4-20: Clarity and Ease of Use - Straight Rapid Transit Bridge

4.7.4 Future Proofing and Legacy

The main performance requirements relating to future proofing and legacy are:

- Station optimised for both Early Deliverable and Ultimate Design
- Optimised potential TOD sites
- Heavy infrastructure enables future adaptability as a lasting legacy.

The Deviated Rapid Transit Bridge alignment cuts AT-owned land into smaller, less valuable parcels of land, as shown in Figure 4-21. This results in a less optimal use of land, creating awkward shaped parcels of land with poor frontages. The Deviated Rapid Transit Bridge concept design has more potential for TOD with direct frontage to bridge. However, TOD between the bridge and shared space will sit between elevated structures. Under the Deviated Rapid Transit Bridge concept design, the community link is separated from the bridge, creating a more pleasant environment.

As illustrated in Figure 4-22, the Straight Rapid Transit Bridge provides greater future proofing and a better legacy as the alignment allows for maximum size and value AT-owned land and creates fewer parcels with direct bridge frontage. The option contains an area under the bridge which can be used for covered pick-up/drop-off and can activate this space. The straight bridge alignment allows for widening or other long-term adaptations. The alignment can be moved north to require the least amount of property acquisition. The public route over the railway under the Straight Rapid Transit Bridge concept design also softens the profile of the RTN bridge.

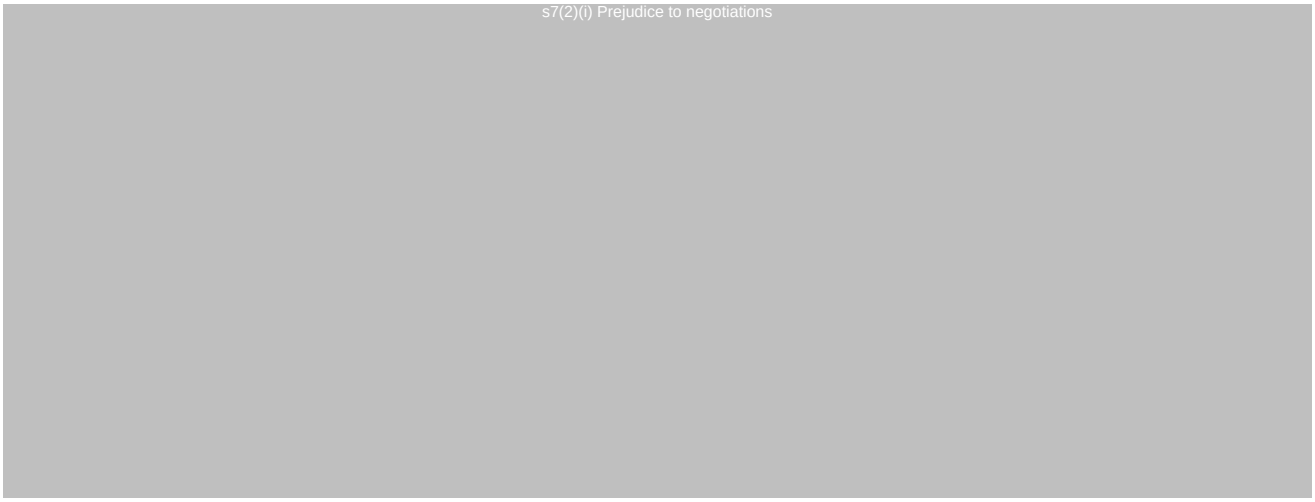


Figure 4-21: Future Proof and Legacy - Deviated Rapid Transit Bridge

Figure 4-22: Future Proof and Legacy - Straight Rapid Transit Bridge

4.7.5 Conclusion

A Rapid Transit Bridge was identified as the preferred option during the Assessment workshop. The impact of different bridge alignment options was investigated in more detail during the concept design phase, in order to assess the impact on the phasing and performance of the ultimate design.

The two bridge options were developed in more detail and workshopped with AT stakeholders. The Straight Rapid Transit Bridge was identified as the preferred RTN alignment, and progressed to concept design, see Parts C and D.

5 Public Transport Network Options

5.1 Introduction

This section covers options for the proposed public transport network changes serving the southwest of Auckland, in order to improve airport area access in the short-term.

It assesses potential bus network changes, extensions and additions in terms of operational implications, operational costs and service delivery impacts, and proposes an indicative preferred network of rapid transit, local and regional buses and Sky Bus51.

The aims of the short-term changes to the public transport system relate to the higher-level Objectives.:

- Provide more reliable and timely travel choices to and from the airport and surrounding areas
- Improve people's access to employment education and social opportunities
- Integrate with and get increased value from existing and planned transport investments
- Be operational by end of 2020/early 2021.

For the services serving the airport area these objectives could be translated into more specific statements:

1. To significantly improve rapid transit connectivity to the airport area in the short-term, with a particular focus on a new rapid transit link to the Airport from the regional rail network at Puhinui, and the southern area bus network at Manukau.
2. To improve the connectivity of the local bus network between the southern suburbs and the airport and its surrounding employment zones, with a focus on serving local residents working in and around the airport precinct.
3. To consider new or improved transit connections between the Airport and other regional centres, that are otherwise not well-served by the rapid transit or local bus network.

Owing to the timeframes associated with the early deliverables, only a bus-based, on-road rapid transit line is feasible to achieve aims 1 and 2.

In the long-term, a rapid transit line will be delivered on the full corridor from the Airport to Botany, and potentially further. The short-term network options should, therefore, provide for an effective transition to this long-term outcome. Other longer-term changes, such as the light rail line between the City Centre and the Airport, via Mt Roskill, Onehunga and Māngere Town Centre, will result in further changes to the local bus network, which may result in further modifications to the local public transport network.

The aims, assumptions and constraints informed the design principles for the short-term public transport network enhancements serving the airport area:

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[51] **Rapid Transit**: refers to heavy rail, light rail, busway and other forms of bus rapid transit, with supporting infrastructure to provide a partially or totally dedicated running way and station-style stops. Service delivery should be characterised higher speeds, high capacity, high frequency and long span of service.

Local buses: refers to the network of standard bus routes contracted under the Public Transport Operating Model (PTOM), including routes classified as Frequent, Connector and Local by AT.

Regional buses: refers to PTOM contracted AT buses, but on routes intended to serve longer distance regional destinations with higher speed, direct service. These fulfil a role similar to rapid transit but may not have the same high-order service levels nor the supporting infrastructure and station-style stops.

SkyBus: refers to commercially-operated specialised airport access bus routes.

- New or modified routes should follow the New Network principles of a connected hierarchal network of frequent services. This includes avoiding excessive duplication of routes on the same corridors, linking local communities directly to nearby centres and employment zones, and connecting from local routes to rapid transit for major cross-regional travel.
- New rapid transit services should be fast and very reliable, and generally, always insulated from traffic congestion and delays.
- Local bus services should be reasonably reliable and robust to traffic and other delays. Network design should avoid or plan for congestion hot spots or other known sources of delay.
- The local neighbourhoods at or between the Airport and the surrounding ring of major rapid transit stations and connected nodes should have high quality, effective connectivity to the Airport employment zones, based on improving or extending existing bus services in the area.
- Improvements to local bus services should focus on extending or enhancing existing Frequent Service routes, rather than creating new ones.
- Major Auckland suburban destinations and town centres should be no more than one transfer away from the airport using some combination of rapid transit, local bus or Sky Bus services.

5.1.1 Network Design Objectives and Analysis

The strategic requirements for short-term public transport enhancements were summarised into the following three design objectives:

1. Establish the first stage of a dedicated bus rapid transit line between the Airport and the existing Manukau rail and bus interchange, via an enhanced Puhinui rail interchange station.
2. Extend local services as appropriate to connect to the Airport directly from surrounding suburbs, targeting areas not otherwise served by connections to rapid transit.
3. Consider new routes to better service the Airport from West Auckland, as the one sub-region not well-served by the existing network or either of the two objectives above.

Multiple route options and variations were generated and analysed in close consultation with AT specialists. Each possibility was analysed against the design principles. The full discussion is found in the report: *Short-term Airport Public Transport Network*, Appendix B. Each variation was assessed for:

- Expected travel speeds and reliability
- Estimated operating costs – allowing for costs per service km, service hour and peak vehicle
- Service spans and frequencies
- Operator contracting – as the change within the units[52] contracted to a particular operator are far easier than changes affecting multiple contracts and operators
- Geographic distribution of likely airport area employees
- Modelled Airport customer spatial distribution
- Airport arrival and departure times
- Additional opportunities to serve non-airport customers
- Infrastructure implications.

Each route possibility was then assessed and discussed with the AT experts using the above information to form recommendations on new routes/variations and consequential adjustments.

[52] As defined in the RPTP

5.2 Potential Short-Term Network

5.2.1 Rapid Transit

The primary recommendation is to deliver a new high frequency express bus service from Manukau to the Airport, via Puhinui station. Its main purpose is to provide a connection to the southern and eastern rail lines at Puhinui, and to the eastern and southern bus network at Manukau.

This route provides airport shuttle access for air travellers and workers from longer distance regional areas via the rail network from the north, to people living in southern South Auckland via the rail network from the south, and from the Manukau, East Tāmaki and Botany areas via the bus network focussed on Manukau central.

This new service should be considered the first stage of a true rapid transit line, to be subsequently improved and expanded to operate across the full Airport to Botany corridor in latter stages.

A ten-minute headway in each direction at peak and off-peak is recommended. A peak headway of five minutes in each direction would be ideal to provide low-barrier connections and meet the high frequency of trains through Puhinui at peak times and should be considered for the longer term.

The span of this service should be at least as broad as the rail lines and bus routes it connects to, and no worse than the Route 380 it replaces. The recommendation for this service is therefore a total span of around 21 hours per day, for example operating from 4:30am to 1:30am. This service will be relatively efficient to operate; with a short, direct route and quick travel times offsetting the service-delivery costs required of high frequency and long span rapid transit.

This new service should replace part of the current Route 380 between the Airport and Manukau via Papatoetoe station, as it serves practically the same function on this corridor.

5.2.2 Supporting Bus Network Changes

Route 380 should be truncated to not duplicate the proposed expressroute between the Airport and Manukau. However, the remainder of the 380 Frequent Service (or a replacement route on the same alignment) should be retained between Onehunga, Airport Oaks and the Airport as a third local route.

A new Frequent Service crosstown route (“Route 36”) between Onehunga, Māngere Town Centre, Papatoetoe and Manukau is recommended, to replace the coverage lost by modifying the Route 380 and introducing the new airport shuttle route. The route will also provide some new parts of Māngere East and suburban Papatoetoe a frequent connection to airport-bound frequent services.

The network response should also truncate the Route 313 to Māngere Town Centre, to avoid duplicating the new Route 36 and the remaining Route 380 service. Running the Route 313 to provide service between Onehunga and Māngere Town Centre is no longer required once the Route 36 takes this role. This route should be realigned slightly in the Puhinui station area to better serve the local neighbourhood and the station.

5.2.3 Local Access Improvements

The Route 31 and Route 32 Frequent Service bus lines should be extended from Māngere Town Centre to the Airport to provide direct connectivity to the airport area. This local network is primarily focussed on workers residing in the local suburbs of Māngere East, Favona, Ōtāhuhu, Hunters Corner and Ōtara, particularly those who are not within walking distance of an existing rail station, and for whom connections to the new rapid transit via Puhinui would require multiple transfers.

Extending these routes to the Airport acknowledges that the wider airport precinct is the main ‘centre’ and employment node for southwest Auckland. This is consistent with the New Network design principle of linking local suburbs directly to their nearby centres.

Routing one of these routes via the Westney Road corridor would provide better coverage of both sides of the Airport Oaks industrial estate.

These extensions will also give direct service to the Airport from Sylvia Park, Papatoetoe and Ōtāhuhu interchange stations. While these local routes will be slower to the Airport from these interchanges than transferring from rail at Puhinui, they would provide a legible and transfer-free connection that may be attractive to new and occasional users.

Extending these two crosstown routes has relatively low service-delivery cost implications. While they are Frequent Service routes, they have an even demand profile across the day and do not have the expensive requirement to ramp up peak service delivery.

5.2.4 New West Auckland Regional Access

A new direct route between New Lynn and the Airport via Tiverton and Wolverton Streets and Stoddard Road is the likely option for new regional access from West Auckland.

This route provides a direct express service between New Lynn and the Airport, enabling one-transfer connections to the Airport from many suburbs of west Auckland via the bus network converging at New Lynn. It also provides a single seat ride between the New Lynn Metropolitan Centre and the airport area.

An express route is recommended to provide a legible service and competitive travel times for connecting passengers. The route should be via Stoddard Road joining SH20 at Dominion Road, as this provides the ability to transfer from buses operating from the southern isthmus to the Sandringham Road and Dominion Road corridors, providing connectivity from Lynnfield, Wesley and Blockhouse Bay. It is only marginally slower than the direct route via the parallel SH20 motorway.

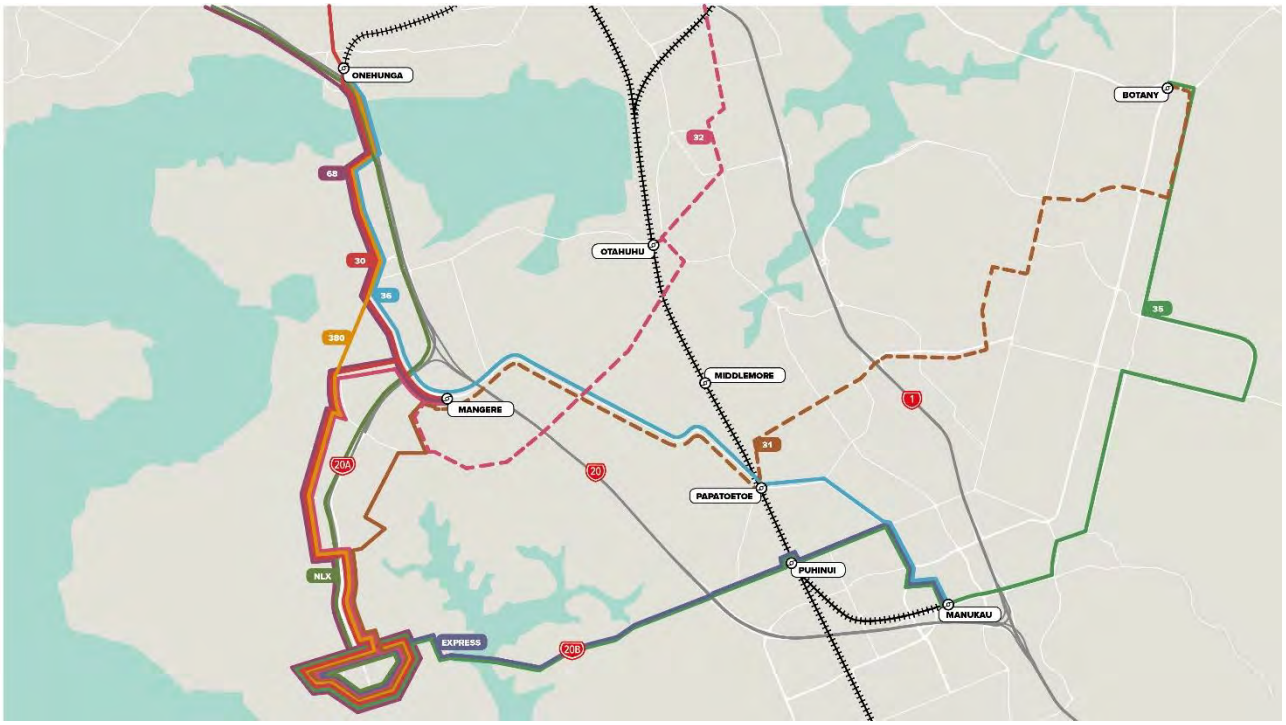


Figure 5-1: Map of potential short-term network

5.3 Outcomes of Recommended Short-Term Network

5.3.1 Network Outcomes

The following table shows the network operating outcomes of the recommended short-term network. In summary, this network includes:

- A new pre-Rapid Transit shuttle route between Manukau, Puhinui and the Airport, supported by a reduced Route 380 and improved crosstown bus links serving the town centres of the southwest
- Two local Frequent Service buses extended to serve the Airport from Botany-Ōtara-Papatoetoe and Sylvia Park-Ōtāhuhu, plus a third Frequent Service bus retained between Onehunga, Māngere Bridge and the Airport
- A new express service between New Lynn-New Windsor and the Airport.

Table 5-1: Outcomes of Short-Term Network Changes

Type	Route option	Buses per hour at airport	Peak Fleet	Service km per annum	Operating cost per annum
Frequent Airport Shuttle	Airport Shuttle to Puhinui and Manukau (10 min all times)	+6	+6	+ 1.06m	s7(2)(b)(ii) Prejudice to commercial position
	Truncate route 380 (Onehunga-Māngere-Airport-Papatoetoe-Manukau)	*-4 (change)* *4 (total)*	*- 7*	*- 0.66m*	
	Total:	**10**	**-1**	**+0.40m**	
Supporting changes	New Route 36 (Onehunga-Māngere-Papatoetoe-Manukau)	N/A	+7	+ 0.85m	
	Truncate and realign Route 313 (Manukau to Māngere Town Centre)	*N/A*	*-3*	*- 0.33m*	
	Total:	***N/A***	***+4***	***+0.52m***	
Improved local connections	Extend route 31 (Botany-Ōtara-Papatoetoe-Māngere)	+4	+4	+0.42m	
	Extend route 32 (Sylvia Park-Ōtāhuhu-Māngere)	+4	+4	+ 0.42m	
	Total:	**+8**	**+ 8**	**+0.84m**	
New regional connection	New Lynn to Airport Express Service (Direct Express via Stoddard Road)	+4	+7	+ $1.01m	

	Total:	**+4**	**+7**	**+1.01m**
GRAND TOTAL:		***22 bph at peak***	***+18 buses***	***2.77m km***

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

5.3.2 Service Delivery Operating Costs and Contracting

This full network increase in service results in an estimated net increase in operating costs per annum in 2018 dollars. This figure accounts for an additional 2.8m service-km per annum, increased service-hours and includes the corresponding annualised costs to increase the bus fleet with 18 additional buses.

Implementing the frequent airport shuttle service together with the supporting changes would require an estimated net increase in operating costs It is assumed that the airport shuttle service implementation would be feasible to deliver within two years as a variation of the Route 380 contract. The new Route 36 and other improved local and regional connections may be more difficult to procure in these timeframes.

Whilst an increase in operating costs is expected, some of this cost will be recovered through fare income. Demand estimates from AT's Macro Strategic Model (MSM) have been used to estimate the change in patronage between a 'do minimum' option and an option implementing most of the full indicative network. The additional fare income expected was then estimated by applying the current proportions of concessions for public transport travel in Auckland (e.g. child, tertiary, adult) and the relevant current fare rates assuming all travel uses an AT HOP card. It is expected that in the short-term, the recommended network will generate an additiona per annum.

s7(2)(i) Prejudice to negotiations

5.3.3 Service Frequency and Fleet Requirement

AT Procured Routes

This indicative network results in a total of 22 AT-contracted buses per hour calling at the airport terminals at peak, an increase of 14 buses an hour over the existing Route 380. It comprises six buses per hour on the express service (one every ten minutes), with a further 12 buses per hour across the three local routes and four per hour on the New Lynn regional route.

Grouping the 'local' and 'regional' routes together results in 16 buses per hour, comprised of four routes operating every fifteen minutes each at peak, or approximately one every four minutes in total.

Private Contracted Buses

For the Sky Bus lines, a further eight buses per hour at peak are assumed. This is comprised of six per hour operating the City to Airport routes, and an additional two per hour for the new North Shore service.

5.4 Public Transport Network Considerations

The recommended public transport network improvements will improve access to the airport for travellers and workers. The AT Airport Access research project provided specific insights into the travel patterns and demand for potential Airport public transport users. This included people who worked around the airport precinct, both at the Airport terminal itself, and the Airport Oaks commercial-industrial employment areas to the north.

The five key findings can be summarised as follows:

- Airport Oaks & Airport precinct workers have distinct shift patterns, with Airport Oaks generally starting between 5am and 7.30am and finishing in the mid-afternoon
- Airport terminal worker patterns are more complex and varied, with many shifts at the airport finishing between midnight and 1.30am

- Airport Oaks workers generally have free parking on site so less interested in public transport
- The airport precinct Park & Ride is primarily intended for, and used by, workers. However, it is considered inconvenient due to long travel times, adding 15 to 25 minutes to each trip, so airport workers open to using public transport
- Workers are much more sensitive to length of journey than air travellers.

The study also indicated that airport workers wanted a public transport service that operates every 10 – 15 minutes for 24 hours a day, with limited requirement to transfer.

The existing and proposed public transport network will generally operate from 5am until midnight, seven days a week. The A2B service will run slightly longer hours than this, while the rail network currently ends service around an hour earlier than buses, at approximately 11pm on weekdays.

The data suggest that workers in the wider Airport-Oaks industrial area tend not to have shift change between midnight and 5am. This indicates that the existing and proposed bus service, with spans of operation from approximately 5am to midnight, will serve these workers adequately. Therefore, there appears to be little need to provide additional bus or alternate transit services to the Airport Oaks area, beyond what is already proposed.

Conversely, for workers at the airport terminal itself there is the potential for a greater range of shift times between midnight and 5am. Therefore, the currently planned public transport network could not serve these shift workers, who would continue to rely on using private cars, or alternative non-public modes of transport. The impact of a reliance on private cars for late night shift workers at the airport terminal is compounded by the constraints on parking at the terminal areas: not only are the forced to drive for those shifts, the majority are also required to park at the remote park and ride lot and catch the shuttle bus to terminal itself.

The proposed public transport network will adequately serve all typical shifts at the Airport Oaks area and would serve most shifts at the airport terminal. However, to serve *all* airport terminal shift-workers, including those needing to travel between midnight and 5am, the public transport option would effectively need to run 24 hours a day, seven days a week.

Potential alternative options were investigated and assessed as part of this project (Appendix J). This included:

- Fixed route public transport – expansion of the span of service of some or all of AT Metro network
- Shuttle options – specialised van or minibus services
- Non-public-transport options – relying on other transport modes
- Hybrid options – combinations of parts of the above options.

While an ideal solution from a user perspective would be to operate all parts of the Auckland regional public transport system twenty-four hours a day, this would be difficult to staff and operate, and require very significant increases in operating costs. This is unlikely to present good value for money in relation to the comparatively tiny number of passenger trips that would be carried between midnight and 5am, region wide.

Better value would likely be gained from one or more of the other options discussed, such as: extended hours on the main A2B service and/or select fixed-route public transport services; targeted shuttle van ‘dial a ride’ operations; increased facilitation of ridesharing and carpooling, or improvements to the cycling network.

The proposals are discussed in more detail in **Appendix J**.

6 Short-Term Improvements – Bus Priority

This section assesses potential short-term bus priority options between SH20 and Manukau Bus Station. In combination with the other short-term improvements (bus priority lanes on SH20B, extended bus lanes within the airport precinct, and a new bus-rail interchange station at Puhinui), an effective “express” service pattern can feasibly be delivered in these timeframes.

6.1 Congestion Locations

To identify the congestion points on the road network to target, a rolling travel time survey was undertaken between SH20 and Manukau Bus Station. Multiple runs were conducted through morning and afternoon peak traffic periods using identical start and stop points to gain an understanding of existing traffic congestion. The observed congestion levels were compared and verified against Google Map Data.

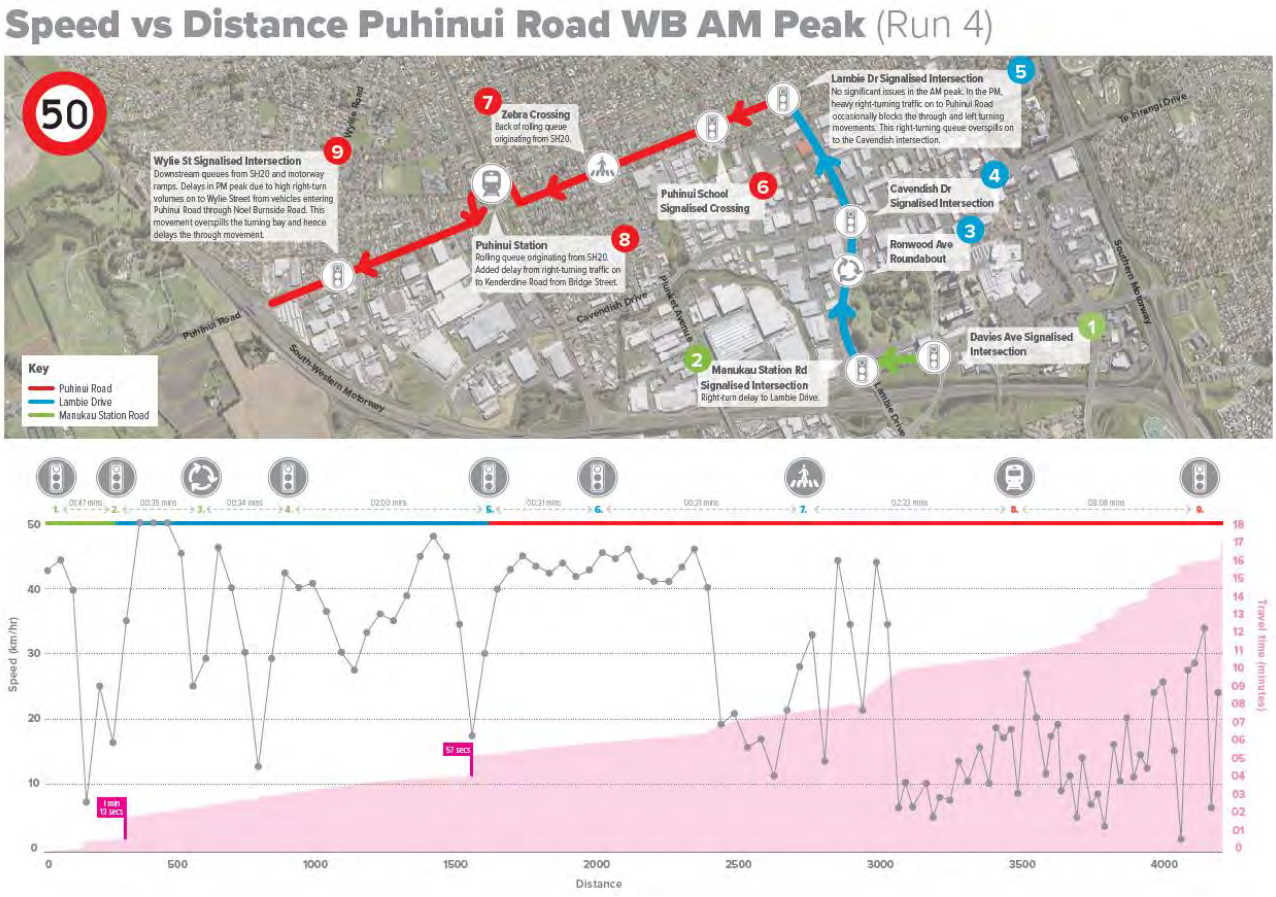


Figure 6-1: Travel Time surveys AM Peak: Westbound

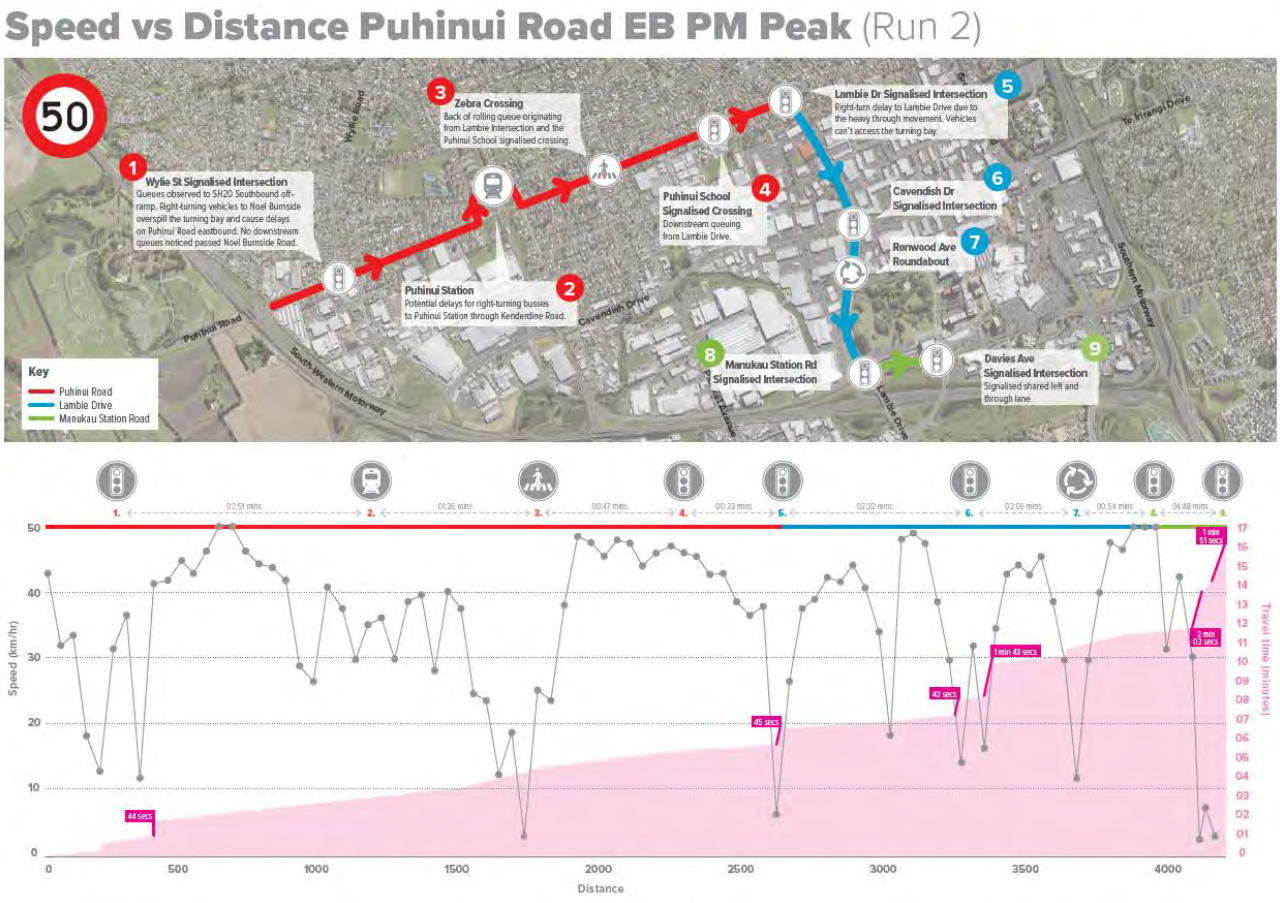


Figure 6-2: Travel Time surveys PM Peak: Eastbound

The graphs below illustrate the speed variability along the study route in both directions during AM and PM peak. The bigger and darker the bubbles the slower the speed. The visualisation allows the identification of locations particularly susceptible to congestion to inform the development of options.

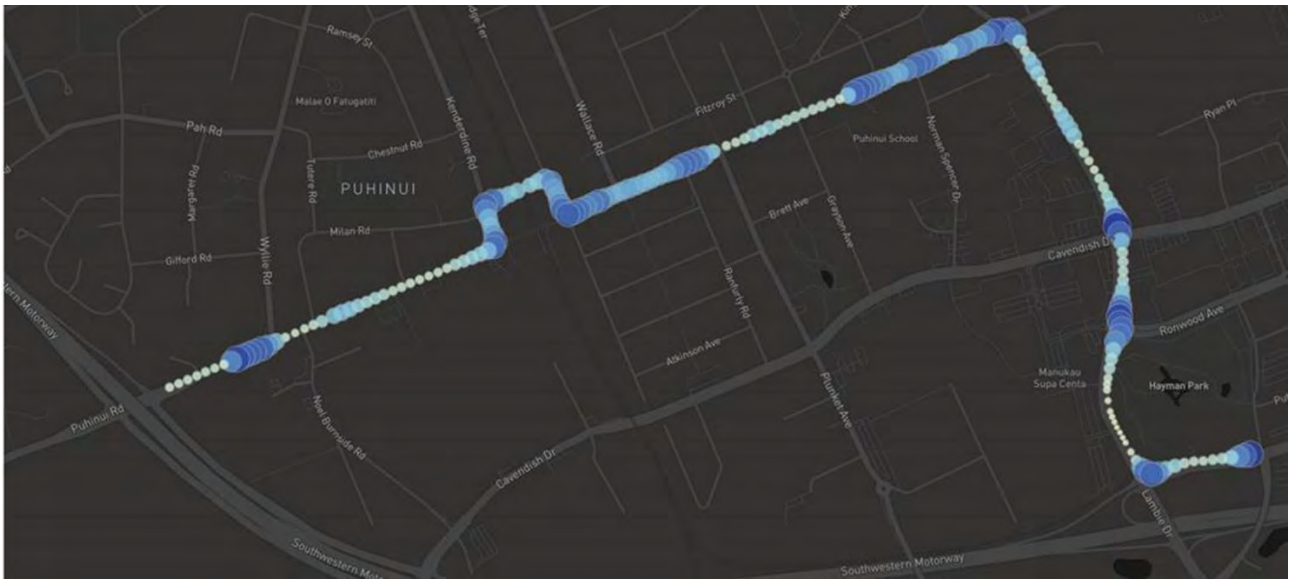


Figure 6-3: Travel Time Surveys (AM Eastbound)

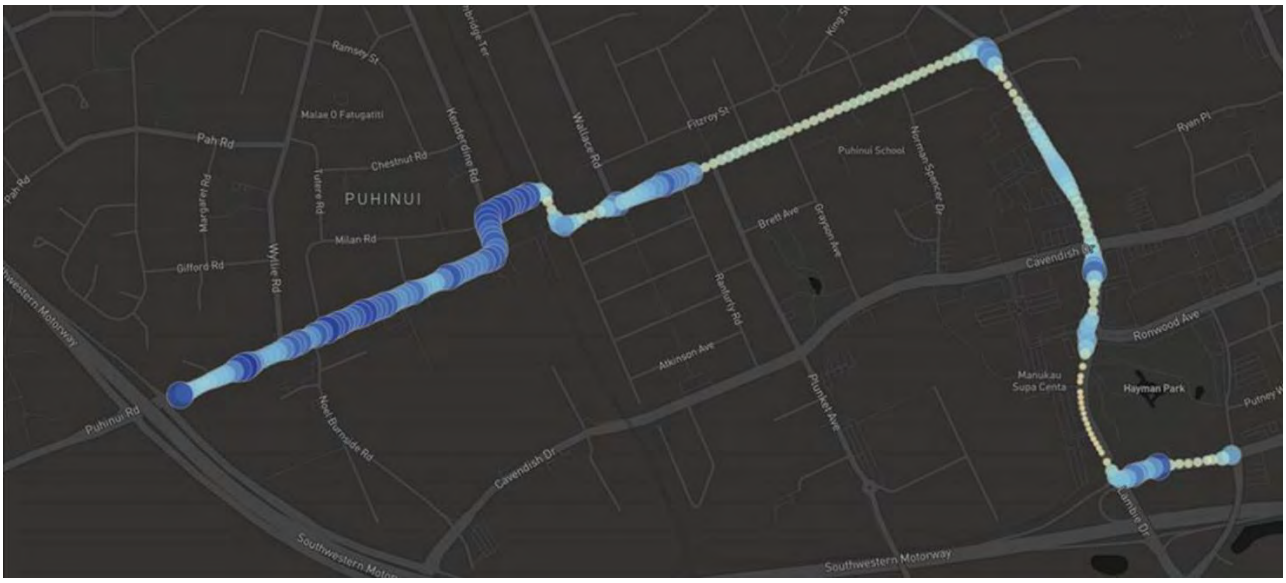


Figure 6-4: Travel Time Surveys (AM Westbound)

The congestion points along the potential bus route were identified through the rolling travel time surveys described above. The main identified congestion points were:

- Puhinui Rd / Wyllie Rd intersection
- Puhinui Rd / Plunket Ave intersection
- Puhinui Rd / Lambie Dr intersection
- Lambie Dr / Cavendish Dr.

6.2 Queue Count Analysis

A queue analysis was undertaken at these sites using a variation of the 'Back of Queue Survey Method' outlined in the SIDRA Intersection User Guide[53]. This method consisted of recording the number of cars observed in a queue at the end of a cycle red time and also the number of cars adding to this 'back of queue' during green time. The addition of these two counts was taken as the total back of queue length experienced at an approach or movement. In some instances, the end of the queue was not visible from the observation point. In these situations, a manual estimation of the extent of the queue was made.

[53] SIDRA INTERSECTION 7: USER GUIDE

6.2.1 Puhinui Rd / Wyllie Rd

Figure 6-5: Puhinui Rd / Wyllie Rd queue analysis

- In the PM peak, the eastbound queue on Puhinui Rd was observed extending beyond the SH20 intersection, with shorter queues (10 to 15 vehicles in both lanes) evident in the AM peak
- In the PM peak, the westbound queue occasionally extended beyond the Noel Burnside Rd intersection. In the AM peak it extended to Puhinui Station at Kenderdine Rd
- Northbound queues in the PM peak extended the full length of Noel Burnside Rd (up to Cavendish Dr)
- Southbound queues in both peaks were typically up to 15 vehicles along Wyllie Rd.

6.2.2 Puhinui Rd / Plunket Ave

Figure 6-6: Puhinui Rd / Plunkett Ave queue analysis

- The eastbound approach to the intersection had a short queue in both peaks surveyed. Significant queues were however identified in the travel time surveys and google data analysis
- There was a much longer queue in the westbound direction in the PM peak, that extended from Plunkett Ave with back of the queue beyond Puhinui School
- Plunkett Ave itself had relatively long northbound queues in the PM peak, with a shorter queue evident in the AM peak.

6.2.3 Puhinui Rd / Lambie Dr

Figure 6-7: Puhinui Rd / Lambie Dr queue analysis

- There were up 30 vehicles queued in the eastbound through lane on Puhinui Rd in the PM peak, which stretched back to Puhinui School – a distance of approximately 300m. A smaller queue was observed in the eastbound right turn pocket for Lambie Dr, although the length of the queue further to the west was such that right turning vehicles could not easily access this pocket. In the AM peak, eastbound queues were shorter, but still evident in both lanes
- On the westbound Puhinui Rd approach, both lanes queued in both peaks, with queue length of approximately 10 vehicles on average
- During the PM peak, the northbound approach on Lambie Dr was queued back up to the Cavendish Dr intersection. In the AM peak, shorter queues are evident in both lanes
- Carruth Rd typically had around 30 vehicles queued on the southbound approach to Puhinui Rd during the PM peak, with shorter, but still significant queues in the AM peak.

6.2.4 Lambie Dr / Cavendish Dr

Figure 6-8: Lambie Dr / Cavendish Dr queue analysis

- Northbound queues in both peaks on Lambie Dr typically extended back to the Ronwood Ave roundabout in both lanes during the PM peak, with shorter queues evident in the AM peak
- The Lambie Dr southbound approach had queues evident in both AM and PM peaks
- There were moderate queues on both Cavendish Dr approaches. The PM peak was busier than the AM peak.

6.3 Existing variability in bus travel times

Segments of all existing routes that intersect with the Airport to Botany corridor for short-term improvements were assessed to inform the development and assessment of bus priority options. This is based on existing services. The rest of Puhinui Road, that doesn't currently have buses on it, is expected to experience similar periods of unreliability to the rest of the area.

6.3.1 Puhinui Road (between Tom Pearce Drive and Wyllie Road, ~4.5 km)

The following figures show the variability in travel times along Puhinui Road between the Airport precinct and just east of the SH20 interchange.

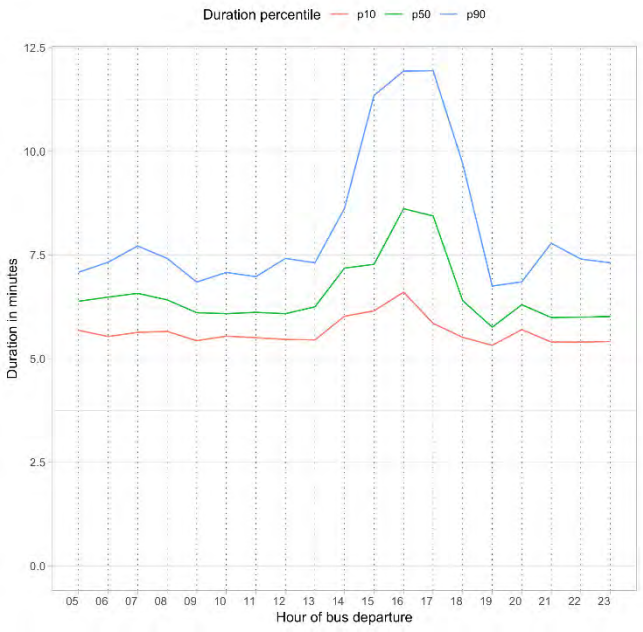


Figure 6-10: Eastbound

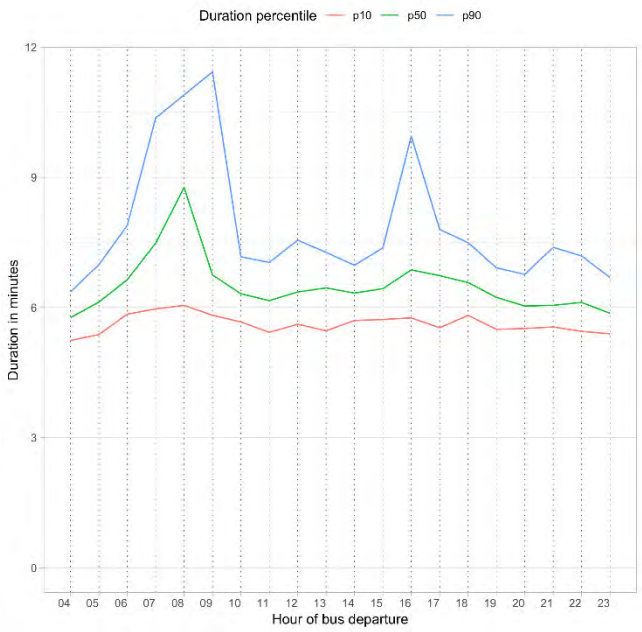


Figure 6-10: Westbound

Key findings for Puhinui Road.

- Eastbound:
  - 7am – 9am: slight rise in 90th percentile travel times
  - 2pm – 7pm: substantial increases in median travel times and variability
  - Travel time range (10th to 90th percentile) increases from ~2 minutes interpeak to ~6 minutes in the evening peak.
- Westbound:
  - 6am – 10am: morning peak period with longer median travel times and more variability
  - 3pm – 7pm: median travel times not significantly affected, but increased unreliability
  - Travel time range (10th to 90th percentile) increases from ~2 minutes interpeak to ~5 minutes in the morning peak and ~4 minutes in the evening peak.

6.3.2 Puhinui Road (between Wallace Road and Plunket Avenue, ~0.5 km)

The following figures are for a short section of Puhinui Road east of Puhinui train station.

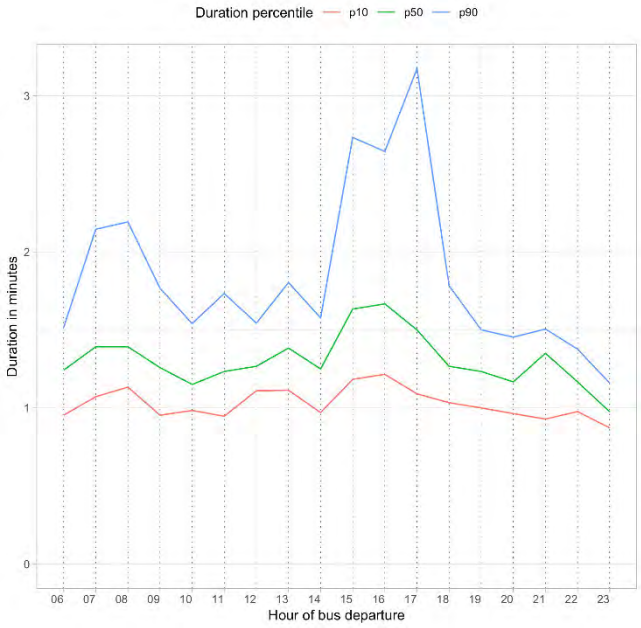


Figure 6-12: Eastbound

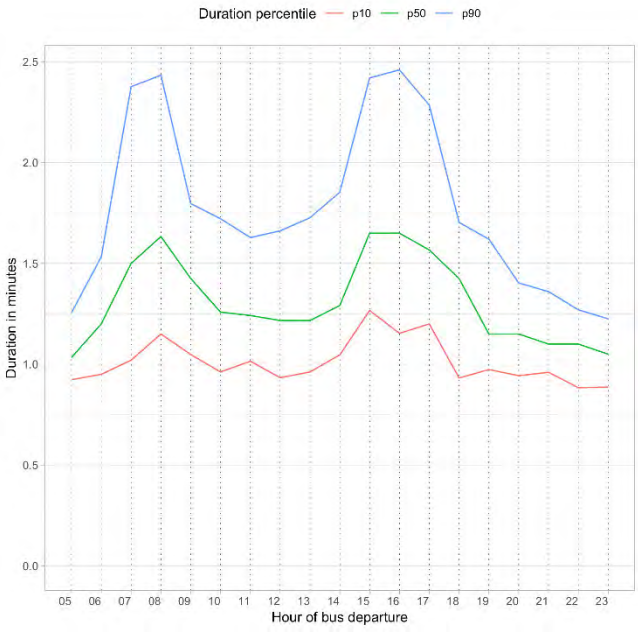


Figure 6-12: Westbound

The key findings for this short segment of Puhinui Road are:

- Eastbound
  - 7am – 9am: standard median travel times but higher unreliability
  - 2pm – 7pm: slight increase in median travel times and significant increase in variability
  - Travel time range (10th to 90th percentile) increases from <1 minute in the interpeak to ~1 minute in the morning peak and ~2 minutes in the evening peak.
- Westbound
  - 7am – 9am: higher median travel times and high variability
  - 2pm – 7pm: higher median travel times and variability
  - Travel time range (10th to 90th percentile) increases from <1 minute in the interpeak to >1 minute in the morning peak and evening peaks.

6.3.3 Lambie Drive/Manukau Station Road (between Puhinui Road and Manukau Station, ~1.5 km)

The following charts are for Lambie Drive and Manukau Station Road, between the intersection of Puhinui Road/Lambie Drive and Manukau Station.

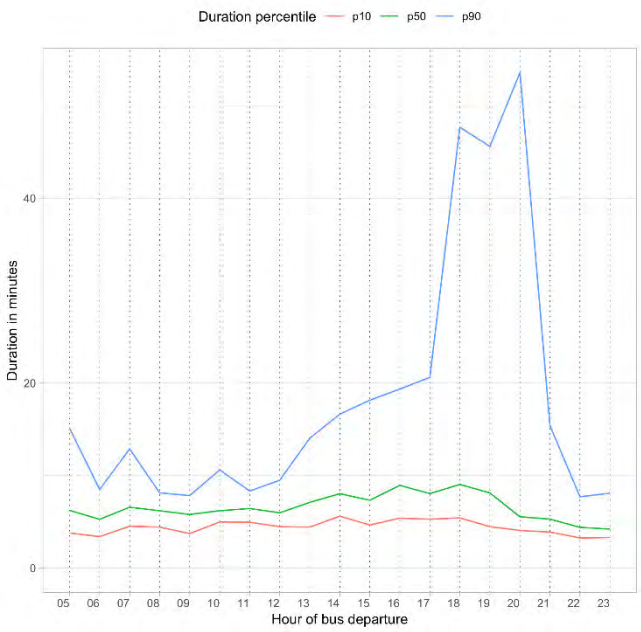


Figure 6-14: Eastbound

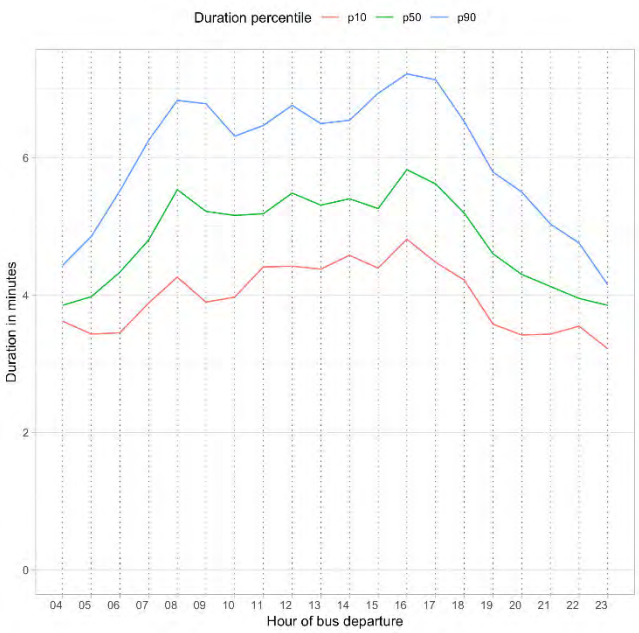


Figure 6-14: Westbound

The key findings from these charts are:

- Eastbound
  - 7am – 8am: slight rise in 90th percentile travel times
  - 1pm – 8pm: median travel times increase, and variability gets dramatically worse*
  - 8pm – 10pm: median travel times back to normal, but still relatively high variability
  - Travel time range (10th to 90th percentile) increases from ~4 minutes interpeak to over 50 minutes in the evening.
- Westbound
  - 7am – 7pm: higher median travel times and variability than in late evening / early morning, with a slight further rise around 8am – 9am, 12pm – 1pm, and 4pm – 6pm
  - Travel time range (10th to 90th percentile) increases from ~1 minute off-peak to ~2 minutes throughout the day (7am – 7pm).

6.4 Bus Priority Measure Options

In conjunction with AT specialists three options were identified to address the congestion. In effect, these were the only three possible options reflecting different degrees of priority on the critical route sections.

6.4.1 Do Minimum

The Do Minimum has investment in bus priority infrastructure along the route, with available capacity being managed through optimisation of traffic signals.

This approach will be challenging for new public transport services as the analysis of current congestion and traffic growth highlights that several sections of the route are already over capacity – particularly the Lambie Dr/Cavendish Dr intersection, Lambie Dr/Puhinui Rd intersection and the Puhinui Rd approaches to SH20 in the eastbound direction.

Figure 6-15: Option 1: Do Minimum

6.4.2 Limited Bus Priority Treatments

This option has relatively low-cost bus priority measures in specific areas identified during the analysis. It includes the provision of bus lanes in each direction on Puhinui Rd west of Wyllie Road, an eastbound bus priority lane leading to the Puhinui Rd and Lambie Dr intersection, and bus lanes in each direction on Lambie Dr. It would require separated walking and cycling facilities in specific areas to accommodate the bus lanes or shared wide bus/cycle lanes.

Figure 6-16: Option 2: Range of Bus Priority Measures between SH20 and Manukau

6.4.3 Targeted Bus Priority Measures

The third option entails the provision of targeted bus priority measures between SH20B and Manukau. In combination with the other short-term programme infrastructure improvements (bus priority lanes on SH20B, extended bus lanes within the airport precinct, and a new bus-rail interchange station at Puhinui), an effective 'express' service pattern can feasibly be delivered within the project timeframes.

Due to corridor width constraints, the need to retain right-turn bays in certain sections, and the programme timeframe which does not allow for any property acquisition, targeted bus priority lanes are limited to approximately 70% of the route between SH20 and Manukau Station.

The option would require separated walking and cycling facilities along the entire length of Puhinui Rd as wide bus lanes are not compatible with an effective express arrangement.

Figure 6-17: Option 3: Targeted Bus Priority Measures between SH20 and Manukau

6.5 Modelling Forecasts

Transport demand forecasts (from AT's MSM) were obtained to estimate the impact of potential bus priority improvements between Manukau Bus Station and the Airport. The figures indicate the forecast travel times and average speed between the Airport and Manukau, with travel times considerably lower in the full bus lanes scenario.

Table 6-1: Modelled Travel times, 2028, AM peak:

Modelled Section of Route	Travel Time	Average Speed
Airport to Wyllie Road		
Do Minimum (Route 380)	34.3 min	9 km/h
Full Bus Lanes	10.1 min	31 km/h
Wyllie Road to Airport		
Do Minimum (Route 380)	37.2 min	9 km/h
Full Bus Lanes	10.5 min	31 km/h
Airport to Manukau Station		
Do Minimum (Route 380)	66.2 min	10 km/h
Full Bus Lanes	22.2 min	25 km/h
Manukau Station to Airport		
Do Minimum (Route 380)	73.9 min	9 km/h
Full Bus Lanes	22.9 min	25 km/h

6.6 Options Assessment

The options were assessed against the project objectives in an assessment framework set up prior to the options being developed. The table below indicates the criteria used to assess these options, and which criteria were generally assessed as being High (H), Medium (M), or Low (L), by colour.

Table 6-2: SH20 to Manukau Bus Priority Options Assessment

Project Objectives	Do Minimum	Limited Bus Priority Measures	Targeted Bus Priority
Provide more reliable and timely travel choices to and from the airport and surrounding areas. **Measure: reduced congestion affecting public transport**	This option will not contribute to this project objective. Existing congestion and forecast growth in traffic volumes will result in variable, and unreliable travel times for public transport passengers.	While existing areas of congestion will be addressed in this option, forecast growth in traffic volumes will result in variable, and unreliable travel times for public transport passengers due to potential future delays in other sections along the route, with the implementation of the full RTN potentially a decade away.	This option helps achieve this project objective. In combination with the other short-term programme infrastructure improvements (bus priority lanes on SH20B, extended bus lanes within the airport precinct, and a new bus-rail interchange station at Puhinui), an effective 'express' service pattern can feasibly be delivered within the project timeframes.
Improve people's access to employment, education and social opportunities. **Measure: increased reliability of public transport**	While a new public transport service between Manukau and Airport (and wider proposed network changes) is consistent across all options, the service will not be reliable due to the limited bus priority measures.	While a new public transport service between Manukau and Airport (and wider proposed network changes) is consistent across all options, the service will not be reliable due to the limited bus priority measures.	In combination with the other short-term programme infrastructure improvements (bus priority lanes on SH20B, extended bus lanes within the airport precinct, and a new bus-rail interchange station at Puhinui), an effective 'express' service pattern can feasibly be delivered within the project timeframes with good reliability and providing better access.
Integrate with and get increased value from existing and planned transport investments. **Measure: increased public transport patronage**	While new public transport service would serve Puhinui, it is unlikely to lead to increased patronage and modal share due to the unreliable travel time. This would not offer a significant improvement in travel time over the existing 380 Airporter.	While a new public transport service would serve Puhinui, it is unlikely to lead to increased patronage and modal share, due to the unreliable travel time. Bus priority measures would improve reliability to Puhinui in the short-term but forecast growth in traffic volumes will lead to unreliable travel times within the foreseeable future.	This option would contribute to achieving increased value from existing transport infrastructure (increased public transport patronage and modal share due to the upgraded interchange and full bus priority for the new bus service).
Be operational by end of 2020/early 2021.	This option does not involve any civil works so can be operational early.	This option entails limited bus priority improvements within the existing corridor and can be delivered by the end of 2020/early 2021.	This option entails full bus priority improvements within the existing corridor and can be delivered by the end of 2020/early 2021.
While –	No improvement.	This option does not improve the customer journey experience as it will not ensure reliability and will not contribute to improving safety.	This option will enhance the customer journey experience and will improve safety with the implementation of separated walking and cycling facilities.
Improving safety			
Delivering value			
Working towards the long-term outcomes			

Project Objectives	Do Minimum	Limited Bus Priority Measures	Targeted Bus Priority
Recognising and providing for the significant cultural values of Mana Whenua within the Airport Area, and			
Improving customer journey experience.			
Capital Cost	This option does not involve any civil works and therefore has no capital cost.	This option entails limited bus priority improvements within the existing corridor, with separated walking and cycling facilities in specific sections along the route, and intersection upgrades. $4 - 6m.	This option entails full bus priority improvements within the existing corridor, with separated walking and cycling facilities along Puhinui Road, and intersection upgrades. $7 - 10m.

6.7 Recommended Option

The three potential options were workshopped with AT stakeholders:

- AT Planning and Investment
- AT Metro - Network Development
- AT Metro – Infrastructure
- AT – Network Operations
- AT – Travel Demand and Operational Planning
- AT – Traffic Engineering, Network Management and Safety.

The Do Minimum option was eliminated as it does not contribute usefully to any of the project objectives.

While the Limited Bus Priority Option delivers some increased public transport priority during peak periods, it is unlikely to lead to significantly increased public transport patronage and modal share due to the unreliable travel time. Bus priority measures would improve reliability to Puhinui in the short-term but forecast growth in traffic volumes will lead to unreliable travel times within the foreseeable future. This option will also not improve travel time reliability for the new airport service. This option was eliminated as it does not provide sufficient public transport priority for the planned frequent service and would thus not deliver a express type service.

The targeted bus priority option was selected as the preferred option to be assessed and designed in more detail. This option is expected to deliver greater prioritisation for public transport and associated benefits and outcomes, including enhanced capacity to meet demand and travel choices for a range of customers. It also provides for improved walking and cycling facilities for all ages and abilities as an early deliverable in a consistent design. While this option will impact existing on-street parking, peak only bus lanes are required to ensure a reliable service.

The targeted bus priority option could deliver significant operational cost savings and patronage benefits to AT, achieving faster, more reliable run times for bus services directly influences the peak vehicle requirements. Bus priority contributes to reducing the number of buses required to operate the express service during peak periods, which saves AT over $50,000 per annum per bus. This is before any additional patronage and/or reduced operating costs for all other buses on the route are considered.

6.7.1 Bus Priority Lanes Rationale

The project objective of AT's Short-Term Airport Access Improvement SSBC is to provide more reliable and timely travel choices to and from the airport and surrounding areas whilst also improving safety, delivering value and **working towards the long-term outcomes**.

There is an urgent need to improve the travel time and reliability of the new proposed airport service linking Manukau with the Airport via Puhinui Interchange. Peak bus priority lanes are recommended for Puhinui Road due to:

- The new public transport service is the early deliverable of the long-term Airport to Botany Rapid Transit Corridor – and needs to operate as close to possible to a rapid transit service. This requires full bus priority between SH20 and Cavendish Drive (main congestion sections – this can be expanded to Ronwood Drive in future)
- Puhinui Road is also identified as a Rapid Transit Network, or RTN. The figure below shows that the Rapid network is the highest level in the public transport hierarchy, exhibiting high frequency services all day (at least 7am to 7pm) every day (7 days a week) and operates on a dedicated right of way. The recommended option is also informed by the fact that the Short-Term Airport Access Improvements are the early deliverables of the long-term Airport to Botany Rapid Transit Line

Service Layers	Rapid	Frequent	Connector	Local
Defining features	All-day network			
Minimum Frequency	15 minutes		30 minutes	60 minutes
Operating hours	7am-7pm, frequency may be less outside these hours			
Achieving speed and reliability	Dedicated Right of Way	Priority measures	Some priority measures	Generally no priority measures

In addition, there will be some targeted services such as peak-only, school, rural and other single-destination services with frequency and service span determined by demand.

Figure 6-18: Priority measures for Rapid Transit Networks

- Puhinui Road is identified as a priority public transport and cycling corridor in the Concept of Operations for the South-West Gateway, and currently has one general traffic lane per direction. These general traffic lanes are being retained with an additional bus lane added per direction along Puhinui Road. Cavendish Drive is the main east-west arterial linking Manukau to SH20, and the intention is not to divert general traffic capacity on Puhinui Road
- Targeted bus priority lanes have significant benefits for the Long-Term Airport to Botany Rapid Transit Corridor. It allows the staging to focus on Botany to Manukau, which involves the implementation of a median-running rapid transit line, as the rapid transit route will effectively already operate as a frequent airport express service between Manukau and SH20. Adding a transit lane to Puhinui Road will have a negative impact on bus reliability due to the growing general traffic volumes. This will require the transit lane to be changed to full bus lane, or the implementation of a fully segregated rapid transit corridor (affecting a large number of properties along Puhinui Road. Additionally, with the subsequent consideration of peak only bus lanes, the bus operation and reliability are only guaranteed during the peak times. With the additional introduction of T3 lanes during this time, the overall network wide bus reliability may be compromised
- Transit lanes will negatively impact the performance of Puhinui Road due to the short-term cross-section. Puhinui Road is not being widened in the short-term – as bus lanes can be provided with minimum change to the existing road corridor without affecting property. This means that existing Bridge Street cross-section is retained will have one lane per direction only. This will require the buses/T3 vehicles to merge and diverge into and from the general traffic lane on Puhinui Road East and Puhinui Road West. Additionally, these

merges and diverges will also be required at specific locations along Puhinui Road where parking is to be retained in front of commercial shops (as directed by AT). Therefore, having transit lanes will not only increase the volumes on Puhinui Road, but this increased volume will require merging/diverging movements along Puhinui Road that will negatively impact bus reliability, reduce the performance of the Puhinui / Kenderdine intersection / roundabout, and pose higher safety risks for cyclists, which are on-road in these sections

- The new frequent service is an airport link, and reliability is key. Removing variations in journey time is fundamental to the whole investment programme. This can be signposted peak-only / peak direction or peak only / all directions based on reliability and travel time analysis
- Extended peak operating hours are proposed along Lambie Drive and Puhinui Road. As this is dependent on the outcomes of the planned engagement process, the hours of operation will need to be confirmed during detailed design.

The potential cross-sections for Puhinui Road and Lambie Drive are indicated below. A reduced walking and cycling cross-section might be required in specific sections as the early deliverable improvements need to be implemented within the existing corridor width.

Figure 6-19: Puhinui Road Bus Priority Recommended Option cross-section

Figure 6-20: Lambie Drive Bus Priority Recommended Option cross-section (north of Cavendish Drive)

The options assessment included in the report: *Short-term Bus Priority Improvements*, **Appendix B3**. An additional assessment between bus priority and transit lanes is attached as **Appendix K**.

7 Walking and Cycling

This section describes the strategic assessment for improving the walking and cycling network, for journeys to and around Auckland Airport and Airport Oaks. It has a focus on State Highway 20A connections, from the Māngere Community to the north and north-east of the Airport. Improved access to the east and south-east, focussing on State Highway 20B to Puhinui Station, relates more to public transport as there is no community close to the Airport on that corridor so has little possibility for shorter walking and cycling to the Airport.

A central part of AT's strategy in creating a resilient transport system is ensuring more people get around by bike with the aim of delivering a safe, connected and convenient cycle network that supports and promotes cycling as a transportation choice for more Aucklanders.

In making cycling a realistic travel choice for a significant proportion of the community it is recognised that cycling needs to be perceived as a safe and comfortable option. Research has established that to meet the needs of the large group of potential cyclists of all ages and abilities ('interested but concerned'), cycle routes need to offer a high level of service, be connected and considered safe and comfortable.

These goals therefore related to the Objectives as walking and cycling can add to the travel choices, improve access to opportunities and integrate with and get more value from other investments.

7.1 Existing Cycling Conditions

Although the area surrounding the Airport is relatively flat there is very little cycle infrastructure close to and within the Airport environs.

The majority of roads within the immediate vicinity are strategic routes (SH20A and SH20B), with the remaining routes being local or collector roads that carry heavy volumes of traffic including relatively high proportions of heavy goods vehicles. Furthermore, there are plans for Airport redevelopment and scheduled commercial development, which, without feasible alternative transport options, will lead to additional vehicle trips being added to a constrained network.

The existing facilities and routes around this area are described below and shown on the map in Section 7.4.1.

7.1.1 State Highway Connections

As part of the SH20A upgrade, a shared path is being implemented from the existing shared path at Bader Drive down to the SH20A/Landing Drive Intersection. On-road cycle lane connections are being provided on Kirkbride Road as part of the SH20A upgrade to connect with the shared path.

7.1.2 Local Road Connections

There are very limited facilities provided for cyclists on the AT road network around the Airport. Routes with space for cycling are on busy roads including Ascot Road, Kirkbride Road and Greenwood Road. These links are more likely to cater for confident riders and in their current form are unlikely to attract new users to the network. Higher quality links are provided within Māngere Central.

Further afield, there are dedicated cycle lanes provided on Bader Drive, and on Buckland Road. However, the cycle provisions on Buckland Road are intermittent and do not provide a continuous cycle route for people travelling to schools off Buckland Road or to Papatoetoe Station. Parks and reserves in this area have path networks.

7.1.3 Airport Road Connections

There are no facilities for people travelling by bicycle on the AIAL road network.

7.2 Existing Walking Conditions

Whilst walking to work is a limited option due to the location of the Airport and the distance to adjoining suburbs, large numbers of internal trips to the Airport environs could be undertaken on foot for example between a workplace and a retail space. Whilst some footpaths and pedestrian links are provided within the road reserve and car parking areas, the footpath network for people to travel between the airport, hotels and commercial activities is disjointed, and given the high traffic volumes on some of the roads within the study area, the walking network could be considered unattractive or unpleasant.

Furthermore, intersections are large, minimal protection is afforded to pedestrians and there is reliance on vehicle slip lanes to keep traffic moving, all of which making crossing of roads more difficult for people travelling on foot, including those that have a visual or physical disability.

7.3 Existing Conditions Summary

A review of the existing conditions shows that there are many opportunities to improve walking and cycling infrastructure to support journeys by active modes to and around the Airport and environs. Whilst non-infrastructure programmes should also be developed such as bike share, travel plans etc, many people are unlikely to cycle unless they perceive the network to be safe.

7.4 Approach to Options Identification and Assessment

The identification of all cycling options was based on the outcomes of the gap analysis – which identified missing sections between existing and planned cycling infrastructure. This included:

- Gaps between the Agency's proposed cycling connection / bridge connecting Onehunga to Māngere and the Agency's Shared Use Path along SH20A
- Gaps between the SH20A Shared Use Path and Auckland Transport's Safer Streets network in Māngere
- Gapes between and around HLC's planned developments in and around Māngere.

Due to the accelerated programme, no property can be acquired as part of the short-term airport access improvements. This is consistent with the options identification and assessment of the bus priority measures as well. The options identification process thus tried to identify the shortest, most direct connection to link the existing network. All options had to be within the existing road corridor, or within publicly owned property, and aligned with the appropriate cycling design standards agreed to with AT.

Following the completion of the gap analysis, a workshop was conducted with representatives from Auckland Transport, NZTA and Bike Auckland. The following locations were identified as key nodes on the Bicycle network that could open-up opportunities for encouraging new journeys on the network with short-term improvements.

The figures below indicate the existing cycling network – and illustrates the gaps between the Agency's network on SH20A and the local network, and the options identified during the workshops.

Figure 7-1 Māngere Network - Gap Analysis

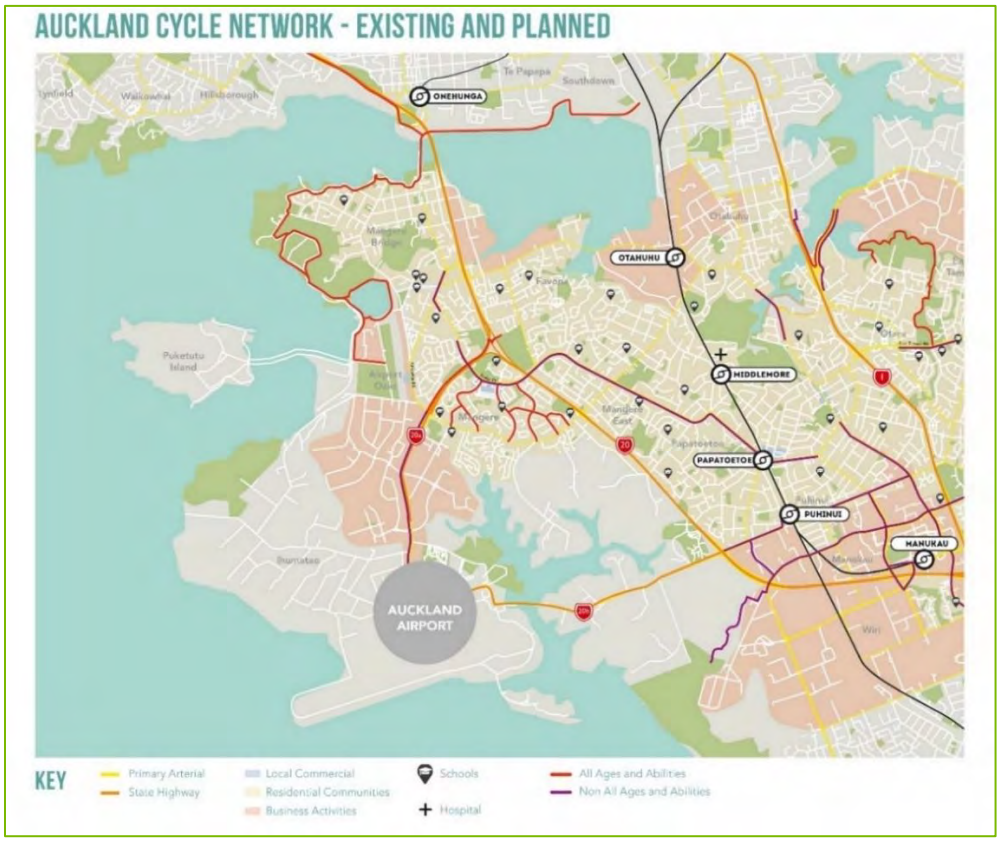
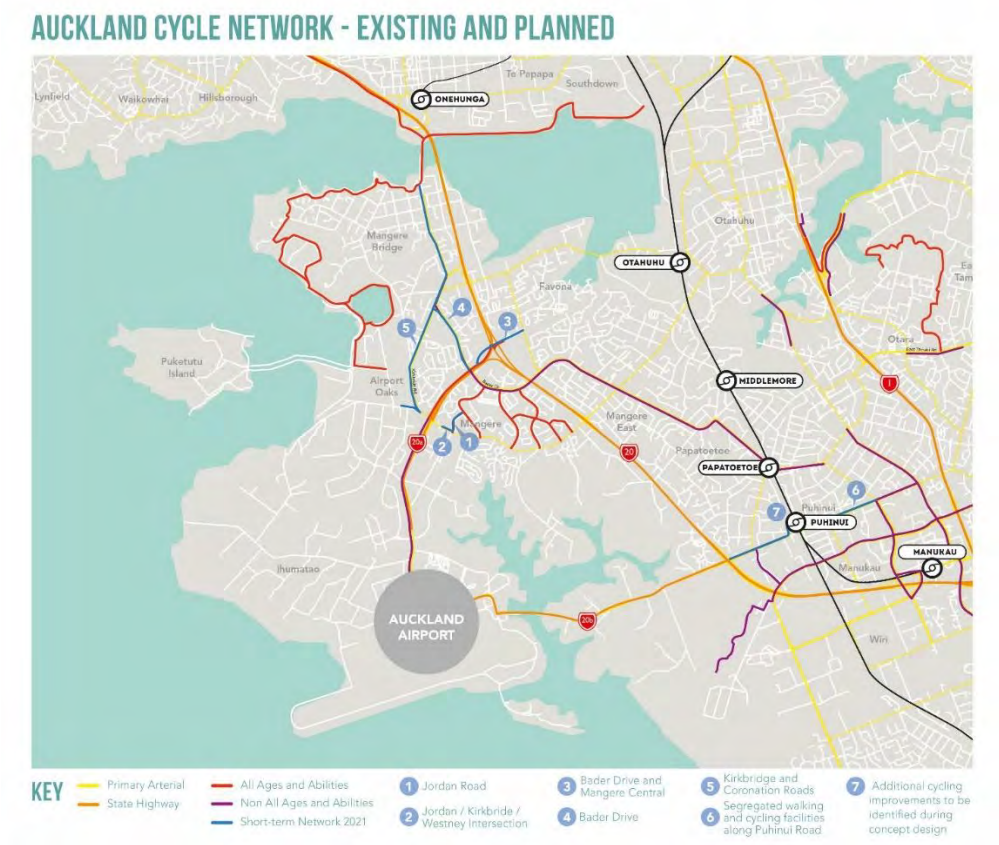


Figure 7-2: Māngere Cycling Schemes



The table below shows the characteristics of each proposed cycling intervention and the reason for its selection. Puhinui Road cycling improvements are included in the bus priority assessment.

Table 7-1: Short-Term Cycling Improvements – Options Assessment

Scheme	Problem / Gap Identified during gap analysis workshop with AT and NZTA	Options Assessed	Assessment	Recommended Option - Scheme Type	Overall comments	Deliverability Challenges (Key Impacts/Issues)
STC 1	This short residential street is an important missing link for bicycle traffic from Māngere Central to the Airport and Airport Oaks area. The carriageway is approximately eight metres wide with parking permitted on both sides. It has a posted speed limit of 50km/hr and carries approximately 3500 to 4000 vehicles per day. As a local residential street, traffic should be discouraged from using this route, however traffic signals now make it easier for access with full turning lanes provided on Kirkbride Road.	Segregated Cycling Facility or Shared Use Path linking Jordan Road with Thomas Road	Option cannot be implemented in the short-term due to the limited width in the corridor. The cross-section cannot be implemented without property acquisition.			
		On-street Cycling Facility	Option cannot be implemented in the short-term due to the limited width in the road corridor. The cross-section cannot be implemented without localised widening – which will require property acquisition.			
		Traffic calming on Jordan Road	Traffic would need to be slowed and reduced in volume for people riding bicycles to ride comfortably in the road space. Traffic calming for Jordan Road similar to Imrie Avenue for consistency across local road network. Local streets that can be traffic calmed to support movements by cyclists, will also improve the pedestrian environment by slowing down traffic. Builds on existing infrastructure by connecting Māngere Future Streets to SH20A shared pathway. Opportunity for tree planting and landscaping for traffic calming and enhancement of local residential street. Discouraging through traffic will also have amenity benefits for residents.	On-road, quiet route.	Improves the link for people walking and cycling and will complete an important connection between Māngere Central and the SH20A cycle route. There is a large residential catchment of potential employees in the surrounding suburbs of the Airport and Airport Oaks area who could cycle. It is generally flat terrain. There are schools and shops located in Māngere Central that would benefit from improved access from uses south and west of Kirkbride Road and SH20.	The scheme is relatively straightforward to implement. Subject to local consultation, but similar schemes delivered close by such as on Imrie Avenue so consistent application for locals (engage with AT early on design). Minor loss of parking for traffic calming features but low demand for parking.
STC 2	The intersection has been upgraded as part of the SH20A interchange works with Kirkbride Road and has been changed from two give-way controlled intersections to one signal-controlled intersection. For a person riding a bicycle through the intersection it is difficult to connect to the SH20A pathways. The signalisation of Jordan Road and Westney Road at Kirkbride Road has created a large area of conflict in the intersection on the main road. If right turning vehicles from Jordan Road then turn left into Westney Road, and a person on a bike turns right to	Holding traffic back on Jordan Road to allow a cycle signal early start.	The intersection was recently upgraded and went through a Road Safety Audit. As this option is closely linked with scheme one, only one feasible option was identified and workshopped with AT, as this allowed a short-term improvement that was cost effective, but still improved safety.	Intersection Upgrade	Improves the link for people cycling between Māngere Central and the SH20A cycle route. There is a large residential catchment of potential employees in the surrounding suburbs of the Airport and Airport Oaks area who could cycle. It is generally flat terrain in this locality. There are schools and shops located in Māngere Central that would benefit from improved access from uses	Subject to outcomes of design and consultation. Non-acceptance of the design by AT/Transport Agency that requires further work. Non-acceptance of scheme by locals if turning restrictions included or delay created. Operationally, delay may increase but would be limited to non-priority movements.

Scheme	Problem / Gap Identified during gap analysis workshop with AT and NZTA	Options Assessed	Assessment	Recommended Option - Scheme Type	Overall comments	Deliverability Challenges (Key Impacts/Issues)
	continue to travel straight through the Westney Road intersection on Kirkbride Road to access separated facilities there is potential for frequent and serious collisions between the two users to occur.				south and west of Kirkbride Road and SH20.	
STC 3	There is an existing link over the SH20 and SH20A interchange that connects the two northern suburbs of Māngere and Favona, increasing connectivity between the communities that are separated by the motorway. The primary issue is that there is no formed path from the end of the motorway to Robertson Road via Māngere Central Park. The path to the west of the interchange has sections of damage, and there has been a lack of maintenance along the route as there is evidence of grass creep. There could be a feeling of isolation at night due to the length of route and lack of lighting. At Bader Drive there are no priority crossings for users continuing to the Airport, the path is unlit and there is little or no wayfinding.	Improvements to existing Shared Use Path and extending / formalising it to link into Robertson Road. One logical option assessed – with most direct connection.	It is understood that some of these issues are being addressed in advance of the opening of the SH20A shared path to and from Kirkbride Interchange including the crossings at Bader Drive. This project will review the works following implementation and make recommendations where required to ensure the pathway is useable for all ages and abilities. CPTED assessment and improvements to address outcomes of assessment including lighting and wayfinding. A concept plan for the re-development of Māngere Central Park has been produced but will be subject to further amendments following consultation with stakeholders and the local board during the next financial year.	Off-road link	Important link so that existing 20A cycleway opens up connections and improves access for communities to the east (Favona) and west of SH20 (Māngere Bridge and Airport). The connection and improvements along the existing path would create a benefit for the community and open many opportunities for access to employment, schools, shopping areas and recreational facilities. Opportunity to enhance the environment that users will travel through.	Acceptance of route through park by park stakeholders.
STC 4	There is a gap between the residential area around Māngere College back to Māngere Central. Bader Drive is a collector road and bus route. It is predominantly fronted by residential properties and the college. The intersection of Bader Drive and Mackenzie Road is not user friendly for those travelling on foot or by bike.	Only one feasible option identified – providing the most logical and most direct link between Mackenzie Road and SH20A (and Scheme 3)	Natural extension from Māngere Central to STC4 McKenzie Route connecting to Moyle Park (SH20A connection) and Māngere College. The facility type should encourage new cyclists of all ages and abilities on to the network, which will include large sections of separated cycleway.	Separated facility	Opportunity to enhance the corridor and places along the corridor with additional trees, landscaping and amenity improvements. Opportunities to improve journeys to school by promoting Travel Planning at the College.	Parking removal but low demand along large sections of route, off-street available at properties along the route. Impacts on traffic capacity by re-addressing balance between vehicle traffic and active mode movements at intersections. On-street parking reduced so engage early with college to look at travel planning and parking management.
STC 5	Very strategic route for journeys by bicycle. People travelling from Onehunga including Onehunga Station (multi-modal trips) by bicycle, can currently use the connection on Māngere Bridge. Whilst there is a shared pathway around the Kiwi Esplanade and Ambury Park, this is not the most direct route and is unlikely to accommodate commuting trips.	Shared Use Path along SH20 between SH20A and Māngere Bridge	Option not considered feasible in the short-term due to the required investment and uncertainty regarding the recommended long-term network. Cannot be implemented without extensive widening and/or property impact.			

Scheme	Problem / Gap Identified during gap analysis workshop with AT and NZTA	Options Assessed	Assessment	Recommended Option - Scheme Type	Overall comments	Deliverability Challenges (Key Impacts/Issues)
	Roads are wide carrying large numbers of vehicles that are often travelling at high speed. Bus routes also use this corridor. There are different cross-sections and environments along the route making it difficult for users to understand how to use the space. There are mixed land-uses along the route including schools, churches, residential properties and commercial/local retail centres generating large numbers of people movements. There are multiple intersections where the design allows for priority for vehicle movements and do not support movements for active modes.	 On-street cycle lanes and Shared Use Path between Māngere Bridge and SH20A – via and cycling facilities via Kirkbride / Wallace / Church Road.	Option is not as direct as Kirkbride / McKenzie and Coronation Drive. Additional costs due need for localised widening and street lighting (existing street lighting only in certain sections). Additional impact on on-street parking.			
		 On-street cycle lanes and Shared Use Path between Māngere Bridge and SH20A – via and cycling facilities via Kirkbride / McKenzie and Coronation Drive.	Option has an impact on on-street parking, but is more cost effective, and direct than other options. A direct route should be implemented from the Māngere Bridge to the SH20A connection at Bader Drive and via Greenwood Road to Ascot Road to connect with SH20A or the Airport Oaks area via the local road network. The facility type should	On-street & Separated facility	Opportunity to enhance the corridor and places along the corridor with additional trees, landscaping and amenity improvements. Opportunities to improve journeys to school and work	Parking removal but low demand along large sections or route, off-street available at properties along the route. Engage early with Stakeholders at Māngere Bridge Commercial area. Impacts on traffic capacity by re-addressing balance between vehicle

Scheme	Problem / Gap Identified during gap analysis workshop with AT and NZTA	Options Assessed	Assessment	Recommended Option - Scheme Type	Overall comments	Deliverability Challenges (Key Impacts/Issues)
			encourage new cyclists of all ages and abilities on to the network, which will include large sections of separated cycleway. Context sensitive design to be considered through Māngere Bridge shops.		by promoting Travel Planning along the corridor.	traffic and active mode movements at intersections.

7.5 Recommended Short-Term Cycling Options

In order to identify options to improve cycling, a workshop with representatives from the Transport Agency, Bike Auckland and Auckland Transport was used to identify the recommended option to encourage new journeys on the network with short-term improvements.

The short-term cycle improvements (STC) selected were:

- STC 1 - Jordan Road
- STC 2 - Jordan Road/Kirkbride Intersection
- STC 3 - Bader Drive to Robertson Road
- STC 4 - Orly Road to McKenzie Drive via Bader Drive.
- STC 5 - Kirkbride Road to Māngere Bridge

The locations are shown below. The figure also indicates the proximity of the schemes to the HLC precincts.

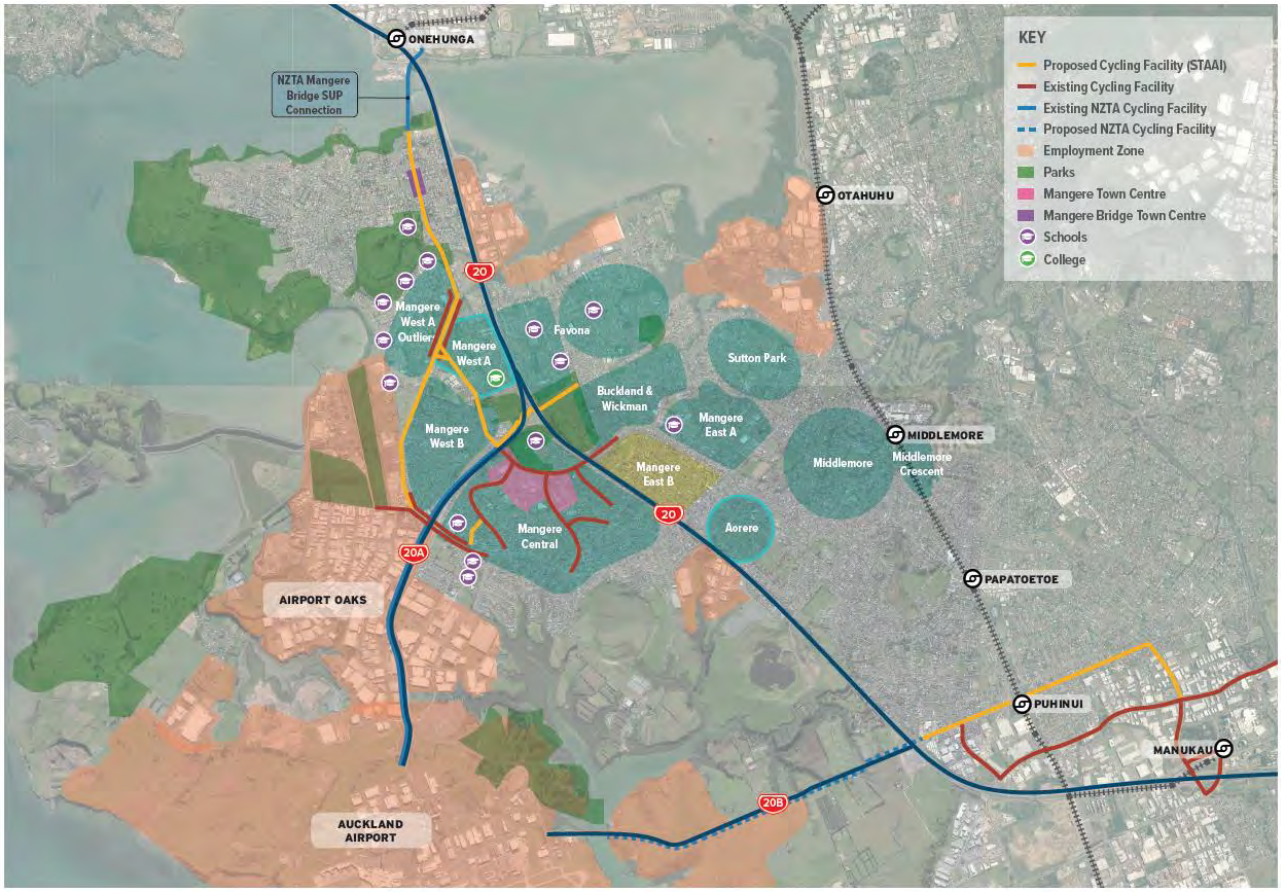


Figure 7-3: Short-Term Cycling Improvements - Recommended Option

7.6 Meeting Objectives and Fit with Strategy

The short-term improvements will play a role in delivering some of the objectives set for the wider project.

Improving the cycle network will enable the transfer of journeys from private car to bicycle, which has the potential to reduce congestion on the transport network and improve journey time reliability. The projects identified will all improve access to and from the wider airport area both for those wanting to ride a bicycle and coming by alternative modes if a noticeable mode shift is achieved. Many of the schemes will provide

separation between cyclists and other vehicles, which will provide routes that are perceived to be safer for journeys by bicycle and will therefore be a more feasible transport option.

The projects will also greatly improve connectivity between Māngere Central and the Airport therefore increasing access to jobs, education and social facilities. The proposed schemes will route directly past schools and educational facilities, and with complementary measures such as travel planning and marketing, will increase the awareness of alternative transport choices. The schemes can enhance the environment by improving the public realm, which is conducive to increasing walking trips in addition to cycle trips. Traffic calming, tree planting, artwork etc also contribute to local neighbourhoods and can assist in providing identity for a community.

Some of the projects build off infrastructure that has been implemented in Māngere Central and aligns with the early and later stages of the Auckland Cycling Business Case for Māngere East and Māngere.

Most of the projects are relatively low risk. Nevertheless, it is recommended that early stakeholder engagement is undertaken. The scheme that carries the higher levels of risk are STC2, subject to the preferred option for the intersection and the associated effects, and STC4 where there could be resistance to parking changes at Māngere Bridge shops.

Table 7-2: Assessment against the objectives

Objective	STC 1	STC 2	STC 3	STC 4	STC 5
Provide more reliable and timely travel choices to and from Auckland Airport and surrounding areas	+++	+++	+++	+++	+++
Improve people's access to jobs, education and social opportunities.	+++	+++	+++	+++	+++
Integrate with and get increased value from existing and planned transport investments.	+++	+	+++	+++	+++
Be operational by 2020.	+	+	+	+	+

PART C

8 Recommended Option

8.1 Puhinui Interchange

The recommended option for the Puhinui Interchange demonstrated through the MCA and with agreement from project and investment partners and stakeholders, is Option 2 (Straight Rapid Transit Bridge).

The initial phase of the recommended option would be the construction of an enclosed concourse above the railway line from which access will be afforded to rail platforms and an at-grade bus interchange via lifts and escalators either side.

A bus circulation area will be provided to the west of the Puhinui Interchange with the bus stops situated in front of the rail station. A drop-off facility and staff parking area is provided to the west of the station.

The Ultimate Design includes a dedicated rapid transit bridge to the south of Puhinui Road. The proposed RTN services travel via a segregated rapid transit line on Puhinui Road in the Ultimate Design, and serve new stops provided on the bridge, to the south and north of the concourse.

8.1.1 Concept Design Transport Outcomes

The concept design supports the original intent of the station identified in the Auckland Airport Access PBC and ATAP by providing a high-quality connection for local and strategic trips in relation to Auckland Airport and the wider southern Auckland region as indicated in the figure below.

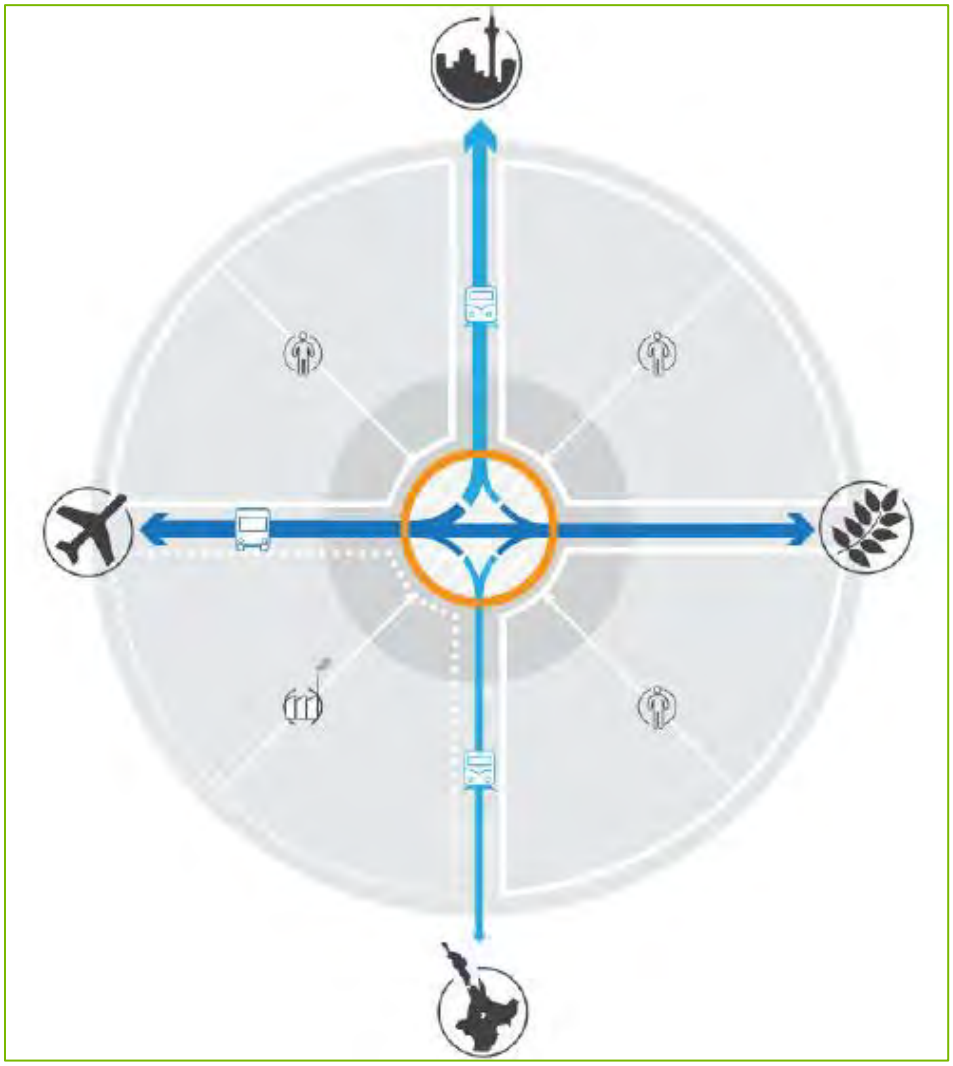


Figure 8-1: Puhinui Interchange Transport Outcomes

The design specifically enables the following journeys:

- City to Airport
- Airport to Eastern suburbs (Botany)
- South to Airport
- South to Eastern suburbs (Botany)
- Local catchment access for origins and destinations.

8.1.2 Concept Design

A concept design was developed for Puhinui Interchange to aid the preparation of more accurate construction cost estimates for the SSBC. Operational and Functional Requirements were agreed with AT through several design workshops. The purpose of the brief was to confirm the overarching objectives and standards that guided the development of the concept design and to define the key station components and requirements. The Operational and Functional Requirements were updated to incorporate comments from AT and formed the basis for Preliminary Design.

The *Concept Design Report* is attached as **Appendix C1**.

8.1.3 Preliminary Design

At the completion of concept design, Puhinui Interchange went through development in the preliminary design stage; incorporating comments made by AT with the completion of concept design in February 2019.

The *Preliminary Design Reports* are attached as **Appendix C2.**

8.1.4 Developed Design

The design of Puhinui Interchange was further refined during the Developed Design stage, incorporating comments made by AT on the preliminary design. This allowed for the latest available and more accurate construction cost estimates to be included in the SSBC.

This stage was completed in May 2019.

Figure 8-2: Developed Design: Exterior view (West)

Figure 8-3: Developed Design: Interior view

Figure 8-4: Preliminary Design: Exterior View (East)

8.1.5 Construction Cost Estimate

Property Acquisition Cost

The potential property cost associated with the recommended option - Early deliverable design is identified in the Puhinui Interchange Property Acquisition Strategy developed by AT. The strategy outlines the framework

and processes that will be adopted by AT to acquire the land necessary to deliver Puhinui Interchange. The property acquisition cost is indicated in the table below.

Table 8-1: Puhinui Interchange Property Cost

Property Impact	Cost
Railway Corridor	Lease and access requirements
Total Acquisitions	s7(2)(b)(ii) Prejudice to commercial position
S72 PWA Costs	
S66 PWA Costs	
AT PWA Costs	
TOTAL	
TIMING	**9 months**

AT's Property Acquisition Strategy is attached as **Appendix H**.

8.1.6 Capital Cost Estimates

A construction cost estimate has been prepared by Truecost Ltd for the recommended Puhinui Interchange Option (Early Deliverable) during detailed design.

- A formal cost risk assessment was completed in October 2019 and included in the parallel estimate.

Table 8-2: Recommended Option - Construction Cost Estimates

Item	Description	Base Estimate
A	Nett Project Property Cost	s7(2)(b)(ii) Prejudice to commercial position
B	Project Development Phase (Investigation & Reporting)	
C	Pre-implementation Phase (Design & Project Documentation)	
D	Implementation Phase (Construction)	
	Physical works	
E	Project Base Estimate (A+B+C+D)	
F	Contingency	
G	**Project Expected Estimate (P50)**	

The detailed cost estimate is attached as **Appendix D1**.

8.1.7 Parallel Estimate

A parallel estimate was commissioned by At and completed by Cuesko Quantity Surveyors in May 2019. The economic evaluation has been updated to reflect the reconciled estimate.

8.1.8 Asset Management

All public transport stations require regular and preventative maintenance. As the recommended option is an upgraded, it will have an impact on the maintenance and renewal budgets of AT. Due to the general similarity

in size and level of amenity provided, the maintenance cost of the recommended option is comparable to the other options considered.

General station maintenance includes Building Warrant of Fitness, trial evacuations, security, cleaning, landscaping as well as maintenance of facilities (painting, seat refurbishment and line-markings). Security and cleaning are generally the highest cost. All systems and technical components of rail and bus interchanges also require regular preventative maintenance. This includes aspects such as CCTV, customer help-points, HVAC and plumbing, electrical components and Passenger Information Displays. AT's Facilities Management team was involved during the development of the recommended option.

8.2 Puhinui Road Bus Priority

8.2.1 Concept Design

The recommended Puhinui bus priority improvements option was progressed to concept design to inform the preparation of the construction cost estimates for the SSBC. The design parameters and potential departures were agreed with internal AT stakeholders through a series of design workshops.

The purpose of the brief was to confirm the overarching objectives, design consideration and standards that guided the development of the concept design and to define the key parameters and requirements for the implementation of short-term bus priority between SH20 and Manukau Bus Station. This includes the signalisation of the Noel Burnside / Puhinui / Wylie Road and the upgrade of the Puhinui Road / Kenderdine Road intersections.

As the Puhinui Road / Kenderdine Road intersection is critical to the design of the Puhinui Bus Interchange, the layout will be developed and tested in more detail as part of the detailed design of the Interchange.

The *Concept Design Report* is attached as **Appendix C2**.

Figure 8-5: Puhinui Road Bus Priority Improvements

The implementation of the bus priority lanes results will have an impact on existing on-street parking bays along Puhinui Road and Lambie Drive. Parking utilisation surveys carried out as part of the project indicated high utilisation during off-peak times.

Based on the analysis carried out in the options assessment, the proposed bus volumes, and the programme risk associated with the potential implementation of 24-hour bus lanes, peak only bus lanes are recommended in the short-term. This will be confirmed by AT during the detailed design.

Additional walking and cycling opportunities aimed at improving accessibility to Puhinui Interchange has been identified in as part of this project. The Puhinui Interchange Walking and Cycling Station Access Assessment is attached as **Appendix I**.

8.2.2 Cost Estimate

A cost estimate has been prepared by Truecost Ltd for the recommended Puhinui Road Bus Priority option.

- A parallel cost estimate was commissioned and completed by Auckland Transport in March 2019.

Table 8-3: Recommended Option - Construction Cost Estimates

Item	Description	Base Estimate
A	Nett Project Property Cost	Excl
B	Project Development Phase (Investigation & Reporting)	s7(2)(b)(ii) Prejudice to commercial position
C	Pre-implementation Phase (Design & Project Documentation)	
D	Implementation Phase (Construction)	
	Physical works	
E	Project Base Estimate (A+B+C+D)	
F	Contingency	
G	**Project Expected Estimate (P50)**	

The detailed cost estimate is attached as **Appendix D2**.

8.3 Māngere Cycling Improvements

8.3.1 Concept Design

The recommended Māngere cycling improvements options were progressed to concept design to inform the preparation of the construction cost estimates for the SSBC. The design parameters and potential departures were agreed with internal AT stakeholders through a series of design workshops.

The purpose of the brief was to confirm the overarching objectives, design consideration and standards that guided the development of the concept design and to define the key parameters and requirements for the implementation of the cycling improvements.

The design criteria for the development of the Shared Use Paths, Cycle Paths and Footpaths was agreed with Auckland Transport's Design Office and is in accordance with ATCoP and developing Transport Design Manual. This includes the provision of side road treatments and physical separators in Mackenzie Drive.

The *Concept Design Report* is attached as **Appendix C3**.

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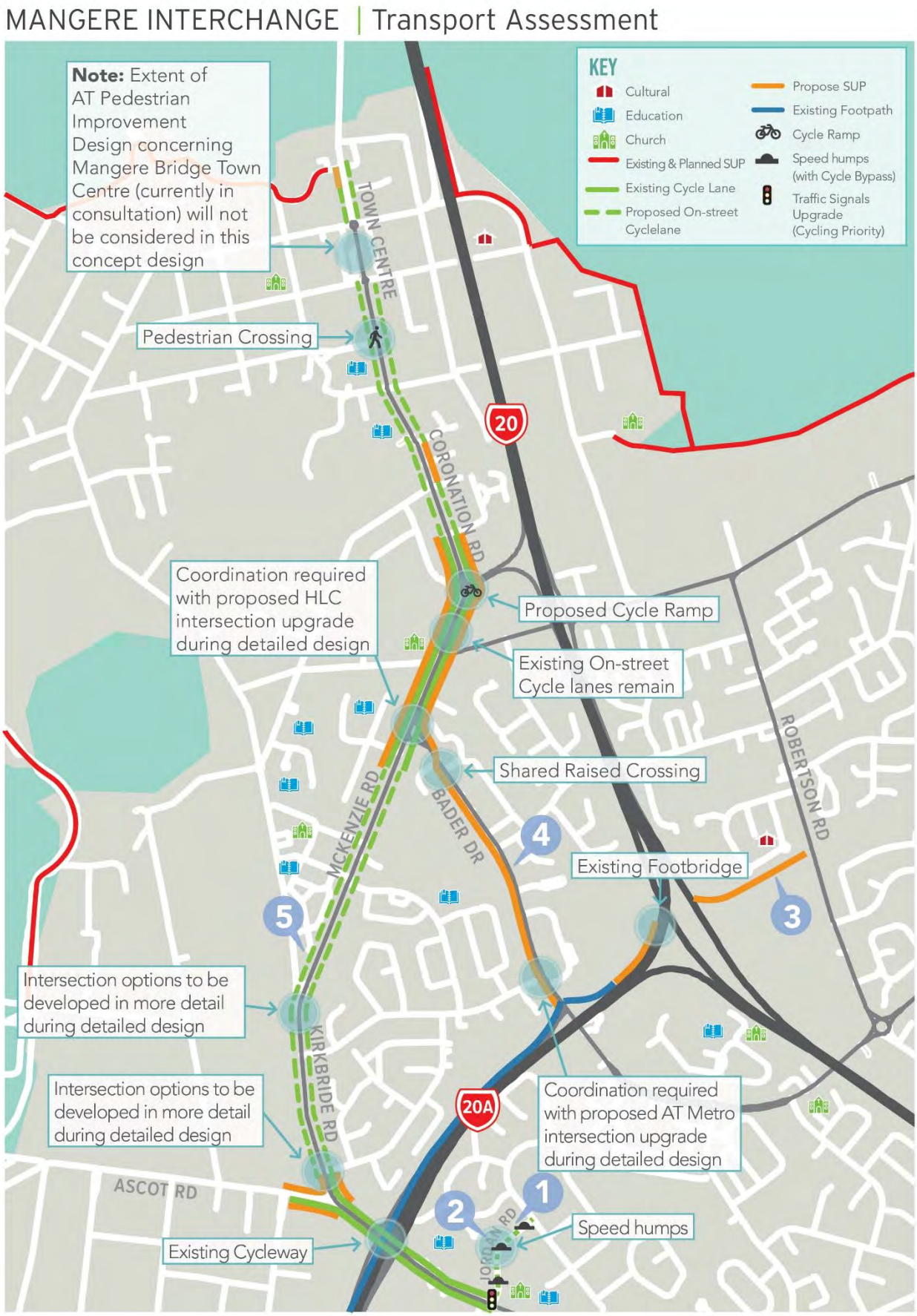

Figure 8-6: Māngere Cycling Improvements

The implementation of scheme 5 will have an impact on existing on-street parking bays along Kirkbride, McKenzie and Coronation Avenue. While parking utilisation surveys carried out as part of the project indicated low utilisation throughout the day, this could potentially be a risk to the programme.

The Māngere HLC Housing Development ITA recommended an upgraded signalised intersection at McKenzie Road / Bader Drive. Based on the Sidra intersection modelling detailed previously, the development will provide dedicated right turn lanes into and out of Bader Drive, a dedicated left turn in lane and a single through lane in both directions on McKenzie Road. The proposed intersection layout can adequately cater for the additional traffic generated by the development and is therefore considered suitable to serve the local transport network. The design of this intersection will need to be coordinated between HLC and AT.

8.3.2 Cost Estimate

A cost estimate has been prepared by Truecost Ltd for the recommended Māngere Cycling Improvements.

- A parallel cost estimate was commissioned by Auckland Transport, and completed by Cuesko Quantity Surveyors Auckland Transport in March 2019.

Table 8-4: Recommended Option - Construction Cost Estimates

Item	Description	Base Estimate				
		STC 1	STC 2	STC 3	STC 4	STC 5
A	Nett Project Property Cost	s7(2)(b)(ii) Prejudice to commercial position				
B	Project Development Phase (Investigation & Reporting)					
C	Pre-implementation Phase (Design & Project Documentation)					
D	Implementation Phase (Construction)					
	Physical works					
E	Project Base Estimate (A+B+C+D)					
F	Contingency					
G	**Project Expected Estimate (E+F) P50**					

The detailed cost estimate is attached as **Appendix D3**.

8.4 Travel Demand Management (TDM), HOP and Customer Experience (CX) Improvements

The following supporting travel demand management HOP and Customer Experience Improvements have been identified by Auckland Transport to support the programme of interventions identified. This included additional wayfinding, ticketing and customer experience improvements at Auckland Airport to support the launch of the new public transport services. These costs will be incurred as part of the programme-wide capital investment and hence will be capitalised.

Table 8-5: Travel Demand Management, HOP and Customer Experience Improvements

#	Measure	Description / Ideal Future State	Cost
1	Wayfinding	Wayfinding improvements at the airport and along the route.	s7(2)(i) Prejudice to negotiations
2	Ticketing	Ticketing measures for the airport, including HOP sales and possible prepaid/return trip tickets.	
3	CSC presence	Intuitively located "Transport Hub" where customers can purchase HOP, paper tickets and potentially Sky Bus/other transport tickets.	
4	CSC Training	Training for CSC staff	
5	Digital Enhancements (including Journey Planner & AT Mobile)	Improvements to our digital products to flag journeys using the Airport Link to our customers as fast, reliable and affordable and improve user experience when planning trips to and from the Airport.	
6	Promotion	Widespread promotion of new services, and a range of marketing & behaviour change initiatives to influence travel behaviours to and from the airport.	
7	Videos	Promotional videos showcasing new transport options to the Airport and Manukau to travellers and employees.	
8	Ambassadors	Staff presence during initial operation of services at the Airport, Puhinui and other touchpoints to help customers navigate new services.	
9	Public Events/activations	Public opening and promotional events.	
10	Personalised Journey Planning / Business Expos	Specific behaviour change-initiatives with businesses in the Airport precinct, including 'Give it a Go' trials and personalised journey planning.	
11	Resourcing	AT internal (or contracted) resource to manage campaigns, promotional events and other TDM measures.	
12	VMS / VPIDs	VMS, VPIDs and other temporary signage around Puhinui Station and the Airport to inform customers and promote behaviour change.	
13	Airport Bus Shelters	Branded bus shelters at the airport terminals with customer information about the Airport Link services and how to get to their destination.	
14	Monitoring	Ongoing surveys and analysis to track the impact of new services and TDM measures on customer experience and mode share.	
15	Miscellaneous / Other	Other customer experience improvements / behaviour changes initiatives, particularly as new Airport terminal opens.	
16	Contingency	20% contingency.	
	Total		

8.5 Total Costs

The total cost for the Short-Term Airport Access Improvements Programme is indicated in the table below:

Table 8-6: Total STAAI Programme Costs

Element	Source	50th percentile cost	96th percentile cost
Puhinui Station Interchange	Developed Design Estimate	s7(2)(b)(ii) Prejudice to commercial position	

Bus lanes and walking/cycling facilities on Puhinui Road and Lambie Drive	Concept Design Estimate		s7(2)(b)(ii) Prejudice to commercial position
Māngere walking and cycling facilities	Concept Design Estimate		
Programme Wide Travel Demand Management & Infrastructure	AT Metro		
Total			
AT Funding Admin Cost (5.7% of P50)	AT Funding		
Total Programme Cost			

8.6 Public Transport Network

The following figure indicates the recommended network to serve the Airport and surrounding employment areas.

Figure 8-7: Short Term recommended public transport network

In summary, the recommended public transport network includes:

- A new frequent airport shuttle route between Manukau, Puhinui and the Airport, supported by a reduced Route 380 and improved crosstown bus links serving the town centres of the southwest (36).
- Two local Frequent Service buses extended to serve the Airport from Botany-Ōtara-Papatoetoe and Sylvia Park-Ōtāhuhu (31, 32), plus a third Frequent Service bus retained between Onehunga, Māngere Bridge and the Airport (380).
- A new express service between New Lynn-New Windsor and the Airport (NLX).

Table 8-7 provides details of service levels, fleet requirements and costs.

Table 8-7: Outcomes of Short-Term Network Changes

Type	Route option	Buses per hour at airport	Peak Fleet	Service km per annum	Operating cost per annum
Frequent Airport Shuttle	Frequent route to Puhinui and Manukau (10 min all times)	+6	+6	+ 1.06m	
	Truncate route 380 (Onehunga-Māngere-Airport-Papatoetoe-Manukau)	*-4 (change)* *4 (total)*	*- 7*	*- 0.66m*	
	Total:	**10**	**-1**	**+0.40m**	
Supporting changes	New Route 36 (Onehunga-Māngere-Papatoetoe-Manukau)	N/A	+7	+ 0.85m	
	Truncate and realign Route 313 (Manukau to Māngere Town Centre)	*N/A*	*-3*	*- 0.33m*	
	Total:	***N/A***	***+4***	***+0.52m***	
Improved local connections	Extend route 31 (Botany-Ōtara-Papatoetoe-Māngere)	+4	+4	+0.42m	
	Extend route 32 (Sylvia Park-Ōtāhuhu-Māngere)	+4	+4	+ 0.42m	
	Total:	**+8**	**+ 8**	**+0.84m**	
New regional connection	New Lynn to Airport Express Service (Direct Express via Stoddard Road)	+4	+7	+ $1.01m	
	Total:	**+4**	**+7**	**+1.01m**	
GRAND TOTAL:		***22 bph at peak***	***+18 buses***	***2.77m km***	

8.6.1 Service Delivery Operating Costs and Contracting

This full network increase in service results in an estimated net increase in operating costs s7(2)(b)(ii) Prejudice to commercial position per annum in 2018 dollars. This figure accounts for an additional 2.8m service-km per annum, increased service-hours and includes the corresponding annualised costs to increase the bus fleet with 18 additional buses.

Implementing the frequent airport shuttle together with the supporting changes would require an estimated net increase in operating costs s7(2)(b)(ii) Prejudice to It is assumed that the implementation of this route would be feasible to deliver within two years as a variation of the Route 380 contract. The new Route 36 and other improved local and regional connections may be more difficult to procure in these timeframes.

8.6.2 Service Frequency and Fleet Requirement

This indicative network results in a total of 22 AT-contracted buses per hour calling at the airport terminals at peak, an increase of 14 buses an hour over the existing Route 380. It comprises six buses per hour on the express service (one every ten minutes), with a further 12 buses per hour across the three local routes and four per hour on the New Lynn regional route.

8.7 Modelling Forecasts

Transport demand forecasts from AT's Macro Strategic Model (MSM) were obtained to estimate the impact of the potential bus priority improvements between Manukau Bus Station and the Airport. Due to some anomalies

in the modelling of SH20B, the model outputs had lower than expected public transport demands, and private vehicle demands were higher than the capacity of the proposed vehicle lanes on this corridor.

While the benefits are likely to be underestimated due to the low forecasted PT demand, it does provide useful insights into the performance of the potential options. The figures indicate the forecasted travel times and average speed between the Airport and Manukau, with travel times considerably lower in the full bus lanes scenario (see highlighted boxes). The majority of the travel time savings are between Wyllie Road and Manukau Station, which corresponds with the congestion locations summarised in the previous section.

Table 8-8: Modelled Travel times, 2028, AM peak:

Segment start	Segment end	B	C	D	E
		Bus lanes on SH20B only (no bus lanes along Puhinui & Lambie Drive)	**Puhinui station with new bus services only (no bus lanes)**	**Puhinui station with bus lanes between Airport and Manukau.**	**Full "urban-busway" Airport to Botany**
Wyllie Road	**Manukau Station**	29.3 min	16.9 min	11.7 min	11.8 min
Manukau Station	**Wyllie Road**	30.9 min	18.1 min	11.9 min	12 min
Airport	**Wyllie Road**	27.8 min	11.7 min	10.1 min	8.6 min
Wyllie Road	**Airport**	33.9 min	11.5 min	10.5 min	8.8 min
Airport	**Manukau Station**	57 min	28.6 min	22.2 min	20.4 min
Manukau Station	**Airport**	65 min	29.7 min	22.9 min	20.8 min

The modelling forecasts also provides a good indication of the potential impact of timely and reliable travel times of passenger numbers between the Airport and Manukau Bus Station (and passengers transferring between rail and bus services at Puhinui Interchange). The tables below provide a summary of the projected patronage from the modelled scenarios for the early deliverable and ultimate designs. The modelling outputs are classified in the tables in the following passenger categories.

- **"From airport"**
  - Modelled demand over the 2-hour period from the airport to Manukau
- **To airport**
  - Modelled demand over the 2-hour period from to Manukau to the airport.
- **Puhinui Interchange**
  - Initial bus boarding's – Passengers boarding bus services from local catchment
  - Transfer boarding's – Passengers transferring to bus services from rail services at Puhinui
  - Transfer alighting's – Passengers transferring to rail services at Puhinui from bus services
  - Final alighting's – Passengers alighting from bus services (end of journey)

Table 8-9: AM Peak Bus passenger volumes)

Modelled Scenarios Options		Between Airport and Puhinui		Puhinui Interchange				Between Puhinui and Manukau	
Options		From airport	To airport	Initial bus boarding's	Transfer boardings (rail to bus)	Transfer alightings (bus to rail bus)	Final alightings	From airport	To airport
D	Puhinui station with bus lanes between Airport and Manukau. (Early Deliverable)	356	385	5	360	323	1	39	21
E	Full RTN Airport to Botany (Ultimate Design)	462	492	10	476	419	7	75	112

Table 8-10: PM Peak Bus passenger volumes)

Modelled Scenarios Options		Between Airport and Puhinui		Puhinui Interchange				Between Puhinui and Manukau	
Options		From airport	To airport	Initial bus boardings	Transfer boardings (rail to bus)	Transfer alightings (bus to rail bus)	Final alightings	From airport	To airport
D	Puhinui station with bus lanes between Airport and Manukau. (Early Deliverable)	637	225	2	199	613	4	39	41
E	Full RTN Airport to Botany (Ultimate Design)	896	510	5	472	949	10	114	185

Based on AT's Peak to daily multi-factor, this equates to approximately 7,000 – 9,000 pax per day. Potential regional rail services are not included in AT's modelling forecasts.

8.8 Economic Evaluation

This section describes the economic assessment of the recommended option. It covers all the components from Part B for short-term improvements to public transport and active transport access to Auckland Airport. Appendix E provides full details of the assessment and the peer review by expert economist, Richard Paling.

Owing to various concerns relating to the input information available, the assessment consistently adopted conservative assumptions. A range of sensitivity tests addressing those assumptions and the possible shorter-than-usual life of the improvements (given that they are potentially a first stage of a major improvement) were used to confirm the robustness of the assessment result.

8.8.1 Do-Minimum

The do minimum option for this assessment is based on the existing network and infrastructure provisions, with the addition of bus lanes on SH20B. The bus lanes on SH20B are part of the full Airport Access early deliverables programme; however, the economic benefits from those bus lanes have been evaluated in a separate assessment as they are funded by NZTA, whilst this assessment covers the proposed investments by AT. Therefore, to avoid double-counting those benefits, SH20B bus lanes are included in the do minimum option for this assessment.

8.8.2 Recommended Option

The recommended option builds upon the do minimum option by introducing the following components:

- Peak only bus lanes and bus priority at intersections between the SH20B/SH20 interchange and Manukau Station
  - Puhinui Road;
  - Lambie Drive between Puhinui Road and Cavendish Drive;
- New and improved bus routes, as detailed in Table 8-11 and displayed in Figure 8-8;
- Upgrades to Puhinui Station; and
- Walking and cycling improvements in Māngere and Puhinui[54].

Table 8-11: New and improved bus routes that form part of the short-term recommended option

Route number	Description	Recommended headway
Frequent Airport Shuttle (New)	Airport to Manukau Station via Puhinui Station	10 minutes all day
36 (New)	Onehunga to Manukau via Māngere and Papatoetoe	15 minutes peak, 30 minutes base
NLX (New)	New Lynn to Airport via Stoddard Road then direct to Airport (via Airport Oaks)	15 minutes peak, 30 minutes base
380	Truncated to operate only the Onehunga to Airport section (currently runs Onehunga to Manukau via Airport)	15 minutes peak, 30 minutes base
313	Truncated to run only the section between Manukau and Māngere Town Centre (currently runs Manukau to Onehunga via Māngere)	20 minutes peak, 30 minutes base
31	Extended to continue to the Airport from Māngere Town Centre	15 minutes peak, 30 minutes base
32	Extended to continue to the Airport from Māngere Town Centre	15 minutes peak, 30 minutes base

[54] These are described in more detail in the report by Flow Transportation Specialists (February 2019)

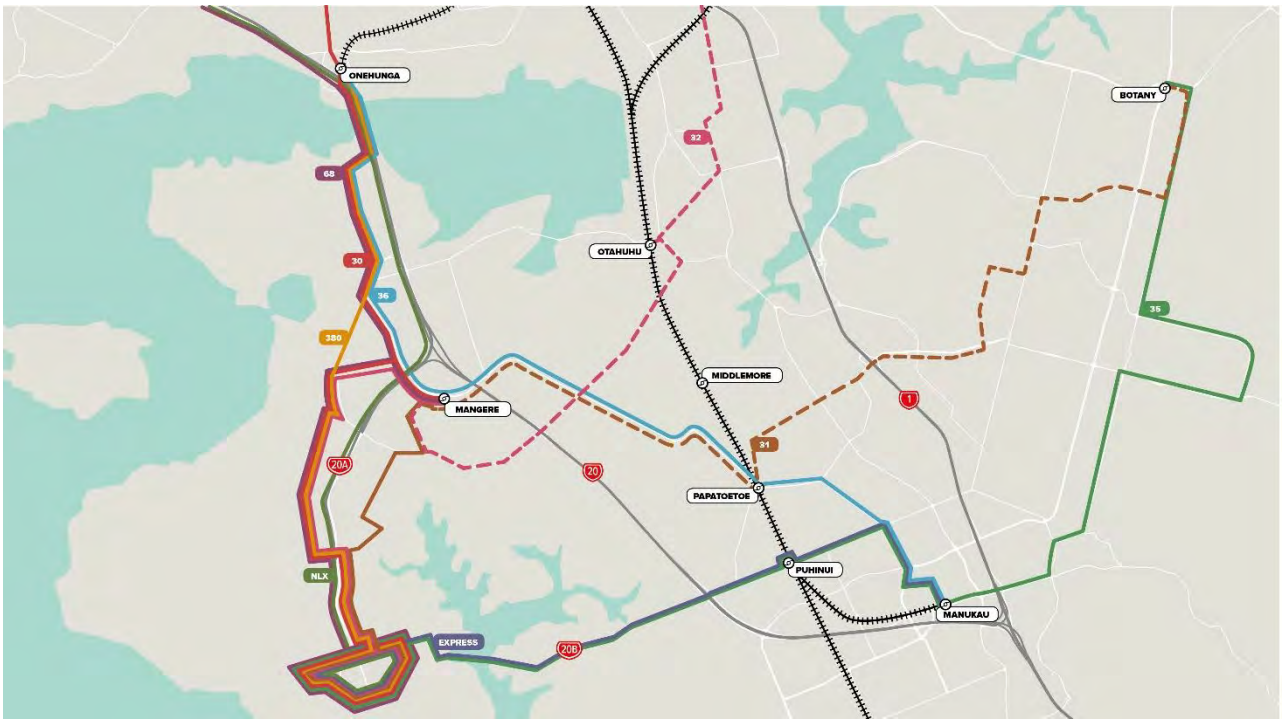

Figure 8-8: Recommended variations to the short-term network

The modelled network changes vary to some extent from what is described above. Section 8.7.8 describes the main modelling anomalies and the expected implications they have on the benefit estimates. It is expected that this results in a slight under-estimate of the benefit-cost ratio for the project.

8.8.3 Assumptions and Parameters

Net Present Value (NPV) Assumptions

Net present value calculations for this assessment assume a standard evaluation period of 40 years, starting in 2018, and a discount rate of 6%. Construction is assumed to take place in 2020, with benefits being realised from 2021 onwards.

Value of Time

The 2018 values of time are used in relevant benefit computations. These are (per hour): Work, $35.78; Commute, $13.46; Other, $11.90 (EEM tables A4.1b, A11.1; EEM benefit update factors, table A12.3).

The reliability benefit is estimated indirectly from model outputs, using data for trip numbers that cannot be divided into different purposes. Therefore, an average value of travel time is assumed for this benefit in particular. The 2018 value of time and split of trip purposes from the EEM (tables 2.4, A4.1b, A11.1; EEM benefit update factors, table A12.3) are used to derive an estimated average value of travel time of $15.07/hour.

The EEM uses an average split of trip purpose regardless of the origin and destination of journeys (10% Work, 50% Commute, 40% Other). However, surveys[55] of travel to and from the Airport indicate a higher proportion of business travel. The split of travel to/from the Airport is about 21% Work, 28% Commute and 51% Other purposes, which results in an average value of time of $17/hour. This increased value of time for travel to/from the Airport is likely to apply to some of the travel affected by the recommended option particularly for trips to

[55] Auckland Airport Access, Supplementary Programme Business Case, Revision 3.0 (New Zealand Transport Agency, 2017).

20Connect, SH20B Short-Term Single-Stage Business Case (Aurecon, 2018).

the west of Puhinui Interchange and into the airport from the north. As a result, the use of the EEM value of time is likely to under-estimate benefits.

8.8.4 Extrapolation of benefit estimates across evaluation period

Model outputs were used to estimate benefits for 2028 and 2048. As the net present value calculations require annual benefit estimates for every year within the evaluation period, it is necessary to interpolate between the 2028 and 2048 estimates, and to extrapolate those estimates to cover the entire model period.

The estimates for MSM modelled benefits before 2028 are assumed to be the same as the benefits for 2028. This is assumed because the MSM modelled demands for 2028 are less than the actual demands observed in 2018, and if the demands from 2028 to 2048 are back-extrapolated to 2018, this effect is magnified and the assumed demands for 2018 are unreasonably low. The MSM modelled benefit estimates from 2028 to 2048 and beyond are linearly extrapolated from those model years.

The benefit estimates for walking and cycling are derived from a separate model by Flow Transportation Specialists. The inconsistencies between observed demands and modelled demands from MSM do not apply to this model, therefore the walking and cycling benefit estimates from the model years of 2026 and 2046 were linearly extrapolated across all years for the economic assessment.

8.8.5 Costs

Construction Costs

Total capital costs for the recommended short-term improvements, including the bus lanes, walking and cycling improvements, travel demand management facilities, and the Puhinui Station upgrade, is expected to s7(2)(b)(ii) Prejudice to commercial position incurred in 2020.

Table 8-12: Construction costs for recommended option, excluding cost of SH20B bus lanes

Element	50th percentile cost	95th percentile cost
Puhinui Station Interchange	s7(2)(i) Prejudice to negotiations	
Bus lanes and walking/cycling facilities on Puhinui Road and Lambie Drive		
Māngere walking and cycling facilities		
Programme wide travel demand management and infrastructure		
Total		
AT Funding admin cost		
Total programme cost		

*Based on previous estimates of similar work undertaken by AT, a nominal cost of approxamately has been allowed to cover any additional side street treatments and physical separators for scheme 4.

This 50th percentile estimate of the capital cost has a present value o

Operating Expenditure

Additional annual operating costs from the recommended new services and increased service frequencies are estimated to s7(2)(b)(ii) Prejudice to commercial position This is based on the added service-kilometres and service-hours required to

[56] Cost estimates from October 2019.

[57] The derivation of this cost is explained in detail in the network planning technical note for the recommended short-term option.

provide new or improved bus services in the study area; the expected changes in annual operating expenditure for the recommended option is included in Table 8-13: .

Due to the variations in the modelled recommended network and the proposed recommended network, an alternative operating expenditure is estimated for the cost benefit analysis, the results of which are then factored back to the proposed recommended network.

Table 8-13: Expected changes in annual operating cost from the do minimum option

Route	Change in annual operating cost
Proposed route – Airport to Manukau Station	s7(2)(b)(ii) Prejudice to commercial position
Proposed route 36 – Onehunga to Manukau	
Proposed route – New Lynn to Airport	
Route 380 – truncated	
Route 313 – truncated	
Route 31 – extended	
Route 32 – extended	
Total	

Annual operating costs are expected to be incurred throughout the evaluation period and hence the net present value of operating costs over the 40-year evaluation period is expected to be on the order s7(2)(b)(ii) Prejudice to commercial position

The assessment does not assume further service increases later on in the evaluation period. That is, the same service pattern and frequencies are recommended for 2028 and 2048 and so the annual costs are assumed to remain unchanged. An annual maintenance costs of a further 1% have been assumed

8.8.6 Maintenance Cost

Operating expenditure have been included for maintenance and operational costs for Puhinui Interchange and Puhinui Road Bus Priority. As these are existing facilities, the impact on maintenance cost will not be significant. For all cycling improvements, annual maintenance costs of a further 1% have been assumed as these are new infrastructure.

8.8.7 Benefits

Transport demand and generalised cost forecasts from Auckland Transport's Macro Strategic Model (MSM) were obtained to estimate the impact of the recommended improvements.

Table 8-14 describes the benefits that are estimated directly from the model estimates, including a brief description of what the benefit aims to measure and how a monetary value of each benefit is estimated. Details of the computations for the benefit estimates using EEM procedures are also provided below the table.

Table 8-14: Descriptions of benefits

Benefit	Description	Calculation methodology
Public transport user benefits	Reductions in journey time and improvements in journey quality for existing and new public transport users.	Evaluate the difference in travel cost, using the generalised cost of public transport travel from the model, in between the improvement and do minimum options. Apply the rule of half and value of time (estimated from the EEM) to each trip according to the trip purpose.
Public transport reliability benefits	Reductions in variability of journey times for existing and new public transport users.	Evaluate the difference in variability of travel times between the do minimum and the option and apply EEM values of time.
Road user benefits	Decongestion benefits for road users reflecting reduced journey times due to mode shift and reduced car usage. This also takes account of any reductions in road capacity due to new bus facilities.	Evaluate the difference in travel cost, using the generalised cost of private vehicle travel from the model, in between the improvement and do minimum options. Apply the rule of half and value of time (estimated from the EEM) to each trip according to the trip purpose.
Health benefits from added walking	Increased public transport use also increases walking to and from stops/stations, resulting in some health benefits. This does not include any benefits from trips switching wholly to active modes.	Demand outputs from the model are used to estimate additional walking trips to and from public transport, using an estimated average walking connection to public transport of 500m. The EEM health benefit and benefit update factors are used to monetise the increased walking associated with the additional public transport demands.
Emission reduction benefits	Mode shift from car to public transport and rationalisation of public transport routes reduces vehicle emissions affecting the environment (carbon dioxide) and human health (fine particles).	Demand outputs from the model are used to estimate the reduction in car emissions. EEM values are then used to monetise the reductions in emissions.
Parking resource cost correction benefits	Mode shift from car to public transport for commuting journeys reduces the economic costs of parking provisions (i.e. the portion of parking costs that is not paid by the users).	Demand outputs from the model are used to estimate the reduction in car commuting/education trips. EEM values for commuting trips are used to monetise these benefits.
Cyclist travel time benefits	Reduction in travel time for existing and new cyclists using the new infrastructure.	Annual benefits estimated by Flow Transportation Specialists[58].
Pedestrian travel time benefits	Reduction in travel time for existing and new pedestrians using the infrastructure.	Annual benefits estimated by Flow Transportation Specialists[58].
Health benefits for cyclists	Increased cycling results in some health benefits	Annual benefits estimated by Flow Transportation Specialists[58].
Health and environmental benefits for pedestrians	New pedestrian trips result in health and environmental benefits.	Annual benefits estimated by Flow Transportation Specialists[58].

[58] Methodology described in the report: *Māngere and Puhinui Walking and Cycling Packages: Demand Assessment and Economic Evaluation.*

Benefit	Description	Calculation methodology
Cycle safety benefits	New or improved cycling facilities improve cyclist safety.	Annual benefits estimated by Flow Transportation Specialists[58].
Pedestrian safety benefits	New or improved walking facilities (particularly road crossings) improve safety for pedestrians.	Annual benefits estimated by Flow Transportation Specialists[58].
Road Traffic Reduction Benefits from New Cycling Trips	Mode shift to cycling reduces vehicle travel and therefore congestion on the road network.	Annual benefits estimated by Flow Transportation Specialists[58].

8.8.8 Public Transport Reliability Benefits

The supporting technical Appendix E discusses how reliability benefits can be estimated and what assumptions are necessary in estimating these benefits. Owing to the high levels of uncertainty in the input assumptions, it was decided to exclude these benefits from the base economic assessment. The reliability benefits were included as a sensitivity test.

8.8.9 Model Outputs

There are some anomalies in the model setup that mean that the option that was modelled using MSM does not exactly match the recommended option. However, as the recommended option includes wide-ranging service changes, it is difficult to perform out-of-model estimates for the benefits of the complete recommended option. It was therefore necessary to use model outputs to estimate the user benefits arising from changes to service patterns and frequencies. This section describes the differences between the modelled and recommended networks and how the model results are used to provide a relevant estimate of the benefits from the short-term recommendations.

8.8.10 Model anomalies

Due to some anomalies in the modelling of SH20B in MSM, the model outputs had lower than expected public transport demands, and private vehicle demands were higher than the capacity of the proposed vehicle lanes on this corridor. The anomalies in the model include:

- An additional lane in each direction and higher speeds than proposed (100km/h instead of 80km/h) along SH20B, resulting in additional road capacity for SH20B
- Bus speeds in bus lanes capped at the speed of adjacent vehicles, despite not travelling in the same congestion, reducing the travel time benefits for public transport users travelling between Manukau and the Airport
- Some service frequencies are modelled at higher or lower frequencies than proposed, resulting in both higher and lower demands for various corridors
- Some recommended service changes not included in the model.

8.8.11 Using model outputs to estimate benefits

As the operating expenditure associated with the model is much greater than the recommended option, simply comparing the modelled benefits to the operating costs from the recommended option would over-estimate the benefit-cost ratio. Therefore, the MSM modelled benefits are compared against the operating costs for the modelled network. This ensures internal consistency between assumptions used for the numerator and denominator of the benefit-cost ratio. The benefits are then factored down according to the actual level of operating expenditure that is proposed in the recommended option.

The process for factoring the MSM modelled benefits[59] down to represent the expected benefits from the proposed recommended option is as follows:

1. Estimate the total costs and benefits for the full modelled network, between the modelled do minimum option and the modelled 'recommended' option
2. Factor the full modelled costs and benefits down, according to the ratio of the proposed additional operating expenditure to the modelled option's operating expenditure
3. Subtract the benefits that are attributable to the SH20B bus lanes, as these have been assessed in a separate economic assessment, for NZTA.

This approach is likely to result in a conservative estimate of the benefit-cost ratio. The modelled network differs from the proposed network by having increased bus frequencies across a number of screen-lines tested throughout the network. There are generally diminishing returns from the benefit of increasing bus frequencies (i.e. there is more benefit by reducing headways from 20 minutes to 10 minutes than from 10 minutes to 5 minutes). Therefore, it is expected that by factoring the benefits down as a direct ratio of the difference in operating costs, the benefit estimate will not be overstated.

8.8.12 Cost Benefit Analysis

Table 8-15 provides a comparison of the estimated benefits for the recommended short-term improvements.

Table 8-15: Net present value of cost and benefit estimates

Parameters	NPV ($000s)
Costs	s7(2)(b)(ii) Prejudice to commercial position
Construction costs	
Maintenance costs	
Additional operating cost	
Total project costs	
Benefits	
Public transport user benefits	
Road user benefits	
Health benefits from added walking	
Emission reduction benefits	
Parking resource cost correction benefits	
Health benefits for cyclists[60]	
Health and environmental benefits for pedestrians[60]	

[59] Note that the walking and cycling benefits estimated by Flow Transportation Specialists are based on a different model. Therefore, the anomalies and adjustments applied to the MSM modelled benefits do not apply to the walking and cycling benefit estimates.

[60] Note that the NPV reported in this technical note for the walking and cycling benefits that were estimated by Flow Transportation Specialists do not directly match the NPV estimates in Flow's report because of a difference in evaluation period assumptions. The assumption used here is that the evaluation period spans from 2018 to 2057 (ie 40 years from the economic assessment year of 2018), whereas Flow's estimates used an evaluation period spanning from 2018 to 2059 (ie 40 years from start of construction in 2020). Additionally, Flow have discounted to a different year 2018 rather than 2017 as used for the main appraisal.

Parameters	NPV ($000s)
Cycle safety benefits[60]	s7(2)(b)(ii) Prejudice to commercial position
Pedestrian safety benefits[60]	
Cyclist travel time benefits[60]	
Pedestrian travel time benefits[60]	
Road traffic reduction benefits from new cycling trips[60]	
Total project benefits	
Net benefits	
BCR	1.4

8.9 Uncertainty of Base Assumptions

This presents the base cost benefit assessment, relying on a number of assumptions that have been outlined throughout this technical note. Where assumptions have been necessary for making benefit estimates, a number of these have been conservative, such that the assessment below, is expected to underestimate the true benefits that will be realised from the recommended option. A summary of the conservative assumptions that have been made are listed here:

- The average value of time follows EEM guidance, despite many of the trips affected by the recommendations connecting with the Airport and having a higher average value of time
- Public transport reliability benefits are excluded from the base assessment for the service upgrading east of SH20, despite the expectation that the proposed bus lanes will improve the reliability of services between the SH20/SH20B intersection and Manukau
- Model benefit estimates were factored down according to the ratio of modelled to proposed additional operating expenditure of the service changes. This implicitly assumes that the benefits result almost entirely from the service changes, with negligible improvements attributable to the bus lanes and infrastructure improvements.

Despite the use of conservative assumptions in estimating benefits, the analysis of the modelled network suggests that it will deliver benefits that are greater than costs. This is indicative that a positive outcome from the infrastructure investments is achievable.

Additionally, the peer reviewer has indicated that unpublished work undertaken as part of ATAP suggested that the benefits derived directly from ART model outputs appeared to underestimate benefits significantly compared to alternative approaches using more detailed, local models.

8.9.1 Sensitivity Tests

This section outlines the impact of changes in various parameters on the cost benefit assessment. These tests are particularly relevant for this assessment, as numerous assumptions have been made to create a relevant estimate from inconsistent model outputs. The base estimates made use of conservative assumptions to reduce the likelihood of overstating benefits. The sensitivity tests here include some tests of less conservative assumptions, thus providing an estimate of the range of benefits that may arise from the recommended option. The BCR is above 1.4 for each individual sensitivity test.

Table 8-16: Sensitivity tests of various parameters

Sensitivity test	Parameters	Total costs ($000s)	Total benefits ($000s)	Net benefit ($000s)	BCR
Base assumptions		s7(2)(b)(ii) Prejudice to commercial position			1.4
Factoring ratio	Factor benefits based on total cost instead of OPEX				1.6
	No factoring of costs or benefits				2.0
NPV assumptions[61]	4% discount rate, 60-year evaluation period				1.6
	8% discount rate, 30-year evaluation period				1.3
Construction cost	95th percentile construction cost				1.4
Annual increase in value of transport benefits	0.8% annual increase				1.6
	1.5% annual increase				1.9
Reliability benefits	Include reliability benefits				1.4
Benefit extrapolations	Linearly extrapolate annual MSM modelled benefits before 2028				1.4
	Assume annual benefits remain constant after 2048				1.4
Shorter evaluation period	10-year evaluation period, 75% residual value				1.6
Cyclist demand	Low: low daily cyclist factor				1.4
	High: high e-bike uptake				1.5
Decongestion rate from cycling mode shift	Low: EEM SP11 decongestion rate				1.4
	High: Flow decongestion rate				1.5

[61] As mentioned in Section **Error! Reference source not found.**, the benefits for the recommended short-term improvements for A2B are calculated by subtracting the benefits attributable to SH20B bus lanes (calculated in a separate economic assessment) from the total benefits from the combined recommended programme. Testing different discount rates has a greater relative impact on the SH20B bus lane benefits than on the total benefits, and as a result the benefits for the recommended option change in the opposite direction from what would normally be expected for these sensitivity tests.

Sensitivity test	Parameters	Total costs ($000s)	Total benefits ($000s)	Net benefit ($000s)	BCR
Alternative cycle network	Full Auckland Cycle Network by 2046	s7(2)(b)(ii) Prejudice to commercial position			1.4

The shorter evaluation period sensitivity test could represent the position if after 10 years the bus rapid transit to the Airport was replaced by some form of light rail also continuing to use the new interchange at Puhinui.

The sensitivity tests also included testing the impact of any potential deferral of local public transport network changes on the overall benefit cost ratio.

The test included the new short-term route Airport to Manukau, the New Lynn to Airport Express, route 36 (new route), and 380 (existing route truncated to run Onehunga to Airport).

- The new Manukau-Airport service contributes approximately one-third of the increased opex in the short-term economics, but it also contributes most of the capex, while the other service changes contribute approximately only one-third total share of present value costs.
- The travel time gains on the Manukau-Airport route are much higher than the other routes due to the proposed SH20B bus lanes and more direct routing to Manukau, which results in this route contributing a much higher share of total benefits compared to the other routes. The share of benefits associated with the deferred local service changes are likely to be approximately one-third of total benefits, i.e., on a similar order of magnitude to their share of costs.
- The potential deferral of some of the proposed new routes, assumed for a period of three years due to funding constraints, is likely to result in a BCR that is similar to or slightly lower than the BCR calculated for the complete short-term programme as the share of benefits associated with the supporting service changes are comparable to their share of costs

8.9.2 Conclusions

This section has described how model results that are inconsistent with the recommended option have been used to create a relevant estimate of benefits from the recommended option. The process undertaken to estimate the base BCR compared the modelled benefits to the cost of implementing the modelled network changes. The resulting cost benefit assessment was then factored to estimate the relevant benefits that are expected from the proposed service changes, rather than simply assessing the benefits that were modelled.

The approach that was undertaken required a number of assumptions to be made and used data from a number of sources. The assumptions and adjustments required for the analysis introduced a degree of uncertainty in forecasting the expected outcomes. Reflecting this, a generally conservative approach has been taken in the analysis.

Despite the use of conservative assumptions in the base cost-benefit assessment, the estimated benefits exceed the costs of the recommended option, with a resulting BCR of 1.4. Furthermore, the sensitivity tests resulted in a range of BCRs between 1.3 and 2.0. These results indicate that the economic position of the recommended option is robust.

8.10 Risks

A Risk Register was developed for Puhinui Interchange and is currently being maintained by the Puhinui Interchange Pre-Implementation project. The major risks identified during the development of the business case were:

8.10.1 Puhinui Interchange

Property, KiwiRail and Mana Whenua Liaison

The property risk for the project is considered low as the proposed Puhinui Interchange Early Deliverable can be accommodated on land holdings currently owned by AT, Auckland Council and KiwiRail. However, a land parcel that was previously owned by KiwiRail was transferred to Land Information New Zealand (LINZ/the Crown) many years ago. KiwiRail has 'called back' this land to provide the planned third and fourth rail lines. A small portion is also required for the Interchange.

Whilst this land was with LINZ, it formed part of Treaty settlement negotiations between the Crown Mana Whenua, which is still on-going. The land parcel has now been removed from the Treaty settlement process by LINZ. Whilst the land will be available for the interchange via KiwiRail, there is a potential reputation and relationship risk between AT, KiwiRail and Mana Whenua. The risk is currently considered low as the project team have an established relationship with Mana Whenua and KiwiRail and will continue to maintain a constructive working relationship with them.

Risk Register

As at May 2019 the Risk Register includes five *Large Threats*, as shown in the tables below. An appropriate response/management strategy is in place for each mitigating their possible impact.

Table 8-17: Large Threats

Risk	Effect	Response
The size of the new structure or temporary works such as scaffolding obscure train driver view of signals	Unacceptable safety risk to operations and signals require relocations or works/design must change.	Design temporary works accordingly
Unable to confirm and book required rail blocks (possessions) in line with KiwiRail booking timescales	Delays to critical rail works being completed as planned Increases in cost due to delayed works and resequencing	Liaise with KiwiRail throughout design process
High level of large Projects underway across the Auckland Region Construction organisations may have their order books filled Inability of the market to find suitable resources to deliver the Project on time and on budget Little interest expressed by the Market for single Projects	Delays incurred to the delivery of the Puhinui Station works Increases in cost due to having to pay a premium for the works to be delivered on time Possible quality issues	

Risk	Effect	Response
Mana Whenua groups may not provide their support to the project if they consider that engagement with them is too late in the piece and not genuine	Delays to securing Mana Whenua agreements Programme team are not able to do its due diligence and spend time/money and effort resolving. Delays occur due to additional Mana Whenua requirements or consultation. Reputational damage with local Iwi if complications are not resolved, this will create ongoing or future strain on the working relationship with Mana Whenua.'	Mana Whenua consultation and communication throughout the entire design process should be undertaken
Contractor identifies contamination while clearing sites Contamination in the form of Asbestos in houses being demolished or in ground contamination during earthworks.	Treatment / removal of contamination is required leading to increased delivery costs	Have plans in place to deal with the presence of asbestos

8.10.2 Puhinui Road Bus Improvements and Māngere Improvements

A Risk Register was developed for the additional short-term improvements and is currently being maintained by the Short-Term Airport Access Improvements – Early Implementation (Detailed Design) project. The major risks identified during the development of the business case were:

Stakeholder Engagement

Approximately 160 on-street parking spaces are affected by the Puhinui Bus Priority Improvements. These parking spaces are predominantly used by residents along Puhinui Road, and commercial property owners and customers on Lambie Drive. While peak-only bus lanes are recommended in the short-term to reduce potential programme risk associated with the removal of parking, it is likely to still have a moderate impact on residents and businesses.

The Māngere Cycling Improvements will also require the removal of existing parking spaces between Kirkbride Road and Māngere Bridge should it be implemented in its current configuration (STC 4).

Programme Risk

The Puhinui Bus Priority concept design involves the construction of a 2.5m wide SUP along Puhinui Road. A departure request has been submitted to relax the minimum width of the SUP to 2.0m around proposed tree pits for sections less than 5m in length due to the constrained space between the existing property boundaries and the kerb. This is proposed to reduce the project delivery and consenting risks for the removal of 15 street trees under the Statutory Framework Act of Pohutukawa Trees.

Impact on Utilities

At this concept design phase, ground investigations have not been carried out. Given the construction of the SUP will involve localised widening and the removal of Pohutukawa Trees, future work may involve utilities-diversions identified during site investigations.

Additional detail on the impact that the SUP will have on existing utilities will need to be explored. The risk is currently considered low as further consultation with Auckland Council and the relevant service providers will be undertaken during detailed design phase to confirm connection details and the location of the existing utilities.

Risk Register

The Risk Register provided in Table 8-18: below aims to identify the key risks to the Project. An appropriate response/management strategy is in place for each mitigating their possible impact.

Table 8-18: Project Threats

Risk	Effect	Response
Design Assumptions - Project Integration with other projects	Additional cost in redesign and potential delays to programme due to additional consent requirements	Contingency funds set aside. Additional comprehensive internal as well as other Road Controlling Authority engagement to reduce likelihood of unknown interfaces
Backlash from Community regarding proposed pedestrian/cycle network	The proposed facility has the potential to receive backlash from the community and major cycling groups due to the reduced level of service resulting in additional consultation costs and delays to project programme	Contingency funds set aside. Additional external stakeholder/community engagement to reduce likelihood of unknown delays
Removal of on-street parking facilities	The proposed facility will receive backlash from the community due to the loss of parking resulting in additional consultation costs and delays to project programme.	Contingency funds set aside. Additional internal and external stakeholder/community engagement to reduce likelihood of unknown delays
Removal of on-street parking facilities	Additional cost in scope increase, redesign, construction and delays to programme.	Contingency funds set aside. Additional internal and external stakeholder/community engagement to reduce likelihood of unknown delays
Drop in level of service for general traffic / Negative impact on general traffic for the proposed route	Additional cost in corridor wide short term express study resulting in redesign and delays to programme or post construction redesign.	Contingency funds set aside. Additional internal and external stakeholder/community engagement to reduce likelihood of unknown delays
Mana Whenua expectations on level of stormwater treatment.	Impaired relationships with Mana Whenua, consenting delays, design delays, scope changes	Incorporate Mana Whenua feedback into stormwater treatment design. Ongoing engagement to explain project constraints
Increase in construction cost	Additional construction costs and potential delays to programme	Contingency funds set aside.
Accommodation / permanent works into private property	Additional construction costs and delays to programme due to consultation	Contingency funds set aside. Additional internal and external stakeholder/community engagement to reduce likelihood of unknown delays

Risk	Effect	Response
Backlash from Community regarding removal of right turn bays along Puhinui Road	The proposed facility has the potential to receive backlash from the community due to delays in turn time from side streets onto Puhinui Road	Contingency funds set aside. Additional external stakeholder/community engagement to reduce likelihood of unknown delays

9 Financial Case

The RLTP of June 2018 allocates towards improving Airport access over its first three years, with allocated to the first phase of the Puhinui Interchange, with the Regional Fuel Tax (RFT) funding s7(2)(b)(ii) Prejudice to this.

Total construction costs for the Puhinui Interchange Puhinui Road and Lambie Drive bus priority Māngere cycling improvements s7(2)(b)(ii) Prejudice to commercial and supporting programme wide travel demand management s7(2)(b)(ii) Prejudice to commercial position ncluding contingency.

The total short-term airport access improvement programme cost, which includes a 5.7% Auckland Transport Funding Admin Cost, s7(2)(b)(ii) Prejudice to commercial position

There is a shortfall of (P50 – P95 range) to deliver the full recommended programme compared to the Regional Land Transport Plan (RLTP) 2018 - 2028 allocation of $67.8M to the STAAI programme. Whilst the programme funding shortfall is an aggregate budget shortfall across all of the STAAI sub-projects, prioritisation of the programme elements means that the funding shortfall affects the ability for AT to deliver the recommended Māngere-Airport cycle schemes.

The new bus services will have an annual operating cost per annum in 2018 dollars partially offset from a financial perspective by an additional s7(2)(b)(ii) Prejudice to annum in fare income.

Non-delivery or delayed delivery of the physical works and bus network improvements identified in the programme by 2020 / 2021 will have the impact of delaying the expected mode-shift change in the area and will delay providing access benefits to customers.

9.1.1 Cash Flow

Based on current estimates, the anticipated cash flow for the investment proposal over its intended life span is set out in the table below. The projected cash flow is indicative and is dependent on the proposed construction methodology and approval of all elements of the programme.

Table 9-1: Cash Flow

Financial Year Starting 1 July				
	2018	2019	2020	2021
Puhinui Interchange	s7(2)(b)(ii) Prejudice to commercial position			
Puhinui Road Bus Priority				
Māngere Cycling Improvements				
Total				

9.1.2 Results Alignment

The business case has been assessed for its alignment in accordance with the latest Transport Agency Investment Assessment Framework (IAF) and guidance on *Developing an assessment profile*[62]. The IAF and guidance contain two factors: The *Results Alignment* which relates to the GPS and the *Cost Benefit Appraisal*.

[62] the Investment Assessment Framework for the 2018-21 National Land Transport Programme https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/2018-21-nltp-investment-assessment-framework-iaf/developing-an-assessment-profile-2018-21/#results-alignment

GPS Results Alignment

The alignment with the GPS has four categories, from Low to Very High (VH). A project that meets at least one of the Public Transport, rapid transit and transitional rail improvements criteria below can be given a High rating:

Access – Liveable Cities[63]:

- addresses a significant gap in level of service in accessing social or economic opportunities and makes a significant contribution
- address significant gap in access to new housing in high growth urban areas
- supports agreed integrated land use, multi-modal plans and mode shift in major metros
- improves intermodal connectivity where this enhances the appropriate use of public transport

Criterion 1:

One of the requirements of the Southwest Gateway Programme (see Section 1.6) is to address the poor level of service of public transport to the Airport – a foremost economic driver in Auckland (Section 2.4.1 explains the economic importance of the Airport while Sections 2.8.5 explore the deficiency of the public transport network). Along with the complementary SH20B bus lanes, the Puhinui Interchange, local bus priority and new bus services are expected to make a significant contribution to changing the level of service to approach that of a rapid transit service. The change in expected public transport use with significantly higher numbers of public transport passengers and a much faster and more reliable service is shown in 8.3.

Criterion 2:

There is a significant gap in access quality between high growth areas to the south of Auckland and the employment area of the Airport (Sections 2.5.1 and 2.6.2). This gap can be partially addressed through the full suite of short-term measures as the connection at Puhinui between rail services serving the south and bus services using the SH20B bus lanes will enable effective public transport options for a substantial demand (Section 2.2).

Criterion 3:

ATAP is the agreed multi-modal plan for Auckland (Auckland is defined as a “major metro”). The Airport to Botany RTN including Puhinui is a named project in ATAP (See Executive Summary and Section 1.4.2). By definition, therefore, the project supports the relevant multi-modal plan. The Interchange, local bus priority and new services are designed to support mode shift as the earlier Supplementary Programme Business Case had demonstrated (Sections 1.1 and 3.2.3) that available road capacity will be exhausted within five years. The Southwest Gateway Programme had therefore emphasised mode shift in the short term (Section 1.6.2).

As noted under criterion 1 a shift to the public transport mode is expected as a result of the proposed short-term measures.

Criterion 4:

Intermodal connectivity will principally be enhanced directly by the Puhinui Interchange. The new bus services, local bus priority (and SH20B bus lanes) will enhance the effectiveness of the Interchange by providing a bus route with much enhanced priority and therefore speed and reliability.

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63 https://nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/2018-21-nltp-investment-assessment-framework-iaf/assessment-of-public-transport-rapid-transit-and-transitional-rail-improvements/

As can be seen the business case meets at least three of the specified criteria for a High rating and is supported by a fourth. The results alignment is therefore *High*.

Cost Benefit Appraisal

The cost benefit appraisal value is *Low*, as it lies between 1.0 and 2.0 (see Section 6).

Overall Priority

Overall, therefore, the Priority Ranking is 5 (IAF page 11) as a project with a Results Alignment of High and a Cost Benefit Appraisal of Low.

10 Commercial Case

This section provides evidence of the commercial viability of the short-term airport access improvements programme.

10.1 Procurement Strategy – Puhinui Interchange

The Puhinui Interchange project involves a significant vertical-build within the operational rail environment, presenting complex access constraints both in terms of health and safety and in ensuring that the operations at Puhinui Train Station continue with minimum disruption.

In addition, the project programme targets of end-2020 requires an efficient procurement approach to leverage the buildability input and innovations of the physical works contractor as early as possible and allow early/enabling works to be efficiently initiated as required.

An informal market sounding of AT Tier 1 Panel members and other contractors with prior experience of public transport vertical build projects indicates that appetite to tender for the Puhinui Interchange project is robust. Prior to issuing an RFT it is intended to arrange a pre-tender interactive with interested tenderers. During the tender period opportunities for a further tenderer-specific interactive will be arranged.

By adopting this approach, tenderers would discuss how they would address the key project issues prior to finalising their tenders. This would give both the tenderer and AT greater certainty about the acceptability of the offer being tendered. Of particular relevance will be information on how the tenderer proposes staging the construction works given the access restrictions of working in and around the operational rail corridor and Puhinui Station.

10.1.1 Indicative Procurement Timetable - Puhinui interchange

The following project and procurement schedule are anticipated:

Table 10-1: Puhinui Interchange – schedule

Date	Activity – Puhinui Interchange
September 2018	▪ *Completion of concept design* ▪ *Procurement Strategy and Plan approval*
October 2018	▪ *Commencement of preliminary design* ▪ *Formal pre-tender ECI interactive*
December 2018	▪ *Issue ECI RFT* ▪ *Submit Resource Consent application*

Date	Activity – Puhinui Interchange
January 2019	▪ *Identification of early works opportunities*
February 2019	▪ *Completion of preliminary design* ▪ *RFT close and evaluation begins*
March 2019	▪ *Award of ECI contract* ▪ *Commencement of developed design*
April 2019	▪ *Easter BOL AT enabling works*
May 2019	▪ *Completion of developed design* ▪ *Completion of Early Works detailed design* ▪ *Resource Consent approval*
June 2019	▪ *Queen's Birthday BOL AT enabling works* ▪ *Competitive tendering of Early Works key sub-trades and parallel estimation process* ▪ *Lodge Early Works Building Consent application*
July 2019	▪ Final reconciliation between contractor price and parallel Early Works price estimates ▪ Receive Early Works Building Consent ▪ SSBC NZTA implementation funding application
August 2019	▪ Completion of detailed design (90%) ▪ Award Early Works contract ▪ Mobilise and establish site ▪ 3-4 August BOL ▪ Ordering of day one long-lead items by Contractor
September 2019	▪ AT and key stakeholders comment on detailed design ▪ Completion of detailed design (100%) ▪ KiwiRail Engineering Approval ▪ Piling to west and east of rail corridor ▪ Demolition of existing station access 28-29 September BOL ▪ Puhinui Station temporarily closed for construction works – 28th September 2019 ▪ NZTA Implementation funding approval
October 2019	▪ Piling within rail corridor ▪ October 2018 Labour Weekend BOL
December 2019	▪ Award Main Works Contract ▪ Christmas BOL
January 2020	▪ Piles and pile caps completed ▪ Auckland Anniversary BOL
April 2020	▪ Easter BOL
June 2020	▪ Queen's Birthday BOL
October 2020	▪ Labour Weekend BOL
December 2020	▪ Christmas BOL

Date	Activity – Puhinui Interchange
January 2021	▪ Target date for opening of facility ▪ Puhinui Station re-opened for train and bus operations
March 2021	▪ Practical Completion of all construction works

10.1.2 Procurement Risks

Key procurement risks identified during earlier stages of the project were:

- Contractor market appetite for an ECI contract of this comparatively small scale
- Successful contractor needs to be experienced in ECI contracts and working in rail corridor
- AT project team may need expert advice/support on ECI contract best practice
- Delays to tendering mean ECI design benefits lost, as design has progressed too far for innovation and buildability input to be useful
- Uncertain construction price until all sub-trade tendering has been completed
- Once awarded, AT will be committed to progressing through construction with appointed Contractor or face extensive programme delays.

10.1.3 Contract Options

The following were considered in the selection of a contract option:

- The value of the project
- Procurement is not proposed to be restricted to the Tier 1 supplier panel on the basis of the Panel Agreement: "Where there are works that Auckland Transport determines, in its sole discretion, to contain elements that are of a specialised nature (e.g. value of building structure is more than 50 percent of the contract value... Auckland Transport may choose to procure such works from outside of the Panel"
- The contract will be professional service bespoke contract based on the Downtown Infrastructure Programme precedent, which will be novated to a modified NZS3910:2013 contract reflecting the ECI model
- Pre-tender and tender interactives are proposed.

10.1.4 Contract Models Considered

The following sourcing/procurement contract models were considered:

- Traditional
- Contractor Design and Build
- ECI.

After consideration, the AT project team recommended pursuing an ECI procurement as likely to achieve the best overall outcome for this project subject to market engagement to gauge the contractor appetite for an ECI procurement.

It is proposed that tenderers be evaluated on quality attributes along with fixed preliminary and general (P&G) and margin percentages. An initial Stage 1 pre-construction phase would be on a cost-plus P&G and margin basis, with sub-trades tendered during the detailed design phase.

10.1.5 Procurement Options

Procurement options considered were:

- Tier 1 Panel
- Two Stage approach including an evaluated Registration of Interest (ROI) stage
- Single Stage approach.

A single stage approach can be carried out within a shorter timeframe, eliciting greater benefits from the ECI model by involving the contractor in the project during late preliminary design stage. Given the limited number of suitably-experienced contractors expected to tender for the project, short listing of tenderers through a two-stage approach is not considered necessary.

The single stage approach was recommended.

10.1.6 Procurement Methods

The following Supplier Selection method was recommended:

Stage 1 (Pre-Construction):

- AT Quality Based Method with fixed P&G and margins for Stage 1 and Stage 2
- Pricing to be open book cost reimbursement, as established on a tendered schedule of rates, plus P&G and margin.

Stage 2 (Construction):

- Novation to a modified NZS3910:2013 contract subject to satisfactory completion of the pricing, design, documentation, approvals and procurement activities during pre-construction
- Sub-trades tendered competitively with AT evaluation involvement/oversight, with fixed P&G and margins established at pre-construction tender
- Self-performing work to be provided on an open book basis reconciled by an independent parallel estimate. This function to be performed by a suitably ECI-experienced quantity surveyor
- At completion of detailed design, a final reconciliation between the Contractor and parallel estimator to agree a lump sum or target price for the entirety of Stage 2.

The reason for recommending a Quality based evaluation is that until the design is completed pricing of the Stage 2 construction cannot be accurately achieved and the emphasis for Stage 1 Pre-construction should be on securing the most competent Contractor team able to enhance the project design and outcomes without the rates of these individuals being a deciding factor in the contract award.

Price tension for Stage 2 construction is retained by fixing the P&G and margin percentages, parallel estimation and reconciliation with the contractor's pricing and demonstrating competitive tendering of sub-trades with AT involvement.

10.2 Procurement Strategy – Puhinui Road Bus Priority and Māngere Cycling Improvements

The supporting short-term improvements involves the implementation of bus priority lanes, localised road widening and intersection improvements, and a combination of shared use paths and on-street cycling lanes along Puhinui Road, Lambie Drive, and areas in Māngere.

The project programme targets of end-2020 requires an efficient procurement approach to leverage the buildability input and innovations of the physical works contractor as early as possible and allow early/enabling works to be efficiently initiated as required.

Auckland Transport uses Physical Works Supplier Panels for the engagement of construction category contractors where the scope of work includes:

- Construction of roads including bridges, streetscape, and traffic signals;
- Construction of transport interchanges including car parks and busway stations/rail stations buildings; and;
- Up to 20% of the annual road corridor rehabilitation works.

Given the estimated value of works, a panel 1 contractor will be procured for the supporting short-term improvements.

The following project and procurement schedule are anticipated:

Table 10-2: Indicative Supporting short-term improvements - schedule

Activity- Puhinui Bus Priority Lanes and Māngere Cycling Improvement	
June 2019	▪ *Start Detailed Design*
September 2018	▪ Submit Resource Consent application
October 2019	▪ Detailed Design bus priority lanes
January 2020	▪ Detailed Design cycling improvements
January 2020	▪ Issue construction tender
March 2020	▪ Award of construction contract
December 2020	▪ Construction complete, issue Practical Completion
January 2021	▪ Project completion

10.2.1 Procurement Risks – Construction

Key procurement risks identified during earlier stages of the project were:

- Contractor market appetite for a contract of this comparatively small scale
- There are a limited number of approved contractors on AT's Physical Works Supplier Panel
- Successful contractor needs to be experienced in service relocation and/or upgrades

10.2.2 Procurement Risks –Public Transport Network Changes

Key procurement risks identified during earlier stages of the project were:

- Potential lead in time to procure additional vehicles required to operate extended or new routes.
- Potential need for additional stakeholder engagement prior to the implementation of the network changes if funding is delayed for a considerable period of time.
- Cost of operating the Airport Link service is based on runtimes provided in the STAAI Business Case, using the assumption that bus priority will be in place and assumed travel speeds will be sufficient. There is a risk that runtimes are not sufficient so additional runtime and extra buses will be required.
- Cost of service change variation has not been confirmed with the operator because new electric vehicles are yet to be procured. The number of vehicles required could increase due to charging time requirements and reliance on on-road charging infrastructure.
- As the Airport Link service operates 22 hours per day there is a very short window for overnight charging meaning extra vehicles could be required. The required opex cost could increase as a result.

10.3 Consenting Strategy

10.3.1 Introduction

This section identifies potential resource consent triggers for the preferred option. The main planning considerations have been identified following a review of the Auckland Unitary Plan – Operative in Part (AUP) provisions and the proposed layout options and assumptions in the context of the surrounding environment.

The Consenting Strategies for Puhinui Interchange and the Supporting Short-Term Improvements are attached as **Appendix G**.

10.3.2 Puhinui Interchange

A Consenting Strategy (Attached at **Appendix G**) was prepared to identify all potential resource consent triggers and the preferred consenting approach for Puhinui Interchange. This was used to inform the preparation of the resource consent application for Puhinui Interchange, which required resource consent as a restricted discretionary activity under the AUP(OP). The consent application was lodged with Auckland Council in April 2019 and resource consent was granted on a non-notified basis in May 2019.

Development of the detailed design for the supporting short-term improvements, is anticipated to alter elements of the consented design for Puhinui Interchange. The resource consent will be updated through a s127 to incorporate the design changes for the supporting short-term improvements that directly and indirectly support the operational functionality of the proposed Puhinui Interchange.

10.3.3 Temporary Traffic Management

An Integrated Transport Assessment (ITA) has been developed as part of the consenting process for Puhinui Interchange. Most of the construction activities will be contained within the off-road construction zones. It is anticipated that all the loading and delivery traffic will enter the site. However, due to the construction vehicle traffic, there will be a need to calm the local traffic environment, to reduce traffic volumes and speeds in the immediate vicinity of the proposed construction work zones.

A detailed construction traffic management plan will be developed and submitted to the relevant authorities for approval / certification in terms of the “Code of practice for temporary traffic management (CoPTTM) as specified in the consent conditions. The ITA included an indicative traffic management plan (TMP), as a high-level guide on the construction traffic management strategy that can be considered by the contractor.

Figure 10-1: Puhinui ITA - Temporary Traffic Management Plan

As Puhinui Station will be closed from late September 2019 to January 2021 to allow construction of the new interchange, Auckland Transport has introduced a new free bus service (Route 349) to provide access between Papatoetoe Station and Puhinui Station.

10.3.4 Puhinui Road Bus Priority

Summary of Planning Context

The entire corridor is zoned as Road zone within the AUP, as shown in Figure 10-2 below.

AT has lodged a notice of requirement (NOR) for the entire Auckland local road network in June 2012. At the time of writing, this designation had not been confirmed.

The adjacent land uses are a mixture of residential, commercial and light industrial. The subject section of road is subject to the Airspace Restriction designation, Aircraft Noise Overlay, High Use Aquifer Management overlay, High Use Stream Management overlay, and partially subject to a Stormwater Management Area – Flow 2 (SMAF 2) control.

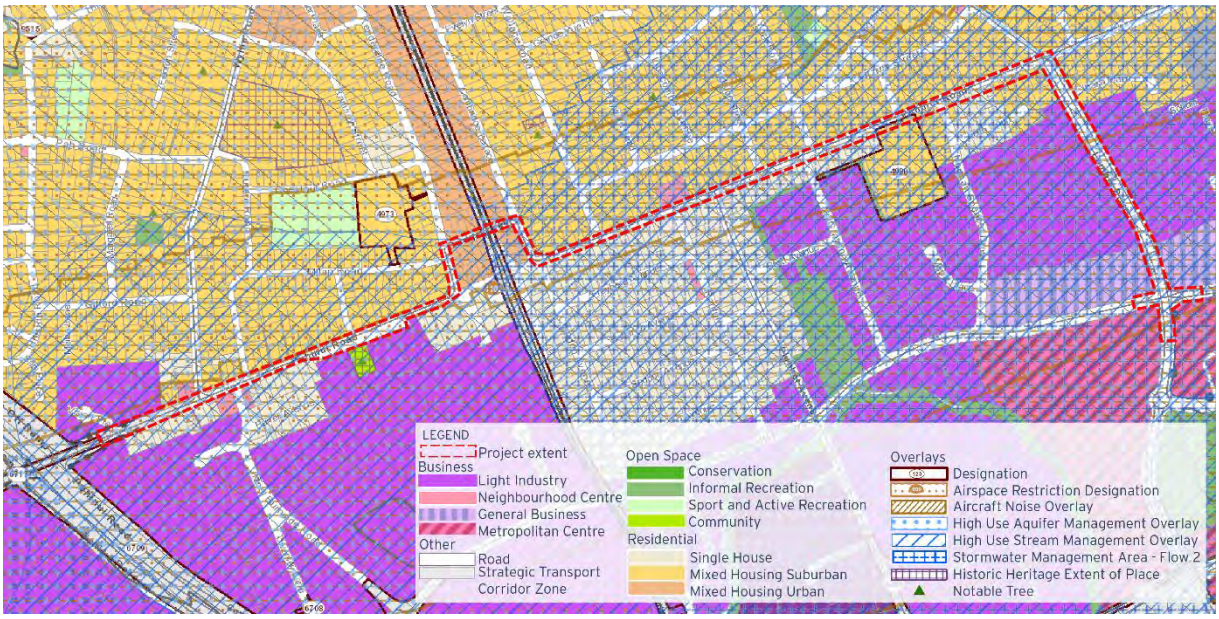


Figure 10-2: Auckland Unitary Plan zoning

Preliminary Planning Analysis

The proposed improvements and associated construction works can entirely be undertaken within the existing road corridor and therefore the provisions of Chapter E26: Infrastructure apply (which largely allow for the changes to the road layout as a permitted activity).

The Puhinui Bus Priority Improvements would require resource consent as **restricted discretionary** activity under the AUP. The reasons for resource consent under the AUP relate to the following activities:

- Works within the protected root zone of a tree pursuant to Rule E26:A88 (restricted discretionary); and
- Removal of 31 trees greater than 4m in height or 400mm in girth pursuant to Rule E26:A92 (restricted discretionary).
- A detailed construction traffic management plan will be developed and submitted to the relevant authorities for approval / certification in terms of the “Code of practice for temporary traffic management (CoPTTM) aby the contractor.

An assessment of the relevant AUP provisions is provided in **Appendix G**.

10.3.5 Māngere Cycling Improvements

Summary of Planning Context

Māngere Centre Park is zoned as Open Space – Sport and Active Recreation and there is a Notable Tree overlay across the site (Figure 10-3:).

Across the subject sections of road corridor and the Māngere Centre Park, there is an Airspace Restriction designation, Aircraft Noise overlay and Regionally Significant Viewshaft overlay. Parts of the shared path between Bader Drive and Māngere Centre Park fall within the extent of the designation for SH20 and SH20A where there is an existing pathway.

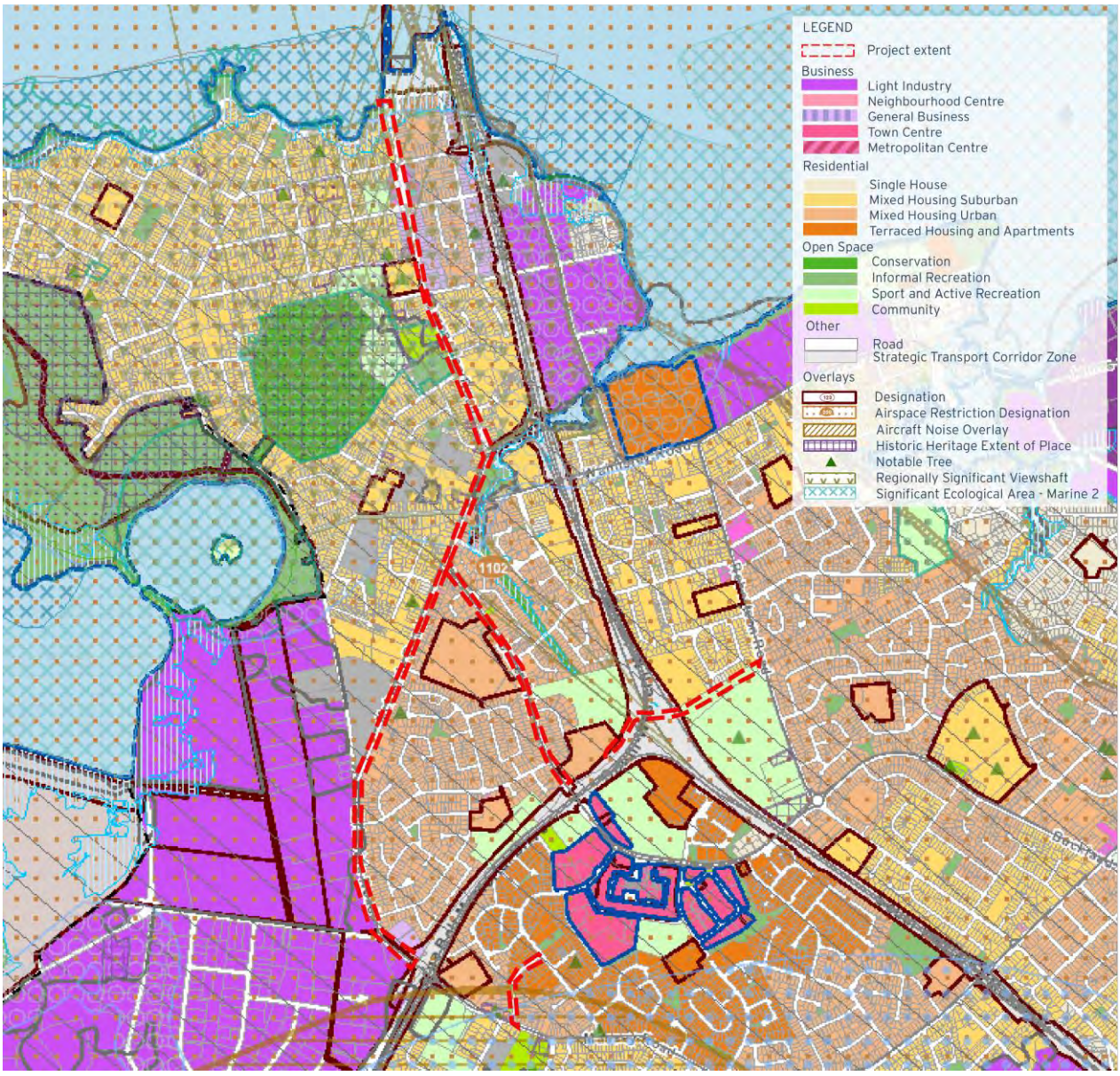


Figure 10-3: Auckland Unitary Plan zoning

Preliminary Planning Analysis

Based on this assessment, the proposed works could be undertaken as a permitted activity (subject to compliance with the applicable permitted activity standards). An assessment of the relevant AUP provisions is provided in **Appendix G**.

Recommended Strategy

A robust consenting strategy has been developed for the Supporting Short-Term Improvements. Multiple options for obtaining statutory approvals under the RMA have been described and assessed in the Consenting Strategy (**Appendix G**). The consenting strategy recommends:

- The preferred consenting approach is for AT to separate the Puhinui Road and Māngere packages from each other during the planning process to avoid potential delays between the two
- All necessary resource consents for the Puhinui Bus Priority Improvements lodge an integrated (district and regional) resource consent application for the Puhinui Road Bus Priority Improvements through the traditional Council process to obtain the necessary RMA approvals required

- On the assumption that AT can successfully obtain section 176(1)(b) approval from the Transport Agency and landowner approval from Auckland Council, the Māngere Cycleway Improvements are anticipated to be a permitted activity. A certificate of compliance (CoC) to confirm authorisation of these works is not considered necessary as there are no exceptional circumstances associated for the works
- A detailed construction traffic management plan will be developed and submitted to the relevant authorities for approval / certification in terms of the "Code of practice for temporary traffic management (CoPTTM) aby the contractor.

The preliminary planning assessment of the Puhinui Road Bus Priority Improvements indicate that resource consent could be processed on a non-notified basis provided the adverse effects of the proposed street tree removal can be appropriately mitigated.

In light of any development of design, determination by a consent authority (in this case, Auckland Council) is recommended.

10.4 Property Acquisition Strategy

10.4.1 Introduction

Overall there are no substantial property acquisition requirements within the Early Deliverable stage of the Project.

The land to the west of the KiwiRail corridor, where the bus interchange is located, is unformed legal road. There is potential conflict with the entry to the interchange and driveway to the Kohanga Reo located at 212 Puhinui Road and as a result the driveway will need to be relocated to the adjacent unformed Kenderdine Road. It is noted that discussion with the Kohanga Reo will be required.

On the east side of the KiwiRail corridor, the station, potential emergency access and canopy encroach on land currently held by LINZ. It is understood the land is being acquired by KiwiRail. There will be lease/access arrangements to be entered into with KiwiRail with regard to the new station.

At-Grade Bus Turnaround and Exit

The entry/exit to the at grade bus turnaround from the west side of the KiwiRail Corridor will cross over three parcels of land already vested in AT. Two of these are vested as road (214 Puhinui Road and the land adjacent to the KiwiRail Corridor). 216 Puhinui Road was vested for "road purpose" under Gazette Notice 1982, however vesting for "road purposes" will need to be reviewed and possibly amended to vest as "road".

There are no property requirements in relation to the two other parcels of land referred to above as this land has already been vested for road.

The exit from the at-grade turnaround crosses over the unformed Kenderdine Road near Puhinui Road. The new access to the Kohanga Reo will be relocated within Kenderdine Road which will need to be formed and will need to be designed to as part of the bus exit. The existing driveway to the Kohanga Reo is via 216 Puhinui Road which will be removed to allow the bus exit from the turnaround.

212 Puhinui Road – Occupied by Kohanga Reo

There is a small encroachment of the new station canopy on the west side of the KiwiRail corridor over the land at 212 Puhinui Road (owned by Auckland Council and leased to Te Kohanga Reo National Trust Board). Consent of the Kohanga Reo will be sought as an affected party and that mitigation will be included in the consent to reduce construction impacts on the operation of the Kohanga Reo.

Land Held by LINZ/KiwiRail

The station infrastructure on the east side of the station affects the land held by LINZ. KiwiRail has confirmed it has funding approval to acquire this part of the corridor from LINZ. LINZ currently holds this land following it being declared surplus by KiwiRail. KiwiRail now intends to extend the third and fourth main into this corridor and requires the land for this purpose.

KiwiRail intends to acquire the land from LINZ imminently. The timing for acquisition will need to be confirmed.

Access and lease arrangements will need to be put in place with KiwiRail. Discussions with KiwiRail indicate that the land requirements for this station should be consistent with other stations on KiwiRail land. There is a current Deed of Lease between AT and KiwiRail for Puhinui Station dated 2023 which relates to an existing smaller scale station and platform at Puhinui. In 2017, AT purchased an area of land from LINZ of 471m² of surplus railway corridor for the Puhinui Station footbridge encroachment.

The Puhinui Interchange Property Strategy is attached as **Appendix H.** Stakeholders

10.5 Engagement Approach and Principal Stakeholders

The engagement approach for the project is guided by the Airport to Botany Rapid Transit Communication and Stakeholder Engagement Plan. The plan is based on the principles and core values of the International Association for Public Participation (IAP2), which is the core tool at the heart of AT's engagement guidelines.

IAP2 provides internationally recognised consultation best practice principles. The community engagement spectrum of participation is based on the decisions to be made and the associated level of influence (if any) the community has on project decision making.

In addition, the project team has been working closely with the Southern Communication Coordination Group, to coordinate engagement on transport projects in south Auckland. This group meet on a quarterly basis and consists of engagement and project leads from AT, AC, the Transport Agency and KiwiRail. New project leads are invited to attend the group discussion as and when new transport projects arise.

The objective of the engagement was for delivery organisations, key stakeholder's community and potentially directly or indirectly affected property owners / occupiers to contribute to the development of the solutions to address the agreed transport.

Engagement with project partners and key stakeholders has been via workshops, socialisation sessions, emails, small group meetings and one-on-one meetings. Information gathered during engagement activities has assisted with decision making at key points in the development of this SSBC.

The methods used to engage with the community and potentially directly and indirectly affected property owner / occupiers has included a series of community open days, letters and email as well as phone calls and meetings. Information gathered during the engagement activities will be considered in ongoing design including walking and cycling provision as well as the minimisation of environmental effects.

Engagement has been with:

- Mana Whenua
- AT
- Transport Agency
- AIAL
- Auckland Council (AC), including specific local boards, councillors and Mayor
- advocacy and interest groups
- road management
- utility providers
- government agencies
- business groups
- emergency services
- local community / residents
- general public.

Overall, project partners, key stakeholders and community have been supportive for the potential early deliverable and ultimate design. They recognise the strategic need for the improvements and the interrelationship with other transport infrastructure in southwest and southwest Auckland.

The next stage of engagement is to engage on the outcomes of the SSBC including a preferred option for improvements.

Further engagement with potentially directly and indirectly affected property owner / occupiers will happen once AT has confirmed the preferred approach.

10.5.1 Mana Whenua

Mana Whenua are recognised as a Treaty Partner by AT, as per the Treaty of Waitangi 1840 / Te Tiriti o Waitangi. With relation to the development of this SSBC, this means sharing decision making with iwi when identifying priorities for investment and identifying the best choice of transport system for their communities, both regionally and nationally.

Mana Whenua who collaborated with the project team are representatives from AT's Southern Mana Whenua Table. Iwi involved in the Table, who regularly attended the monthly hui, are:

- Ngāi Tai Ki Tāmaki
- Ngāti Maru
- Ngāti Tamaoho
- Ngāti Te Ata Waiohua
- Ngāti Whanaunga
- Te Ahiwaru Waiohua
- Te Ākitai Waiohua
- Te Patukirikiri.

The project team has engaged Mana Whenua regularly since April 2018.

During December 2018, a formal request was sent to the representatives of the AT Southern Mana Whenua Table as well as other iwi (listed below) to confirm preferences for engagement:

- Te Kawerau a Maki
- Ngāti Paoa
- Ngāti Tamaterā
- Ngāti Whātua o Ōrākei
- Waikato-Tainui.

Ngāti Tai Ki Tāmaki and Ngāti Te Ata Waiohua responded to the request and will prepare a Māori Values Assessment (MVA) in 2019. Te Ākitai Waiohua will provide an addendum to the previously developed Puhinui Precinct MVA.

Delivery Organisations

'Delivery organisations' in the context of the Airport to Botany Rapid Transit project is AT, the Transport Agency, AIAL. Representatives from various departments within these organisations have been engaged through workshops and meetings to exchange information and assist in the decision making on the options proposed.

10.5.2 Government Agencies and Auckland Council

- Ministry of Business, Innovation and Employment

Mayoral including:

- Deputy Mayor – Bill Cashmore
- Wards and Councillors including:
- Manukau – Cllr Alf Filipaina
- Howick – Cllr Sharon Stewart
- Manukau – Cllr Fa'anana Efeso Collins,
- Manurewa-Papakura – Cllr Daniel Newman

AC local boards including:

- Howick
- Māngere-Otahuhu
- Manurewa
- Otara-Papatoetoe

Relevant departments including:

- Cemeteries team (Manukau Memorial Gardens)
- The Southern Initiative
- Panuku Development
- Auckland Tourism, Events & Economic Development (ATEED)

10.5.3 Key Stakeholders

A number of key stakeholders have been identified as having a potential influence on the outcome of the project. Key stakeholders who have been engaged to discuss and exchange information include:

Road Management

- Auckland Motorway Alliance (AMA)
- Auckland Joint Operations Centre (ATOC).

Government agencies

- Heritage NZ Pouhere Taonga
- Department of Conservation
- KiwiRail
- HLC
- Housing NZ.

Business groups

- Auckland Business Forum
- Auckland Chamber of Commerce
- Airport Connect

Utility providers

- Vector
- Chorus
- Spark
- Vodafone
- NovaGas
- FX cable/ Vocus

Emergency Services

- NZ Police
- NZ Fire Service
- St John Ambulance

Local community and residents

General public

- Public engagement has been focused on enabling stakeholders and the community to:
  - consider the relative strengths and weaknesses of the short-listed options
  - provide feedback on the short-listed options
  - provide key customer insights and user experience aspirations, i.e. journey patterns and what people value regarding the transport system.

A public feedback period was undertaken during November and December 2018 which included a series of community open days and feedback forms (online and flyer mail drop).

10.5.4 Engagement activities

Engagement with project partners and key stakeholders has been centred on workshops at key milestones during the development of the SSBC. Public engagement during November and December 2018 was the first time the projects shared materials publicly. A second round of public engagement is expected to happen later in 2019 in alignment with the longer term 20Connect and Airport to Botany Rapid Transit proposals.

The following describes the key engagement activities carried out for a more detailed summary refer to Southwest – Engagement Summary Report.

Stakeholder workshops

The key workshops attended by AT, AIAL, Auckland Council, Mana Whenua, the Transport Agency and key industry stakeholders include:

- Long List to Short List Option (August 2018)
- Short List to Preferred Option (December 2018).

Prior to each workshop pre-meetings were held with attendees to give stakeholders the opportunity to raise issues or ask questions ahead of the workshop. The pre-meetings allowed the project teams time to consider these comments prior to the workshop itself.

Hui

Monthly meetings (hui) have been held with Mana Whenua of the south Auckland area through the existing AT Southern Mana Whenua Table.

Southwest Gateway Integration Group

Fortnightly meetings have been held with representatives from AT, AIAL, AC, Mana Whenua and the Transport Agency since December 2017. These meetings are an opportunity to discuss and provide updates on respective projects, align project programmes and to coordinate upcoming consultation and engagement activities, where appropriate.

Socialisation Sessions

In July 2018, five informal socialisation sessions were held with the staff of the delivery organisations and key industry and community stakeholders.

The objectives were:

- to inform attendees about the programme/ projects
- to begin building relationships in the early stages of project planning
- to understand the concerns that key stakeholders and project partner staff may have, their thoughts and organisational/ historical knowledge of the area that could potentially help decision making
- to give key stakeholders and project partner staff the opportunity to engage with the project team early
- to discuss and seek to identify a range of potential solutions to the issues identified in this area.

Feedback and comments received in relation to an upgraded Puhinui Station was mixed. There was concern about traffic, parking and safety with Manukau Station being suggested as an alternative interchange. The comments were considered during the development of the options for the Puhinui Interchange options assessment. The recommended public transport network option serves Puhinui Interchange as well as Manukau Bus Station. The route to Manukau from the airport passes Puhinui Interchange, which provides the shortest travel times for airport passengers. Travel times from Manukau to the airport on a potential direct airport service would not be an improvement on the current 380 Airporter route that serves Papatoetoe. Traffic impact, parking and safety considerations were incorporated into the design of the options, as this was highlighted during AT's Customer Insights research exercise.

One-on-one meetings

Several one-on-one meetings have been held with other key stakeholders. The meetings were an opportunity for the project team to inform other stakeholders of the proposed improvements under investigation.

Emails

In November 2018, the project team issued emails to key stakeholders to inform them of the public consultation dates and invite any feedback via the online feedback form.

Property owner letters

During November 2018, AT issued a letter to 140 potentially, directly and indirectly affected property owner / occupiers surrounding Puhinui Station to notify them of the public engagement period.

Mail drop/ flyers

In November 2018, a joint Airport to Botany Rapid Transit and 20Connect flyer was issued to 17,539 properties in the Southwest Gateway Programme area to announce the projects publicly. The flyer consisted of project information, opportunities to provide written feedback.

In addition, the project teams attended four train stations in the programme area to hand out the flyers at peak travel periods.

Media

On the 20 November 2018, the Transport Agency issued a media release to publicly announce the Southwest Gateway Programme, its projects and to promote opportunities to provide feedback and engage with the project teams.

A media event was held at Puhinui Station on the 17 May 2019 with Auckland mayor Phil Goff and Transport Minister Phil Twyford to announce that AT had awarded the contract for the station upgrade.

Website

In August 2018, the Airport to Botany Rapid Transit project webpage was published. The webpage provides a high-level overview of the problems, benefits and proposed improvements.

In November 2018, the webpage was updated with community open day information and links to online feedback forms.

Social media

During the public consultation period in November and December 2018, AT shared a series on of posts on the organisation's social media platforms.

The post reached over 30,000 people and received around 230 likes and 150 comments.

On the 17 May 2019, following the media event at Puhinui Station AT shared a post on their social media platforms. The post received over 400 likes, 160 comments and 60 shares.

Online feedback forms

AT established an online feedback form for the Airport to Botany Rapid Transit project which was available for public and stakeholders to submit feedback between 20 November and 14 December 2018.

Community open days

During September the project team attended two Supporting Growth Alliance south Auckland community open days in Papakura and Manukau to provide support and answer any public enquiries. No formal feedback was taken during the events.

In November and December 2018, the project teams organised and attended nine community open days listed in table below. The open days were the first opportunity for the project team to socialise the project with the public.

The open days were held in open, inviting spaces located central to the communities in the programme area. The project team also attended a community event at the Tupu Youth Library to broaden engagement reach following feedback from the Otara-Papatoetoe Local Board. Eleven information boards were developed and displayed based on the event location.

The community were invited to read about the Southwest Gateway Programme and the project/s, project staff were available to answer queries. People were encouraged to provide feedback by writing post-it notes, discussion with project staff or by taking a flyer and providing feedback by Freepost.

Each project team member recorded the comments and feedback by writing it on a post-it notes and sticking it onto the relevant information board or in a notebook.

During the AC Local Board briefings prior to the community open days it was requested that the project team provide a variety of languages to actively engage the community. In repose to this request the project team included staff who spoke English, Tongan, Sāmoan, Māori, Chinese, Hindi and Urdu.

About 850 people were spoken with across the nine events and staff managed to record around 500 written comments. These comments have been collated and categorised into themes and summarised in the Southwest Gateway Engagement Summary Report.

10.5.5 Key Contacts and Responsibilities

The table below gives the roles and responsibilities of those involved in the project.

Table 10-3: Key contacts and responsibilities

Contact	Role and organisation
Project Manager (AT)	Renata Smit Manager Airport Access Programme
	Adrian Price Specialist Project Manager – Puhinui Interchange
	Remy Cruz Project Sponsor – Short-Term Airport Access Improvements – Early Implementation Saby Virdi Project Manager – Short-Term Airport Access Improvements – Early Implementation
Consultation & Engagement (AT)	Ben Levesque Senior Stakeholder Advisor
Consultation & Engagement (AT)	Scott Winton Consultation Manager
Communication & Engagement	Carol Greensmith Communication Lead Aurecon
Communication & Engagement	Briony Hill Communication 2IC Aurecon

10.5.6 Enquiries Management

All enquires are directed to the AT call centre and recorded in the internal customer interaction management system. The call centre will then direct enquiries [redacted]AT, for response.

All communication with partners, key stakeholders, community and potentially directly and indirectly affected property owner / occupiers that has been collected by the project teams and been documented and stored in Consultation Manager. Consultation Manager is a cloud-based management system used by the AT to record, track and respond to feedback.

10.5.7 Utility Engagement and Issues

All affected utility operators (NUOs) were contacted to discuss the proposals, effects on the existing utilities and any potential opportunities for new (future proofing). A summary of the NUO responses is below.

Table 10-4: NUO consultation register

NUO	Utility	Comment	Contact Detail
Watercare	Potable Water Supply Transmission main (Hunua No.4) Retail wastewater	Watercare provided clearance requirement for their assets.	s7(2)(a) Privacy
Vector	Electricity Gas Communications	Vector have provided clearance requirements for their assets; no future works in the area and for redundant cables shown to be exposed and checked.	
Chorus	Communications	Awaiting response	
Vodafone	Communications	Awaiting response	
Spark	Communications	Awaiting response	
NovaGas	Gas	NovaGas advised that access is required to their network. We are awaiting confirmation of clearance requirements and future works.	
FX cables/ Vocus	Communications	No future works in the area or clearances required. Protect pipes affected by works	

Auckland Council Stormwater Team has been consulted as part of the stormwater management strategy.

Further consultation with the affected NUOs will be undertaken during the preliminary design stage to understand the implications of the proposed design including identifying which assets require protection, how they will be protected and if they require diversion.

The NUOs will also be consulted to identify suitable service connection locations and to confirm the capacity of their network with regards to the additional load from the proposed Puhinui Interchange.

PART D

11 Management Case

11.1 Background

This SSBC reports the proposed implementation process for Short Term Airport Access Improvements (STAAI) projects. This moves the project from a strategic transport planning focus to one of securing statutory approvals, detailed design and completion of construction by 2020/2021. Short Term Airport Access Improvements includes the following three projects:

- Puhinui Station Interchange
- Puhinui Road and Lambie Drive Bus Priority Lanes
- Māngere - Airport Oaks Cycling Improvements

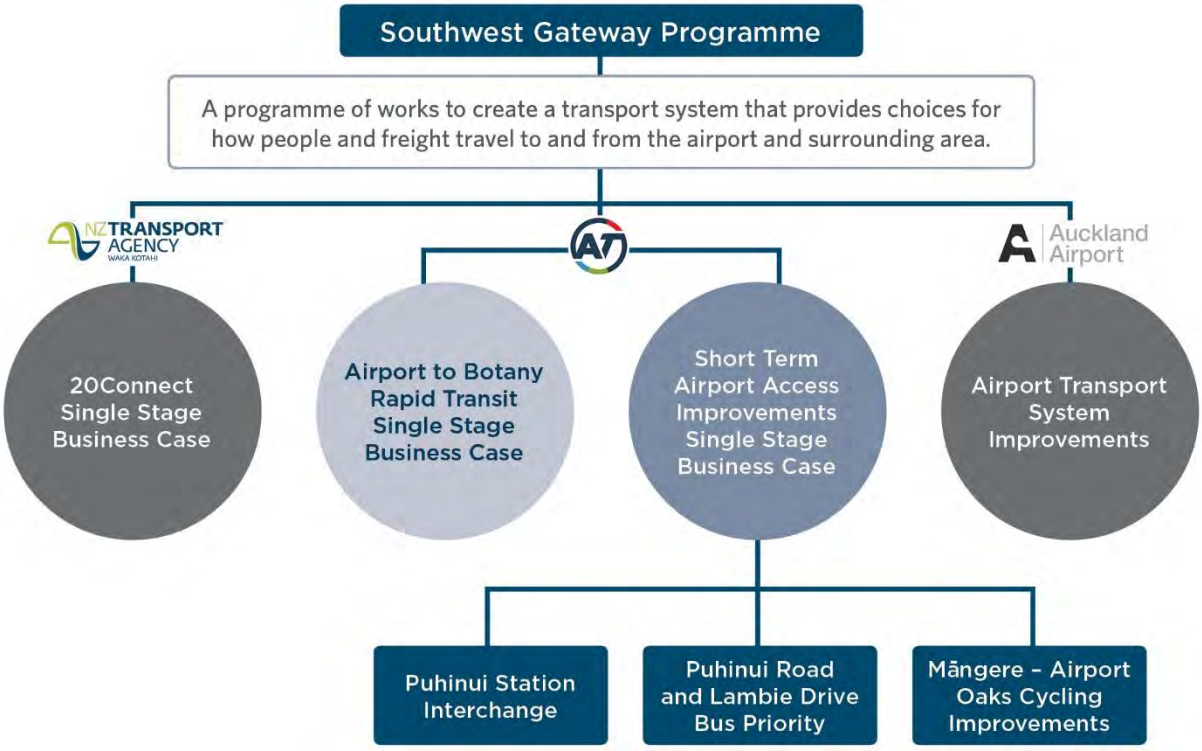


Figure 11-1: Southern Gateway Programme Alignment with STAAI Projects

The STAAI SSBC identifies an urgent need for improved access to Auckland Airport. Any available capacity on routes serving the Airport are projected to be exhausted within the next five years due to growing traffic demand.

In 2021 Auckland will be hosting the APEC 2021 Leaders' Week and the 36th America's Cup yacht race. Each event will bring substantial numbers of domestic and international visitors and associated economic benefits. There is an expectation from government, NZTA, AT, AC and AIAL that the STAAI improvements will be operational by end 2020. The problem statements identified in the SSBC and to be addressed by the STAAI and later associated projects are:

- Forecast growth in transport demand; inadequate capacity and congestion
- Declining access to employment and labour
- Unreliable travel times for the movement of people and goods
- Limited viable public transport options
- Limited active mode provision as a travel choice

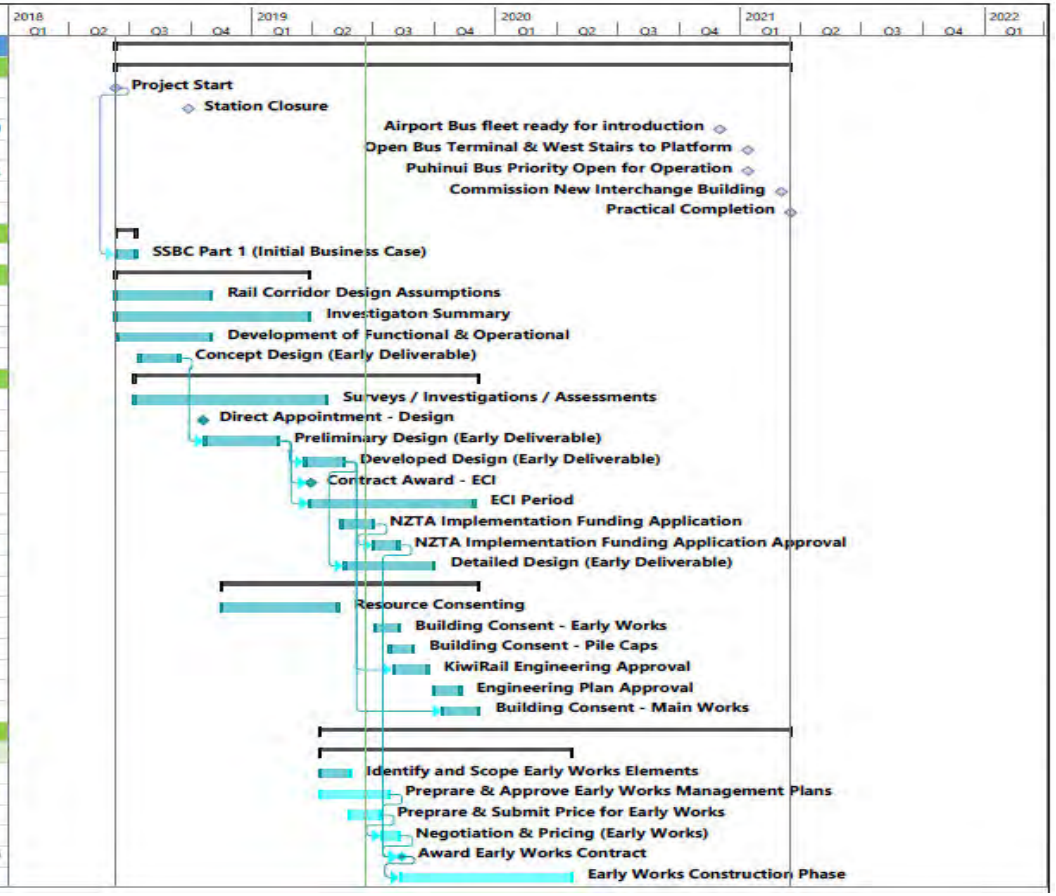
11.2 Project Plan and Schedule

11.2.1 Puhinui Interchange

The figure below shows STAAI Puhinui Interchange Project Schedule as summarised for the business case. It will be updated as required.

Proposed methodology for the construction of Puhinui interchange involves the temporarily closure of the station to help the project focus on delivering within the agreed timeframes. Additionally, this will assist with health and safety management of the station due to the proximity of the construction works and pedestrian boarding areas. Note that this will not prevent the movement of trains through the worksite.

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Puhinui Interchange Programme**	**722 days**	**Mon 11/06/18**	**Tue 16/03/21**
2		**MILESTONES**	**722 days**	**Mon 11/06/18**	**Tue 16/03/21**
3		Project Start		Mon 11/06/18	
4		Station Closure		Fri 28/09/18	
5		Airport Bus fleet ready for introduction			Mon 30/11/20
6		Open Bus Terminal & West Stairs to Platform			Mon 11/01/21
7		Puhinui Bus Priority Open for Operation			Mon 11/01/21
8		Commission New Interchange Building			Tue 2/03/21
9		Practical Completion			Tue 16/03/21
10		**START-UP AND INTIATION**	**22 days**	**Tue 12/06/18**	**Wed 11/07/18**
11		SSBC Part 1 (Initial Business Case)	22 days	Tue 12/06/18	Wed 11/07/18
12		**INVESTIGATION**	**209 days**	**Mon 11/06/18**	**Thu 28/03/19**
13		Rail Corridor Design Assumptions	103 days	Mon 11/06/18	Wed 31/10/18
14		Investigaton Summary	209 days	Mon 11/06/18	Thu 28/03/19
15		Development of Functional & Operational	99 days	Fri 15/06/18	Wed 31/10/18
16		Concept Design (Early Deliverable)	43 days	Tue 17/07/18	Thu 13/09/18
17		**DESIGN**	**370 days**	**Mon 9/07/18**	**Fri 6/12/19**
18		Surveys / Investigations / Assessments	206 days	Mon 9/07/18	Mon 22/04/19
19		Direct Appointment - Design	1 day	Fri 19/10/18	Fri 19/10/18
20		Preliminary Design (Early Deliverable)	79 days	Tue 23/10/18	Fri 8/02/19
21		Developed Design (Early Deliverable)	41 days	Fri 22/03/19	Fri 17/05/19
22		Contract Award - ECI	1 day	Fri 29/03/19	Fri 29/03/19
23		ECI Period	176 days	Fri 29/03/19	Fri 29/11/19
24		NZTA Implementation Funding Application	34 days	Wed 15/05/19	Mon 1/07/19
25		NZTA Implementation Funding Application Approval	27 days	Tue 2/07/19	Wed 7/08/19
26		Detailed Design (Early Deliverable)	96 days	Mon 20/05/19	Mon 30/09/19
27		**Consenting**	**276 days**	**Fri 16/11/18**	**Fri 6/12/19**
28		Resource Consenting	125 days	Fri 16/11/18	Thu 9/05/19
29		Building Consent - Early Works	25 days	Fri 5/07/19	Thu 8/08/19
30		Building Consent - Pile Caps	25 days	Fri 26/07/19	Thu 29/08/19
31		KiwiRail Engineering Approval	37 days	Thu 1/08/19	Fri 20/09/19
32		Engineering Plan Approval	30 days	Mon 30/09/19	Fri 8/11/19
33		Building Consent - Main Works	40 days	Mon 14/10/19	Fri 6/12/19
34		**CONSTRUCTION**	**503 days**	**Fri 12/04/19**	**Tue 16/03/21**
35		**Early Works**	**269 days**	**Fri 12/04/19**	**Wed 22/04/20**
36		Identify and Scope Early Works Elements	32 days	Fri 12/04/19	Mon 27/05/19
37		Preprare & Approve Early Works Management Plans	74 days	Fri 12/04/19	Wed 24/07/19
38		Preprare & Submit Price for Early Works	35 days	Mon 27/05/19	Fri 12/07/19
39		Negotiation & Pricing (Early Works)	20 days	Mon 15/07/19	Fri 9/08/19
40		Award Early Works Contract	1 day	Mon 12/08/19	Mon 12/08/19
41		Early Works Construction Phase	183 days	Mon 12/08/19	Wed 22/04/20



ID	Task Mode	Task Name	Duration	Start	Finish
42		**Main Works**	**429 days**	**Thu 25/07/19**	**Tue 16/03/21**
43		Preprare & Approve Main Works Management Plans	288 days	Thu 25/07/19	Mon 31/08/20
44		Preprare & Submit Price for Main Works	25 days	Mon 14/10/19	Fri 15/11/19
45		Negotiation & Pricing (Main Works)	20 days	Mon 18/11/19	Fri 13/12/19
46		Award Main Works Contract		Mon 16/12/19	
47		Main Works Construction Phase	326 days	Tue 17/12/19	Tue 16/03/21
48		Bus Operation Commence		Mon 11/01/21	
49		Physical Works Completion			Tue 16/03/21
50		**Block of Lines (More B.O.L. to be added)**	**449 days**	**Fri 19/04/19**	**Wed 6/01/21**
51		Station Electrical / ICT relocation - Easter BOL	2 days	Fri 19/04/19	Mon 22/04/19
52		BOL - June 2019	2 days	Sat 1/06/19	Mon 3/06/19
53		BOL - August 2019	2 days	Sat 3/08/19	Sun 4/08/19
54		BOL - September 2019	2 days	Sat 28/09/19	Sun 29/09/19
55		BOL - October 2019	1 day	Sun 6/10/19	Sun 6/10/19
56		BOL - October 2019	2 days	Sat 26/10/19	Mon 28/10/19
57		BOL - December 2019	7 days	Fri 27/12/19	Mon 6/01/20
58		BOL - January 2020	2 days	Sat 25/01/20	Mon 27/01/20
59		BOL - April 2020	2 days	Fri 10/04/20	Mon 13/04/20
60		BOL - December 2020	9 days	Sun 27/12/20	Wed 6/01/21
61					
62					

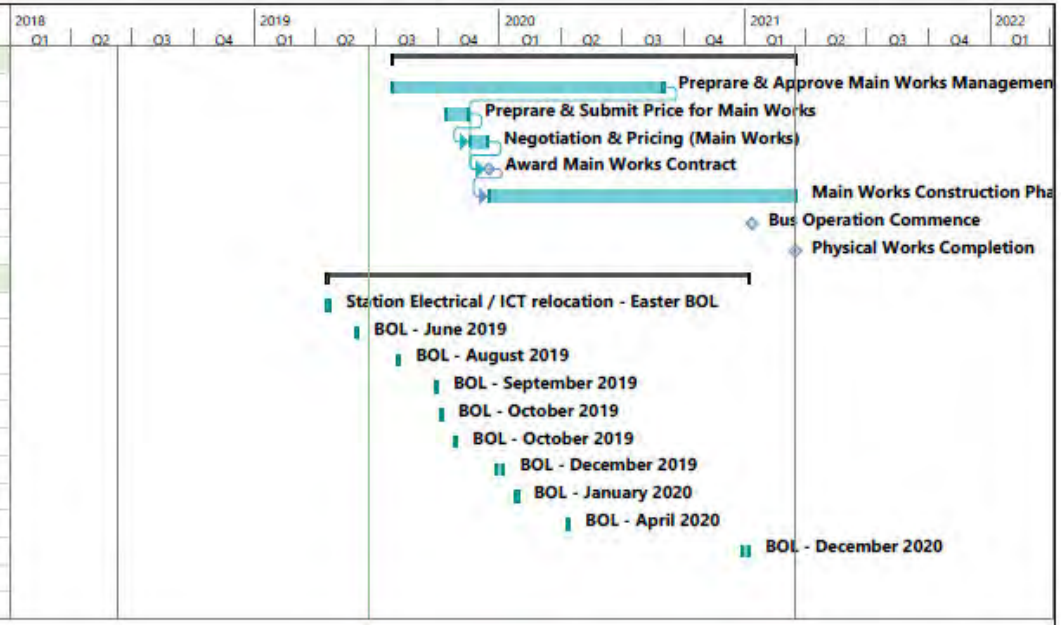
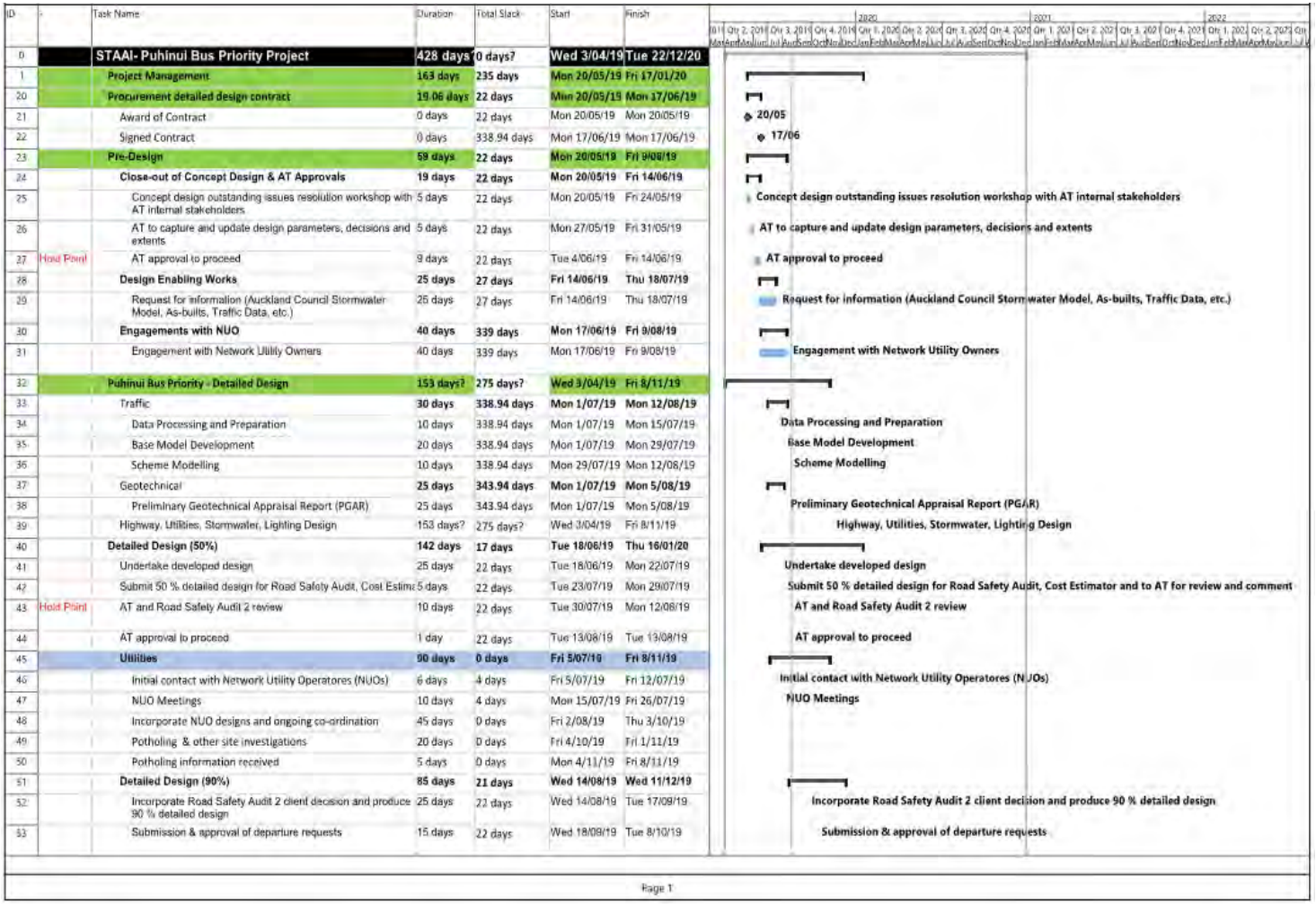


Figure 11-2: STAAI Puhinui Interchange Programme

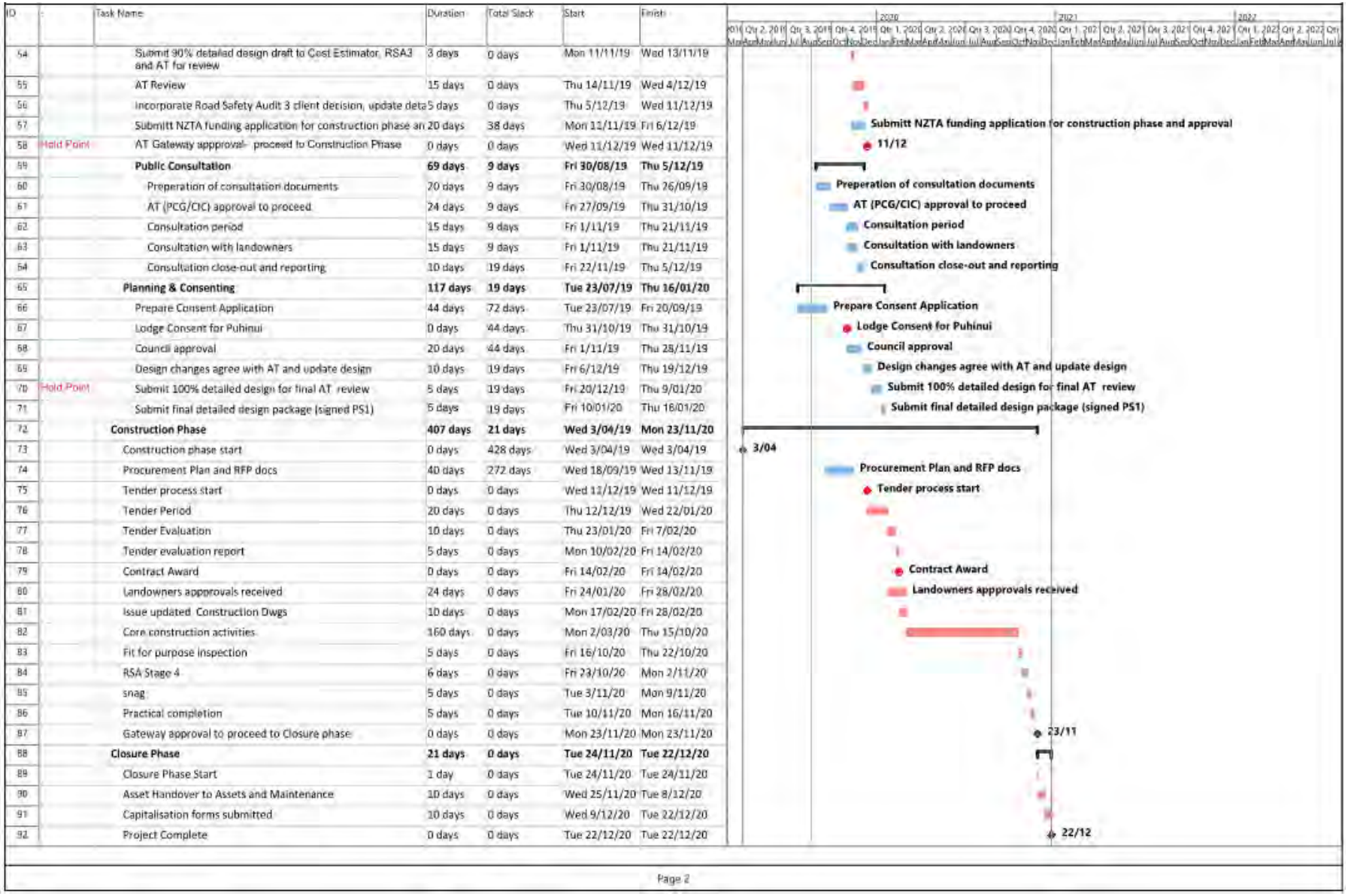
11.2.2 Puhinui Bus Priority Lanes

The figure below shows the Project Schedule for STAAI Puhinui Bus Priority Lanes project as developed for the business case. It will be updated regularly during the next project phases.



ID		Task Name	Duration	Total Slack	Start	Finish
0		STAAI- Puhinui Bus Priority Project	428 days?	0 days?	Wed 3/04/19	Tue 22/12/20
1		Project Management	163 days	235 days	Mon 20/05/19	Fri 17/01/20
20		Procurement detailed design contract	19.06 days	22 days	Mon 20/05/19	Mon 17/06/19
21		Award of Contract	0 days	22 days	Mon 20/05/19	Mon 20/05/19
22		Signed Contract	0 days	338.94 days	Mon 17/06/19	Mon 17/06/19
23		Pre-Design	59 days	22 days	Mon 20/05/19	Fri 9/08/19
24		Close-out of Concept Design & AT Approvals	19 days	22 days	Mon 20/05/19	Fri 14/06/19
25		Concept design outstanding issues resolution workshop with AT internal stakeholders	5 days	22 days	Mon 20/05/19	Fri 24/05/19
26		AT to capture and update design parameters, decisions and extents	5 days	22 days	Mon 27/05/19	Fri 31/05/19
27	Hold Point	AT approval to proceed	9 days	22 days	Tue 4/06/19	Fri 14/06/19
28		Design Enabling Works	25 days	27 days	Fri 14/06/19	Thu 18/07/19
29		Request for information (Auckland Council Stormwater Model, As-builts, Traffic Data, etc.)	25 days	27 days	Fri 14/06/19	Thu 18/07/19
30		Engagements with NUO	40 days	339 days	Mon 17/06/19	Fri 9/08/19
31		Engagement with Network Utility Owners	40 days	339 days	Mon 17/06/19	Fri 9/08/19
32		Puhinui Bus Priority - Detailed Design	153 days?	275 days?	Wed 3/04/19	Fri 8/11/19
33		Traffic	30 days	338.94 days	Mon 1/07/19	Mon 12/08/19
34		Data Processing and Preparation	10 days	338.94 days	Mon 1/07/19	Mon 15/07/19
35		Base Model Development	20 days	338.94 days	Mon 1/07/19	Mon 29/07/19
36		Scheme Modelling	10 days	338.94 days	Mon 29/07/19	Mon 12/08/19
37		Geotechnical	25 days	343.94 days	Mon 1/07/19	Mon 5/08/19
38		Preliminary Geotechnical Appraisal Report (PGAR)	25 days	343.94 days	Mon 1/07/19	Mon 5/08/19
39		Highway, Utilities, Stormwater, Lighting Design	153 days?	275 days?	Wed 3/04/19	Fri 8/11/19
40		Detailed Design (50%)	142 days	17 days	Tue 18/06/19	Thu 16/01/20
41		Undertake developed design	25 days	22 days	Tue 18/06/19	Mon 22/07/19
42		Submit 50 % detailed design for Road Safety Audit, Cost Estim	5 days	22 days	Tue 23/07/19	Mon 29/07/19
43	Hold Point	AT and Road Safety Audit 2 review	10 days	22 days	Tue 30/07/19	Mon 12/08/19
44		AT approval to proceed	1 day	22 days	Tue 13/08/19	Tue 13/08/19
45		Utilities	90 days	0 days	Fri 5/07/19	Fri 8/11/19
46		Initial contact with Network Utility Operatores (NUOs)	6 days	4 days	Fri 5/07/19	Fri 12/07/19
47		NUO Meetings	10 days	4 days	Mon 15/07/19	Fri 26/07/19
48		Incorporate NUO designs and ongoing co-ordination	45 days	0 days	Fri 2/08/19	Thu 3/10/19
49		Potholing & other site investigations	20 days	0 days	Fri 4/10/19	Fri 1/11/19
50		Potholing information received	5 days	0 days	Mon 4/11/19	Fri 8/11/19
51		Detailed Design (90%)	85 days	21 days	Wed 14/08/19	Wed 11/12/19
52		Incorporate Road Safety Audit 2 client decision and produce 90 % detailed design	25 days	22 days	Wed 14/08/19	Tue 17/09/19
53		Submission & approval of departure requests	15 days	22 days	Wed 18/09/19	Tue 8/10/19

Figure 11-3: STAAI Puhinui Bus Priority Lanes and Māngere Cycling Improvements Project Schedule 1 of 2



ID		Task Name	Duration	Total Slack	Start	Finish
54		Submit 90% detailed design draft to Cost Estimator, RSA3 and AT for review	3 days	0 days	Mon 11/11/19	Wed 13/11/19
55		AT Review	15 days	0 days	Thu 14/11/19	Wed 4/12/19
56		Incorporate Road Safety Audit 3 client decision, update deta	5 days	0 days	Thu 5/12/19	Wed 11/12/19
57		Submitt NZTA funding application for construction phase an	20 days	38 days	Mon 11/11/19	Fri 6/12/19
58	Hold Point	AT Gateway approval- proceed to Construction Phase	0 days	0 days	Wed 11/12/19	Wed 11/12/19
59		**Public Consultation**	**69 days**	**9 days**	**Fri 30/08/19**	**Thu 5/12/19**
60		Preperation of consultation documents	20 days	9 days	Fri 30/08/19	Thu 26/09/19
61		AT (PCG/CIC) approval to proceed	24 days	9 days	Fri 27/09/19	Thu 31/10/19
62		Consultation period	15 days	9 days	Fri 1/11/19	Thu 21/11/19
63		Consultation with landowners	15 days	9 days	Fri 1/11/19	Thu 21/11/19
64		Consultation close-out and reporting	10 days	19 days	Fri 22/11/19	Thu 5/12/19
65		**Planning & Consenting**	**117 days**	**19 days**	**Tue 23/07/19**	**Thu 16/01/20**
66		Prepare Consent Application	44 days	72 days	Tue 23/07/19	Fri 20/09/19
67		Lodge Consent for Puhinui	0 days	44 days	Thu 31/10/19	Thu 31/10/19
68		Council approval	20 days	44 days	Fri 1/11/19	Thu 28/11/19
69		Design changes agree with AT and update design	10 days	19 days	Fri 6/12/19	Thu 19/12/19
70	Hold Point	Submit 100% detailed design for final AT review	5 days	19 days	Fri 20/12/19	Thu 9/01/20
71		Submit final detailed design package (signed PS1)	5 days	19 days	Fri 10/01/20	Thu 16/01/20
72		**Construction Phase**	**407 days**	**21 days**	**Wed 3/04/19**	**Mon 23/11/20**
73		Construction phase start	0 days	428 days	Wed 3/04/19	Wed 3/04/19
74		Procurement Plan and RFP docs	40 days	272 days	Wed 18/09/19	Wed 13/11/19
75		Tender process start	0 days	0 days	Wed 11/12/19	Wed 11/12/19
76		Tender Period	20 days	0 days	Thu 12/12/19	Wed 22/01/20
77		Tender Evaluation	10 days	0 days	Thu 23/01/20	Fri 7/02/20
78		Tender evaluation report	5 days	0 days	Mon 10/02/20	Fri 14/02/20
79		Contract Award	0 days	0 days	Fri 14/02/20	Fri 14/02/20
80		Landowners appprovals received	24 days	0 days	Fri 24/01/20	Fri 28/02/20
81		Issue updated Construction Dwgs	10 days	0 days	Mon 17/02/20	Fri 28/02/20
82		Core construction activities	160 days	0 days	Mon 2/03/20	Thu 15/10/20
83		Fit for purpose inspection	5 days	0 days	Fri 16/10/20	Thu 22/10/20
84		RSA Stage 4	6 days	0 days	Fri 23/10/20	Mon 2/11/20
85		snag	5 days	0 days	Tue 3/11/20	Mon 9/11/20
86		Practical completion	5 days	0 days	Tue 10/11/20	Mon 16/11/20
87		Gateway approval to proceed to Closure phase	0 days	0 days	Mon 23/11/20	Mon 23/11/20
88		**Closure Phase**	**21 days**	**0 days**	**Tue 24/11/20**	**Tue 22/12/20**
89		Closure Phase Start	1 day	0 days	Tue 24/11/20	Tue 24/11/20
90		Asset Handover to Assets and Maintenance	10 days	0 days	Wed 25/11/20	Tue 8/12/20
91		Capitalisation forms submitted	10 days	0 days	Wed 9/12/20	Tue 22/12/20
92		Project Complete	0 days	0 days	Tue 22/12/20	Tue 22/12/20

Figure 11-4: STAAI Puhinui Bus Priority Lanes Project Schedule- 2 of 2

The principal interface between the Puhinui Interchange and Bus Priority is the coordination of physical works in the vicinity of Puhinui Station and Puhinui Road, which will be mitigated by apportioning the physical works scope appropriately, particularly the decision as to which project delivers the Kenderdine / Puhinui Road intersection upgrade.

The principal interdependency between STAAI projects is the completion dates. In order to realise the benefits of the new bus service and route, AT Puhinui Interchange and bus priority, the NZTA 20Connect and Auckland International Airport Limited's improvements need to be completed, or substantially completed to allow anticipated journey times and performance to be achieved. All projects are targeting an early 2021 operational readiness date with contingency plans in place to achieve this should all works not be completed by this milestone.

11.2.3 Māngere Cycling Improvements

The figure below shows the Project Schedule for STAAI Māngere Cycling Improvements project as developed for the business case. It will be updated regularly during the next project phases. The project design will start after AT approval of the project budget. The project construction is estimated to be complete by mid-2021.

ID		Task Name	Duration	Start	Finish
0		**STAAI- Mangere Cycling Improvements Project**	**496 days**	**Thu 8/08/19**	**Mon 16/08/21**
1		**Funding Approval- Mangere Cycling**	**85 days**	**Thu 8/08/19**	**Thu 5/12/19**
2		Submit report to AT Capital Programme Control Group	0 days	Thu 8/08/19	Thu 8/08/19
3	Hold Point	Capital Programme Control Group endorsement	28 days	Thu 8/08/19	Mon 16/09/19
4		**Public Consultation**	**69 days**	**Fri 30/08/19**	**Thu 5/12/19**
5		Preparation of consultation documents	20 days	Fri 30/08/19	Thu 26/09/19
6		AT (PCG/CIC) approval to proceed	24 days	Fri 27/09/19	Thu 31/10/19
7		Consultation period	15 days	Fri 1/11/19	Thu 21/11/19
8		Consultation with landowners	15 days	Fri 1/11/19	Thu 21/11/19
9		Consultation close-out and reporting	10 days	Fri 22/11/19	Thu 5/12/19
10		**Detailed Design**	**176 days**	**Fri 6/12/19**	**Mon 31/08/20**
11	Hold Point	AT approval to proceed	20 days	Fri 6/12/19	Thu 16/01/20
12		Procurement of detailed design contract	15 days	Fri 6/12/19	Thu 9/01/20
13		**Technical investigations**	**56 days**	**Fri 10/01/20**	**Tue 31/03/20**
14		Geotechnical Appraisal and Interpretative Reports	30 days	Fri 10/01/20	Mon 24/02/20
15		Highway, Utilities, Stormwater, Lighting Design	20 days	Fri 10/01/20	Mon 10/02/20
16		**Utilities**	**56 days**	**Fri 10/01/20**	**Tue 31/03/20**
17		Initial contact with Network Utility Operators (NUOs)	6 days	Fri 10/01/20	Fri 17/01/20
18		NUO Meetings	10 days	Mon 20/01/20	Mon 3/02/20
19		Incorporate NUO designs and ongoing co-ordination	15 days	Tue 4/02/20	Tue 25/02/20
20		Potholing & other site investigations	20 days	Wed 26/02/20	Tue 24/03/20
21		Potholing information received	5 days	Wed 25/03/20	Tue 31/03/20
22		**Detailed Design (50%)**	**103 days**	**Wed 1/04/20**	**Thu 27/08/20**
23		Submit 50 % detailed design for Road Safety Audit, Cost Esti	20 days	Wed 1/04/20	Fri 1/05/20
24	Hold Point	AT and Road Safety Audit 2 review	15 days	Mon 4/05/20	Fri 22/05/20
25		AT approval to proceed	10 days	Mon 25/05/20	Mon 8/06/20
26		Incorporate Road Safety Audit 2 client decision and produce 90 % detailed design	20 days	Tue 9/06/20	Mon 6/07/20
27		Submission & approval of departure requests	10 days	Tue 7/07/20	Mon 20/07/20
28		Submit 90% detailed design draft to Cost Estimator, RSA3 and AT for review	3 days	Tue 21/07/20	Thu 23/07/20
29		AT Review	15 days	Fri 24/07/20	Thu 13/08/20

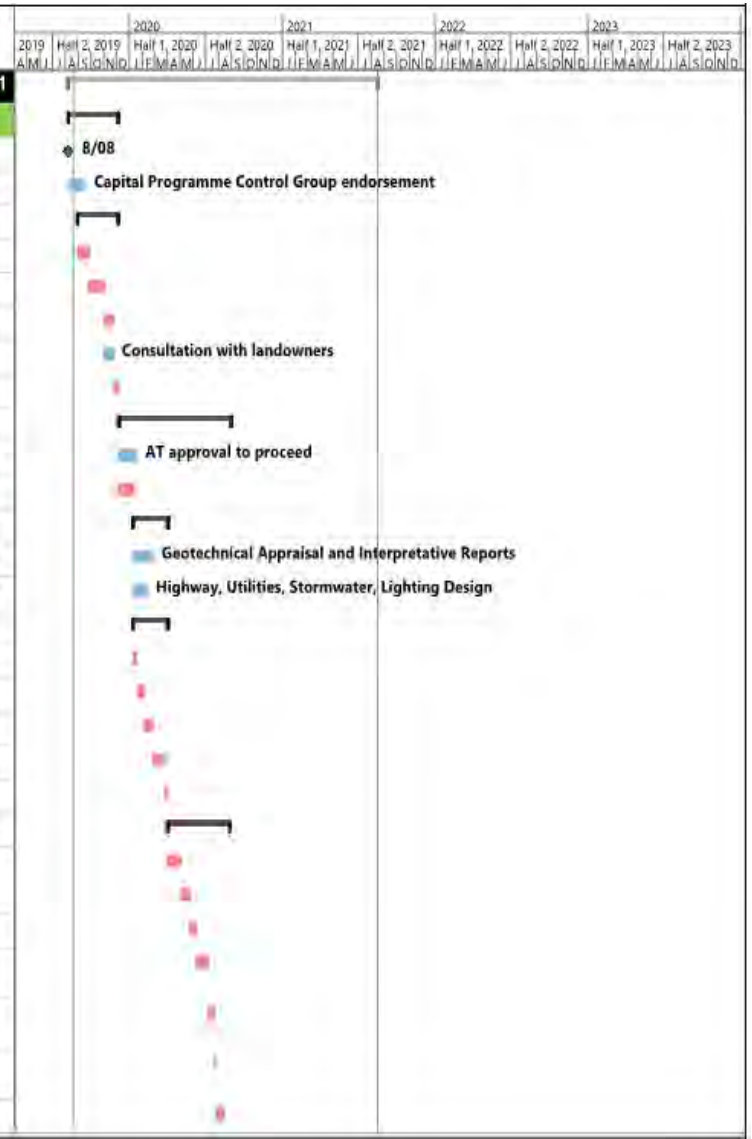


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Figure 11-5: STAAI Māngere Cycling Improvements Project Schedule- 1 of 2

ID		Task Name	Duration	Start	Finish
30		Incorporate Road Safety Audit 3 client decision, update deta	5 days	Fri 14/08/20	Thu 20/08/20
31		Submit NZTA funding application for construction phase and	5 days	Fri 14/08/20	Thu 20/08/20
32	Hold Point	Submit 100% detailed design to AT	0 days	Thu 20/08/20	Thu 20/08/20
33		Submit final detailed design package (signed PS1)	5 days	Fri 21/08/20	Thu 27/08/20
34		**Planning & Consenting**	**40 days**	**Tue 7/07/20**	**Mon 31/08/20**
35		Prepare Consent Application	20 days	Tue 7/07/20	Mon 3/08/20
36		Lodge Consent	0 days	Mon 3/08/20	Mon 3/08/20
37		Council approval	20 days	Tue 4/08/20	Mon 31/08/20
38		**Construction Phase**	**254 days**	**Tue 7/07/20**	**Fri 16/07/21**
39	Hold Point	AT Gateway approval- proceed to Construction Phase	5 days	Fri 28/08/20	Thu 3/09/20
40		Construction phase start	0 days	Thu 3/09/20	Thu 3/09/20
41		Procurement Plan and RFP docs	40 days	Tue 7/07/20	Mon 31/08/20
42		Tender process start	0 days	Thu 3/09/20	Thu 3/09/20
43		Tender Period	20 days	Fri 4/09/20	Thu 1/10/20
44		Tender Evaluation	10 days	Fri 2/10/20	Thu 15/10/20
45		Tender evaluation report	5 days	Fri 16/10/20	Thu 22/10/20
46		Contract Award	0 days	Thu 22/10/20	Thu 22/10/20
47		Landowners approvals received	10 days	Fri 23/10/20	Fri 6/11/20
48		Issue updated Construction Dwgs	10 days	Fri 23/10/20	Fri 6/11/20
49		Core construction activities	140 days	Mon 9/11/20	Thu 10/06/21
50		Fit for purpose inspection	5 days	Fri 11/06/21	Thu 17/06/21
51		RSA Stage 4	6 days	Fri 18/06/21	Fri 25/06/21
52		snag	5 days	Mon 28/06/21	Fri 2/07/21
53		Practical completion	5 days	Mon 5/07/21	Fri 9/07/21
54		Gateway approval to proceed to Closure phase	0 days	Fri 16/07/21	Fri 16/07/21
55		**Closure Phase**	**21 days**	**Mon 19/07/21**	**Mon 16/08/21**
56		Closure Phase Start	1 day	Mon 19/07/21	Mon 19/07/21
57		Asset Handover to Assets and Maintenance	10 days	Tue 20/07/21	Mon 2/08/21
58		Capitalisation forms submitted	10 days	Tue 3/08/21	Mon 16/08/21
59		Project Complete	0 days	Mon 16/08/21	Mon 16/08/21

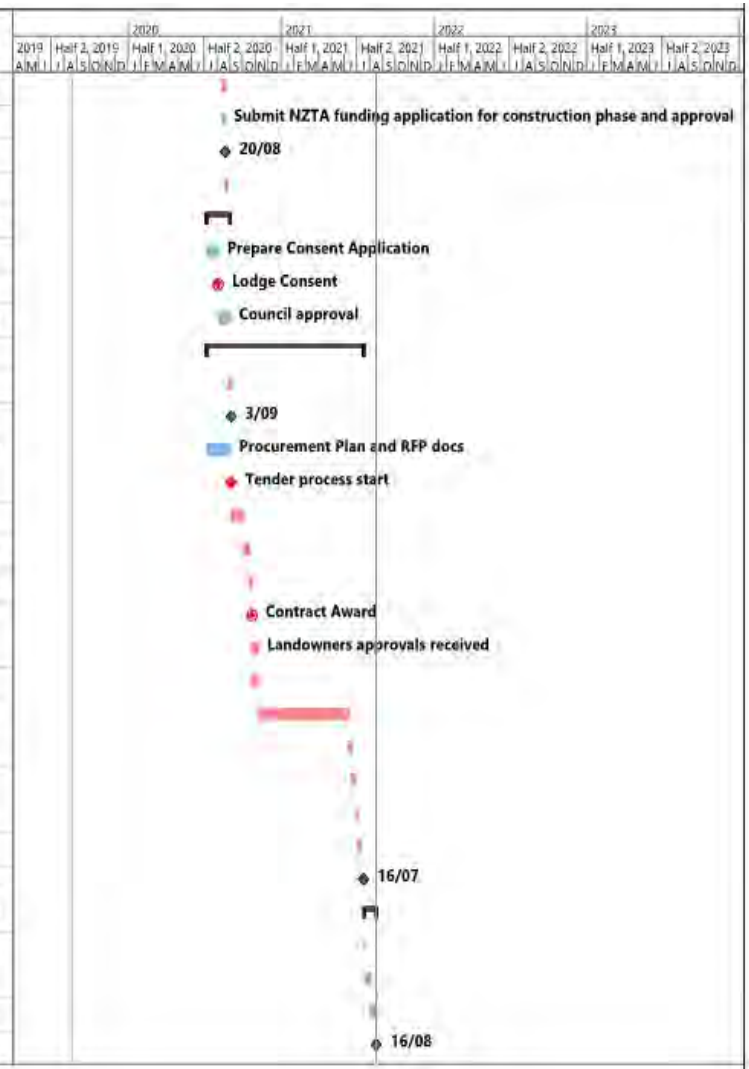

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Figure 11-6: STAAI Māngere Cycling Improvements Project Schedule- 2 of 2

In the event the Māngere – Airport Oaks Cycling Improvements project works are deferred, there is no impact to the construction works for Puhinui Interchange and the Bus Priority projects. The pre-implementation phase of Māngere schemes is currently on hold until funding is confirmed.

In lieu of this programme funding shortfall, the recommended STAAI SSBC programme has been assessed and recommended elements prioritised as follows:

- **Highest Priority**: Puhinui Station Interchange s7(2)(b)(ii) Prejudice to commercial position
- **Second Priority:**
  - New Airport–Puhinui–Manukau Bus Service (p.a. OPEX – operational budget already allocated); and
  - Puhinui Rd Priority Lanes and
- **rity:** Behaviour Change Strategy and Supporting Infrastructure, e.g. ticketing, wayfinding s7(2)(b)(ii) Prejudice to commercial position
- **Fourth Priority:** Interventions proposed on the Norther Corridor:
  - Māngere Cycle Improvements and
  - New Airport-New Lynn Express Bus Service (p.a. OPEX – operation budget already allocated).

The principal interface between the Puhinui Interchange and Bus Priority and cycleway improvements is the coordination of physical works in the vicinity of Puhinui Station and Puhinui Road, which will be mitigated by apportioning the physical works scope appropriately, particularly the decision as to which project delivers the Kenderdine / Puhinui Road intersection upgrade.

The principal interdependency between STAAI projects is the completion dates. In order to realise the benefits of the new bus service and route, Puhinui Interchange, the AT bus priority and cycleway improvements, the NZTA 20Connect and Auckland International Airport Limited's improvements need to be completed, or substantially completed to allow anticipated journey times and performance to be achieved. All projects are targeting an early 2021 operational readiness date with contingency plans in place to achieve this should all works not be completed by this milestone.

11.3 Project Roles and Governance

The STAAI project roles are shown below, with the top line being the governance group

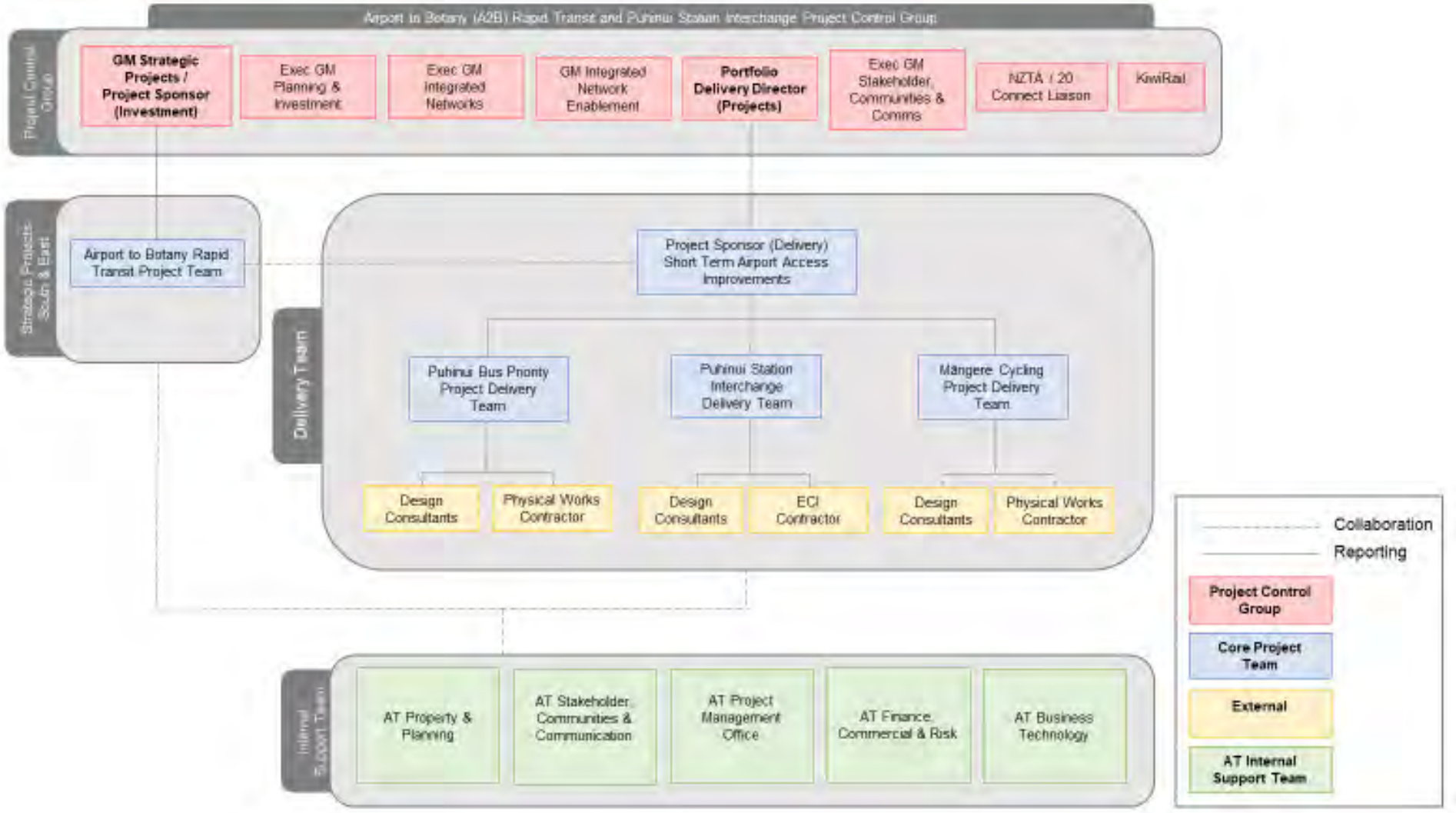

Figure 11-7: Short Term Airport Access Improvements Governance

The governance structure for the Puhinui Interchange and Bus Priority projects do not require Auckland International Airport Limited (AIAL) involvement for delivery. This is to be considered on a wider programme and strategic context for the Auckland to Botany (A2B) Rapid Transit Network (RTN) project

11.3.1 Project Delivery Team

The STAAI project delivery team is shown in the table below:

Table 11-1: STAAI Delivery team (as at 05 June 2019)

Role	Name
Project Sponsor	s7(2)(a) Privacy
Puhinui Interchange Project Manager	
Puhinui Interchange Principal Rep Project Manager	
Puhinui Bus Priority Lanes and Māngere Cycling Improvement Principal Rep Project Manager	
Puhinui Bus Priority Lanes and Māngere Cycling Improvement- Construction Manager	
Puhinui Interchange Design Manager (Aurecon)	
Puhinui Interchange Design Project Manager (Aurecon)	
Puhinui Interchange ECI Contractor Representative (McConnell Dowell)	
Puhinui Interchange ECI Contractor Design Manager (McConnell Dowell)	
Puhinui Interchange ECI Cost Consultant (Alta)	
Puhinui Bus Priority Design Manager (Aurecon)	
Investment and Planning	
Planning Specialist	
Property Specialist	
Business Technology	
Design Office	
Customer Central	
Customer Service	
Market and Engagement	

Role	Name
Wayfinding	s7(2)(a) Privacy
Retail Strategy	
Mana Whenua Engagement	
Communications	
Procurement	
Commercial Advisor	
Legal	
Project Management Office	
Finance	
Public Transport	
Facilities	
ATOC	
Road Operations	
Road Safety	

Project roles and responsibilities are given below.

Table 11-2: Roles and responsibilities

Role	Responsibility
Project Manager	In accordance with Section 3.3.1 of the PMF15
Project Sponsors	In accordance with Section 3.3.2 of the PMF15, with the following exceptions Endorses the Project Plan Endorses the project Business Case Endorses gateway approval Request Review Project Highlight Report

Role	Responsibility
STAAI Project Control Group	A single Project Control Groups (PCG) has been established for STAAI Puhinui Interchange, Puhinui Bus Priority Lanes and Māngere Cycling Improvements Projects. The STAAI PCG is the decision-making body that will ensure the right activities are taking place, undertaken correctly and are in alignment with strategic goals. The PCG provides the forum for senior management to better understand the scope, benefits and financial and contractual status of infrastructure projects, enabling informed decisions to be made and ensuring a high level of communication with stakeholders. NZTA are represented on the STAAI PCG. An invitation has been extended to KiwiRail to be a part of this PCG. The STAAI PCG will discuss any key issues or potential delivery risks that may have adverse implications for AT in terms of time and cost; or being of a high public profile / politically sensitive nature whilst ensuring a zero-harm focus on project delivery is maintained. Any approvals or endorsements required that are outside of the PCG's delegated financial authority will be referred to the AT Chief Executive or AT Board. The PCG members are not involved in the day to day management of the project but rather set the broad direction to be implemented by the project team responsible for the delivery and administration of the project.

11.4 Resources

The STAAI Puhinui Interchange project is utilising an Early Contractor Involvement (ECI) delivery model to help achieve the expected facility opening date by end 2020 / early 2021. An ECI contract was awarded to McConnell Dowell in March 2019. McConnell Dowell will work collaboratively with the Aurecon / Jasmax design team until the completion of Detailed Design to identify design efficiencies, develop methodologies and temporary works that can expedite construction and minimise disruption to passengers and freight.

The project team have also engaged Alta Consulting Ltd to provide ECI contractual advice, cost consultancy and quantity surveying services to add value to project outcomes for ECI contracts. Alta will provide ECI advisory services and produce parallel estimates which will be reconciled with independent estimates provided by McConnell Dowell at key design stages.

The STAAI Puhinui Interchange project leads are:

- s7(2)(a) Privacy roject Sponsor STAAI Projects, Auckland Transport
- – Project Manager, Auckland Transport
- echnical Director, Aurecon
- – Design Manager, Aurecon
- – Principal, Jasmax
- – Operational Manager (North Island), McConnell Dowell
- – Partner, Alta

A traditional procurement delivery model is adopted for the Puhinui Bus Priority Lanes and Māngere Cycling Improvements i.e. detailed design phase procured initially, followed by separate procurement of construction phase.

In addition to STAAI team above the Puhinui Bus Priority Lanes and Māngere Cycling Improvements project leads are:

- Project Sponsor STAAI Projects, Auckland Transport
- - Project Manager, Auckland Transport
- - Construction Manager, Auckland Transport
- – Design Manager, Aurecon

11.5 Milestones

The milestones in relation to STAAI Puhinui Interchange, Puhinui Bus Priority Lanes and Māngere Cycling Improvements are shown below. Italicised text milestones have been completed.

Table 11-3: Project Milestones

Date	Activity – Puhinui Interchange
September 2018	▪ *Completion of concept design* ▪ *Procurement Strategy and Plan approval*
October 2018	▪ *Commencement of preliminary design* ▪ *Formal pre-tender ECI interactive*
December 2018	▪ *Issue ECI RFT* ▪ *Submit Resource Consent application*
January 2019	▪ *Identification of early works opportunities*
February 2019	▪ *Completion of preliminary design* ▪ *RFT close and evaluation begins*
March 2019	▪ *Award of ECI contract* ▪ *Commencement of developed design*
April 2019	▪ *Easter BOL AT enabling works*
May 2019	▪ *Completion of developed design* ▪ *Completion of Early Works detailed design* ▪ *Resource Consent approval*
June 2019	▪ *Queens Birthday BOL AT enabling works* ▪ *Competitive tendering of Early Works key sub-trades and parallel estimation process* ▪ *Lodge Early Works Building Consent application*
July 2019	▪ Final reconciliation between contractor price and parallel Early Works price estimates ▪ Receive Early Works Building Consent ▪ SSBC NZTA implementation funding application
August 2019	▪ Completion of detailed design (90%) ▪ Award Early Works contract ▪ Mobilise and establish site ▪ 3-4 August BOL ▪ Ordering of day one long-lead items by Contractor
September 2019	▪ AT and key stakeholders comment on detailed design ▪ Completion of detailed design (100%) ▪ KiwiRail Engineering Approval ▪ Piling to west and east of rail corridor ▪ Demolition of existing station access 28-29 September BOL ▪ Puhinui Station temporarily closed for construction works – 28th September 2019 ▪ NZTA Implementation funding approval

Date	Activity – Puhinui Interchange
October 2019	■ Piling within rail corridor ■ October 2018 Labour Weekend BOL
December 2019	■ Award Main Works Contract ■ Christmas BOL
January 2020	■ Piles and pile caps completed ■ Auckland Anniversary BOL
April 2020	■ Easter BOL
June 2020	■ Queen's Birthday BOL
October 2020	■ Labour Weekend BOL
December 2020	■ Christmas BOL
January 2021	■ Target date for opening of facility ■ Puhinui Station re-opened for train and bus operations
March 2021	■ Practical Completion of all construction works
Activity- Puhinui Bus Priority Lanes	
June 2019	■ Start Detailed Design
September 2018	■ Submit Resource Consent application
October 2019	■ Detailed Design bus priority lanes
January 2020	■ Detailed Design cycling improvements
January 2020	■ Issue construction tender
March 2020	■ Award of construction contract
December 2020	■ Construction complete, issue Practical Completion
January 2021	■ Project completion
Activity- Māngere Cycling Improvements	
December 2019	■ *Start Detailed Design*
August 2020	■ Detailed Design complete
September 2020	■ Issue construction tender
October 2020	■ Award of construction contract
July 2021	■ Construction complete, issue Practical Completion
August 2021	■ Project completion

11.6 Project Assumptions, Constraints and Dependencies

11.6.1 Assumptions

The core STAAI project assumptions are:

- Zero harm during design and construction

- Completion ahead of America's Cup yachting event (March 2021) and the Asia-Pacific Economic Cooperation (APEC) Economic Leaders' Meeting (from June 2021) events
- Quality outcomes consistent with an airport-style customer experience, including incorporating Crime Prevention Through Environmental Design (CPTED) and Safety in Design (SID) principles
- Outcomes aligned with the wider A2B and Southwest Gateway project objectives
- Efficient whole-of-life maintenance and renewal costs consistent with other facilities across the AT public transport and road corridor network
- Addressing and minimising effects on adjacent property owners and occupiers, road corridor and public transport patrons, as well as rail passenger and freight services and local traffic operations
- Avoid, remedy or mitigate actual and potential effects on the environment where necessary during construction
- Consideration of integration of future planned infrastructure, including an overbridge for bus and light rail to interface with the new facility, platform extension for nine car train services and space provision for third and fourth main lines and a track turnback, including spacing for future platforms to service these
- Delivery within the approved project budget.
- Integration with Te Aranga urban design principles and incorporating outcomes sought by AT's Mana Whenua partners
- Positive sustainability and social outcomes that align with the AT Sustainability Framework requirements.

11.6.2 Constraints

- The project is to be operational in early 2021 ahead of the America's Cup and APEC events later that year
- The Puhinui Interchange design must allow for future improvements such as the addition of a Rapid Transit Network overbridge, extension of the rail platform and addition of third and fourth mains and platforms, as well as a track turnback
- In respect of Puhinui Interchange, KiwiRail health and safety and other approvals restricting access to the rail corridor.
- Maintaining an operational rail corridor during construction phase.
- Maintaining an operational road corridor during construction phase
- Resource and building consent approvals and inspections for CPU.

11.6.3 Dependencies

Table 11-4: Project Dependencies

Dependency For / On	Potential Impact
Decisions within the wider A2B, Auckland Airport and 20Connect projects	Revision of the wider business case and change to strategic objectives
Alignment with other aspects of the Short-Term Airport Access Improvements Programme	Delay to when STAAI project benefits can be realised as supporting infrastructure projects not in place on time
Land purchase	KiwiRail purchase of LINZ land adjacent to rail corridor does not proceed, constraining Puhinui Interchange construction. Additional costs are not included in contingency. Access agreement with LINZ will prevent delay for construction if KiwiRail has not purchased.

Dependency For / On	Potential Impact
Building consent or EPA approval delayed	Consent delays impact construction programme
Resource consent approval delayed	Consent delays impact Bus Priority construction programme (resource consent received for Puhinui Interchange)
Removal of car parks	Consultation and response delays bus priority construction
Removal of trees	Consultation and response delays bus priority construction

- There is expectation both Puhinui Interchange and Supporting Short-Term Improvements projects are operational by early 2021
- There is construction overlap between both Puhinui Interchange and Puhinui Bus Priority
- Supporting Short-Term Improvements and Puhinui Interchange deliverables align and are co-presented at e.g. Mana Whenua hui, Local Board meetings, the PCG
- These deliverables are also to align with the wider Southwest Gateway programme of projects.

The three STAAI projects are minimally interdependent from a construction perspective, particularly the Māngere-Airport Oaks Cycling Improvements project as the design and construction works will have no impact on the other projects. Puhinui Interchange and the Bus Priority projects will need to coordinate some construction works for a limited zone near the station at the intersection of Puhinui and Kenderdine Roads. This will principally consist of coordinated traffic management around the station entrance for intersection upgrades and tie-in of the different project teams and contractors and communications to residents and stakeholders in the immediate vicinity. The delivery of these aspects of the works will be with close liaison between the teams and project governance managed by the same delivery sponsor and PCG. Regular programme updates will be received and scrutinised for each package and linked back to the overall programme timelines via weekly coordination meetings. Stakeholder communications are managed by a single lead, common to both projects.

The construction of the bus priority route is to be completed in line with the Puhinui Interchange opening to allow the full airport services to operate as intended. In the event the completion of either package of works is delayed, the PCG will be informed and three months prior to the planned opening a decision will be required in regard to the commencement date of the new bus services. This will provide sufficient time to secure changes to timetable, journey planners, bus and bus driver resources.

Programme coordination reviews will be carried out monthly, along with alignment with the other programme Southwest Gateway short term improvement works that are being completed by NZTA and AIAL. The key interface with these parties is the SH20B 20Connect works linking the Bus Priority and AIAL improvements, and their impact on the performance of the new bus service running between Auckland Airport and Manukau should elements fail to be completed to schedule. The A2B and STAAI PCG includes a representative from NZTA, providing governance oversight and a point of escalation for coordination with NZTA's 20Connect project.

11.7 Project Controls

11.7.1 Project Meetings

- Monthly meetings with the Project Control Group
- Monthly Project Highlight Reports (PHR) submitted to the Project Sponsor for review and other PCG members
- Weekly progress meeting with external design consultant Aurecon
- Weekly alignment meetings with each STAAI project and A2B project team

- Regular (weekly-monthly as required) meetings with interdependent projects, principally those of the Transport Agency and AIAL
- Monthly PACE meetings with external consultants/suppliers or as per the contract
- Monthly hui with Mana Whenua partners
- Additional special meetings with stakeholders and external design consultants to facilitate any unusual design requirements or discuss design decisions/reports.

11.7.2 Cost Management and Reporting

Standard cost management processes will be used via the AT SAP suite of software. Annual expenditure plans will be set up and partitioned into monthly cash-flow forecasts. These will be updated and monitored by the AT management team.

The Puhinui Interchange team considered an ECI to be the best contract model as it allows effective identification and mitigation of construction-phase risks and ability to efficiently achieve programme and quality outcomes sought. Alta Consulting Ltd are engaged by AT to provide ECI cost consultancy and quantity surveying services. Alta will produce parallel estimates which will be reconciled with estimates provided by McConnell Dowell at key design stages to ensure good value for money is being achieved and to inform the final price submission from McConnell Dowell for the physical works.

For Puhinui Road Bus Priority and Māngere Cycling Improvements, AT has appointed Cuesko to provide cost consultancy and quantity surveying services. Cuesko will produce parallel estimates which will be reconciled with estimates provided by the design team at key stages to ensure good value for money is being achieved.

Cost estimates are prepared at significant design milestones along with independent parallel estimates or peer reviews and include Monte Carlo analysis of risks to determine P50 (expected estimate) and P95 cost estimates.

11.7.3 Quality Assurance

A Project Quality Plan is prepared by AT in accordance with AT project Management Framework and PPM 005 Project Quality Plan for the Detailed Design stage.

A separate Road Safety Audit programme will cover the safety requirements of road users. The safety plan framework will be based on the AT's Zero Harm initiatives. Verification processes will include internal verification in AT and third-party peer review and certification.

The ECI model encourages a collaborative approach to the project delivery and includes the preparation of a Quality Management Plan by both the designer and the physical works contractor to ISO 9001 2015 standards. There are significant opportunities for the Contractor to add value during the design phase to introduce innovation, efficiencies, effectively manage staging of enabling works and mitigate key risks.

11.7.4 Risk Management

The basis for risk management will be the AT's Project Risk Management Handbook. It is envisaged that suppliers for on-going work stages will use proprietary risk management systems to document, compile, manage and report this activity. These will largely focus on the delivery of the preferred activity.

In order to mitigate generic risks and project specific risks that emerge through a project, risk is being managed in the following ways:

- Hold risk workshops with key stakeholders at key project milestones
- Regular (at least monthly) monitoring and updating of the Risk Register until project completion
- Risk management in accordance with controls and mitigation identified in the Risk Register.

Project risk registers have been established and will be maintained throughout the life of the projects. These are reviewed and updated on a monthly basis. The top five key risks are included in the monthly PHR and a dashboard report included in the monthly PCG report.

Puhinui Interchange risk workshops have been held in September 2018 (commencement of Preliminary Design) and another in June 2019 (commencement of Detailed Design). A further risk workshop is planned for November 2019 ahead of main works commencement. The ECI model allows for early identification of design optimising opportunities and appropriate allocation of risk to the party best able to manage that risk.

A risk assessment has been completed and potential risks have been identified of high to low threats. The Puhinui Interchange project utilises Active Risk Manager (ARM) software, with the Bus Priority STAAI project moving to ARM as part of the transition from the Planning and Investment group to Portfolio Delivery (Projects) group. The top risks identified are:

					Current	Current	Post Treatment
Risk	**Cause**	**Effect**	**Status**	**Owner**	**Current Assessment**	**Probability (%)**	**Residual Assessment**
ID: 960 **Title:** Delay to completion of Puhinui Station Project (Critical Path Delay) causes reputational damage	Realisation of identified risk(s) that cause critical path delay(s)	Delays to operations of an integrated transport interchange at Puhinui Station Increases in cost due to potential delay claims from the Contractor Damage to AT reputation	ECI procurement and station closure have been progressed to mitigate effect and regular controls to monitor and mitigate critical path delays in place.	s7(2)(a) Privacy	Moderate Threat 19	30%	Low Threat 9
ID: 952 **Title:** Delays incurred due to drawn out consenting processes	Building consent approvals process is extended, incomplete consenting impformation provided, peer review lengthy or delayed	Delays to the consenting of Puhinui Station works flow through to delayed procurement and delivery (requirement for acceleration) Increased costs due to acceleration payments / incentives to deliver the works to original timeframes Possible reputational damage to AT due to acceleration activities	Pre-application meeting held and consent packages will be staged to minimise programme risks		Moderate Threat 18	60%	Low Threat 11
ID: 964 **Title:** Securing long lead materials and specialist equipment takes longer than anticipated.	Specialist equipment necessary for the project may require different lead times / procurement routes to standard construction equipment.	Possible programme delay and increased costs to mitigate against delays.	Procurement register prepared by ECI Contractor and early engagement with key suppliers underway.		Moderate Threat 18	50%	Low Threat 9
ID: 1173 **Title:** Footbridge required for southern emergency egress	KiwiRail or other key stakeholder rejects proposal for at-grade secondary emergency egress at south end of station.	Significant cost increase (~$2M) and additional scope. Bridge may not be able to meet accessibility requirements due to platform space constraints on a ramp.	Seeking KiwiRail confirmation at-grade egress acceptable. Fire Engineering Brief to be circulated to stakeholders		Moderate Threat 18	50%	NIL
ID: 947 **Title:** Delays to the approval of design by KiwiRail	Kiwirail request design changes prior to endorsing and approving the AT preferred design; extended timeframe for responses from KiwiRail	Programme delays Additional cost	Project agreement being finalised, engineering approvals on preliminary design received in principle		Moderate Threat 17	40%	Low Threat 9

Figure 11-8: Puhinui Interchange Top 5 Risk Register

#	What category does this risk fall under?	What is the risk?	Who is the person responsible for monitoring this risk?	What causes that uncertainty?	What is the impact to the project should the event occur?	What is your current control to manage the risk?	Probability x Impact	Active or Non Active Risk
IDENTIFY			ANALYSE					CONTROL
Risk #	Risk Category	Risk	Risk Owner	Cause	Impact (Narrative)	Current Control	Risk Level (Rating)	Status
2	Scope	There is a threat of stakeholder opposition to the Puhinui Road bus priority project due to on site car park removal.	Strategy PM	The cause of the threat is that the hours (extended peak) of bus priority lanes will impact approximately 160 on-street car parking along Puhinui Road and Lambie Drive.	The consequence of the threat is that redesign of the prefered option will have to be undertaken, which will result in additional cost, may have an impact on the performance of the bus priority lanes, scope change and delays to the programme.	Identify and provide alternative car park spaces on side roads to service local business. Undertake further survey's to understand the type of user parking their cars on the road (business customers or daily PT commuters)		Open
3	Scope	There is a threat of stakeholder opposition to the Mangere-Airport Oaks Walking & Cycling project along the Kirkbride / McKenzie / Coronation Road corridor.	Strategy PM	The cause of the threat is the proposal to remove 440 existing on-street car parking bays along the Kirkbride / McKenzie / Coronation Road corridor.	The consequence of the threat is that redesign is required, which will result in additional cost in scope increase, redesign, construction and delays to the programme.	Identify and provide alternative car park spaces, on side roads, to service local business where convenient parking is in high demand.		Open
1	Consenting	There is a threat of stakeholder opposition to AT's RMA consent application for Puhinui Road bus priority project.	Strategy PM	The cause of the threat is the design proposal to remove 15 trees within the road corridor (on Puhinui Rd, east of Puhinui Station) to accommodate the width of the shared used path.	The consequence of the threat is that redesign of the preffered option will have to be undertaken, which will result in additional cost, may have an impact on the perfromance of the bus priority lanes, scope change and delays to the programme.	Pre-application mitigation measures (planting of new trees) will be negotiated with the Council RMA planning staff. The Local Board and mana whneua will be presented with the mitigation measures duirng project engagement well before the submission of the consent application.	Moderate threat	Open

#	What broader category does this risk fall under?	What is the risk?	Who is the person responsible for monitoring the risk?	What causes that uncertainty?	What is the impact to the project should the event occur?	What is your current control to manage the risk?	Probability x Impact	Active or Non Active Risk
IDENTIFY			ANALYSE					CONTROL
Risk #	Risk Category	Risk	Risk Owner	Cause	Impact (Narrative)	Current Control	Risk Level (Rating)	Status
4	Time	There is a threat of stakeholder opposition to Puhinui Road bus priority project due to proposed changes to side streets (removal of dedicated right turn bays into side roads at non-signalised intersections)	Strategy PM	The cause of the threat is due to the proposed removal of right turning bays along the Puhinui Road to accommodate dedicated bus lanes eastbound and westbound, this will increase traffic turn time.	The consequence of the threat is that redesign is required, which will result in additional cost in scope increase, redesign, construction and delays to the programme.	Early engagement with the local community and stakeholders, explain the design changes and its impacts, this will minimise the risk of late opposition to the project.	Moderate threat	Open
5	Cost	There is a threat of cost increase to Puhinui Road bus priority project as further investment may be needed at the existing intersections to improve traffic travel time.	Strategy PM	The cause of the threat is that localised micro- traffic modelling has not been undertaken and the journey travel time impacts are not clearly understood. The current design assumes no change to the existing signalised intersection lane configuration and retaining all existing signalised pedestrian crossings.	The consequence of the threat is that redesign is required, which will result in additional cost and delays to the programme.	Appropriate traffic modelling will be undertaken in the detailed design phase and options will be considered to minimise cost increase.	Moderate threat	Open
8	Scope	There is a threat of cost increase to Puhinui Road bus priority project as further investment may be needed on Kenderdine Road, Bridge Street and Cambridge Terrace.	Strategy PM	The cause of the threat is that the STAAI business case assumes no dedicated bus lanes on Kenderdine Road, Bridge Street and Cambridge Terrace.	The consequence of the threat is change in scope, additional cost and delays to the programme.	Re validate the design assumptions so that the impacts are clearly understood by AT.	Moderate threat	Closed

Figure 11-6: STAAI Puhinui Bus Priority Lanes and Māngere Cycling Improvements Risk Register

All risks with a current assessment Risk Level greater than Low require an active management strategy to lower the Risk Level to Low or Nil. Risks with a current assessment Risk Level of Low are monitored but no active management strategy to lower the Risk Level further is required.

11.7.5 Issue Management

In order to identify and address issues that emerge during the delivery of the project, a project issue register has been established and maintained throughout the life of the project. This will be reviewed monthly and key issues included in the monthly PHR and PCG report.

The issues identified for the Puhinui Interchange project are (as at 20 June 2019):

IDENTIFY		ANALYSIS				CONTROL			
Ref No	Description	Consequence or Impact	Action Required	Owner	Priority	Date Identified	Due Date	Comments/ Resolutions	Status
1	Splitting of project into Stage 1 and Stage 2 and 3rd main futureproofing adds cost that exceeds RLTP budget	s7(2) of additional costs due to redundant works to split project into 2 stages and to widen concourse to span 3rd main improvements planned by KiwiRail in future years These contribute towards the expected estimate of or the project exceeding the RLTP budget.	Discuss with PCG at January 2019 meeting. Efficiencies identified reducing expected estimate to s7(2) Proposed to manage overall RLTP budget within wider STAAI envelope (bus priority cycleway and NOR Stage 2 costs / budge added to Puhinui Stage 1)	s7(2)(a) Privacy	Medium	12/12/2018	31/03/2019	PCG decision at March 2019 PCG endorsed s7(2) budget baseline figure.	Closed
2	Road Safety Audit for preliminary design excluded the Puhinui Rd / Kenderdine Rd intersection as believed would be covered by STAAI RSA. Revealed that STAAI RSA has not considered the Puhinui project.	Neither Puhinui nor STAAI bus priority RSAs consider the combined effects of the projects on the intersection. This leaves a potential road safety issue at the intersection that could impact the design.	Intersection to be added to the Puhinui RSA scope of work. This will require additional payment to the auditor AECOM.		Medium	1/02/2019	30/04/2019	Revised design options for intersection received from Aurecon and workshop held with RSA auditor and AT raffic safety.	Closed
3	Ground investigation has revealed the watertable on the western side of Puhinui Station is much closer to the surface than anticipated (0.5-1.8m below surface)	Stormwater detention ponds will end up mixing ground water with storm water capacity will be reduced for storm water. Mixing of ground water with storm water problematic as tests show ground water contains metal contaminants.	Liners for detention ponds required which will add a small construction and design cost element (TBD) and will prevent planting of vegetation with large root bases in the detention ponds e.g. trees. This will require a change to the current preliminary landscape design. Benefit is that separation of ground water from storm water will aid resource consent approvals. Resolution required before consent submission end of March		Medium	8/02/2019	28/03/2019	Aurecon have revised preliminary design to show liners included. Effects communicated to mana whenua and additional cost allowed for in revised (and peer reviewed) cost estimate.	Closed
4	s7(2)(f)(i) Free and frank expression of opinion				Medium	5/02/2019	30/05/2019	s7(2)(a) Privacy	Closed
5	Aurecon design manager has resigned and replacement to be arranged.	Design manager is a key role in ensuring success of the design and management of the design deliverbales. Risk is poor project quality outcomes or programme slippage as a result of poor handover or lower-quality replacement in the role.	Aurecon to propose a replacement desig manager and suitable and effective handover arrangements. Needed ahead of current manager's last days around mid April 2019		Important	28/02/2019	31/03/2019	s7(2)(a) Privacy to replac with 1 month handover	Closed
6	Consultation with stakeholder Altus Enterprises reveals temporary access planned for station during construction likely to be unsuitable for 80-100 of their staff with disabilities who use the train station.	Bus shuttle service from Papatoetoe Station proposed costs $132K and subject to bus availability.	Explore shuttle availability and options as part of station closure investigation and in consultation with AT Metro and Altus Enterprises.		Medium	1/05/2019	20/06/2019	PCG decision to proceed with station closure Altus staff will be included within wider bus replacement arrangements.	Closed
7	KiwiRail track replacement works planned urgently for Puhinui Station upmain	Timing of works close to start of main works construction and could complicate site access	KiwiRail to advise timing of rail replacement works so effects on construction enabling works can be minimised. May be possible to complete replacement as night works minimising any impact on the project.		Minor	28/05/2019	15/07/2019	KiwiRail to advise programme for completing rail replacement works	Pending
8	Early works building consent package does not include pile caps	Contractor sub-surface works need to include pile caps as remaining building consent approvals will not be approved in time to prevent a delay	Separate consent just for the pile caps to be prepared. This will incur additional cost but maintains programme momentum.		Important	28/05/2019	7/06/2019	Agreement with Auckland Council that separate pile cap consent acceptable.	Closed

Figure 11-7: Puhinui Interchange Issue Register

The issues identified for the STAAI Puhinui Bus Priority Lanes and Māngere Cycling Improvements project are (as at 20 June):

IDENTIFY		ANALYSIS				CONTROL			
Ref No	Description	Consequence or Impact	Action Required	Owner	Priority	Date Identified	Due Date	Comments/ Resolutions	Status
1	Scheme design public consultation planned for June is now rescheduled to November.	The detail design is planned for completion by end December, which will now have to be updated post public consultation.	PCG to reconfirm the decision at next meeting scheduled in July, and re-baseline the schedule to indicate revised detailed design completion timeframes.	s7(2)(a) Privacy	Medium	18/06/2019	31/08/2019		Open
2	STAAI projects updated cost estimate indicates a budget shortfall.	The project cannot proceed in its current form, soe of the project elements will have to be rescoped so that the revised cost estimate is within the allocated approved budget.	Present options to the PCG at next meeting scheduled in July. The options could be to approved additional budget or descope some of the project elements.		Important	18/06/2019	31/08/2019		Open

Figure 11-8: STAAI Puhinui Bus Priority Lanes and Māngere Cycling Improvements Issue Register

11.7.6 Project Tolerances

The three areas where change could occur are typically scope, resource and timing. One likely consequence of a change in any of these is a change in project cost. All three will be managed through both project-specific and existing AT systems. Project Specific- change in macro-scope, project direction, timing and outcomes sought will be managed via the PCG. Initial project macro settings will be agreed by that entity,

who will then seek a consensus on any subsequent macro-level change. It will also determine the implications on cost, timing and resource. Further action to be taken will be determined by the PCG.

The Project Manager will notify the Project Sponsor via the monthly PHR of any changes that sit outside accepted tolerances. Any change to the project scope and deliverables, or departure from the project requirements will require a scope change request to be completed and approved under the process described in 'Scope'.

Project tolerances are set at:

- Change in programme schedule of greater than two months.
- Change in forecast expenditure of greater than 5 percent of the approved project budget. This will reduce to 2.5 percent at Detailed Design phase and 1 percent at Construction phase.

Scope

Any change in scope by the client, end user, other party will be assessed first by the project manager by completing a scope change request application. The time/ cost impact of the requested scope change will be presented to the Sponsor for approval before implementation where the impact is less than 0.5 percent of the approved project budget and does not adversely affect the project programme critical path by more than a month. The outcome of the Sponsor's decision should be reported at the monthly Project Control Group meeting and in the monthly PHR.

Where the impact of the change is greater than 0.5% of the budget or adversely affect the project programme critical path by more than a month, the scope change request shall be referred to the PCG for approval.

11.7.7 Budget – Puhinui Interchange

An ECI model approach has been developed for the Puhinui Interchange works. The ECI model provides best value for money as it allows construction input to the design phase, ensuring risks are minimised during construction phase. The Puhinui Interchange project team have employed a comprehensive procurement plan and strategy for ECI engagement. Techniques described in the procurement strategy include the competitive tendering of construction margins during the ECI procurement process, provision of transparent, detailed cost estimates for self-performed works, and the involvement of AT in the tendering of sub trades to secure competitive pricing for the construction phase. The contractor is required to obtain multiple quotes (ideally minimum of three) for each sub-trade where this is viable. Alta Consulting Ltd provide ECI cost consultancy and quantity surveying services and produce parallel independent estimates which are reconciled with the estimates provided by the ECI contractor at key design stages. Should the ECI process fall short of AT expectations, AT will retain the right to procure the construction-phase work as a separate traditional tender with other physical work contractors.

In addition, the project continues to conduct further separate estimates on the whole project costs, prepared by our designer Aurecon and with parallel estimates or peer reviews prepared by Cuesko Ltd. In total, four independent quantity surveyor organisations are involving in estimating, reconciling and monitoring the project costs.

In the event of scope increase, AT have carried out an assessment of value engineering options that have low retrospective costs and limited impact to benefits. These have been reviewed by the PCG and if triggered, can be agreed by the PCG to swiftly reduce costs with minimal to no programme impacts.

Budget – Bus Priority and Māngere Cycleways

For the Bus priority and cycling works, due to the type of works and programme availability a traditional approach will be employed. This will see the project team utilise AT's Procurement Panel's that were developed for these types of works. These panels have been established to provide competitive tendering and value for money whilst maintaining a high level of quality.

In addition, the project continues to conduct further separate estimates on the whole project costs, prepared by our designer Aurecon and with parallel estimates or peer reviews prepared by Cuesko Ltd.

11.7.8 Budget

The project manager will flag any potential issues or risks that may cause the project cost to exceed the approved budget with the appropriate personnel in AT's Project Governance structure.

If the increase in cost is deemed appropriate and valid, the project manager will then initiate a contract variation assessment through AT's budget change request process. Approved variations will be reported in the monthly PHR and at the monthly PCG. For Transport Agency subsidised projects, a copy will also be sent to the Funding team to initiate a Cost Scope Adjustment (CSA) to help offset the additional cost of the project.

The project manager cannot commit additional budget until it is approved by the appropriate financial delegation. The project manager will realistically reforecast the total expected cost of the project on a monthly basis within SAP system.

11.7.9 Programme

If the approved project schedule baseline date for completion is likely to extend by one month or more, the project manager will assess the implications of the programme extension and recommend a response to the Sponsor for approval. The outcome of the Sponsor's decision will be reported in the monthly PHR and PCG meeting.

11.7.10 Risk/Issues

If the approved project schedule baseline date for completion is likely to extend by one month or more, the project manager will assess the implications of the programme extension and recommend a response to the Sponsor for approval. The outcome of the Sponsor's decision will be reported in the monthly PHR and PCG meeting.

The risk of programme overrun is mitigated by regular (at least monthly) reviews of risk-adjusted programmes informed by independent programmes supplied to AT by the designer and (in the case of Puhinui Interchange) the ECI contractor. These programmes identify critical path activities and allow for contingency scenarios to be considered to reduce programme risks.

For Puhinui Interchange, two such examples are the decision to procure under the ECI model, greatly reducing contractor mobilisation and tendering times and introducing programme efficiencies into construction, and the decision to temporarily close Puhinui Station during construction, reducing the construction interfaces with the public and allowing a more efficient and safer construction.

11.7.11 Quality Management

Any and all business case related documents shall generally be in accordance with best practice and with the principles that have been established by AT.

The project shall maintain standard quality standards appropriate for AT, specifically:

- AT Code of Practice (Traffic Design Manual)
- Safe systems approach
- Urban Design Framework
- Standard Engineering Detail (SED)
- Development Code NZ and Auckland
- CPTED
- Accessibility Standards.

The following reviews of the documentation have been undertaken at suitable stages of the design phase to maintain the quality.

- Economic Evaluation Peer reviews by s7(2)(a) Privacy (March 2019)
- External Road Safety Audits have been carried out for Puhinui Interchange Preliminary Design (January 2019 and June 2019) and Puhinui Road Bus Priority and Māngere Cycling Improvements (December 2018)
- Technical peer review by the AT specialist staff
- Technical peer reviews (PS2- design Review) of the design documentation by an external consultant
- KiwiRail engineering approvals
- Peer review and refresh of business case at each phase gateway
- Internal peer review of the cost estimates
- Parallel Cost Estimate - Parallel cost estimates for all short-term improvements was commissioned by AT and carried out by Cuesko Quantity Surveyors Ltd.

During the construction phase:

- MSQA during site construction. Expected level CM4 for Puhinui Interchange. Resource consent compliance checks
- Building consent compliance checks.

11.7.12 Change Control

In scope changes

Any change will firstly be assessed by the project manager. This review will consider the decisions made by the Engineer to Contract if applicable. These changes will be managed as per the financial delegations register and draw down from approved project contingency (P50). The PCG will be informed each month as part of the financial report.

Out of scope changes

Any change in scope by the client, end user, or other party will be assessed first by the project manager by completing a scope change request application. The time/ cost impact of the requested scope change will be presented to the Sponsor for approval before implementation where the impact is less than 0.5% of the approved project budget and does not adversely affect the project programme critical path by more than a month. The outcome of the Sponsor's decision should be reported at the monthly PCG meeting and in the monthly PHR.

Where the impact of the change is greater than 0.5% of the budget or adversely affect the project programme critical path by more than a month, the scope change request shall be referred to the PCG for approval. Due to the nature of the construction works these requests may be accelerated outside of the normal PCG meetings. In this circumstance the PCG chair or delegated representative will approve the change and this change will be reported to the full PCG at the next meeting.

11.8 Benefits Realisation

Given the connected nature of the short-term AT and Transport Agency projects and focus on customer journey experience, a single suite of investment objectives has been developed to guide the development of the short-term options. The combined short-term objectives were approved by the project partners at a project governance level during an Auckland Airport – Transport Management Collaborative Operations Group (TM COG) meeting held on 4 May 2018. The Key Performance Indications (KPIs) were adapted from those for the long-term business case to be suitable for short-term.

11.8.1 Results the Recommended Option Will Deliver

The table below summarises the benefits and effectiveness of the Recommended Option in giving effect to the Project Objectives. This indicates that the integrated Recommended Option including the following elements is highly effective in meeting the Project Objectives.

- Additional and enhanced bus services providing access to more catchments and better frequencies
- A new bus-train interchange enabling a high-quality safe transport from train services to the direct bus link to the Airport and employment areas, significantly increasing the viable catchment for public transport use to the Airport area and faster journeys at lower cost from the City Centre
- New bus priority lanes providing faster journey times and greater reliability for bus services
- New cycle connections, improving safety and connecting gaps in the existing cycle network.

Table 11-5: Performance of the Recommended Option

Project Objectives	Measure/ KPI for Options Assessment	Performance
Project Objective 1: Provide more reliable and timely travel choices to and from Auckland Airport and surrounding areas	Extent to which option contributes to reliable travel times to and from Airport.	■ Provides 22 buses per hour in peaks to the Airport area, up from 6 per hour (excluding Skybus) ■ Increases bus routes for people to access the Airport and surrounding area from 1 to 5. ■ More direct connection between Manukau, the rail network and Airport with an increase fro 4 to 6 buses per hour at peaks. ■ Reduces actual peak travel time by bus from Manukau to the Airport from 66 mins to 22 mins. ■ Significantly reduces variability in journey time in bus passengers between Manukau and the Airport (via rail connection) from 30 mins on a 35 minute trip.
Project Objective 2: Improve people's access to employment, education and social opportunities	Extent to which option improves people's access to employment, education and social opportunities	■ Directly connects the rail network and its catchments with a high frequency route to the Airport and the Airport's key employment zones. ■ Directly connects the Manukau Bus Intrerchange with a high frequency route to the Aairport and the Airport's key employment zones – enhancing access to these jobs to the catchments served by buses calling at Manukau. ■ Provides 3 routes serving the Ascot employment zone – up from 1.

Project Objectives	Measure/ KPI for Options Assessment	Performance
		▪ Direct, high frequency connection between Manukau, a major Metropolitan Centre and location for two tertiary campuses and the Airport. ▪ Direct cycle routes to known locations of Airport area employees in Māngere and Papatoetoe.
Project Objective 3: Provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	Extent to which option could provide an enhanced and integrated bus/rail interchange at Puhinui that incorporates cultural values and reflects community identity.	▪ Provides a purpose-designed interchange of quality to enable bus-train transfer at Puhinui. ▪ An interchange design that provides for future RTN alignment. ▪ A design of the Puhinui Interchange that has been influenced by iwi and reflects local values and identity.
Project Objective 4: Integrate with and get increased value from existing and planned transport investments.	Extent to which option integrates with and gets increased value from existing and planned transport investments.	▪ An interchange at Puhinui makes optimial use of Auckland's recent and proposed investments in its rail network (electrification, new trains, increased frequencies, service extensions) for access to the airport. ▪ Commencing the direct airport service at Manukau enables effective use of the new Manukau Bus Interchange as a hub for airport journeys from local routes in South and East Auckland. ▪ Increased services on SH20B from 4 to 6 with a direct link to the wider region via Puhinui Station will utilise NZTA's proposed investment in new bus lanes on SH20B. ▪ New cycle connections in Māngere and Papatoetoe connect gaps in the cycle network, enabling complete journeys and better use of the existing network. ▪ The Puhinui Interchange is deisnged to accommodate a future RTN bridge as part of the Long Term Airport to Botany RTN system.
Project Objective 5: Be operational by end of 2020/early 2021	Ability of the option to be operational by end of 2020/early 2021	▪ All elements of the Recommended Programme can be delivered by eary 2021.
While: ▪ Improving safety ▪ Delivering value	▪ Improved safety for users through CPTED/interchange design	▪ The Puhinui Interchange has been purpose designed to provide a safe environment. ▪ Separated cycle facilities will improve safety for cyclist on key routes.

Project Objectives	Measure/ KPI for Options Assessment	Performance
▪ Working towards the long-term outcomes ▪ Recognising and providing for the significant cultural values of Mana Whenua within the Auckland Airport Area ▪ Improving customer journey experience.	▪ Affordability of option in relation to other options. This includes potential redundant investment associated with designs. ▪ Extent to which the option can be staged with a long-term rapid transit service ▪ Extent to which the option contributes to an improved customer journey experience through station design, quality and legibility of interchange and the likelihood of a timely transfer between rail and bus modes.	▪ The preliminary cost estimate for the project is approximately s7(2)(b)(ii) Prejudice to commercial position above the RLTP budget. ▪ The design fully enables a long-term rapid transit service through the station design enabling a future bridge access for RTN. ▪ The Puhinui Interchange enables a high-quality journey experience through a legible, simple layout, fully covered and enclosed transfer space and quality information provision. ▪ Service frequencies are high at 6 per hour, fully prioritised enabling reduced wait times and reliable journey times.

A Benefits Realisation Plan has been developed by Auckland Transport and identifies agreed KPI's, baseline information and performance measures per objective.

Appendices

Appendix A1
AT Auckland Airport Access Customer Research - Full Report

Appendix A2
Role of technology in transport and growth in the surrounding area

Appendix B1
Puhinui Options Assessments Report

Appendix B2
Short Term Public Transport Network

Appendix B3
Short Term Puhinui Bus Priority Improvements

Appendix B4
Short Term Māngere Cycling Improvements

Appendix C1.1
Puhinui Interchange Concept Design Report

Appendix C1.2
Puhinui Interchange Preliminary Design Report

Appendix C2
Puhinui Bus Priority Concept Design Report

Appendix C3
Māngere Cycling Improvement Concept Design Report

Appendix D1
Puhinui Interchange - Cost Estimate

Appendix D2
Māngere Cycling Improvements - Cost Estimate

Appendix D3
Puhinui Bus Priority - Cost Estimate

Appendix E1
Economic Evaluation

Appendix E2
Māngere and Puhinui Demand Assessment & Economic Evaluation Economic Assessment (Flow)

Appendix E3
Economic Evaluation Peer Review

Appendix F1.1
Puhinui Interchange Project Risk Register

Appendix F1.2
STAAI-SSBC Puhinui and Māngere Project Risk Register

Appendix G
STAAI - Consenting Strategy Addendum 1

Appendix H
Puhinui Interchange Property Strategy

Appendix I
Puhinui Interchange Walking and Cycling Station Access Assessment

Appendix J
RTN Service Concept Technical Note

Appendix K
Puhinui Road Bus Priority vs Transit Lanes Technical Note

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