TE TUPU NGĀTAHI
SUPPORTING GROWTH

VOLUME 2

Airport to Botany Assessment of Effects on the Environment

December 2022

Version 1

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

Document Status

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Structure of the Notices of Requirement documentation

The Assessment of Effects on the Environment report and supporting documents are structured as set out in the table below:

Volume	Title	Contents
1	Form 18	Attachment A: Designation Plans; Attachment B: Schedule of Directly Affected Property; and Attachment C: Proposed Conditions for the Designation.
2	Assessment of Effects on the Environment	Appendix A: Assessment of Alternatives; and Appendix B: Relevant statutory and strategic planning documents.
3	Drawings	General Arrangement Layout Plan – NoR 1 Botany Town Centre to Rongomai Park; General Arrangement Layout Plan – NoR 2 Rongomai Park to Puhinui Station, in the vicinity of Plunket Avenue; General Arrangement Layout Plan – NoR 3 Puhinui Station, in the vicinity of Plunket Avenue to SH20B/20 Interchange; General Arrangement Layout Plan – NoR 4a SH20B/20 Interchange to Orrs Road; and General Arrangement Layout Plan – NoR 4b Alteration to NZ Transport Agency Designation 6717 State Highway 20B.
4	Supporting Technical Reports	Appendix A: Airport to Botany Assessment of Transport Effects; Appendix B: Airport to Botany Assessment of Arboricultural Effects; Appendix C: Airport to Botany Assessment of Landscape Effects; Appendix D: Airport to Botany Social Impact Assessment; Appendix E: Airport to Botany Urban Design Evaluation; Appendix F: Airport to Botany Assessment of Flooding; Appendix G: Airport to Botany Assessment of Construction Noise and Vibration Effects; Appendix H: Airport to Botany Assessment of Traffic Noise Effects; Appendix I: Airport to Botany Assessment of Ecological Effects; Appendix J: Airport to Botany Assessment of Archaeological Effects; and Appendix K: Airport to Botany Assessment of Built Heritage Effects

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Acronym/Term	Description
AEE	Assessment of Effects on the Environment (this Report)
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
ARI	Average Recurrence Interval
AUP:OP	Auckland Unitary Plan: Operative in Part
AUT	Auckland University of Technology
BRT	Bus Rapid Transit
CCRA	Climate Change Response Act 2022
CEMP	Construction Environmental Management Plan
CNVMP	Construction Noise and Vibration Management Plan
CPTED	Crime Prevention through Environmental Design
CTMP	Construction Traffic Management Plan
CVA	Cultural Values Assessments
DRMP	Development Response Management Plan
EcIAG	Ecological Impact Assessment Guidelines
EMP	Ecological Management Plan
ERP	Emissions Reduction Plan
FENZ	Fire and Emergency New Zealand
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
GHG	Greenhouse Gas Emissions
GPS	Government Policy Statement
GRPA	Government Roading Powers Act 1989
HHMP	Historic Heritage Management Plan
HNZPT / Heritage NZ	Heritage New Zealand Pouhere Taonga
HNZPT Act	Heritage New Zealand Pouhere Taonga Act
KiwiRail	KiwiRail Holdings Limited
LG(AC)A	Local Government (Auckland Council) Act 2009
LNRS	Low Noise Road Surface

LTA	Land Transport Act 1998
LTMA	Land Transport Management Act 2003
LEA	Landscape Effects Assessment
MCA	Multi-Criteria Assessment
MDRS	Medium Density Residential Standards
MIT	Manukau Institute of Technology
MPD	Maximum Probable Development
N/A	Not Applicable
NES	National Environmental Standard
NES:FW	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
NIMT	North Island Main Trunk railway track
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
NoR	Notice of Requirement
NoR 1	Notice of Requirement 1: Airport to Botany Bus Rapid Transit (Botany Town Centre to Rongomai Park)
NoR 2	Notice of Requirement 2: Airport to Botany Bus Rapid Transit (Rongomai Park to Puhinui Station, in the vicinity of Plunket Avenue)
NoR 3	Notice of Requirement 3: Airport to Botany Bus Rapid Transit (Puhinui Station, in the vicinity of Plunket Avenue to SH20/20B Interchange)
NoR 4a	Notice of Requirement 4a: Airport to Botany Bus Rapid Transit (SH20/20B Interchange to Orrs Road)
NoR 4b	Notice of Requirement 4b: Alteration to NZ Transport Agency Designation 6717 – State Highway 20B
NPS	National Policy Statement
NPS:FM	National Policy Statement on Freshwater Management
NPS:UD	National Policy Statement on Urban Development
NUMP	Network Utility Management Plan
PPFs	Protected premises and facilities
Programme partners	Te Ākitai Waiohua, Auckland Airport, Auckland Transport and Waka Kotahi
RCA	Road Controlling Authority

RLTP	Auckland Regional Land Transport Plan
RMA	Resource Management Act 1991
RMAA	Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021
RP	Regional Plan
RPS	Regional Policy Statement
RTN	Rapid Transit Network
SCEMP	Stakeholder and Communication Engagement Management Plan
SEA	Significant Ecological Area
SH1	State Highway 1
SH20	State Highway 20
SH20B	State Highway 20B
SIA	Social Impact Assessment
SSBC	Single Stage Business Case
SSTMP	Site-Specific Traffic Management Plan
SWGP	Southwest Gateway Programme
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth
UDE	Urban Design Evaluation

1 Introduction

This Assessment of Effects on the Environment (**AEE**) supports the Notices of Requirement (**NoRs**) for the Airport to Botany Bus Rapid Transit Project lodged by Waka Kotahi NZ Transport Agency (**Waka Kotahi**) and Auckland Transport as requiring authorities under the Resource Management Act 1991 (**RMA**). The NoRs propose four new designations for the Bus Rapid Transit (**BRT**) corridor and an alteration to Designation 6717 for State Highway 20B (**SH20B**).

This AEE and supporting technical assessments have been developed in an integrated manner. Whilst this Report covers all aspects of the Project, some aspects of this report will only be relevant to specific:

- Geographical areas; or
- NoRs; or
- Components of the Project.

Notice	Description	Requiring Authority
NoR 1	Widening of the existing Te Irirangi Drive between Botany Town Centre and Rongomai Park to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities.	Auckland Transport
NoR 2	Widening of the following existing roads to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities: • **Te Irirangi Drive** (between Rongomai Park and SH1) • **Great South Road** (between SH1 and Ronwood Avenue intersection) • **Ronwood Avenue** (between Great South Road intersection and Davies Avenue) • **Davies Avenue** (between Ronwood Avenue and Manukau Station Road) • **Manukau Station Road** (between Davies Avenue and Lambie Drive) • **Lambie Drive** (between Manukau Station Road and Puhinui Road) • **Puhinui Road** (between Lambie Drive and Plunket Avenue)	
NoR 3	Widening of the existing Puhinui Road between Plunket Avenue and east of the SH20/20B Interchange, including a BRT bridge connecting to Puhinui Station. This widening will provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities. Widening is also proposed for Cambridge Terrace, Bridge Street and Kenderdine Road to provide for high quality walking and cycling facilities	
NoR 4a	Extension of Puhinui Road between the SH20/20B Interchange and Orrs Road to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities.	
NoR 4b	Widening of SH20B corridor between the SH20/20B interchange and the intersection of Manukau Memorial Gardens. This is an alteration to the existing Waka Kotahi Designation 6717 to provide westbound lanes to	NZ Transport Agency

	Auckland Airport, high quality walking and cycling facilities and a ramp from SH20B onto SH20 for southbound traffic while enabling the provision of a Bus Rapid Transit corridor.	

Figure 1: Overview of the NoRs for the Airport to Botany Project

1.1 The Airport to Botany project

The overall Airport to Botany Bus Rapid Transit Project will provide an 18 km, dedicated, high capacity, reliable, and frequent BRT corridor and walking and cycling facilities. The Project will improve connections between the major centres of Botany, Manukau, Auckland Airport and their employment areas to existing and intensifying residential areas in southern and eastern Auckland.

Auckland Transport and Waka Kotahi are seeking to authorise a 14.9 km portion of the overall Project which extends from the south of Botany Town Centre to Orrs Road (**Project**). The remainder of the overall Project will be delivered separately by:

- **Auckland Airport** – BRT corridor and walking and cycling facilities between Orrs Road and the Airport including a bridge across Pūkaki Creek; and
- The **Eastern Busway Alliance** – Botany Station.

1.2 The Requiring Authorities

1.2.1 Auckland Transport

Auckland Transport is financially responsible for Auckland's transport network and services (excluding state highways), including roads, footpaths, cycling, parking and public transport services such as rail. Auckland Transport is a Council-controlled Organisation under the Local Government (Auckland Council) Act 2009 (**LGACA**), which states that Auckland Transport's purpose is to *"contribute to an effective, efficient and safe Auckland land transport system in the public interest"*.

Auckland Transport's functions are identified in section 45 of the LGACA and include managing and controlling the Auckland Transport system in accordance with the LGACA, including performing the statutory functions and exercising the statutory powers set out in section 46 as if Auckland Transport were a local authority or other statutory body, and acting as a Requiring Authority under section 167 of the RMA.

Under section 47(1) of the LGACA, Auckland Transport is deemed to be approved as a Requiring Authority, as a network utility operator, under section 167 of the RMA for the purpose of *"constructing or operating or proposing to construct or operate roads in relation to the Auckland transport system"* and *"the carrying out of an activity or a proposed activity (other than an activity described in paragraph (a)) in relation to the Auckland transport system for which it or the Auckland Council has financial responsibility".* Subsequently, Auckland Transport may designate land to construct, operate and maintain roads and any other activities in relation to the Auckland transport system that Auckland Council has financial responsibility for.

In the context of this Project, Auckland Transport is the Requiring Authority for NoRs 1 to 4a.

1.2.2 NZ Transport Agency

The Land Transport Management Act 2003 (**LTMA**) provides the statutory framework for New Zealand's land transport system and is the statute under which NZ Transport Agency operates (in conjunction with the Government Roading Powers Act 1989 (**GRPA**) and the Land Transport Act 1998 (**LTA**)).

The NZ Transport Agency's principal objective under section 94 of the LTMA is *"to undertake its functions in a way that contributes to an effective, efficient, and safe land transport system in the public interest"*. The NZ Transport Agency functions are set out in section 95(1) and the principles under which it must operate are affirmed in section 96 of the LTMA.

Section 95 (1)(h) of the LTMA includes the management of *"the State highway system (including its planning, funding, design, supervision, construction, maintenance, and operation) in accordance with this Act and the Government Roading Powers Act 1989"*

Section 95 (1)(i) of the LTMA sets out the function of overseeing *"the planning, operation, implementation, and delivery of public transport (including issuing guidelines for regional public transport plans)"*

Section 61 of the GRPA sets out the powers and duties of the Transport Agency in relation to state highways. NZ Transport Agency has the sole powers of control for all purposes, including construction and maintenance, of all state highways under the GRPA. Further, section 88 states that the Transport Agency is able to declare a state highway, or part of a state highway, a limited access road.

NZ Transport Agency was approved under section 167 of the RMA as a Requiring Authority by three gazette notices in 1992, 1994 and 2015.

Pursuant to the 1994 notice, the Transport Agency may designate land, water, subsoil or airspace for the "construction and operation (including the maintenance, improvement, enhancement, expansion, realignment and alteration) of any State highway or motorway pursuant to the GRPA". Under the 2015 notice, NZ Transport Agency may also designate land, water, subsoil or airspace for "the purpose of constructing or operating (or proposing to construct or operate) and maintaining cycleways and shared paths in New Zealand pursuant to the GRPA and the LTMA.

In the context of this Project, NZ Transport Agency is the Requiring Authority for NoR 4b (alteration to Designation 6717).

1.2.3 Notification

Auckland Transport for NoRs 1 to 4a and NZ Transport Agency for NoR 4b – Alteration to Designation 6717 request that the notices are publicly notified.

1.2.4 Background and context

The overall project is part of the Southwest Gateway Programme (**Programme**), a programme of investments aiming to deliver transformative improvements to address critical transport-related issues in Auckland's south-western, southern, and eastern suburbs. Te Ākitai Waiohua, Auckland Transport, Waka Kotahi, and Auckland Airport are programme partners and are working together to deliver the Project.

Te Tupu Ngātahi Supporting Growth (**Te Tupu Ngātahi**) is a collaboration between Auckland Transport and Waka Kotahi to investigate and plan transport investment in Auckland's future growth areas over the next 10 to 30 years. Auckland Transport and Waka Kotahi have partnered with Auckland Council and Manawhenua and are working closely with stakeholders and the community to develop the strategic transport network to support growth and intensification in Auckland.

In December 2021, Te Tupu Ngātahi, was tasked with designating the Project. Therefore, Te Tupu Ngātahi, on behalf of Auckland Transport and Waka Kotahi has prepared the NoRs for the construction, operation and maintenance of the Project.

1.3 Need for the Project

Auckland's south-western, southern and eastern areas is home to a significant population of 360,000 people and includes two of the seven metropolitan centres in Auckland, a substantial growth area at Ormiston and two of Auckland's largest employment areas at the Airport and in East Tāmaki.

Public transport is currently provided by standard bus services, with no direct connection to Manukau or the Airport from Auckland's eastern areas. Without a new rapid transit connection, large areas of southern and eastern Auckland will remain only partially served by the Rapid Transit Network (**RTN**).

People living in southern Auckland are heavily dependent on access to Manukau Central, the Airport and East Tāmaki for employment. These areas are not easily accessible by the existing public transport network.

In summary, the following key transport-related issues were identified in the business case process:

- A large gap in the RTN in the southern and eastern suburbs resulting in a poor mode share (refer to Figure 2);
- Poor quality access to employment, including Auckland Airport, Manukau Central, East Tāmaki and community facilities; and
- Increased pressure on the existing transport network as a result of intensification of residential land.

Figure 2: Map showing Auckland's existing and proposed RTN. Area in yellow illustrates the gap in the RTN

The proposed designations for the Project are critical to address the identified issues.

If the Project is not protected now, this may result in a lack of certainty around the investment in public and private development, and locations for nationally directed intensification. Efficient, transport networks are vital for the success of centres and neighbourhoods as they provide safe, accessible and sustainable travel choices that connect communities and encourage a shift from private vehicles to public and active transport.

2 Partnership with Manawhenua

Auckland Transport and Waka Kotahi recognise and respect Te Tiriti o Waitangi as Te Tūāpapa (foundation). This underpins the way Auckland Transport and Waka Kotahi partner with Manawhenua, to build strong, meaningful and enduring relationships.

Partnership in the context of this Project is a commitment to ongoing and regular engagement with Manawhenua at all levels (including governance and katiaki) in a manner that is open and transparent to ensure Manawhenua continue to have the space and resources to influence decision making in all phases of the Project.

The sections to follow summarise the partnership with Manawhenua to date and include:

- Partnership through previous phases of the Project;
- Partnership through Te Tupu Ngātahi; and
- The development of a framework for future phases of the Project.

2.1 Partnership in previous phases of the Project

Manawhenua have been involved in all previous phases of the Project. Engagement with Manawhenua first commenced in 2018 as part of the Southwest Gateway Programme. This involved monthly hui and project workshops over the course of the previous business case process to seek feedback from Manawhenua on key project decisions through the Auckland Transport's Southern Mana Whenua Table.

2.1.1 Te Ākitai Waiohua

The overall project traverses the Puhinui peninsula, which is of significant cultural value to Manawhenua, in particular Te Ākitai Waiohua. To recognise the significance of the area to Te Ākitai Waiohua and facilitate their ongoing involvement in the development of the Project, Auckland Transport and Waka Kotahi partnered with Te Ākitai Waiohua for the development of the Programme.

Te Ākitai Waiohua are the owners of Pūkaki and Waokauri Creeks (which includes areas of Māori Reservation). These areas are highly significant to Te Ākitai Waiohua. Te Ākitai Waiohua also has a longstanding involvement in the area's development, including as a signatory party to the Eastern Access Agreement signed in 1991, the development of the Puhinui Structure Plan and the Puhinui Precinct in the Auckland Unitary Plan Operative in Part (**AUP:OP**).

Through the Eastern Access Agreement, it was agreed that the form of the bridge over Pūkaki Creek would remain as a two-lane bridge in perpetuity. This bridge is located to the west of Orrs Road and is a crucial element for the future connection of the Project to Auckland Airport. Discussions on this agreement are being progressed between the four programme partners. These discussions will continue post lodgement of the Project NoRs.

2.2 Partnership through NoR phase

Following the commencement of the NoR phase of the Project, all Manawhenua iwi representatives who were previously involved in the Project (through the business case stage) were invited to engage

in the NoR phase. To date, the following Manawhenua partners have been actively involved in the preparation of the NoRs:

- Te Ākitai Waiohua;
- Ngāi Tai ki Tāmaki;
- Ngāti Tamaoho;
- Ngaati Whanaunga;
- Ngāti Te Ata Waiohua;
- Ngāti Maru;
- Ngāti Tamaterā;
- Te Ahiwaru Waiohua; and
- Ngāti Paoa Trust Board.

The Project Team's engagement with Manawhenua is primarily enacted through the established Southern Te Tupu Ngātahi monthly hui and Project specific hui which is attended by representatives of the iwi identified above. These hui have provided several opportunities for kōrero and knowledge sharing.

Site visits were also held with Manawhenua, meeting at key locations of interest along the Project corridor. These site visits were followed by workshops to map out sites of significance to Manawhenua, opportunities within the Project to acknowledge cultural landscapes, and iwi aspirations for the Project.

The Project Team recognise the importance of te taiao to Manawhenua. In particular, through ongoing kōrero at the Southern Te Tupu Ngātahi hui, it was acknowledged that the environment is steeped in cultural history for iwi Māori through whakapapa, and the interconnectivity of people, place, and nature.

The Project Team has engaged in several discussions with Manawhenua to map out the cultural landscapes. This is discussed further below.

The cultural values and narrative shared by Manawhenua has guided the development of the conditions for the proposed designations and alteration to Designation 6717 (see Figure 3). These conditions set out a framework to identify Project specific opportunities to acknowledge and respond to the cultural landscape within the Project corridor and surrounding areas.

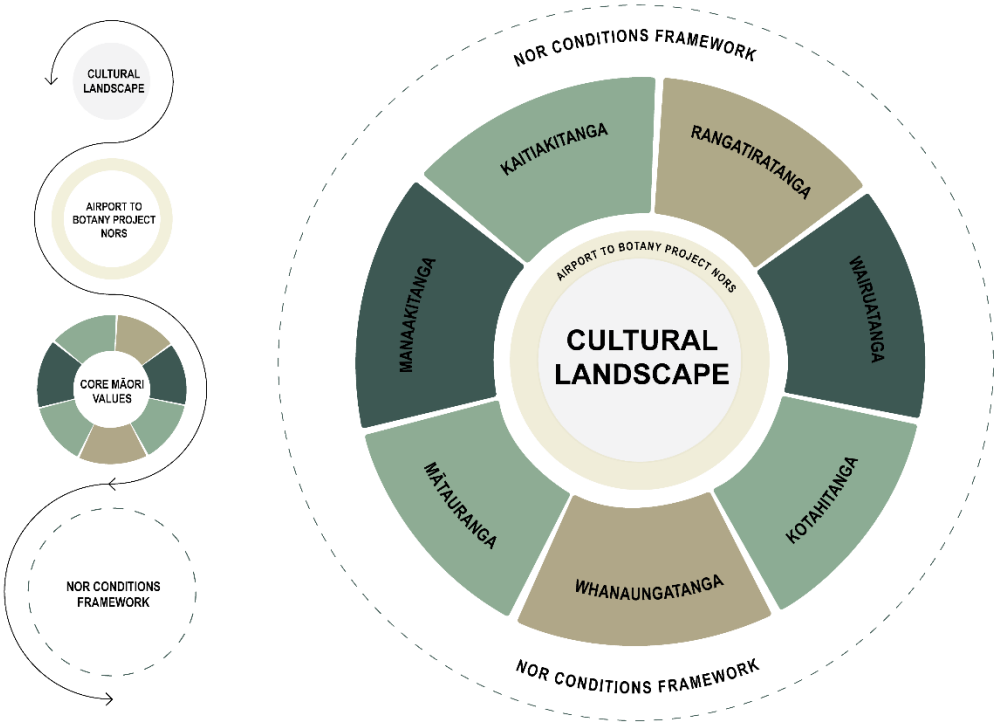


Figure 3: Manawhenua partnership through the Project

Three key elements were discussed in collaboration with Manawhenua. These are detailed in the subsequent sections:

- Cultural landscape;
- Core Māori values and project specific outcomes; and
- Actions (refer to Section 9.2).

2.2.1 Cultural landscape

Manawhenua shared that the Project traverses a significant cultural landscape through kōrero at hui, site visits and Cultural Values Assessments (**CVA**) prepared for the current and previous phases of the Project. Manawhenua identified that maunga, moana, awa, marae and papakāinga are key features of their identity and form the wider cultural context:

- **Maunga** hold a paramount place in the historical, spiritual, ancestral and cultural identity of the iwi and hapū of Tāmaki Makaurau.
- **Moana and awa** have their own value through cultural, historic and traditional links with specific streams, rivers, wetlands, lakes, springs, and other water bodies. Mauri is a binding force that sustains all life and is strongly present in water.
- **Marae and papakāinga** can be seen as both a physical and spiritual location, a collection of buildings, an anchoring to the land, a place where people meet and the community of related people itself.

Figure 4 below acknowledges the key features that Manawhenua have shared. These constitute part of the wider cultural context with respect to the Project.

Figure 5 provides an overview of the following key areas of interest that were identified in the CVA prepared by Te Ākitai Waiohua for the previous business case phase, specific to the Puhinui area:

- The Puhinui Peninsula is an important area in the history, stories, whakapapa and mythology of Te Ākitai Waiohua;
- Pūkaki and Waokauri Creeks have Māori Reservation status, meaning they are held for the common use or benefit of Te Ākitai Waiohua;
- The Pūkaki marae is on the northern bank of the Waokauri Creek;
- There are many recorded archaeological sites and evidence of widespread occupation in the area by Manawhenua during pre-European times. These are generally concentrated around Pūkaki Creek, Waokauri Creek, and Crater Hill (Ngā Kapua Kohuora);
- Volcanic cones, such as Ngā Kapua Kohuora; and
- Other significant sites include Papāhinau, Mimiti Te Arero historic settlements and the Manukau Harbour.

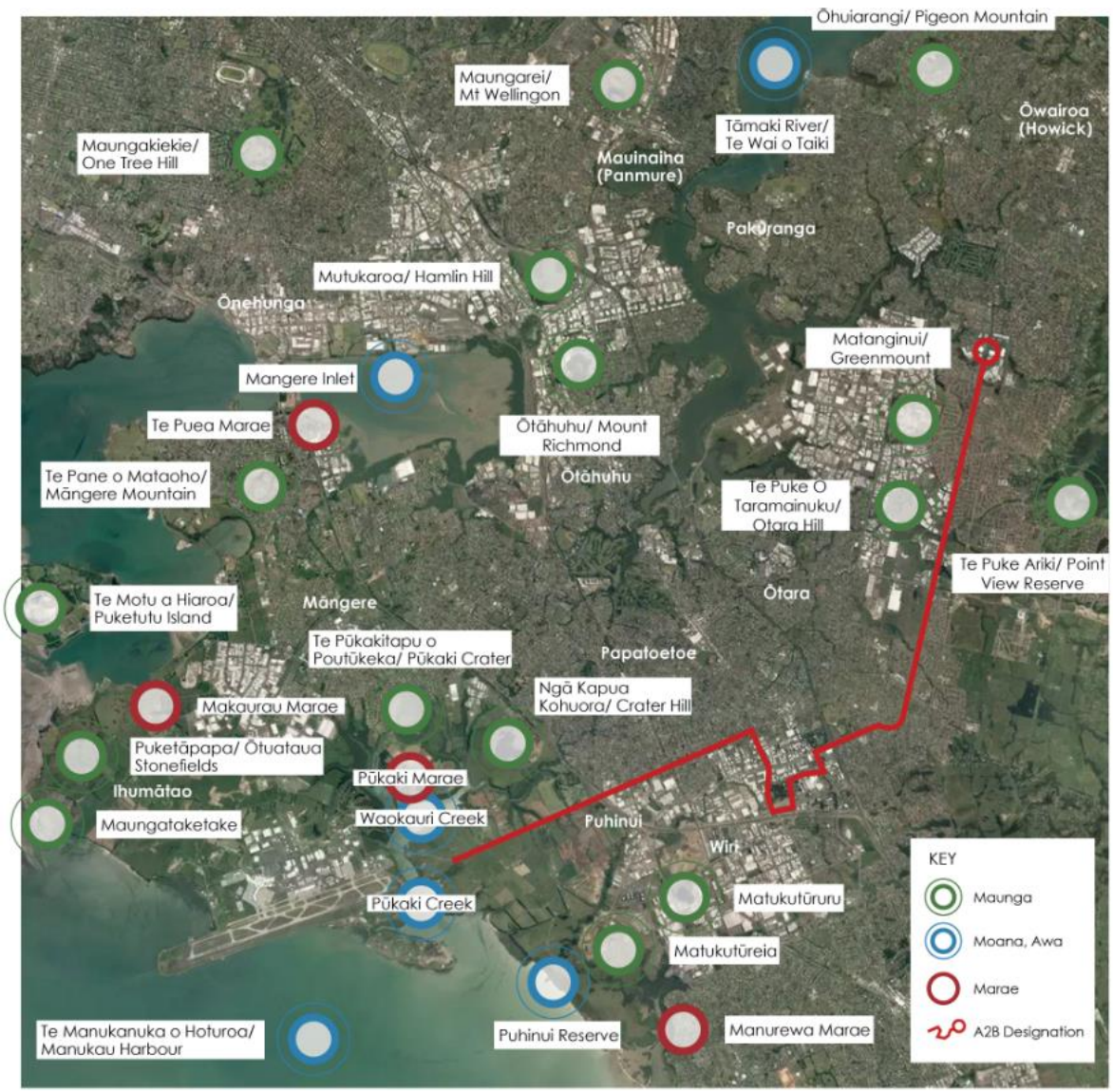


Figure 4: Map showing the Project in the context of a wider cultural landscape

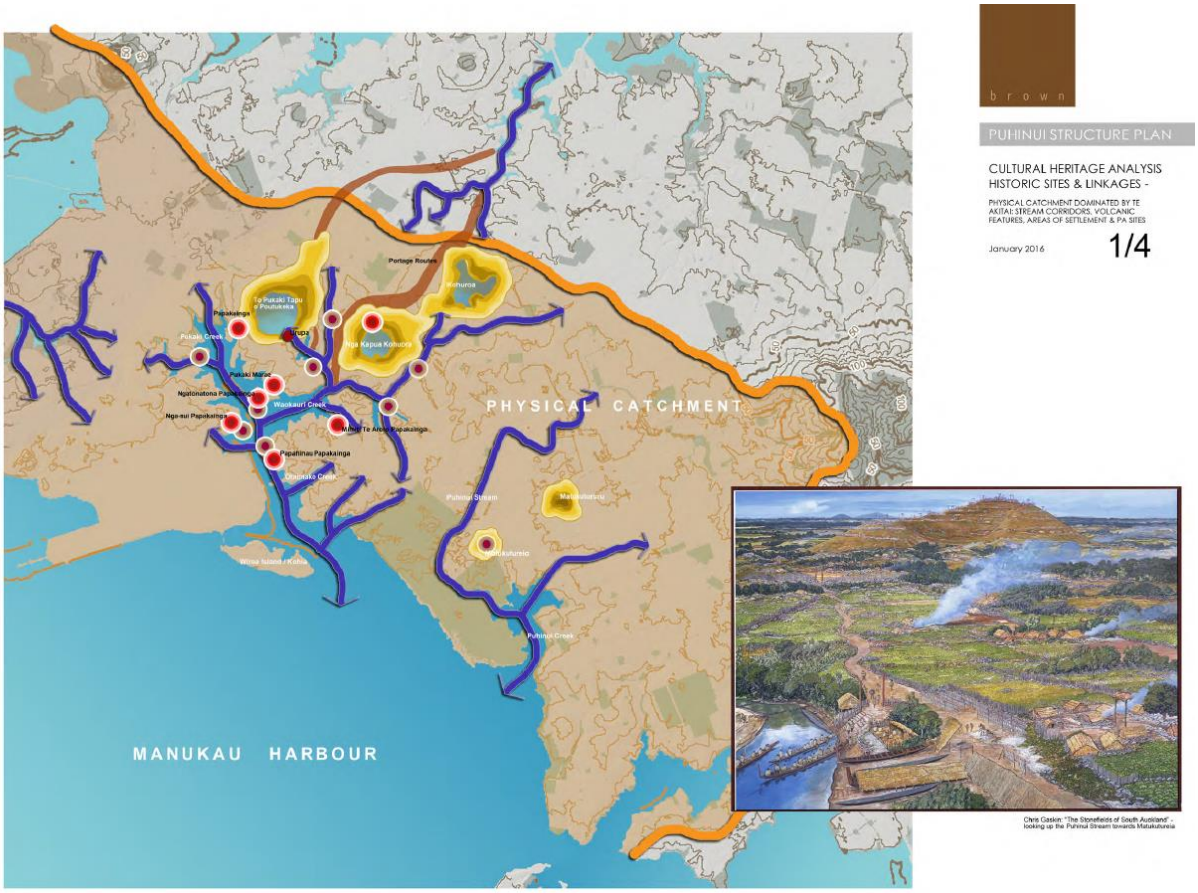


Figure 5: Puhinui Structure Plan - Cultural heritage analysis - historic sites and linkages (Stephen Brown, January 2016)

2.2.2 Core Māori values

Through discussions with Manawhenua, seven core Māori values were identified as underpinning the partnership between Manawhenua and the Project Team in the context of the Project.

These values provide an insight into Māori concepts and beliefs. The Project Team worked closely with Manawhenua to understand how these values can be interpreted with respect to the Project. This is set out below.

- **Rangatiratanga** – Manawhenua perform their role as Partners through all phases of the Project;
- **Katiakitanga** – The mauri of the natural and cultural landscapes is restored, enhanced and protected;
- **Manaakitanga** – Future Project decisions are undertaken in a way that recognises the obligation of Mana Whenua to be good hosts;
- **Wairuatanga** – The sense of belonging associated with the spiritual connection Manawhenua have to maunga, moana, awa and marae in the vicinity of the Project area and the wider cultural context is recognised through the future design of the Project;
- **Kotahitanga** – All phases of the Project are undertaken in a cohesive manner which strengthens the relationship between Mana Whenua and wider Project stakeholders;
- **Whanaungatanga** – Through the integration of the Project into the surrounding landscape, people's experience and sense of belonging is enriched; and

- **Mātauranga** – The intergenerational knowledge Manawhenua have through whakapapa is shared where appropriate, valued and utilised in future Project decisions.

Notwithstanding the above descriptions, it is recognised that the interpretation of the core values and what this looks like through future design can only be facilitated by Manawhenua as Partners in all phases of the Project.

Section 9.2 sets out how the framework has been applied in the development of the conditions for the proposed designations and alteration to Designation 6717.

3 Project description

This AEE specifically relates to a 14.9 km portion of the overall Project and primarily involves the upgrade and widening of existing transport corridors to provide for a dedicated BRT corridor and high-quality walking and cycling facilities.

Nine BRT stations are proposed as part of the Project. These stations are generally located at signalised intersections and will be staggered on either side of the intersection as shown in Figure 6

These stations are situated in the following locations:

- Smales Road;
- Accent Drive;
- Ormiston Road – Botany Junction Shopping Centre;
- Dawson Road;
- Diorella Drive;
- Ronwood Avenue (Manukau Central);
- Manukau Station;
- Puhinui Road/Lambie Drive; and
- Puhinui Station.

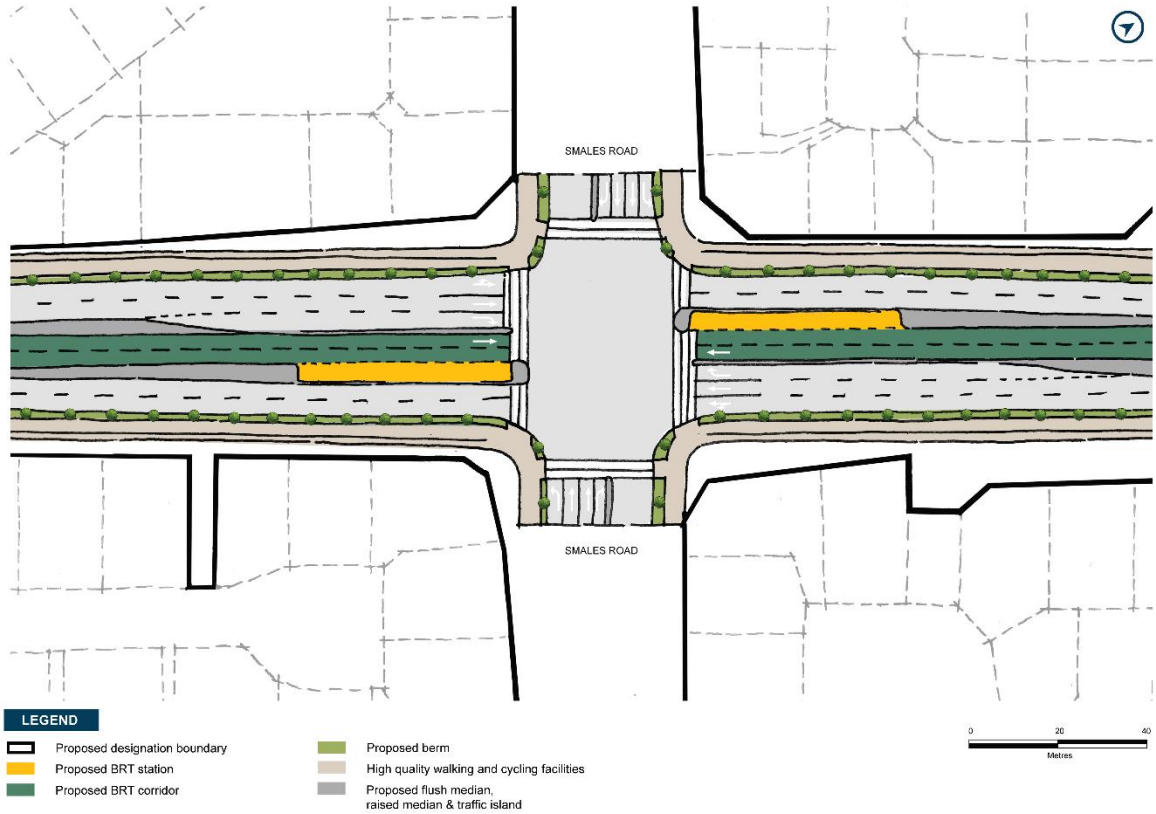


Figure 6: Indicative sketch of BRT station layout

As part of the Project, two new structures are proposed:

- A BRT bridge crossing the North Island Main Trunk (**NIMT**) and connecting to the concourse level of the Puhinui Station (see Figure 7); and
- A southbound ramp from SH20B to SH20 (see Figure 8).

Upgrades to existing structures are proposed at the:

- Bridge over Otara Creek (NoR 1);
- Bridge over SH1 (NoR 2);
- Bridge over NIMT (NoR 3); and
- Bridge over Waokauri Creek (NoR 4a).

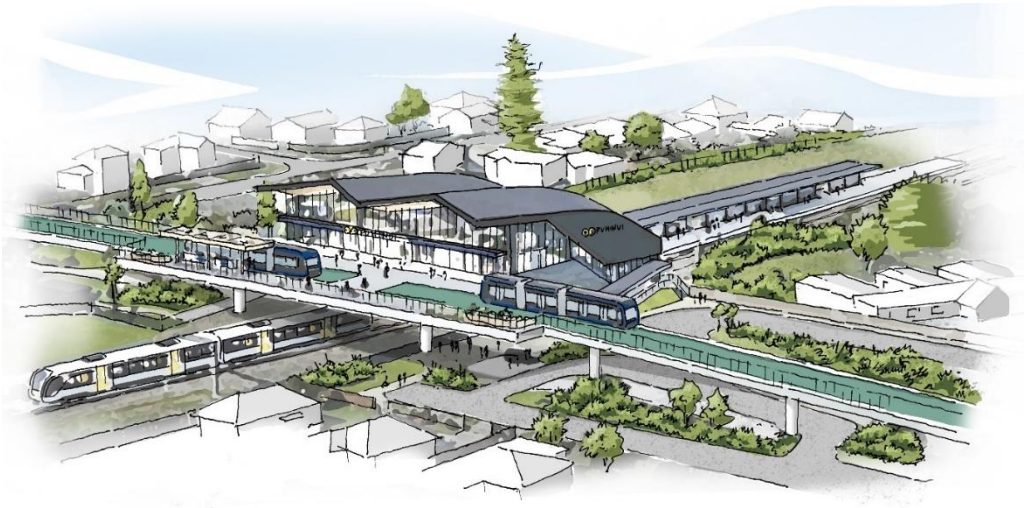


Figure 7: Indicative sketch of the BRT bridge connecting to the existing Puhinui Station

Figure 8: Indicative sketch of the southbound ramp from SH20B to SH20 (viewpoint from Puhinui Road looking west, towards Auckland Airport)

Once implemented, the Project will provide:

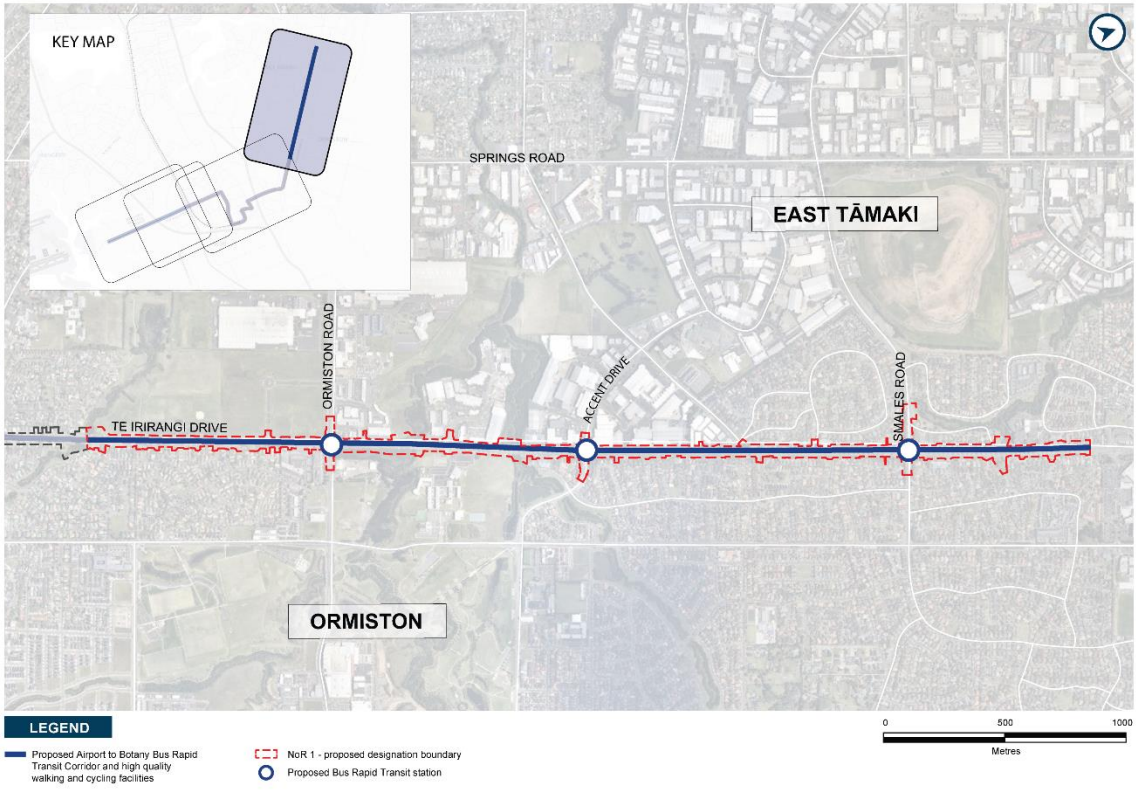
- A regular and even service pattern so that people can arrive at stations and use the service without the need to refer to a timetable; and
- Evenly spaced BRT stations with bicycle parking and off-board ticketing to reduce dwell times of these services.

To assess the varied environment that the Project passes through, the Project has been split into four sections:

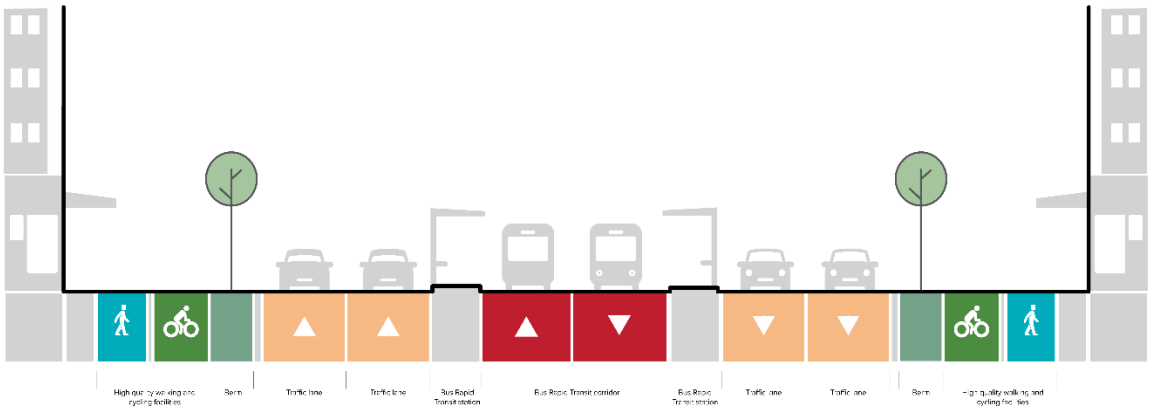
- Botany Town Centre to Rongomai Park (NoR 1);
- Rongomai Park to Puhinui Station, in the vicinity of Plunket Avenue (NoR 2);
- Puhinui Station, in the vicinity of Plunket Avenue to the SH20/SH20B Interchange (NoR 3); and
- SH20/SH20B Interchange to Orrs Road (NoR 4a (Auckland Transport)) and the intersection of Manukau Memorial Gardens (NoR 4b (alteration to Designation 6717 – NZ Transport Agency).

The key features of the Project across each of the NoRs are outlined in the tables below.

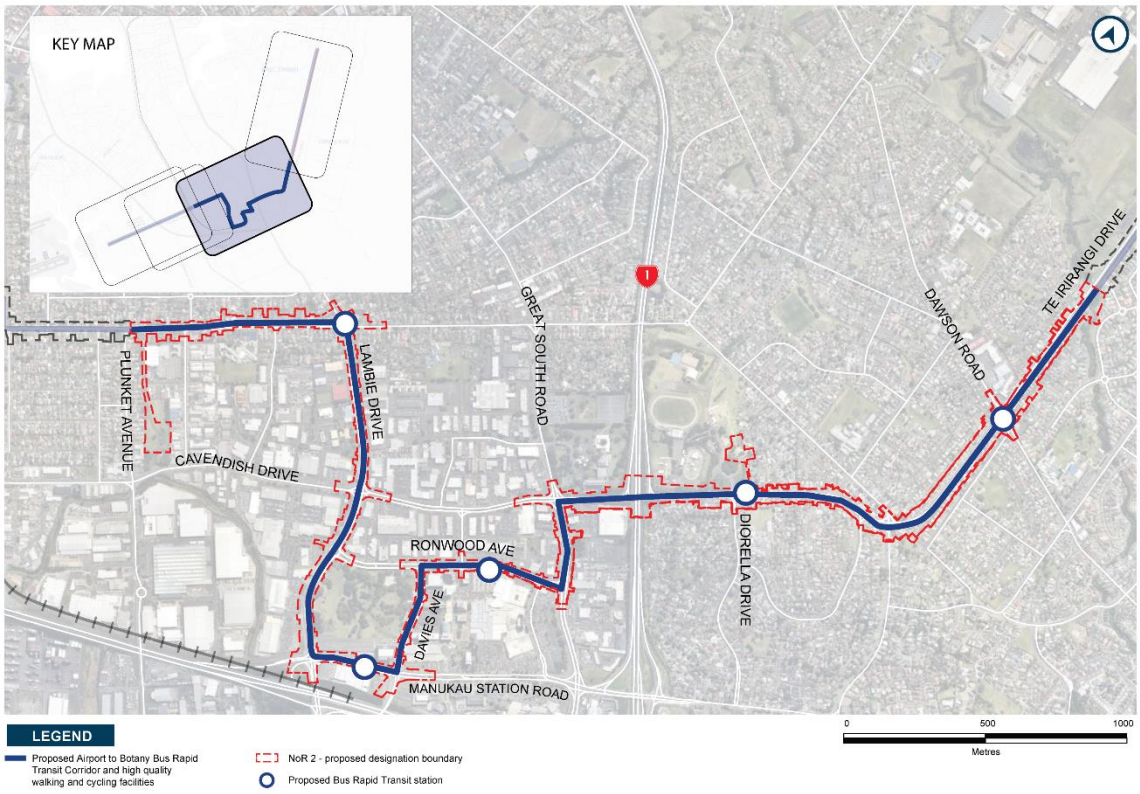
NoR 1 – Botany Town Centre to Rongomai Park



Key features	
BRT Corridor	Centre-running along Te Irirangi Drive
BRT Stations	• Smales Road Station; • Accent Drive Station; and • Ormiston Road Station.

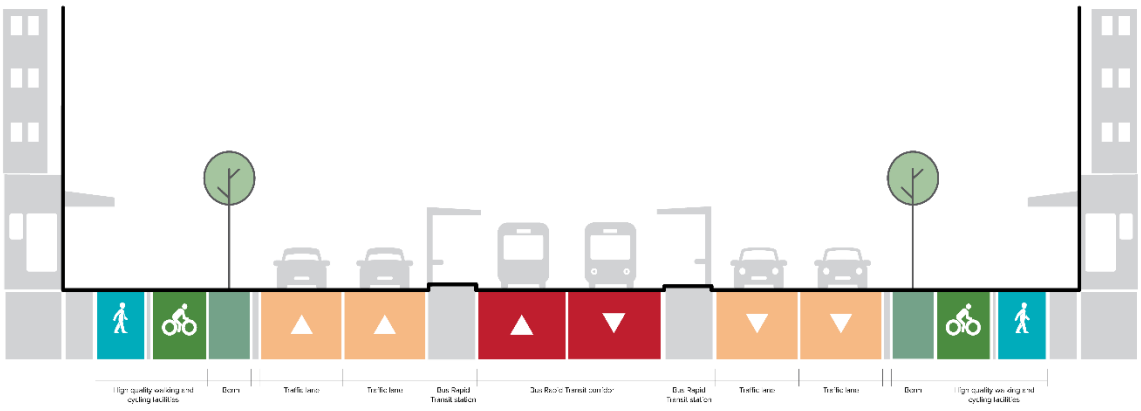
Walking and cycling facilities	Walking and cycling facilities on both sides of the corridor
General traffic	Two lanes in each direction (existing)
Access	There is an existing central median along the majority of Te Irirangi Drive which restricts right-turn access
Speed environment	50 km/h
Signalised intersections	• Te Irirangi Drive and Smales Road; • Te Irirangi Drive and Accent Drive; • Te Irirangi Drive and Bishop Dunn Avenue; and • Te Irirangi Drive and Ormiston Road.
Stormwater infrastructure	• Swales; and • Wetlands.
NoR 1 typical cross section	
	

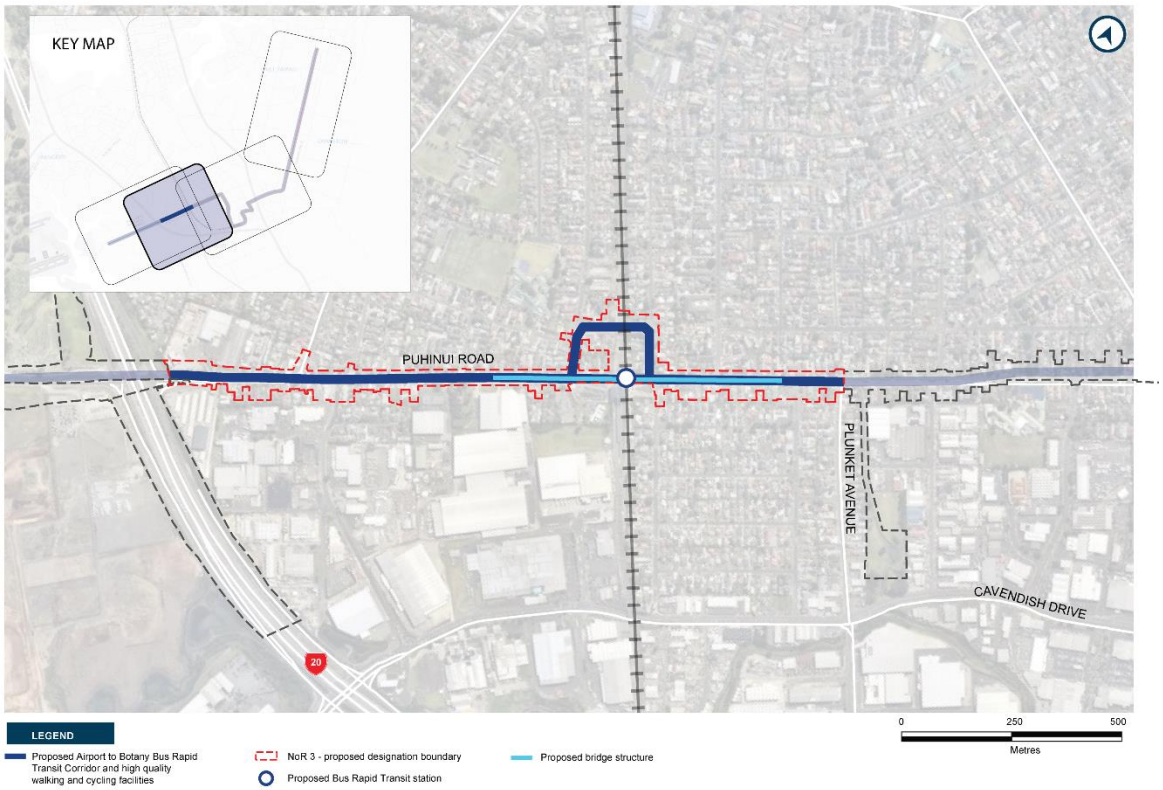
NoR 2 – Rongomai Park to Puhinui Station, in the vicinity of Plunket Avenue

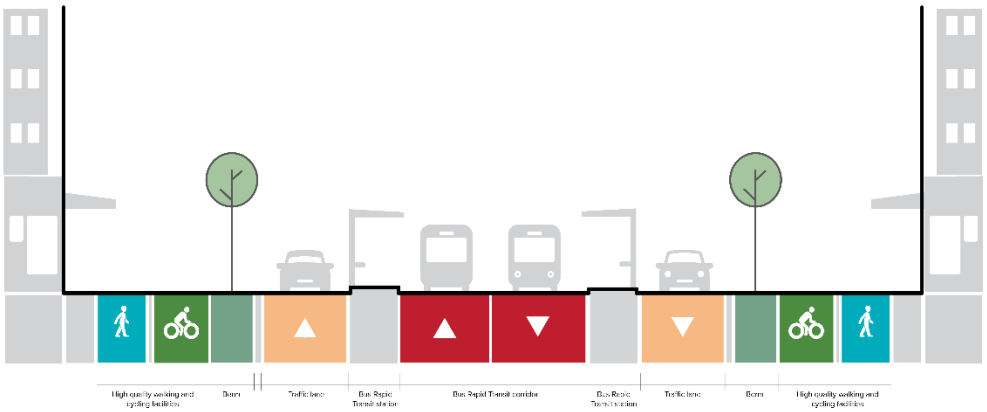


Key features

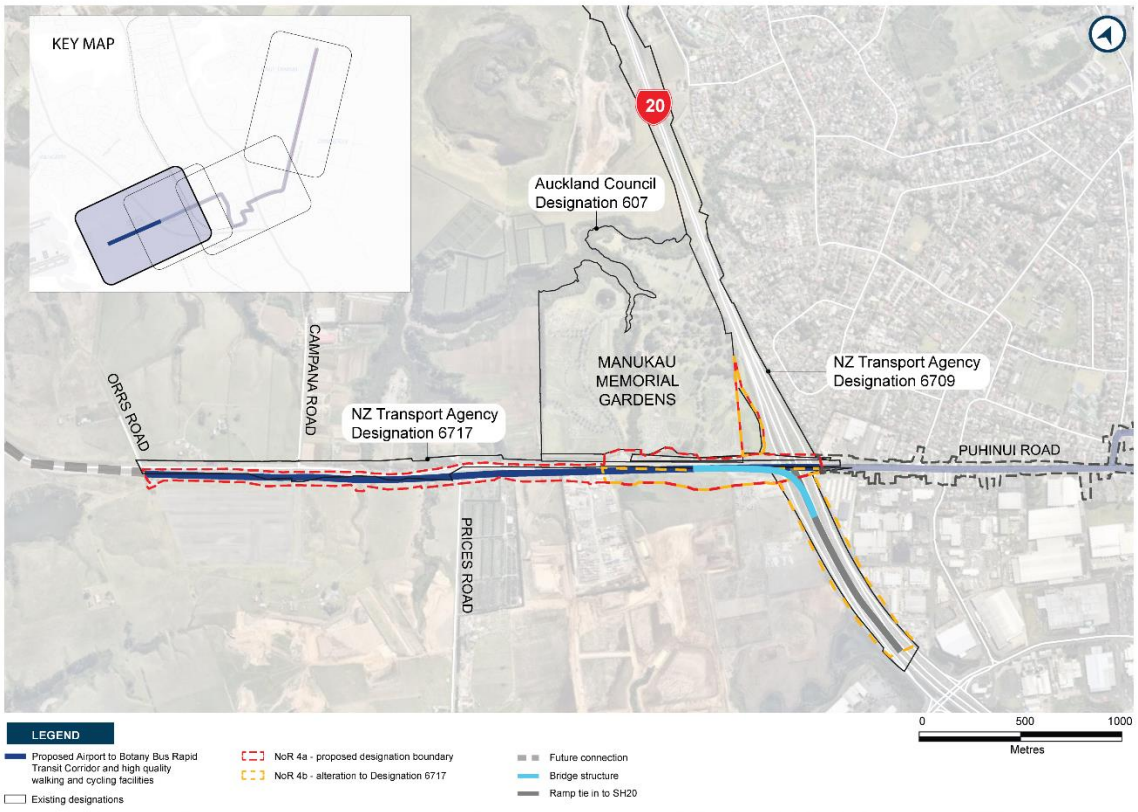
BRT Corridor	Centre-running for the majority of the corridor along Te Irirangi Drive, Great South Road, Ronwood Avenue, Manukau Station Road, Lambie Drive, and Puhinui Road West-running on Davies Avenue along the edge of Hayman Park
BRT stations	• Dawson Road Station; • Diorella Drive Station; • Ronwood Avenue Station; • Manukau Station; and • Corner of Lambie Drive and Puhinui Road Station.
Walking and cycling facilities	Walking and cycling facilities on both sides of the corridor
General traffic	• Two lanes in each direction along Te Irirangi Drive, Great South Road, Ronwood Avenue, Manukau Station Road, and Lambie Drive; • One-way single lane along Davies Avenue; and • One lane in each direction along Puhinui Road.
Access	Existing central medians limit right turn access on Te Irirangi Drive, Great South Road, Ronwood Avenue, and Lambie Drive.

	New signalised intersection at Mitre 10 and Bunnings Warehouse on Lambie Drive. Priority access for fire engine movements across the BRT corridor at Papatoetoe Fire Station.
Speed environment	• 30 km/h on Ronwood Avenue and Davies Avenue; and • 50 km/h on Te Irirangi Drive, Great South Road, Manukau Station Road, Lambie Drive and Puhinui Road.
Signalised intersections (**new intersections in bold**)	• Te Irirangi Drive and Dawson Road; • Te Irirangi Drive, Boundary Road and Hollyford Drive; • Te Irirangi Drive and Diorella Drive; • Te Irirangi Drive, Great South Road and Cavendish Drive; • Great South Road and Ronwood Avenue; • Ronwood Avenue and Davies Avenue; • Davies Avenue, Wiri Station Road and Manukau Station Road; • Manukau Station Road and Lambie Drive; • **Mitre 10 and Bunnings Warehouse;** • **Lambie Drive and Ronwood Avenue;** • Lambie Drive and Cavendish Drive; • Lambie Drive and Puhinui Road; and • **Puhinui Road and Plunket Avenue.**
Stormwater infrastructure	• Swales; and • Wetlands.
NoR 2 typical cross section	
	

NoR 3 – Puhinui Station, in the vicinity of Plunket Avenue to SH20/20B Interchange	
	
Key features	
BRT Corridor	Centre-running along Puhinui Road connecting to the Puhinui Station concourse via a new BRT bridge structure
BRT Stations	Puhinui Station
Walking and cycling facilities	• Walking and cycling facilities on both sides of the corridor; and • Walking and cycling facilities will be provided along Cambridge Terrace, Bridge Street and Kenderdine Road.
General traffic	One lane in each direction on Puhinui Road
Access	Limited right turn access
Speed environment	50 km/h
Signalised intersections	• Puhinui Road and Noel Burnside Road; and • Puhinui Road and Wyllie Road.
Stormwater infrastructure	• Wetland
NoR 3 typical cross	

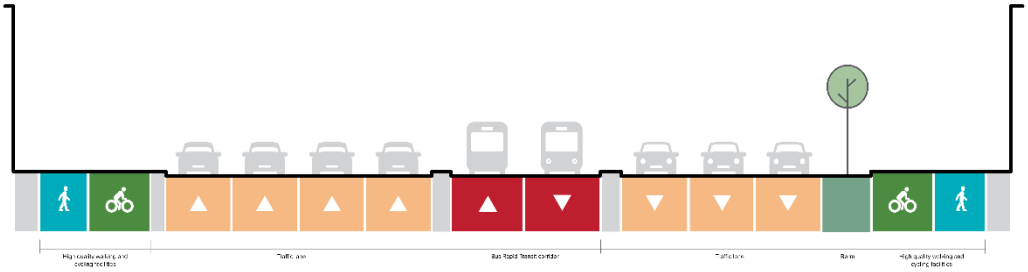

High quality walking and cycling facilities
Berm
Traffic lane
Bus Rapid Transit station
Bus Rapid Transit corridor
Bus Rapid Transit station
Traffic lane
Berm
High quality walking and cycling facilities

NoRs 4a and 4b – SH20/20B Interchange to Orrs Road

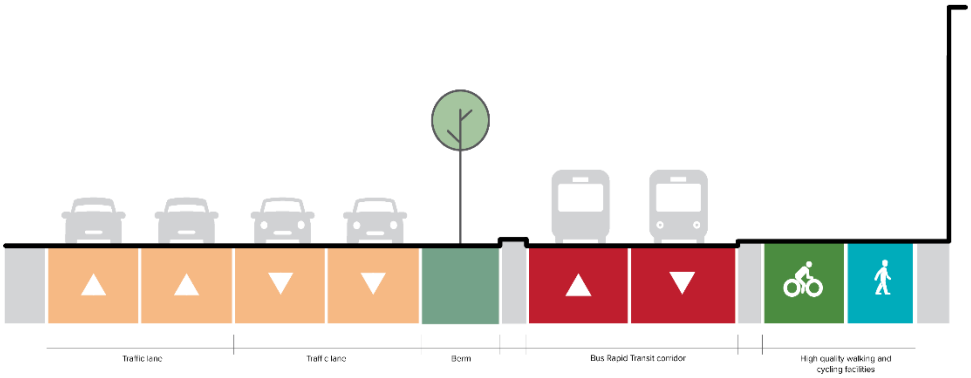


Key features	
BRT corridor	• Centre-running on Puhinui Road through to the Manukau Memorial Gardens intersection (approx. 600 m west of SH20/20B Interchange); and • South running to Orrs Road.
Walking and cycling facilities	Walking and cycling facilities on southern side of the corridor
General traffic	• Two lanes in each direction; and • New southbound ramp from SH20B onto SH20.
Access	• Limited access; and • Access maintained via signals at Manukau Memorial Gardens and Campana Road.
Speed environment	• 60 km/h
Signalised intersections	• SH20/SH20B Interchange; • Puhinui Road and Manukau Memorial Gardens; and • Puhinui Road and Campana Road.
Stormwater infrastructure	• Swales

NoR 4b typical cross section



NoR 4a typical cross section



4 Section 171 of the Resource Management Act 1991

Section 171 of the RMA sets out the matters that a territorial authority must (subject to Part 2), have particular regard to when considering the effects on the environment of allowing a Requirement. These matters are set out in the table below:

Matters to consider	**Section of the AEE where the matter is primarily addressed**
Whether particular regard has been had of any relevant provision of[1] a) A national policy statement; b) A New Zealand coastal policy statement; c) A regional policy statement or proposed regional policy statement; d) A plan or proposed plan	Section 12.2 Appendix B
Whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work if[2]: a) The requiring authority does not have an interest in the land sufficient for undertaking the work; or b) It is likely that the work will have a significant adverse effect on the environment.	Section 4.1 Appendix A
Whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought[3]	Section 4.2
Any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement[4]	Section 12.3

[1] Section 171(1)(a) of the RMA
[2] Section 171(1)(b) of the RMA
[3] Section 171(1)(c) of the RMA
[4] Section 171 (1)(d) of the RMA

4.1 Consideration of alternatives

A detailed assessment of alternatives was undertaken for the Project. This section provides an overview of the alternatives assessment process which commenced in 2018. This summary should be read in conjunction with the full assessment which sets out the process undertaken and is provided in the Alternatives Assessment Report attached at Appendix A to the AEE.

Options for the rapid transit route and mode were considered using a Multi-Criteria Analysis (**MCA**) and expert judgement. The assessment process was iterative with inputs from partners, stakeholders, and the public.

Generally, the assessment process has followed a long list – short list – recommended option process, starting at the broadest feasible area and progressively narrowing the area to a single preferred route.

28 initial route and mode options were developed. These options were then assessed through a high-level sieving process. Options did not progress if they were infeasible or determined to have high implementation risks. The 10 remaining route options formed the long list and progressed through an MCA process.

Following the long list assessment, broadly six options progressed to the short list. These options are set out in the Figure below:

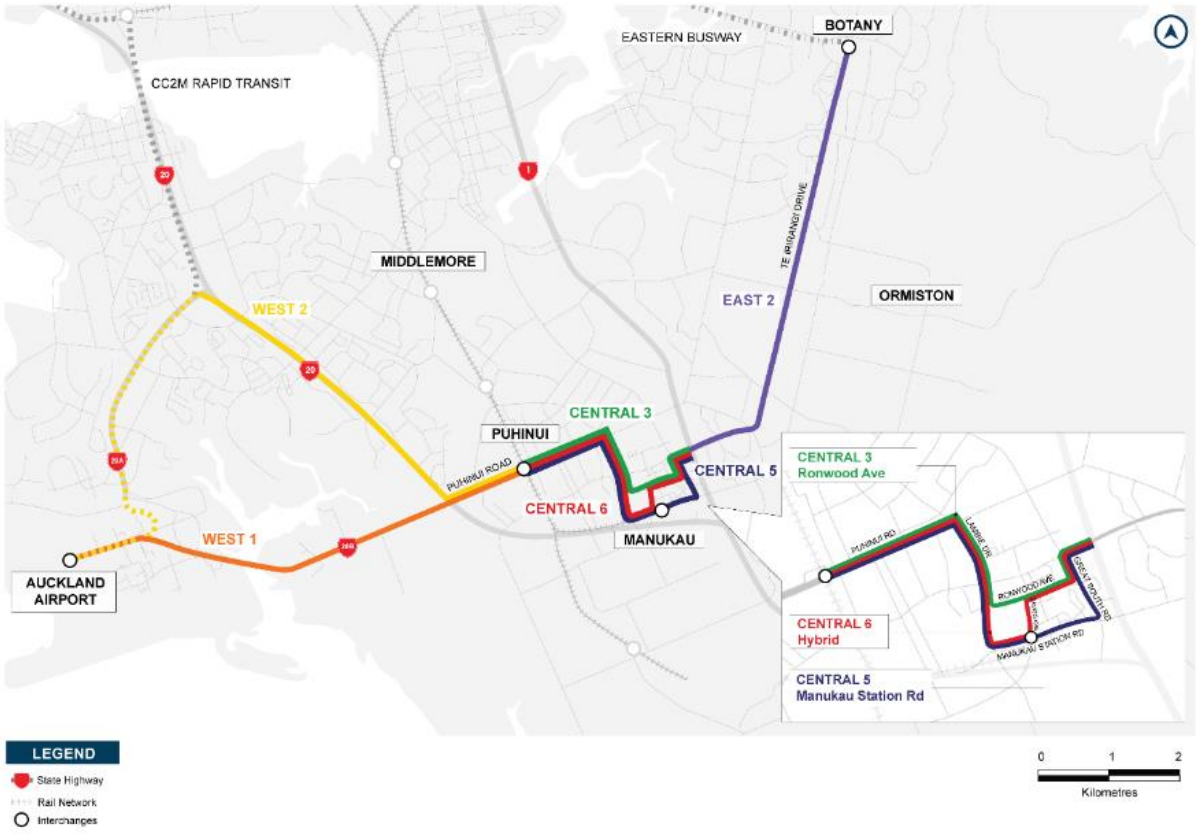


Figure 9: Map showing short list of options considered for the Project

Following the short list assessment and the consideration of partner and stakeholder feedback, the preferred Project route was identified. This followed Te Irirangi Drive, Great South Road, Ronwood Avenue, Davies Avenue, Manukau Station Road, Lambie Drive, Puhinui Road and SH20B.

Following the confirmation of the preferred Project route from Botany to the Airport, the process of identifying the preferred Project mode (i.e. Bus Rapid Transit or Light Rail Transit) was carried out. This involved customer research, local and international expertise and feedback from programme partners, Manawhenua and stakeholders. A Bus Rapid Transit mode was preferred for the Project based on forecasted demand in 2038.

Additional assessments were undertaken to determine the bus rapid transit corridor placement, side of road widening, station locations, and walking and cycling facility placement. In summary, these assessments concluded:

- The provision of centre-running BRT corridor with the exception of Davies Avenue and SH20B;
- Location and number of BRT stations; and
- The provision of high quality walking and cycling facilities including along Cambridge Terrace, Bridge Street and Kenderdine Road.

A gap analysis was undertaken in 2022 following the approval of the SSBC by the Auckland Transport and Waka Kotahi Boards. The purpose of the gap analysis was twofold – to test:

- That alternative options proportional to the scale of potential effects were considered (in accordance with section 171(1)(b) of the RMA); and
- Whether new information had emerged since the completion of the SSBC that would alter the Project.

The gap analysis concluded that some parts of the alignment required further testing based on the above. Following this process, a change was made to the side of road assessment for Puhinui Road.

The completion of this process ultimately informed the recommended Project to progress to the NoR stage. As set out in Appendix A of this AEE, adequate consideration has been given to alternative sites, routes and methods in a manner that is transparent, robust and replicable.

4.2 Whether the work and designation are reasonably necessary for achieving the objectives

Section 171(1)(c) of the RMA states that:

"When considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to—

…

(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought;"

The project objectives for the Project have been developed with section 171(1)(c) of the RMA tests in mind. Specifically, particular regard to project objectives is had:

a) In the context of considering effects on the environment; and
b) Expressly subject to Part 2 of the RMA.

Therefore, the Project objectives do not have a Part 2 or "effects management" (e.g. avoid, remedy or mitigate effects on the environment) focus but instead have been developed to:

a) Be outcomes focused and definitive of the Project; and
b) Provide a clear line of sight from the SSBC investment objectives in a manner that reflects that the investment objectives and project objectives are developed for two different purposes.

Having regard to the above, the following project objectives have been developed. Table 1 below illustrates how the line of sight between the Project objectives and the SSBC investment objectives:

Table 1: Line of sight between SSBC Investment Objectives and RMA Project Objectives

Relevant NoR/s	SSBC Investment Objectives	RMA Project Objectives
NoRs 1 – 4a	Investment Objective 1: More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland. Investment Objective 2: Reliable and resilient transport system in south and east Auckland that is easy to use. Investment Objective 3: Transport network that enables the efficient movement of goods and people. Investment Objective 4: Urban regeneration and improved built environment.	Enable the provision of public transport and active mode corridors in a manner that: a) Is safe for all transport users b) Connects Orrs Road (Auckland Airport boundary), with Manukau City Centre and Botany Town Centre. c) Includes efficient, resilient & reliable dedicated public transport and active mode infrastructure. d) Contributes to mode shift by improving travel choice and access to key destinations along the corridors. e) Connects to existing and planned public transport stations f) Integrates with the existing and planned future environments.

	Investment Objective 5: Reduce impact of the transport system on the environment and Taonga. Investment Objective 6: Safe and secure transport facilities in south and east Auckland.	g) Recognises the future strategic function of the corridor
NoR 4b		Provide for the maintenance, operation and improvement of the State Highway 20B corridor while enabling the implementation and delivery of a cycleway and shared path and a public transport corridor.

With respect to Section 171(1)(c) of the RMA, it is considered that:

a) Reasonably allows for some tolerance in terms of where necessary falls; and
a) Necessary falls somewhere between desirable and essential.

With this in mind, it is considered that the "reasonable necessity" test allows for a threshold assessment, proportionate to the circumstances to determine whether the Project is justified in the context of Section 171(1)(c) of the RMA.

The following provides an assessment of whether the work and designation are reasonably necessary for achieving the Project objectives:

NoR	**RMA Objective**	**The proposed designations and alteration to Designation 6717 are reasonably necessary to achieve the Project Objectives because they provide for:**
NoRs 1 to 4a	Enable the provision of public transport and active mode corridors in a manner that: a) Is safe for all transport users; b) Connects Orrs Road (Auckland Airport boundary), with Manukau City Centre and Botany Town Centre; c) Includes efficient, resilient and reliable dedicated public transport and active mode infrastructure; d) Contributes to mode shift by improving travel choice and access to key destinations along the corridors; e) Connects to existing and planned public transport stations; f) Integrates with the existing and planned future environment; and g) Recognises the future strategic function of the corridor.	Auckland's south-western, southern and eastern areas is home to a significant population. Currently, public transport within these areas is provided by standard bus service and only partially served by rapid transit, with no direct connections to key employment areas such as Manukau and Auckland Airport. Within these areas, there is also a lack of safe and separated walking and cycling facilities which means that cyclists need to share road space with general traffic along major arterial corridors. Future growth is projected for Auckland, including the southern and eastern areas and this is likely to increase pressure on the existing transport network. The Transport chapter of this AEE (Section 9.3) demonstrates that the Project addresses these issues by providing: • A BRT corridor which will improve access between Botany, Manukau and the Airport; and
NoR 4b	Provide for the maintenance, operation and improvement of the State Highway 20B corridor while enabling the implementation and delivery of a	

	cycleway and shared path and a public transport corridor.	• Separated walking and cycling facilities which will increase mode shift and improve safety for all users. Therefore, the Project is reasonably necessary to meet the Project objectives.

5 Lapse period sought and rationale

In accordance with section 184(1) of the RMA, a designation lapses five years after it is included in the District Plan unless:

a) It has been given effect to; or
b) Within three months of the designation lapsing, the territorial authority determines that substantial progress or effort has been and continues to be made towards giving effect to the designation, or
c) The designation specifies a different lapse period.

In accordance with section 184(1)(c) of the RMA, lapse periods of 15 years are required for the Project (except for NoR 4b which is an alteration to Designation 6717).

When considering an extended lapse period, it is appropriate to balance the need for that lapse period against the potential prejudicial or "*blighting*" effects. In the context of the Project, an extended lapse period is considered necessary for the following reasons:

a) It provides the Requiring Authorities sufficient time to:
    (i) Undertake the detailed design of the Projects;
    (ii) Obtain the necessary resource consents;
    (iii) Procure funding;
    (iv) Undertake tendering / procurement; and
    (v) Undertake property and access negotiations and other processes associated with the Project construction
b) It provides property owners, businesses and the community certainty on where transport routes will be located (i.e. within the designation boundaries) and within what timeframe (the end lapse date).
c) It supports efficient land use and transport integration by enabling the efficient delivery of transport infrastructure at a time and in a way that is integrated with planned intensification;

It is noted that:

a) An extended lapse period does not mean that the designation will not be given effect to until the end of the lapse period sought. A lapse period is a limit and not a target.
b) It is not uncommon for infrastructure projects to have a longer lapse period and this has been confirmed on recent projects such as the Drury Arterial Network (Auckland Transport), 2022 Southern Links (Waka Kotahi), 2015, the Northern Interceptor Wastewater Pipeline (Watercare), 2013 and the Hamilton Ring Road (Waikato District Council, Hamilton City Council).
c) Setting an unrealistically short lapse period would not be a significant factor in facilitating earlier availability of funding than is planned at the time the NoRs are sought.

Generally, the effects of an extended lapse period include a lack of uncertainty as to:

a) When construction will commence;
b) How long an affected party will be subjected to construction effects and the degree to which they will be affected by those effects; and
c) The form of the potential effects of the future operation of the Project.

In the absence of a specific construction commencement date, and other precise information regarding construction duration within any specific area, it is considered that the most workable method for managing any outstanding uncertainty associated with the lapse period being sought is

ongoing communication. This is discussed further in Section 8 and addressed in the conditions of the proposed designations and Alteration to Designation 6717.

6 Design and assessment approach

This section sets out the approach to design, construction methodology and the existing and future environment.

6.1 Approach to design

As established, the proposed designations (NoRs 1 to 4a) and alteration to Designation 6717 (NoR 4b) sought by the NoRs will protect a BRT corridor with high quality walking and cycling facilities.

The design undertaken to date is at a level sufficient to inform the proposed designation boundaries and to assess an envelope of effects that includes operational and maintenance requirements, potential construction areas, and areas required to mitigate effects from the Project. It has been prepared for assessment purposes, and to indicate what the final design of the Project may look like.

The final alignment for the Project (including the design and location of associated works including bridges, culverts, stormwater management systems, soil disposal sites, signage, lighting, landscaping, realignment of access points to local roads, and maintenance facilities), will be refined and confirmed at the detailed design stage.

The detailed design will be undertaken before construction and an Outline Plan or Plans (as the Outline Plans may be staged to reflect Project phases or construction sequencing) will be submitted to Council as set out in s176A of the RMA.

The implementation timeframe for the Project is yet to be confirmed and is subject to funding. To enable an assessment of the potential effects of the Project on the environment, the assumed construction start date is 15 years away.

The drawing set contained in Volume 3 includes General Arrangement Plans for each NoR.

6.2 Construction methodology

6.2.1 General approach

An indicative construction methodology has been developed based on the level of design undertaken to date and the current land use / land form in which the corridor is located.

The construction of the Project will be undertaken within a Management Plan framework. The conditions for each of the proposed designations and altered existing designation will be in place to manage the effects of the construction activities. Should the contractors wish to undertake construction activities in a manner which is not within the scope of the proposed designations, or any future resource consents, additional authorisations will need to be obtained at that time.

Management Plans form an integral part of the construction methodology for the Project setting out how specific matters will be managed. A suite of Management Plans are proposed for the Project. These are discussed in Section 10 of this AEE and include the following:

- Construction Environmental Management Plan (**CEMP**);
- Construction Noise and Vibration Management Plan (**CNVMP**);
- Construction Traffic Management Plan (**CTMP**);

- Stakeholder and Communication Engagement Management Plan (**SCEMP**); and
- Network Utilities Management Plan (**NUMP**).

The management of any potential or actual effects arising from construction activities that relate to regional resource consenting matters will be provided for when these consents are sought, in the future.

The Management Plans and future Outline Plan(s) required for the proposed designations will be submitted to Auckland Council prior to the commencement of construction.

Following the Completion of Construction, the designation boundary will be reviewed and any land that is not required for the permanent work or for the on-going operation, maintenance or mitigation of the Project will be reinstated in coordination with directly affected landowners or occupiers.

6.2.2 Construction area requirements

Typical offsets for construction areas of various construction work have been adopted to inform the proposed designation boundaries. These offsets and typical construction areas have been based on similar transport infrastructure projects of this size and nature.

The table below provides guidance on the typical offsets and construction areas. These are intended to allow sufficient working areas to facilitate the construction of the Project and are indicative only. Final areas will be determined during detailed design and informed through the Outline Plan process.

Table 2: Typical construction work areas

Construction Element	Typical area or offset required for construction
Earthworks - construction of batter slopes (urban environment, minimal earthworks cut/ fill)	2 m from earthworks batter slopes
Earthworks - construction of batter slopes (rural environment, moderate earthworks cut/ fill)	6 m from earthworks batter slopes for construction access and environmental controls
Stormwater wetland	6 m around for access and environmental controls.
Construction access road	Typically 4 m wide for smaller vehicles, utes, etc. No heavy vehicle access.
Bridge construction (substructures: abutments, piers)	20 m either side of the bridge, and minimum 40m behind each abutment ends for construction access, e.g. cranes, piling rigs, trucks
Bridge construction (Superstructure)	20 m either side of bridge for typical crane access, truck access
Retaining wall construction (minor/ small retaining walls e.g. timber or blocks works)	Typically, 6 m outside the wall in cut, 2 m for fill retaining walls

Retaining walls (large) e.g. secant pile wall, sheetpiles, mechanically stabilised earth	Typically, 15 m outside of wall in cut, 5 m behind wall for fill retaining walls
Main site compound	5,000 - 10,000 m^2 (depending on scale of the Project)
Construction areas	500 m^2 to 2,000 m^2 for satellite site compounds and construction yards. (located near critical work areas, e.g. bridge, retaining walls, culverts, major drainage works, major earthworks for site staff and crews)
Stream diversions, culverts and headwalls	Typically 10 to 20 m beyond the extent of the permanent works for stream diversions, culverts, and larger headwall construction.

6.2.3 General construction activities

This section contains a description of the following general construction activities across the Project including:

- Site establishment;
- Temporary traffic management;
- Construction yards and site compounds;
- Protection and/or relocation of existing network utilities;
- Bridge and structures works;
- Earthworks;
- Works in watercourses; and
- Pavement construction, streetscape and finishing works.

6.2.4 Enabling works, utility relocation and protection

The Project traverses a predominantly urban environment. As a result, there a several network utilities crossing the corridor. The key services within the NoRs include:

- Aviation fuel lines;
- High voltage overhead and underground transmission lines; and
- A gas transmission line

Section 9.13 of the AEE sets out the assessment of effects of the Project on these network utilities.

Initial discussions have been undertaken with network utility operators. Works in relation to any network utility will be undertaken in accordance with any future agreements made with each network utility operator to ensure compliance with their methodologies, standards and requirements.

The exact scope of works for service relocation will be confirmed through site investigations and developed in consultation with the respective utility operators once detailed design of the Project is complete.

6.2.5 Site establishment

6.2.5.1 Construction areas

Construction areas include main site compounds and site laydown areas. The main site compound will be used as office facilities for project and administration staff. Typically, the main compound will be located in a strategic location with easy access from a nearby road or public transportation.

Where possible, the main site compound will utilise an existing site or building(s) that are within the proposed designation boundary due to being impacted by the Project. The use of the main site compound will only be required during the construction period and the site will be reinstated upon completion of the works.

Construction areas are located along the corridor near works sites for example, major earthworks, bridges and culvert sites. These areas are relatively flexible and can evolve as the construction progresses. Several areas within the designation boundary have been identified as indicative construction areas. These areas are set out in Volume 3 and summarised in the table below:

Construction area	NoR	Plan reference
1	NoR 1	General Arrangement Plan – NoR 1 Chainage 2620
2		General Arrangement Plan – NoR 1 Chainage 2780
3		General Arrangement Plan – NoR 1 Chainage 3250
4		General Arrangement Plan – NoR 1 Chainage 6420
5		General Arrangement Plan – NoR 1 Chainage 6880
6	NoR 2	General Arrangement Plan – NoR 2 Chainage 2400
7		General Arrangement Plan – NoR 2 Chainage 400
8		General Arrangement Plan – NoR 2 Chainage 050
9		General Arrangement Plan – NoR 2 Chainage 320
10	NoR 3	General Arrangement Plan – NoR 3 Chainage 1200
11		General Arrangement Plan – NoR 3 Chainage 1100
12	NoRs 4a and 4b	General Arrangement Plan – NoR 4 Chainage 3200

6.2.5.2 Site clearance and demolition

Site clearance to allow for construction activities across the Project may involve the removal of topsoil, fences, structures, trees, vegetation and other clearance works such as building demolition.

Vegetation removal will be carried out by a Suitably Qualified and Experienced Person and will be in accordance with relevant designation conditions. Traffic management will be required during the clearing of vegetation adjacent to live carriageways.

In some instances, site clearance includes the demolition of existing buildings or structures. Property demolition will be carried out by a Suitably Qualified and Experienced Person. The scope of demolition and accommodation works will be verified by the contractors once detailed design and construction planning progresses.

6.2.6 Traffic management and access

Construction of the Project will likely involve disruption to the surrounding existing road network and property accesses. Additional traffic will be generated from general staff and workforce for the Project as well as construction specific traffic such as traffic movements for material delivery and movement within construction areas.

The assessment and proposed temporary construction traffic management measures are discussed in Section 9.3.2 of this AEE and detailed in the Assessment of Transport Effects provided in Volume 4.

Generally, access along the existing Project corridor will largely be maintained, however, some closures will be needed for critical activities at night or on weekends.

Site Access Points will be required to access the nominated construction areas. Each construction area may require several access points to ensure adequate access and flexibility for the construction works. Access for construction vehicles, plant and materials will be via the designated Site Access Points.

The Site Access Points and temporary traffic management controls will be in accordance with the Waka Kotahi code of practice for temporary traffic management.

6.2.7 Bridge, culvert and stream works/works in watercourses

The bridge, culvert and stream works will be confirmed during detailed design and be undertaken in accordance with any specific conditions on the designation and the applicable resource consent conditions. Resource consents for bridge, culvert and related stream works will be sought as part of the future consenting stage.

Bridges over rail will require specific KiwiRail approval to work adjacent live overhead lines and rail lines. These works are required to be carried out during a block of line which are typically carried out during night-time, weekends, and public holidays. An extended block of line is typically available during the Christmas and New Years' period which the contractor may plan to carry out significant construction works to make use of the prolonged closure period. The planning and approval process will be managed through a Management Plan framework by the contractor closer to the time of construction and in consultation with KiwiRail.

6.2.8 Earthworks

Bulk earthworks will typically be undertaken during summer earthworks months and minor earthworks and pavement construction can be carried out all year round provided sediment runoff and environmental controls are managed accordingly. Resource consents for bulk earthworks will be

sought in the future at detailed design stage. Bulk earthworks will be required to accommodate road formation and contouring for the proposed stormwater wetlands.

Earthworks will typically include the following activities once enabling works have been undertaken:

- Topsoil stripping and removal of any unsuitable materials;
- Cut and/or fill to grade or formation, including conditioning and suitable compaction;
- Preparation and conditioning of the subgrade layer;
- Final trimming and topsoil placement; and
- Landscaping and site reinstatement.

Within each of the construction areas an earthwork compound for handling, stockpiling some topsoil, loading and conditioning site won material will be established to enable better utilisation of the existing material. Where required, top soil stockpiles can also be utilised. The topsoil can be used as water diversion bunds for environmental control purposes. The remaining volume will need to be stockpiled in site laydown areas. Areas for these activities have been provided for within the proposed designation boundaries.

Suitable dust management measures will be considered for the Project and are anticipated to include:

- Water carts to minimise dust during earthworks;
- Covered trucks hauling material onto and off site; and
- Mulching and top soiling of exposed earthworks.

Erosion and sediment control measures will be installed in the future, in accordance with any applicable resource consent conditions and the Auckland Council Erosion and Sediment Control Guidelines or subsequent amendments.

6.2.9 Indicative construction staging and programme

The specific staging of construction works will be dependent on the:

- Procurement;
- Land acquisition;
- Final detailed design of the Project;
- The construction duration, staging of the Project and targeted completion dates;
- Technological advancements of construction methods;
- Availability of contractors; and
- Availability of other resources (such as materials and construction equipment).

Based on a high level estimate of similar transport projects, the anticipated construction duration for each NoR is set out in Table 3 below. These durations are indicative and assume that each NoR will be constructed independently of each other. If the NoRs were to be constructed concurrently or sequentially, this may change these durations.

Table 3: Indicative construction duration for each NoR

NoR	Extent	Length	Estimated duration
NoR 1	Botany Town Centre to Rongomai Park	4.3 km	4 to 5 years

NoR 2	Rongomai Park to Puhinui Station, in the vicinity of Plunket Avenue. Including the widening of existing bridge over SH1.	6.4 km	4 to 6 years
NoR 3	Puhinui Station, in the vicinity of Plunket Avenue to SH20/20B Interchange. Including the BRT bridge connecting to Puhinui Station	1.9 km	3 to 4 years
NoRs 4a and 4b	SH20/20B Interchange to Orrs Road. Including the ramp structure from SH20B to SH20	2.3 km	3 to 4 years

6.3 Approach to the assessment of effects

Section 171(1) of the RMA sets out the matters that must be considered by a territorial authority in making a recommendation on a NoR for a new designation. Under section 181(2), those same matters are to be considered "*with all necessary modifications*", in relation to a NoR for an alteration as if it were a NoR for a new designation. In the context of the Project, NoR 4b is for an alteration to an existing designation (Designation 6717) for NZ Transport Agency, NoRs 1 to 4a are new designations for Auckland Transport.

When assessing the actual or potential effects on the environment, the assessment has been limited to matters that trigger a District Plan consent pursuant to section 9(3) of the RMA.[5]

Where national (through any applicable National Environmental Standard) or Regional Plan consenting requirements are triggered, these will not be authorised by the proposed designations and alteration to existing designation and will require all necessary national and regional consents to be obtained in the future.

Based on the above, the assessment of effects that have been undertaken to support the Project is limited to the following matters:

- Transport;
- Arboriculture;
- Social;
- Property, land use and business;
- Urban design;
- Landscape;
- Flooding;
- Noise and vibration;
- Terrestrial ecology;
- Archaeology and built heritage; and
- Network utilities.

[5] Section 176(1)(a) – *If a designation is included in a district plan then section 9(3) does not apply to a public work or project or work undertaken by a requiring authority under the designation*

6.4 Approach to stormwater management

Effects of stormwater quantity, quality and effects on streams is authorised under the Regional Plan and therefore will be considered as part of a future consenting process.

Notwithstanding this, provision is made for the future mitigation of potential stormwater effects (retention/detention and stormwater quality) within the proposed designation boundaries. This is based on a stormwater philosophy developed for the Project in partnership with Manawhenua.

This partnership has informed the Project Team's understanding of how development within the catchments that the Project corridor traverses has impacted Manawhenua, including people, traditional practices, and the environment. Key guidance from Manawhenua through wānanga included the following:

- Support for ki uta ki tai, catchment scale approach seeking opportunities for net catchment benefit;
- Preference for green infrastructure and nature-based solutions;
- Recognition that the Project traverses a predominantly urban environment which means there are many constraints, however, environmental enhancement should be prioritised;
- Multifunctional solutions are preferred as stormwater management inherently spans both environmental and social considerations;
- The stormwater management outcomes need to connect with and be integrated within other Project outcomes and opportunities; and
- Stormwater management solutions positioned in close proximity to stream receiving environments need to be developed in partnership with Manawhenua.

Considering the above, the stormwater philosophy for the Project is guided by the following principles:

- **Te mauri o te wai** – the life-sustaining capacity of water is protected and enhanced;
- **Ki uta ki tai** – provide net catchment benefit, recognising connected waterways from the mountains to the sea;
- **Partnership** – Manawhenua are enabled as decision makers and kaitiaki, with inter-organisational collaboration enabling wider outcomes; and
- **Multi-benefit solutions for broader outcomes** – include opportunities for stormwater management within landscaping requirements and community spaces.

In order to determine the type and location of stormwater management solutions (to inform the proposed designation boundaries), the following key technical considerations were identified in addition to current stormwater design guides, strategic guidance documents[6] and constraints along the Project corridor:

- Locating stormwater management solutions near low points along the corridor to maximise contributing catchment;
- Integrating stormwater management solutions with parks and public open spaces, where practicable;
- Considering the proximity of potential stormwater management solutions to high contaminant generating areas; and
- Locating stormwater management solutions outside of flood plains where practicable.

[6] Hīkina te Wero – Auckland Transport's Environmental Action Plan, Toitū Te Taiao – Waka Kotahi's Sustainability Action Plan

The summary of the stormwater management approach is set out in Figure 10 below.

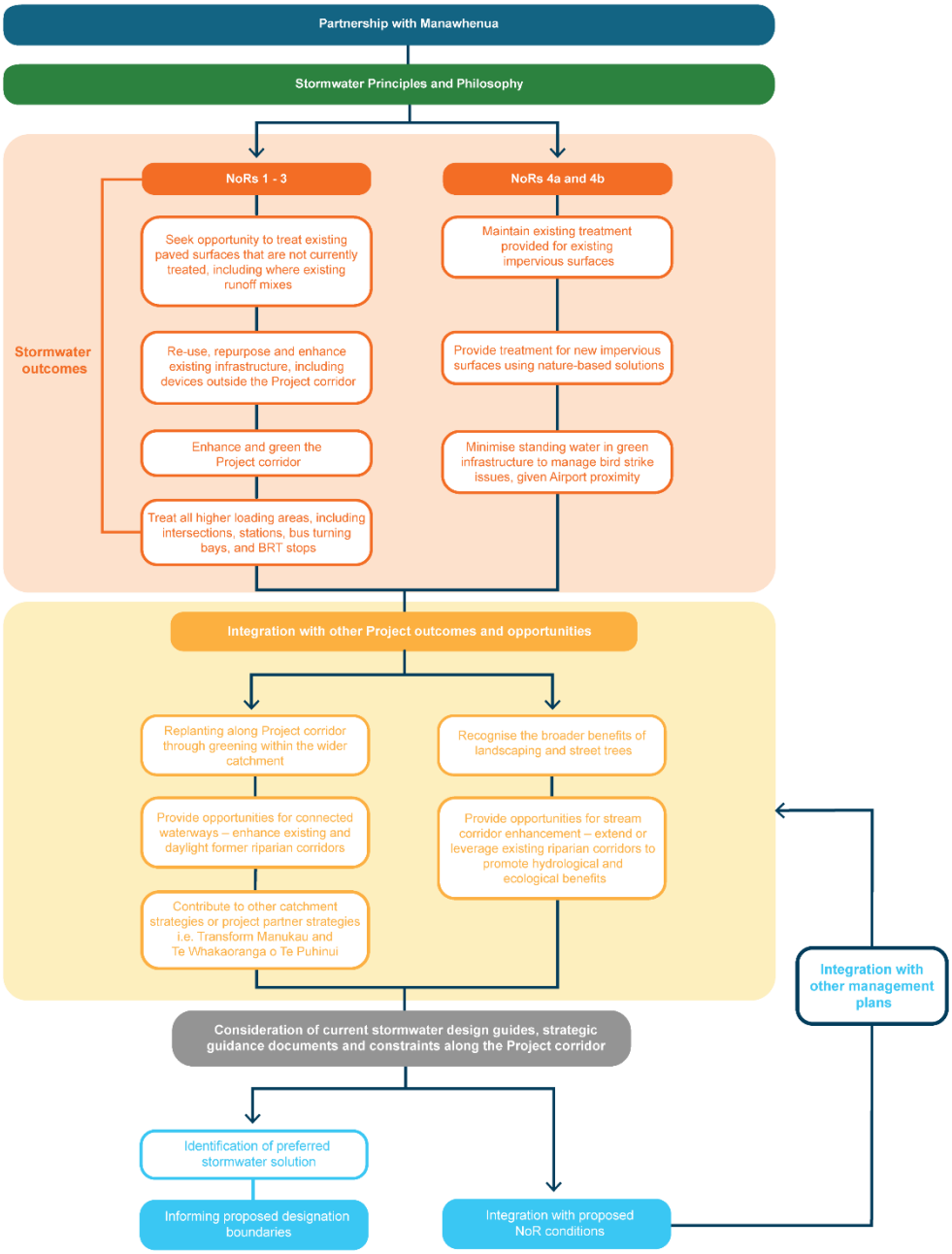


Figure 10: Overview of stormwater management approach

It is noted that this approach sets out the overarching stormwater management philosophy and rationale for proposed stormwater management treatment along the Project corridor in the context of relevant stormwater related statutory requirements. This approach will be further developed through future consenting and the detailed design process.

7 Existing environment

It is well established that the *"environment"* is the existing environment as well as elements of the future environment such as permitted activities under the relevant plans and resource consents that have or are likely to be implemented. In addition, it is acknowledged that the future environment requires consideration of that environment as signalled by operative objectives and policies of a District Plan.

Sections 7.1 – 7.4 sets out the existing environment for the Project as at the date of lodgement.

While the environment is predominantly urban, consideration of the environment as it exists today will not be a true reflection of the environment in which the corridor will operate. As a result, Section 7.5 sets out the likely future receiving environment for the Project.

7.1 NoR 1 – Botany Town Centre to Rongomai Park

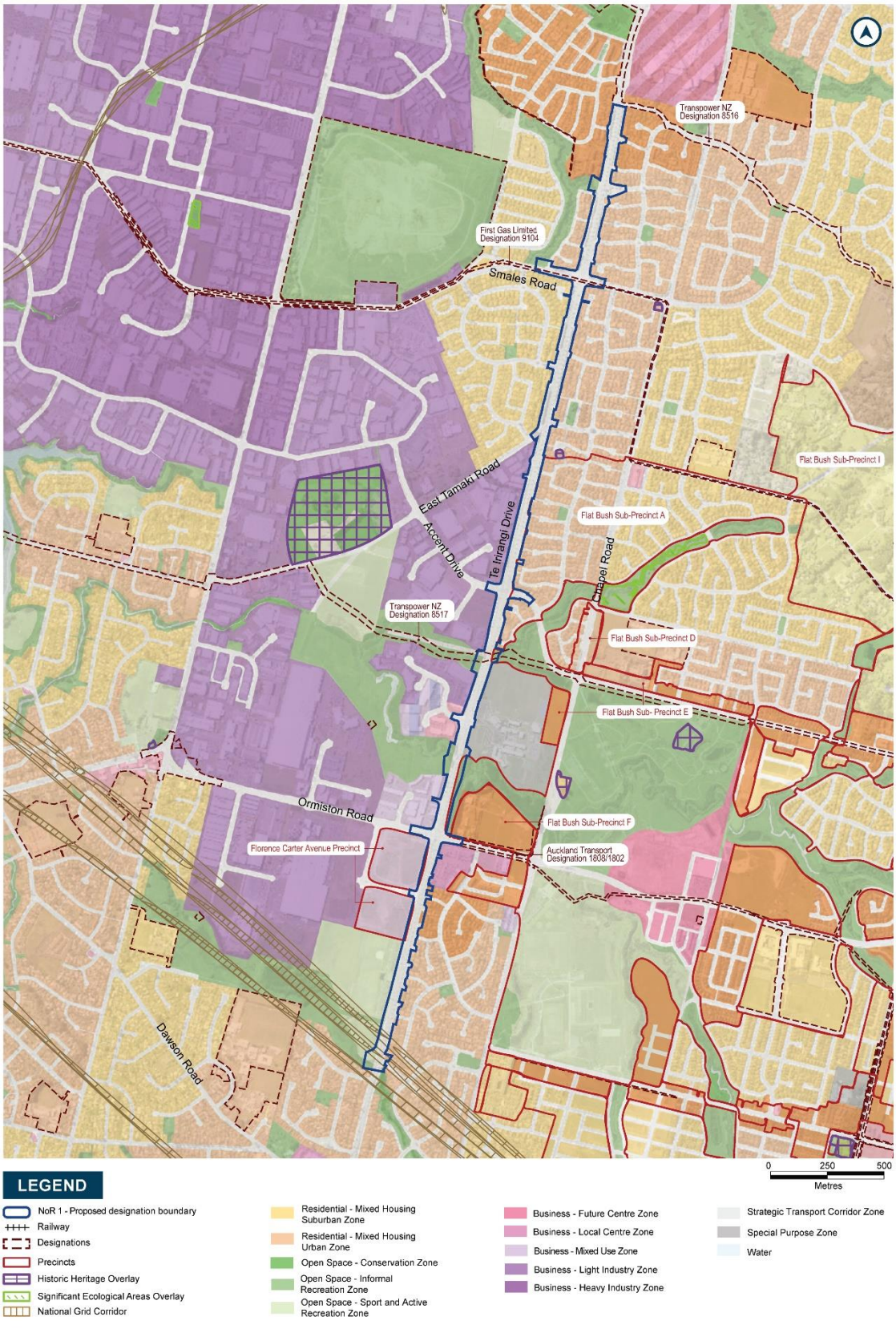


Figure 11: Key features - NoR 1

Features	Description
Current land use	The land use along Te Irirangi Drive is primarily residential with some commercial, educational, and retirement facilities. Rongomai Park is zoned for both sports and active recreation and informal recreation.
Community and local facilities	• Local Doctors; • Dannemora Gardens Metlifecare Retirement Village; • Sancta Maria schools; • Early Childhood Education – Kindercare; and • BestStart Early Childhood Education
Waterbodies	The Project crosses Otara Creek to the south of Sancta Maria schools
Vegetation and ecology	Riparian vegetation adjoins Otara Creek
Historic heritage and archaeology	Four recorded archaeological sites and one associated historic heritage extent of place within 200 m of the Project.
Existing designations	• Designation 8516 Brownhill Road to Pakuranga Underground Electricity Transmission Cables (Transpower New Zealand Ltd); • Designation 8517 Brownhill Road to Otahuhu Underground Electricity Transmission Cables (Transpower New Zealand Ltd); and • Designation 9104 Gas transmission pipeline (First Gas Limited)
Precincts	• Flat Bush Precinct; and • Florence Carter Avenue Precinct.
Overlays	• Aircraft Noise Notification Area Overlay; and • National Grid Overlay.
Other non statutory features	• Flood Prone Areas; • Flood Plains; and • Overland Flow Paths including 100 ha and above
Current zoning	• Business – Metropolitan Centre Zone; • Business – Local Centre Zone; • Business – Neighbourhood Centre Zone; • Business – Mixed Use Zone; • Business – General Business Zone; • Business – Light Industry Zone; • Residential – Mixed Housing Suburban Zone; • Residential – Mixed Housing Urban Zone; • Residential – Terrace House and Apartment Buildings Zone; • Open Space – Informal Recreation Zone; • Open Space – Sports and Recreation Zone; and • Special Purpose Zone – Sancta Maria School

Likely future zoning	Refer to Section 6.4 of the AEE

7.2 NoR 2 – Rongomai Park to Puhinui Station, in the vicinity of Plunket Avenue

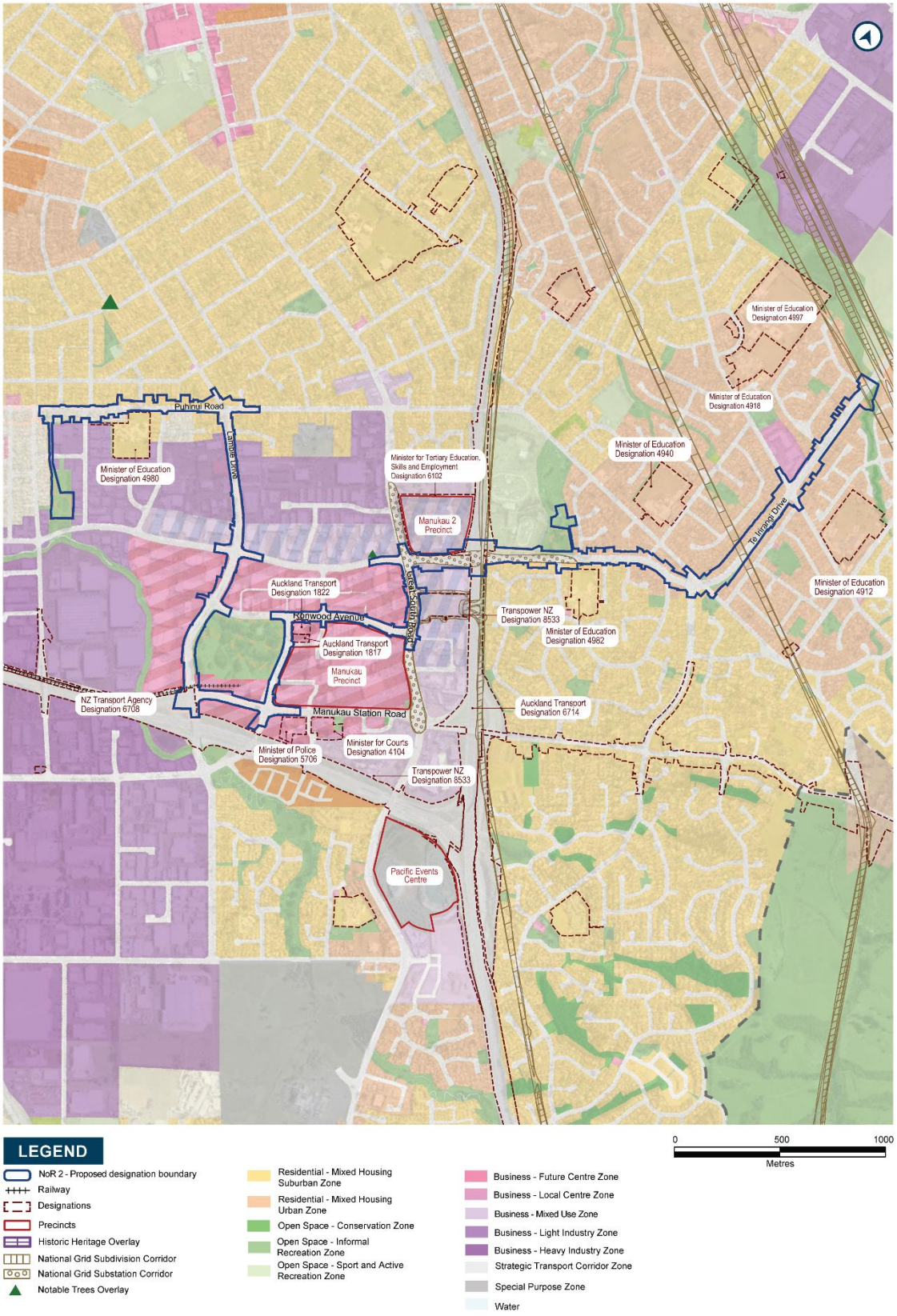


Figure 12: Key features - NoR 2

Features	Description
Current land use	The land use along Te Irirangi Drive is low density residential through to SH1. Local shops, services, and educational facilities are located in the vicinity of Dawson Road. Manukau Central transitions into a commercial and retail environment which serves as a major economic centre and employment node. Hayman Park zoned for informal recreation and is fronted by Manukau Station and Manukau Institute of Technology (**MIT**). The land use between Ihaka Place and Puhinui Station is low density residential with local shops and service throughout the area on Puhinui Road adjacent to Ranfurly Road. Puhinui School is located on Puhinui Road. Puhinui Domain is zoned for informal recreation.
Community and local facilities	• Dawson Road shops; • Redoubt North School; • Countdown; • Auckland University of Technology (**AUT**); • MIT; • Kingdom Hall of Jehovah's Witnesses; • Papatoetoe Fire Station; • Best Start Early Childhood Education; • Universal Church; • Puhinui Medical Centre; • Ranfurly local shops on Puhinui Road; and • Puhinui Superette.
Waterbody	Puhinui Stream
Vegetation and ecology	Riparian vegetation within margins around Rongomai Park
Historic heritage and archaeology	• Notable Tree - Oak Tree outside 9 Cavendish Drive • Milepost 13 outside 656 Great South Road, which is no longer standing
Existing designations	• 6708 South Western Motorway State Highway 20 (Waka Kotahi); • 6307 Manukau Rail Link (KiwiRail Holdings Ltd); • 6302 North Island Main Trunk Railway Line (KiwiRail Holdings Ltd); • 4980 Puhinui School (Minister of Education); • 1822 Car Park – Davies Avenue (Auckland Transport); • 1817 Car Park – Davies Avenue (Auckland Transport); • 8533 Wiri Electricity Substation (Transpower New Zealand Ltd); • 6714 State Highway 1 – Manukau City Centre to Takanini (Waka Kotahi); and

	• 6102 Auckland University of Technology South Campus (Minister for Tertiary Education, Skills and Employment)
Precincts	• Manukau Precinct; and • Manukau 2 Precinct.
Overlays	• High-Use Stream Management Areas Overlay; • High-Use Aquifer Management Areas Overlay; • Aircraft Noise Notification Area Overlay; • Moderate Aircraft Noise Area Overlay; • High Aircraft Noise Area Overlay; and • National Grid Corridor Overlay.
Other non statutory features	• Flood Prone Areas; • Flood Plains; and • Overland Flow Paths including 100 ha and above.
Current zoning	• Residential – Single House Zone; • Residential – Mixed Housing Suburban Zone; • Residential – Mixed Housing Urban Zone; • Business – Metropolitan Centre Zone; • Business – Local Centre Zone; • Business – Neighbourhood Centre Zone; • Business – Mixed Use Zone; • Business – General Business Zone; • Business – Light Industry Zone; • Open Space – Conservation Zone; • Open Space – Informal Recreation Zone; and • Open Space – Sport and Active Recreation Zone.
Likely future zoning	Refer to Section 6.4 of the AEE

7.3 NoR 3 – Puhinui Station in the vicinity of Plunket Avenue to SH20/SH20B Interchange

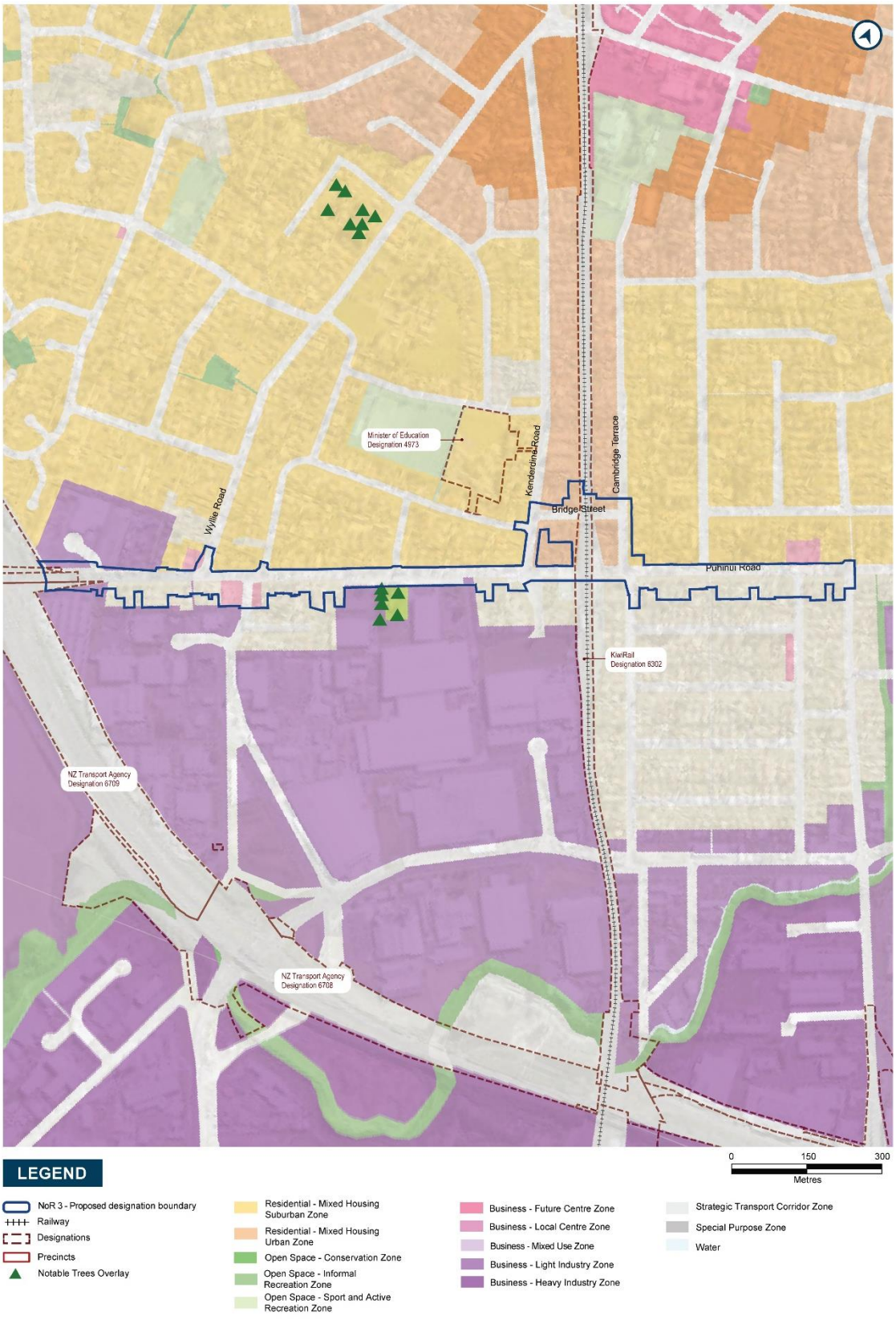


Figure 13: Key features - NoR 3

Features	Description
Current land use	The land use is low-density residential to the north of Puhinui Road. Larger industrial sites are to the south of Puhinui Road, with some neighbourhood and local commercial activities throughout. Cambria House is zoned for community use.
Community and local facilities	• Te Kohanga Reo ki Puhinui; • Kingdom Hall of Jehovah's Witnesses; • Whānau Ora Community Clinic; • Local shops at 258 Puhinui Road; • Hari Suprette; and • Mobil Service Station.
Waterbody	Puhinui Stream
Vegetation and ecology	Mixed native and exotic vegetation adjoining Bridge Street

Historic heritage and archaeology	• Two Notable Trees identified:
	  • Flowering gum on the corner of Puhinui Road and Vision Place; and
	  • Magnolia adjoining the Cambria House site at 250 Puhinui Road.

Overlays	• High-Use Stream management Areas Overlay; • High-Use Aquifer Management Areas Overlay; • High Aircraft Noise Area Overlay; • Moderate Aircraft Noise Area Overlay; • Notable Trees Overlay; and • Historic Heritage Overlay Extent of Place.
Other non statutory features	• Flood Prone Areas; • Flood Plains; and • Overland Flow Paths including 100 ha and above.
Current zoning	• Residential – Single House Zone; • Residential – Mixed Housing Suburban Zone; • Business – Light Industry Zone; • Business – Neighbourhood Centre Zone; and • Open Space – Community Zone.
Likely future zoning	Refer to Section 6.4 of the AEE

7.4 NoRs 4a and 4b – SH20/SH20B Interchange to Orrs Road

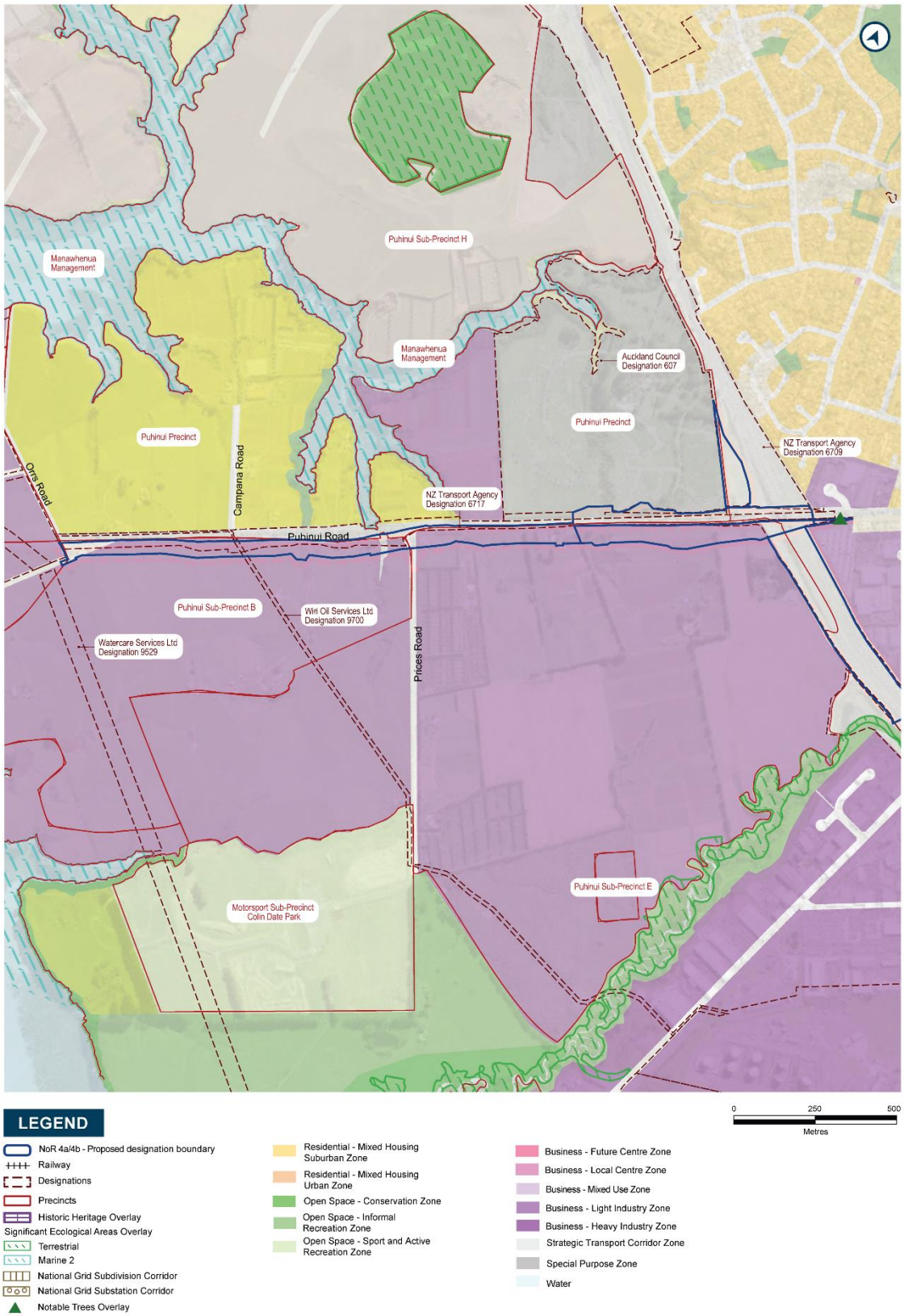


Figure 14: Key features - NoRs 4a and 4b

Features	Description
Current land use	The current land use is predominantly rural, however land south of SH20B is zoned for light industry and the land use there is currently transitioning.
Community and recreational facilities	Manukau Memorial Gardens is a cemetery is located to the north of Puhinui Road, adjoining SH20/SH20B
Waterbodies	• Waokauri Creek; and • Pūkaki Creek.
Vegetation and ecology	Riparian margins adjoining the tributaries of Waokauri Creek and Pūkaki Creek
Historic heritage and archaeology	There are eight recorded archaeological sites within 200 m of the Project.
Existing designations	• Designation 6717 State Highway 20B - State Highway 20 to Auckland International Airport (Waka Kotahi); • Designation 6709 South Western Motorway State Highway 20 (Waka Kotahi); • Designation 1100 Auckland International Airport (Auckland International Airport Limited); • Designation 9529 Southwestern Interceptor Line (Watercare Services Ltd); • Designation 6501 Petroleum Pipeline – Urban Section (New Zealand Refining Company Ltd); • Designation 9700 Wiri to Auckland International Airport Jet Fuel Pipeline (Wiri Oil Services Ltd); and • Designation 607 Manukau Memorial Gardens (Auckland Council).
Precincts	• Puhinui Precinct – Development and subdivision that does not comply with the transport provisions (total traffic generated shall not cumulatively exceed 1035 vehicles per hour) of the Puhinui Precinct is a non-complying activity; and • Puhinui Precinct (sub-precinct A, B, D) – 40 m yard setback for sites adjoining the edge of Designation 6717 (as at 30 September 2013).
Overlays	• Significant Ecological Areas Overlay; • High-Use Stream Management Areas Overlay; • High-Use Aquifer Management Areas Overlay; and • High Aircraft Noise Area Overlay.
Other non statutory features	• Flood Prone Areas; • Flood Plains; and • Overland Flow Paths.
Current zoning	• Future Urban Zone; • Business – Light Industry Zone; • Special Purpose Zone – Cemetery; and • Open Space – Informal Recreation Zone.

Likely future zoning	Development of the existing Business – Light Industry Zone is currently underway or imminent. The Future Urban Zone located on the northern side of Puhinui Road is likely to be development ready between 2028 and 2032 in accordance with the Future Urban Land Supply Strategy for business use.

7.5 Approach to assessing the likely receiving environment

The Project Team developed an approach to assessing the likely receiving environment as the Intensification Streamlined Planning Process, implemented by Plan Change 78 of the AUP:OP, is underway but has not reached the hearing stage of the process.

Plan Change 78 introduces the planning response to Policy 3 of the National Policy Statement on Urban Development (**NPS:UD**) and the Medium Density Residential Standards as required by the RMA.

Policy 3 of the NPS:UD is of particular relevance to the Project as it requires that Regional Policy Statements and District Plans enable intensification. This means that District Plan zoning must enable a minimum of 6 storeys within walkable catchments of existing and "planned"[7] rapid transit stops. At present Plan Change 78 does not include the required zoning within the walkable catchments of the BRT corridor. It is noted that whilst the BRT corridor meets the definition of "planned", there is no certainty of station locations (and subsequently the walkable catchments) until such time the designations are confirmed.

Figure 15 below provides an indication of what the implementation of Policy 3 in the NPS:UD could look like in the context of the Project (at the time of lodgement), taking into account the locations of the proposed BRT stations which meet the definition of planned rapid transit stops. However, this approach may evolve through the Intensification Streamlined Planning Process or a subsequent plan change.

[7] As set out in the NPS:UD, "planned" in relation to forms or features of transport, means planned in a regional land transport plan prepared and approved under the Land Transport Management Act 2003

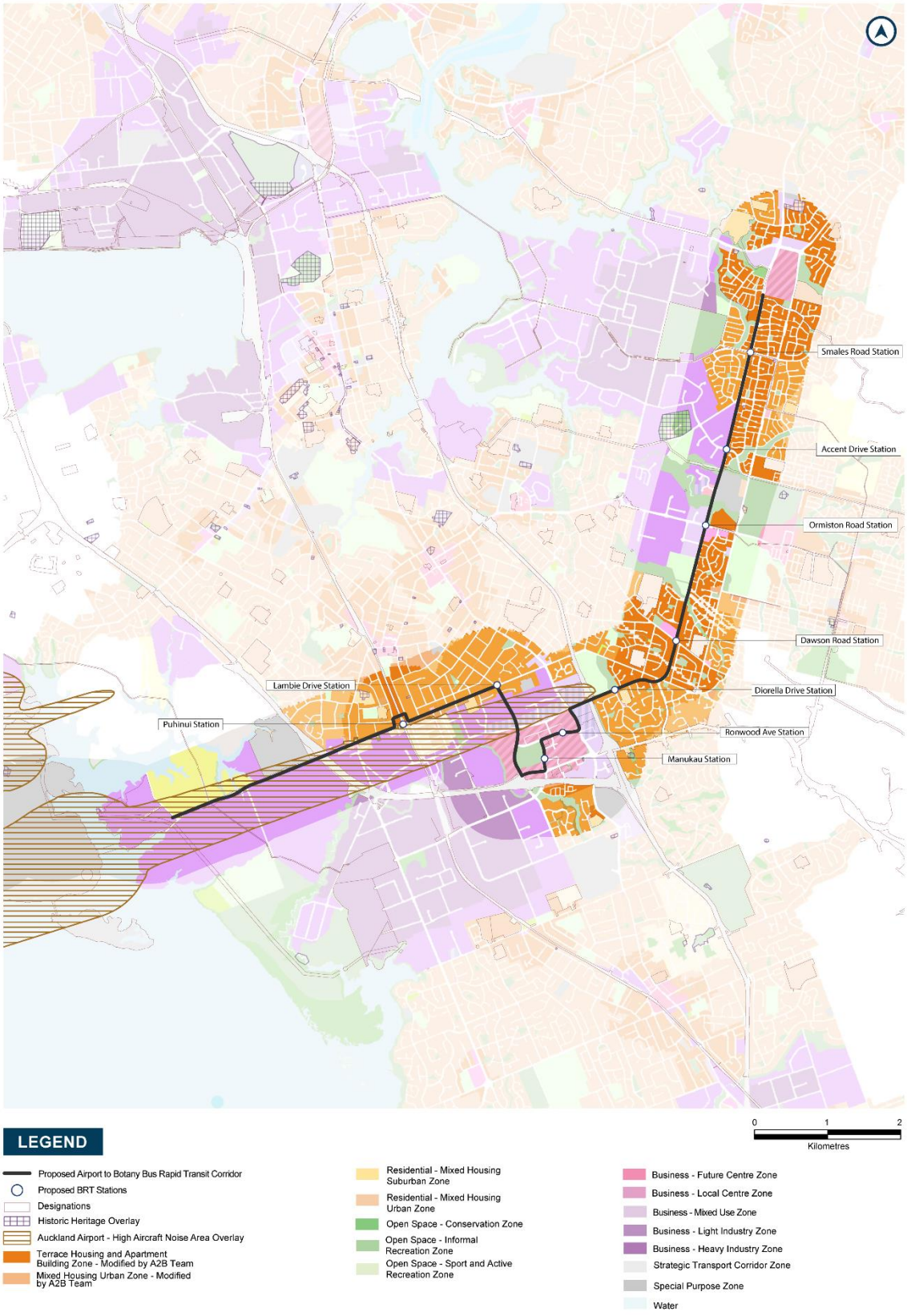


Figure 15: Application of the NPS:UD in the context of the Project (Plan Change 78 zoning forms the base map)

7.6 Summary of Notices of Requirement

Notice	Purpose	Project objective	Extent	Lapse period
NoR 1	Construction, operation and maintenance of a BRT corridor and walking and cycling facilities	Enable the provision of public transport and active mode corridors in a manner that: a) Is safe for all transport users; b) Connects Orrs Road (Auckland Airport boundary), with Manukau City Centre and Botany Town Centre; c) Includes efficient, resilient and reliable dedicated public transport and active mode infrastructure; d) Contributes to mode shift by improving travel choice and access to key destinations along the corridors; e) Connects to existing and planned public transport stations; f) Integrates with the existing and planned future environment; and g) Recognises the future strategic function of the corridor.	Proposed designation approximately 4.3 km long from Botany Town Centre to Rongomai Park	15 years
NoR 2			Proposed designation approximately 6.4 km long from Rongomai Park to Plunket Avenue on Puhinui Road	15 years
NoR 3			Proposed designation approximately 1.9 km long from Plunket Avenue to the SH20/20B interchange	15 years
NoR 4a			Proposed designation approximately 2.3 km long from the SH20/20B interchange to Orrs Road	15 years
NoR 4b	State Highway 20B Road purposes: the maintenance, operation and improvement of the State Highway (including road widening).	Provide for the maintenance, operation and improvement of the State Highway 20B corridor while enabling the implementation and delivery of a public transport corridor for the Airport to Botany public transport network.	Proposed designation alteration approximately 0.9 km long from Manukau Memorial Gardens to SH20/20B interchange, and approximately 0.7 km long ramp from SH20B onto SH20 for southbound traffic. Refer to Figure 17 in Section 8 for the full extent of the alteration	A lapse period is not required for NoR 4b because the designation being altered has already been given effect to.

8 Alteration to Designation 6717

8.1 Introduction

As set out in Section 3, the western portion of the Project is subject to an existing designation (Designation 6717) for the maintenance, operation and improvement of the State Highway (including road widening) as show in Figure 16 below.

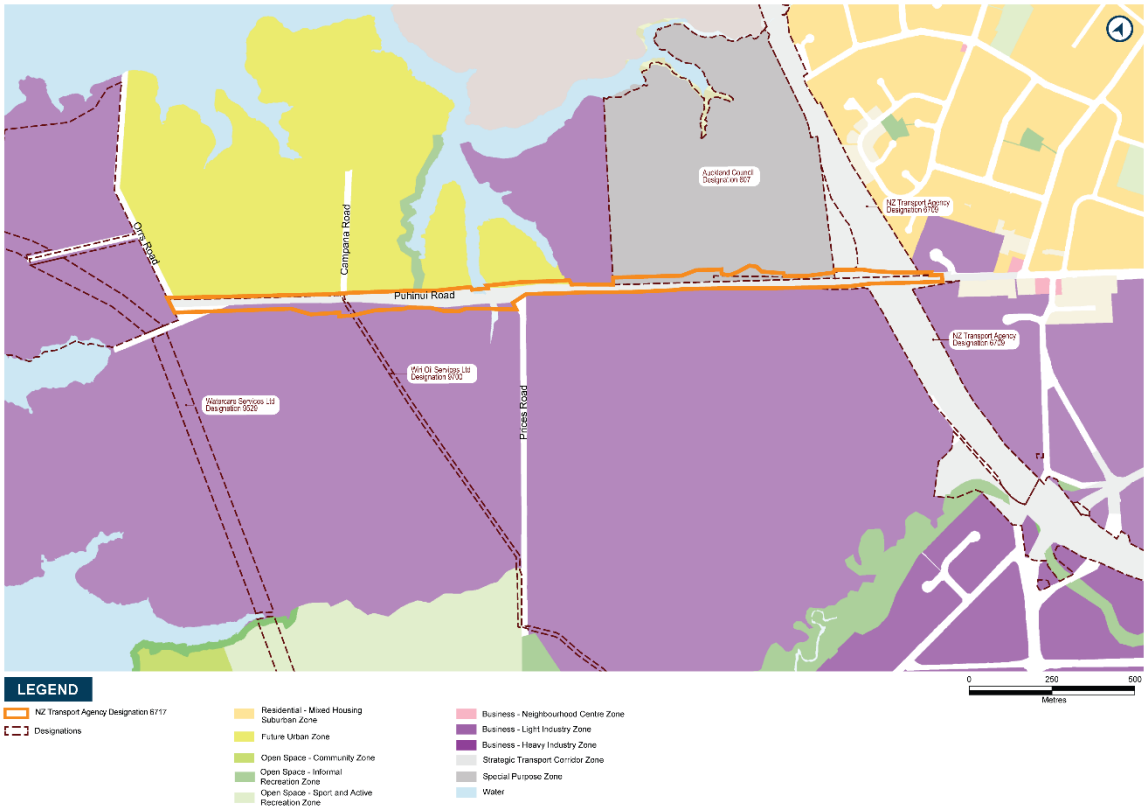


Figure 16: Map showing extent of existing Designation 6717 (shown in orange) - SH20B in the AUP:OP

The existing Designation 6717 includes a set of conditions which relate to an earlier project – SH20B Short Term Improvements. This project was completed in 2021 as part of the Programme.

NoR 4b proposes to widen SH20B between the SH20/20B interchange and the intersection of Manukau Memorial Gardens. This is to provide westbound lanes to Auckland Airport, high quality walking and cycling facilities and a ramp from SH20B onto SH20 for southbound traffic, while enabling the provision of a Bus Rapid Transit corridor. As such, an alteration to the existing NZ Transport Agency Designation 6717 is required.

The full extent of the proposed ramp from SH20B onto SH20 will be included in NoR 4b. This means that the proposed alteration will increase the overlap with NZ Transport Designation 6709 for SH20.

NoR 4b also includes a portion of land adjacent to SH20 on the north side of SH0B adjacent to Manukau Memorial Gardens, this is Crown owned land and is proposed to be utilised by the Project.

The extent of the proposed alteration to Designation 6717 is illustrated below:

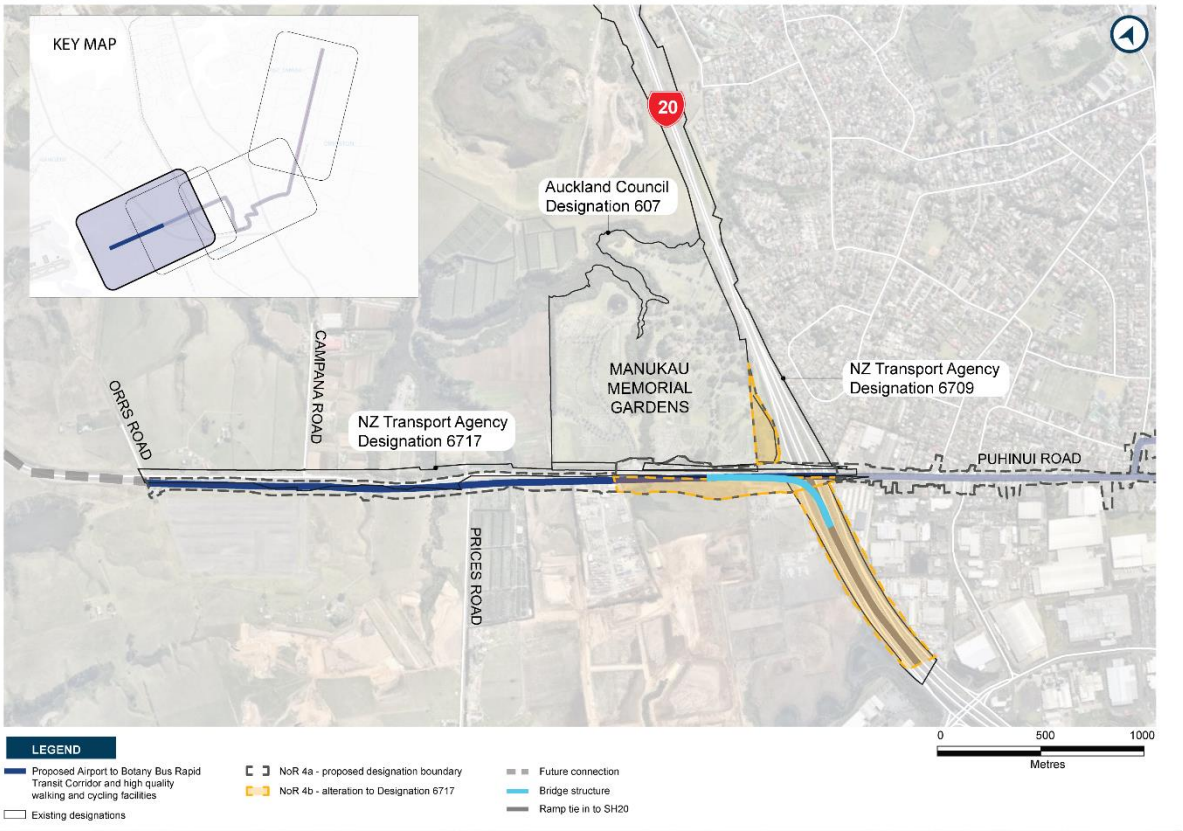


Figure 17: Map showing the extent of the proposed alteration to Designation 6717

It is proposed that the two NoRs overlap between the SH20/20B interchange and Manukau Memorial Gardens to:

- Facilitate the Bus Rapid Transit corridor;
- Recognise that the timing of construction for NoRs 4a and 4b is likely to coincide; and
- Provide sufficient space for the construction, operation, maintenance and mitigation of the NoRs.

The overlap between NoRs 4a and 4b is shown in Figure 18 below. NoR 4a is shown as a red dashed line, NoR 4b is shown as a yellow dashed line and the overlap between the NoRs is shown as a dashed red-yellow line.

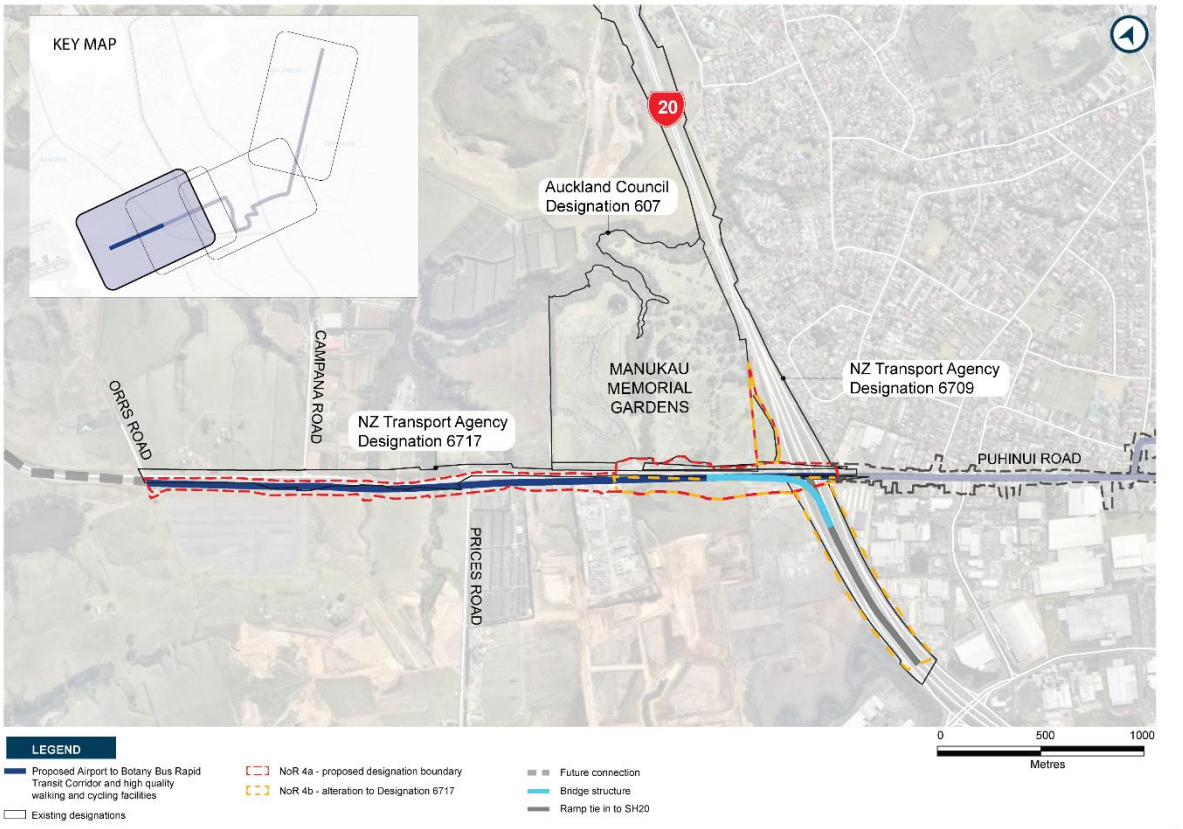


Figure 18: Map showing extent of NoR 4a, 4b and the overlap

8.2 Alteration of existing Designation 6717 conditions

As set out above, the existing conditions for Designation 6717 relate to the SH20B Short Term Improvements project.

For the extent of the proposed works for NoR 4b, the existing conditions for Designation 6717 are proposed to be removed and new conditions will be applied in response to any effects identified.

These proposed conditions will not apply to works beyond the extent of NoR 4b associated with the on-going operation, safety improvements, and maintenance of the existing state highway (SH20B), or the upgraded state highway following construction of the Project.

8.3 Approach to the assessment of effects for the proposed alteration to Designation 6717

The effects on the environment and measures to manage these effects have been assessed holistically for the Project as far as practicable while considering that the Project traverses through changing environments. In the context of NoR 4b, it is recognised that some effects have not been identified within the extent of the proposed alteration, therefore no conditions for these matters are proposed. For example, currently there are no arboricultural effects as there are no trees protected under the District Plan within NoR 4b.

Section 9 sets out the assessment of effects on the environment of the Project. A summary of the specific effects as the relate to NoR 4b include:

Technical assessment	Summary of effects
Transport	No significant changes are proposed to individual property access other than changes to the access layout. An existing central flexible median barrier is provided along the centre of SH20B, therefore all properties are currently restricted to left turn in / out access. Changes required to existing property access will be addressed at future detailed design.
Property	Potential adverse effects on existing private properties and businesses have been reduced, where practicable through the development of the proposed designation boundary. However, the proposed NoR requires land to enable the construction, operation, maintenance and mitigation of the Project. There are three privately owned and one crown owned properties that are affected by the Project.
Landscape	NoR 4b includes a new southbound ramp structure from SH20B to SH20. However, considering that the existing structures associated with the state highway network in the vicinity of NoR 4b are already dominant elements within the landscape, and the visual amenity is relatively low within the adjoining industrial zoned landscape, the overall visual amenity effect is low.
Flooding	Stream crossings are key sites for potential flooding effects during construction. There is one stream crossing within NoR 4b – an existing culvert crossing on Puhinui Road, near Manukau Memorial Gardens. It is anticipated that there are no changes to existing flood levels as a result of the Project.

9 Assessment of Effects on the Environment

The sections to follow provide a summary of the technical reports in Volume 4 which support the NoRs for the Project. These reports should be read in conjunction with the AEE. The relevant sections in the AEE for each matter and the corresponding technical reports are set out in Table 4.

Table 4: Summary of the effects on the environment sections and technical reports

AEE Section	Topic	Relevant technical report/ supporting information
9.3	Transport	Appendix A: Airport to Botany Assessment of Transport Effects
9.4	Arboriculture	Appendix B: Airport to Botany Assessment of Arboricultural Effects
9.5	Landscape	Appendix C: Airport to Botany Assessment of Landscape Effects
9.7	Social	Appendix D: Airport to Botany Social Impact Assessment
9.8	Property and business	
9.5	Urban design	Appendix E: Airport to Botany Urban Design Evaluation
9.9	Flooding	Appendix F: Airport to Botany Assessment of Flooding
9.10	Noise and vibration	Appendix G: Airport to Botany Assessment of Construction Noise and Vibration Effects Appendix H: Airport to Botany Assessment of Traffic Noise Effects
9.11	Terrestrial ecology	Appendix I: Airport to Botany Assessment of Ecological Effects
9.12	Archaeological and built heritage	Appendix J: Airport to Botany Assessment of Archaeological Effects Appendix K: Airport to Botany Assessment of Built Heritage Effects
9.13	Network utilities	Refer to the AEE section.

9.1 Positive effects of the Project

This section sets out the positive effects of the Project. Given the interconnected nature of the positive effects associated with the Project, these effects are summarised in this section as opposed to being broken down into the individual effects sections (Section 9.2 onwards).

9.1.1 Network integration outcomes

As set out in the Assessment of Transport Effects (included in Appendix A of Volume 4), by providing for a dedicated BRT corridor and high quality walking and cycling facilities, the Project will have significant positive transport effects. In summary, it will:

Provide better access to jobs and education for southern and eastern Auckland and increase labour and customer catchments for business by 2038:

- The Project will bring an additional 269,000 people within 45 minutes travel time of the Airport, by public transport (76 per cent increase);
- The Project will bring an additional 203,000 jobs within 45 minutes travel time of the Airport, by public transport (62 per cent increase);
- The Project will improve access to Manukau Central and Botany for an additional 98,000 people (18 per cent increase) and 87,000 (19 per cent increase) people within 45 minutes by public transport respectively; and
- By providing better access, the Project will improve equity for people with no, limited or poor access to transport before the implementation of the Project.

Enable a significant increase in public transport usage in the area, increasing the public transport mode share and decreasing travel by light vehicles.

- The anticipated passenger kilometres travelled by public transport increases by approximately 144,000 km per day. This increase in public transport usage will reduce light vehicle travel by approximately 60,000 vehicle kilometres per day;
- The Project is predicted to reduce the perceived travel time costs of public transport by 32 per cent between Botany and Manukau, 40 per cent between Botany and Auckland Airport and 14 per cent between Botany and Drury. Perceived costs include estimates of the time to access the system (generally via walking), the waiting time for the service, the in-vehicle time (including estimates of reliability and on-board crowding) and the fare. Because of the inclusion of perception factors and fares, these perceived costs are typically significantly higher than the actual time spent travelling; and
- In 2038, it is anticipated that approximately 31,000 passengers per day will use the BRT service.

Facilitate an uplift in public transport patronage through the corridor. The public transport mode share is expected to increase by:

- 13% at Botany (southbound);
- 5% crossing SH1 (westbound); and
- 15% on SH20B (westbound).

Improve integration with existing and future public transport networks

- The Project connects four existing and proposed RTN lines (southern and eastern lines, the Eastern Busway and the proposed Auckland Light Rail Project) as well as frequent local bus networks; and
- The Project will support an increase in patronage on the southern rail line to and from southern Auckland.

Serve as a key enabler for greater use of active transport modes

- The Project is anticipated to facilitate an increase of 510-520 cycle trips per day and approximately 4,200 additional cycle-km per day;
- Improve safety for pedestrians and cyclists when compared to the existing environment;
- The reduction in light vehicle travel associated with the Project could save approximately 2.4 deaths and serious injuries per year, 183 total crashes per year and $2.44 million social crash costs per year; and
- The provision of separated walking and cycling facilities along entire Project corridor is expected to contribute to a reduction in likely crashes involving those users (approximately 4% in total).

Integrate with Auckland Airport and Botany Town Centre

Discussions with Auckland Airport and the Eastern Busway Alliance have continued through the NoR phase of the Project. As of lodgement:

- Auckland Airport is in the planning phases of providing a BRT corridor and two stations from Orrs Road to the Airport precinct; and
- Eastern Busway are securing designations for the final stages of their project. This includes a station in the vicinity of the Botany Town Centre.

Ultimately, the Project will connect to two major destinations and proposed rapid transit networks at each end.

9.1.2 Urban integration outcomes

Enable opportunities for higher density urban development

By protecting a rapid transit network and nine BRT stations, the Project will facilitate the enablement of intensification which is of national significance.

Revitalisation of Manukau Central

The Project will contribute to the revitalisation work being led by Eke Panuku, particularly along Davies and Ronwood Avenue where BRT stations are proposed.

9.1.3 Environmental outcomes

Environmental outcomes have been considered from the outset of the Project optioneering phase, the identification of the preferred corridor, and the development of the concept design and designation boundaries. Generally, the positive environmental outcomes of the Project include:

- The inclusion of berms within the corridor will provide an opportunity to establish street trees and vegetation suited to the environment which in turn will increase canopy cover in southern Auckland;

- The corridor provides for the inclusion of green stormwater infrastructure, such as vegetated swales, planted stormwater wetlands and raingardens;
- The high quality walking and cycling facilities can be integrated with open spaces adjoining the Project;
- There are opportunities to enhance the character and identity of the neighbourhoods through the future design;
- The designations boundary provide sufficient footprint to:
  - Raise the existing road levels at the future detailed design stage to prevent flood flows across the road and reduce flood hazard;
  - Improve existing culvert capacities and provide green stormwater infrastructure which improve ponding and stream flow in the area; and
  - Improve stormwater quality treatment, retention and detention for existing and proposed impervious areas.

9.2 Application of the core Māori values to the Project

The table below summarises how the partnership approach set out in Section 2 has been applied to the Project considering the surrounding cultural landscape and core Māori values. In summary these outcomes seek to identify iwi aspirations for the Project and are underpinned by the principle of ongoing partnership.

Core Māori values	Action
Rangatiratanga *Manawhenua perform their role as Partners through all phases of the Project.*	Manawhenua shall be invited as partners to participate in all phases of the Project. This will include but not be limited to: – Identifying opportunities for Māori cultural values and concepts to be recognised in design aspects of the Project; – Involvement in future design stages and resource consent process; – The preparation of outline plans and any associated management plans; – Opportunities to provide cultural advisory reports to assist in identifying ngā taonga tuku iho; – Opportunities to provide cultural oversight and monitoring prior to and during construction activities; and – Opportunities to perform tikanga and kawa prior to and during construction activities.
Katiakitanga *The mauri of the natural and cultural landscapes is restored, enhanced and protected.*	Working with Partners and key stakeholders to identify opportunities to enhance and restore the health and well being of waterways Where possible, preserve the natural and cultural landscape including native flora and fauna with a specific connection to the area. Recognise and where appropriate protect and enhance view shafts to and from sites that are significant to Manawhenua Establish an integrated stormwater management approach in partnership with Mana Whenua for the Project which prioritises (in the following order)[8]: – Opportunities for ki uta ki tai (a catchment scale approach); – Opportunities for net catchment benefit rather than a Project specific focus; – Green infrastructure and nature-based solutions to drive stormwater management outcomes; and – Opportunities for low maintenance design.
Manaakitanga *Future Project decisions are undertaken in a way that recognises the obligation of Mana Whenua to be good hosts.*	Future Project decisions are undertaken in a way that recognises the obligation Manawhenua have to be good hosts by for example: • Enhancing the experience of the Project and its surrounding context for everyone; • Minimising impacts/disruption on the environment and people; • Restoring, enhancing and maintaining the mauri of te taiao; • Supporting connectivity to key centres, employment areas, open spaces; • Maintaining access to key social infrastructure; • Managing disruption to people's quality of life through the construction and operation of the Project; and

[8] Based on the opportunities identified through the Integrated Stormwater Management Approach developed for this Project in partnership with Manawhenua.

	• Work in partnership with Mana Whenua to support physical, mental, social and economic wellbeing for iwi and the local community through the Project. This could include:
	  ○ Planting supplied through Mana Whenua and community based nurseries;
	  ○ Local schools being involved in planting; and
	  ○ Scholarships, cadetships and job creation.

Wairuatanga *The sense of belonging associated with the spiritual connection Manawhenua have to maunga, moana, awa, marae and papakāinga in the vicinity of the Project area and the wider cultural context is recognised through the future design of the Project.*	The connection Manawhenua have to the Project area should be acknowledged through the Project, this shall include but not be limited to: • Accurate historical signage; • Recognition of historical portage routes; and • Cultural expression – for example mahi toi, art, sculptures or other public amenity features. Where possible, the natural and cultural landscape including native flora and fauna with a specific connection to the area should be: • Preserved in the design and long term maintenance of the Project; • Restored in a manner that recognises its historical and cultural significance. For example, clustering planting to represent a lost ngahere; and • Where appropriate culturally significant plants should be utilised for the Project.
Kotahitanga *All phases of the Project are undertaken in a cohesive manner which strengthens the relationship between Mana Whenua and wider Project stakeholders.*	Strengthen relationships between Manawhenua and other Project Partners, key stakeholders and the wider community through all phases of the Project by: • Identifying opportunities for positive outcomes beyond the reach of the Project; and • Facilitating Mana Whenua participation in wider Partner and stakeholder engagement.
Whanaungatanga *Through the integration of the Project into the surrounding landscape, people's experience and sense of belonging is enriched.*	Facilitate Manawhenua participation in local community engagement for example with local business associations, social institutions and community groups through all phases of the Project Acknowledge that Manawhenua have their own priorities and initiatives within their iwi and wider communities and identify opportunities where the Project can support these initiatives.
Mātauranga *The intergenerational knowledge Manawhenua have through whakapapa is shared where appropriate, valued and utilised in future Project decisions.*	Manawhenua shall be invited as partners through all phases of the Project to: • Share maaramatanga, Manawhenua wisdom and provide opportunities to enable the transfer of customary knowledge; • Incorporate mātauranga Māori alongside engineering methods, including retention and enhancement of intermittent and permanent streams and natural floodplains to provide natural attenuation where practicable; and • Incorporate mātauranga Māori to restore and enhance existing habitats. With respect to the opportunities identified above, it is recognised that only Manawhenua can determine how maaramatanga and mātauranga Māori are applied. The future Project Team must recognise that

	wisdom shared by Manawhenua is Project specific and should not be applied broadly without Manawhenua being involved. Manawhenua shall be invited as partners in all phases of the Project to showcase their history within the area and how their partnership has shaped the Project. This could include but is not limited to: h) Incorporating Manawhenua values and narrative through the form of the Project and associated structures; i) Identifying opportunities to recognise the historic and cultural significance of the Puhinui Historic Gateway to the Airport; j) Providing pou, art, sculpture, mahi toi or other public amenity features located on land within or adjoining the Project; k) Providing any other feature that represents the Māori history of the area and promotes a distinctiveness or sense of place appropriate for the wider heritage area; and l) Identifying opportunities to promote or enhance public access to coastal areas, waterways and open space where appropriate.

To ensure Manawhenua are involved as partners in all future phases of the Project, the matters identified in the 'action' column above have guided the conditions of the proposed designations and alteration to Designation 6717. These conditions are set out in Section 10 of this AEE.

9.3 Transport

The Assessment of Transport Effects, included in Appendix A of Volume 4, assesses the actual and potential effects of the future construction and operation of the Project as it relates to transport and recommends ways of managing these effects. This effects assessment has been based on a 2038 forecast year horizon. This aligns with the available regional models and the likely horizon for the implementation of the Project.

To consider the effects of the Project, the existing environment includes the likely future urban development based on zoning (including land zoned Future Urban) but does not include the Project. The effect of the Project is then assessed using the same land use assumptions which are based on demand forecasting estimates provided by Auckland Council.

Land use forecasts have inherent uncertainty. Currently, there is additional uncertainty around the likely outcomes and the rate and location of the higher density development enabled through the NPS:UD and Medium Density Residential Standards (**MDRS**). The land use planning response to these policies is currently being progressed by Auckland Council and revised land use forecasts reflecting any expected changes were not available at the time of preparing this assessment.

The subsequent sections provide a summary of the transport effects and proposed management measures.

9.3.1 Assessment of operational traffic and transport effects

As established, Auckland's southern and eastern areas contain a significant population of 360,000 and include two of seven metropolitan centres in Auckland. Access to jobs for the people living in southern Auckland is heavily dependent on access to Manukau Central, the Airport and East Tāmaki.

There is currently a large gap in Auckland's rapid transit network, resulting in a lack of efficient and reliable public transport and mode choice in the southwest, south and east of Auckland for a growing population.

The positive transport effects associated with the Project are set out in Section 9.1.

Potential operational transport effects are assessed using:

- Transport planning assessment of expected outcomes and effects;
- Transport modelling to inform demands and network performance;
- Alignment with key policy documents.

The assessment has been undertaken for key elements of the transport system, including effects on safety, different modes and property access. These are summarised in the sections to follow.

9.3.1.1 Safety

The Ministry of Transport, Waka Kotahi and Auckland Transport have adopted the Vision Zero philosophy.[9] The Project is expected to result in positive effects on safety when compared to the existing corridor. The effects of the Project on safety consist of:

[9] As part of the "Road to Zero: New Zealand's Road Safety Strategy 2020-2030" and "Vision Zero for Tāmaki Makaurau: A Transport Strategy and Action Plan to 2030"

- Improved walking and cycling facilities along the full corridor including separation commensurate with an urbanised environment, resulting in improved protection for vulnerable road users;
- Improved walking and cycling crossing facilities along the full corridor, resulting in a safer environment for all road users; and
- Consequential reductions in the risk of Death or Serious Injuries (**DSIs**).

Overall, the Project will provide a safer transport system which is likely to reduce the number of DSIs. Further complementary measures to achieve the desired safety outcomes identified in Appendix A of Volume 4 will also be identified as part of future detailed design.

9.3.1.2 Public transport

The Project will form an integral part of the future rapid transit network providing improved connectivity to key destinations of Botany, Manukau Central and the Airport. The effects of the Project on public transport effects consist of:

- Significantly better quality, frequency, and reliability of public transport services (BRT services);
- Good integration with the future public transport network and significantly improved north south connectivity and improved access to employment and social amenities; and
- Better and safer access provisions for pedestrians, cyclists, and mobility impaired passengers.

Overall, the BRT corridor will respond to the existing and future demand on public transport. The Project will improve the connection of communities between centres, employment and existing rapid transit stations.

9.3.1.3 Walking and cycling

Walking and cycling are key components of the transport network. There are several key attractors which suggest walking and cycling will significantly increase as the intensification envisioned through national policy direction is realised along the corridor. The effects of the Project on walking and cycling consist of:

- Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along the corridor;
- Improved integration with the future walking and cycling network, resulting in improved north-south and east-west walking, and cycling connectivity;
- Environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips;
- Supporting growth surrounding the corridor, particularly around proposed BRT stations; and
- Improved safety for pedestrian and cyclists accessing employment and amenities.

The provision of high quality walking and cycling facilities will significantly improve safety for vulnerable users and will significantly reduce the risk of DSIs. Overall, the provision of the BRT and walking and cycling facilities will provide a choice of transport options, reduce reliance on private vehicle trips and result in positive environmental and health benefits.

9.3.1.4 General traffic

The Project generally retains all existing vehicle movements, except where the Project proposes to:

- Close the southern end of Davies Avenue in Manukau Central to general traffic to create a shared space for pedestrians between the various stations and MIT campus sites;
- Restrict right turns in or out of properties along the corridor to facilitate the centre-running BRT corridor; and
- Close the current access to the SH20B southbound on-ramp from Puhinui Road (east of SH1). This change is to accommodate the new ramp structure from SH20B to SH20, that removes the high-volume traffic movement from the interchange and allows reallocation of space to the BRT corridor.

Changes to traffic capacity are also expected where the Project proposes to:

- Remove left turn slip lanes at signalised intersections along the corridor to provide safe crossings for pedestrian and cyclists;
- Reduce the queuing lengths of some turning lanes to facilitate the BRT corridor and stations;
- Remove some right turn lanes where more than one currently exists at intersections, to facilitate the BRT corridor and stations; and
- Change from roundabouts to signalised intersections to facilitate safer crossings for pedestrians and cyclists, BRT pre-emption and access to stations.

These changes are expected to impact some existing traffic routes, resulting in the diversion of traffic to other roads. Notwithstanding this, the screenline assessment indicated that the number of vehicle trips undertaken within the surrounding network is not significantly affected by the Project.

With regard to intersection performance, the Project does not significantly worsen the performance of key intersections.

For detail on the traffic volumes including traffic flows and intersection performance, refer to Volume 4, Appendix A.

9.3.1.5 Access and parking

Property access

The Project proposes to widen existing transport corridors to accommodate a BRT corridor and high quality walking and cycling facilities. As a result, existing access arrangements for properties located adjacent to the Project corridor will be affected.

Property access impacts range from minor changes to the physical access arrangements to prohibiting right turn movements into and out of properties. Access to properties by walking and cycling will be retained and generally enhanced through the proposed walking and cycling facilities.

The ability to access all properties by vehicles will be retained. This assessment therefore focuses on the restrictions to specific vehicle movements.

Direct physical changes will be addressed by reforming/regrading accesses to relevant design standards.

Typically, left-in and left-out vehicle access movements are retained, and right turning vehicle movements are restricted. The restriction of the right turns will require vehicles to utilise alternative routes through the existing network to access properties with a left-in or left-out configuration.

The potential effects of the restrictions are assessed by considering the length of alternative routes, along with the expected volume and familiarity of impacted users and any specific safety issues identified.

For properties within the proposed designation boundary, access impacts are not assessed. Where only a front lot is within the proposed designation boundary, adequate access to the rear lots is assumed. In addition to the above, the table below summarises the access impacts for each NoR.

Table 5: Summary of access impacts

NoR	Access impacts	Assessment
NoR 1	An existing solid median runs through the centre of Te Irirangi Drive. Therefore, right turn access is currently restricted for all properties along this corridor. Left-in or left-out access is provided in some locations via adjoining service lanes.	There are no significant changes to property access in this section.
NoR 2	Te Irirangi Drive, Great South Road, Ronwood Avenue, Manukau Station Road and Lambie Drive provide an existing central solid median. However, there are gaps in the median enabling all-movement access into some, predominantly commercial properties. Some properties with existing all-movements access will be restricted to left-in and left-out access. No significant impacts were noted for loading and servicing arrangements.	Affected properties are required to use alternative routes for access. The adjacent road network within the surrounding area is relatively granular and therefore these alternative routes are considered achievable. The increase in expected travel distance is at most 2.5 km (approx. 3 to 4 minutes). Some properties have existing alternative access points.
NoR 3	Currently all movements are possible at individual access points. All properties within NoR 3 with access onto Puhinui Road will be restricted to left-in and left-out access.	Affected properties are required to use alternative routes for access. The general road network in the surrounding area is such that alternative routes are achievable and the increase in expected travel distance is at most 2.5 km (approx. 3 to 4 minutes).
NoR 4a	NoR 4a – The proposed designation has no impact on property access	There are no significant changes to property access in this section. An existing central flexible median barrier is provided along the centre of SH20B, therefore all properties are currently restricted to left turn in / out access.
NoR 4b	NoR 4b – The proposed alteration to Designation 6717 has no impact on property access.	There are no significant changes to property access in this section. An existing central flexible median barrier is provided along the centre of SH20B, therefore all properties are currently restricted to left turn in / out access.

In addition to the above, an assessment was undertaken to determine the severity of access impacts and whether the alternative routes were feasible to access sites. In summary, the assessment noted that:

- There are high volumes of retail customers that use the existing access to the Mitre 10 and Bunnings sites on Lambie Drive, where all vehicle movements are currently permitted. Restricting right turn access at this location may lead to unsafe manoeuvres at the Lambie Drive and SH20 motorway interchange; and
- The Papatoetoe Fire Station is a regionally important station that is required to operate with access in all directions and without delays to its emergency response times. It is therefore considered necessary for the Fire Station to be provided with adequate and safe all-movement access arrangements.

Parking

On-street parking

On-street parking along the Project corridor is limited and includes approximately 140 on-street parking spaces. These spaces are all located in NoRs 2 and 3. The Project will remove all existing on-street parking spaces along the corridor.

Existing on-street parking spaces within NoR 2 typically serve nearby parks, commercial and retail centres and include pick up / drop off spaces for education facilities along the corridor, while the on-street spaces within NoR 3 serve the nearby residential areas.

The Project will provide a high quality, attractive alternative to car use which will support mode shift from private vehicle use. It is anticipated that Auckland Transport will reconfigure the local bus network to maximise the new BRT corridor and provide more accessible opportunities for travel. The increased provision and use of public transport is considered likely to lead to less demand for on-street parking near commercial and retail areas, with adequate parking facilities such as paid car park buildings available within proximity, for use if necessary.

The removal of on-street parking is a consequence of intensification anticipated, and encouraged, by the draft Auckland Transport Parking Strategy[10] which provides guidance regarding parking on arterial roads. This draft strategy seeks to repurpose kerbside space to improve safety and the movement of people, goods and services on key arterial roads.

In this regard, the removal of on-street parking proposed along the corridor is in accordance with the draft strategy. The impacts of the removal of on-street parking can be managed through existing measures.

On-site parking

Existing car parking provision for properties adjacent to the Project corridor will be affected. Volume 4, Appendix A describes the properties affected and the number of parking spaces affected due to the Project.

[10] Draft Auckland Parking Strategy, April 2022

The NPS:UD specifically removes most parking minimum requirements from the AUP:OP. In this regard, the removal of on-site parking spaces because of the Project does not infringe any relevant provisions.

The increased attractiveness and forecasted increase in demand for public transport is likely to lead to less demand for on-site parking for commercial and retail properties, with adequate parking facilities such as paid car park buildings available within proximity for use, if necessary.

Freight

The Project passes through and adjacent to some of Auckland's main industrial, warehousing and distribution areas. The provision of a BRT corridor, particularly on the SH20B section is likely to remove significant volumes of general traffic, thereby reducing congestion on the state highway and creating capacity for freight. Impacts on freight in the central commercial and residential areas are minimal and generally focussed around heavy vehicle accessibility as opposed to improved freight travel time.

9.3.2 Assessment of construction effects

The assessment of construction effects associated with transport is based on the indicative construction method, construction programme and the nature of works proposed for each construction zone.

There are several potential temporary adverse effects mainly linked to traffic management. Potential adverse effects on transport during the construction of the Project can be summarised as follows:

Temporary traffic diversions – will be required to facilitate the construction activities as the proposed Project works will be adjacent to or on existing road corridors. The scale of temporary traffic diversions are largely dependent on the various stages and requirements of the construction activities (e.g. bridge construction). It is expected that full road closures and diversions will be required for some specific activities and adjustments to intersections may be required to accommodate diverted traffic;

Construction traffic movements – to accommodate the movement of earthworks will likely result in an increase in traffic volume on construction routes used during the construction of the Project;

Construction vehicles – will include truck movements (heavy), light delivery and staff/contractor vehicle movements (light);

Pedestrian and cyclist safety – the provision of walking and cycling facilities is variable across the network. However, it is anticipated that the existing network of parallel collector roads can be used as alternative routes during construction;

Road safety – impacts from site access points, posted speeds and sight lines for construction; and

Existing driveways – that remain during construction will be required to have temporary access provision through temporary traffic management controls.

9.3.3 Measures to avoid, remedy or mitigate potential adverse effects on transport

The sections to follow provide the proposed measures to manage the construction and operational effects on transport.

9.3.3.1 Operational

In terms of measures to mitigate operational effects, the reformation and regrading of driveways along the full extent of the Project corridor is recommended to facilitate safe access for existing properties.

For NoR 2, signalised intersections have been incorporated into the Project concept design as a proposed mitigation measure. This is to:

- Maintain existing levels of access for emergency vehicles at Papatoetoe Fire Station; and
- Prevent unsafe manoeuvres at the Lambie Drive and SH20 motorway interchange from and to the Mitre 10 and Bunnings Warehouse sites.

With regard to the restricted right-turn access in NoRs 2 and 3, it is considered that the alternative routes and additional distances are within acceptable standards.

9.3.3.2 Construction

To address the potential construction effects identified, a Construction Traffic Management Plan (**CTMP**) will be prepared prior to the start of construction. The objective of the CTMP is to avoid, remedy or mitigate, as far as practicable, adverse construction traffic effects. To achieve this objective, the CTMP will cover:

- Methods to manage the effects of temporary traffic management activities on traffic;
- Measures to ensure the safety of all transport users;
- The estimated numbers, frequencies, routes and timing of traffic movements, including any specific non-working or non-movement hours to manage vehicular and pedestrian traffic near schools or to manage traffic congestion;
- Size access routes and access points for all construction vehicles, the size and location of parking areas for plant, construction vehicles, and the vehicles of workers and visitors;
- Identification of detour routes and other methods to ensure the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads;
- Methods to maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be;
- The management approach to loads on heavy construction vehicles, including covering loads of fine material, the use of wheel-wash facilities at site exit points and the timely removal of any
- material deposited or spilled on public roads; and
- Methods that will be undertaken to communicate traffic management measures to affected road users (e.g. residents/public/stakeholders/emergency services).

9.4 Arboriculture

The Assessment of Arboricultural Effects included in Appendix B of Volume 4 assesses the actual and potential effects of the future construction and operation of the Project on existing trees protected under the District Plan provisions and recommends ways of managing these effects. Any trees that trigger Regional Plan requirements will be assessed and managed through a future consenting process.

Due to the changing nature of the environment, a further survey of protected trees under the District Plan will be undertaken as part of the proposed Tree Management Plan (**TMP**) which will be a condition on the proposed designations.

The subsequent sections provide a summary of the arboricultural effects and proposed management measures.

The amenity and ecological values associated with trees proposed for removal is assessed respectively in the landscape assessment, Section 9.5 and terrestrial ecology assessment, Section 9.11.

9.4.1 Construction effects

The Project will result in the removal of trees protected by District Plan provisions on open space land and in the road reserve. Works may also occur in the root zone of protected trees. The table below summarises the number of protected trees and groups of vegetation requiring removal for each NoR.

Table 6: Summary of protected trees and groups and vegetation requiring removal

NoR	**Number of protected trees/ requiring removal**	**Mass planted areas/groups of vegetation requiring removal (m^2)**
NoR 1	683	25 Groups (27,084 m^2)
NoR 2	404	28 Groups (5,960 m^2)
NoR 3	30 (Including 2 Notable Trees)	0
NoRs 4a and 4b	0	0
Total	**1,117**	**53 (33,044 m^2)**

Key points of the assessment for each NoR are summarised below. A full tree schedule is provided in Appendix B, Volume 4.

9.4.1.1 NoR 1

NoR 1 includes 683 single trees and 25 groups of trees that are located within the road reserve and open space land that are likely to be removed. In summary, this section is planted with Pōhutukawa and Washingtonia Palms.

The existing slip lanes adjoining Te Irirangi Drive are planted with Pōhutukawa.

9.4.1.2 NoR 2

NoR 2 includes 404 single trees and 28 groups of trees that are growing within the road reserve and open space land that are likely to be removed. The Pōhutukawa, Washingtonia Palms and London Plane are located within the Te Irirangi Drive road reserve.

An English Oak which is scheduled as a Notable Tree in the AUP:OP is located within 9 Cavendish Drive. There are likely to be works within the root zone, these are likely to be relatively minor and will be limited in extent to the existing road reserve.

9.4.1.3 NoR 3

NoR 3 includes 30 single trees that are growing within the road reserve and open space land that is likely to be removed. In summary, these include Pōhutukawa trees on both the northern and southern sides of Puhinui Road.

Notable Magnolia tree

A Notable Magnolia tree is located within the road reserve, adjoining Cambria House at 250 Puhinui Road. The Notable Magnolia tree is in good visual health, but its optimal structure has been heavily modified due to frequent pruning to clear the adjacent powerlines. This has resulted in an upright, largely one-sided canopy form with several pruning wounds and pockets of decay visible near the base of the tree. This ongoing pruning has likely to have reduced the tree's long term structural health and longevity.

Notable Flowering Gum tree

A Notable Flowering Gum tree is located within the road reserve, adjacent to the intersection of Puhinui Road and Vision Place. As noted in the *Airport to Botany: Landscape Effects Assessment*, the Notable Flowering Gum, forms a recognisable natural marker in the view looking west due to the lack of nearby street trees. In part, this defines a book end to this section of road as it approaches the SH20 / SH20B interchange.

The tree is currently in good visual health. However, some structural concerns were noted. The structural issues identified are a result of heavily weighted limbs and cambial cracking due to wind loading stresses. These have been managed to some degree by periodic limb reduction and canopy management.

Given that both these notable trees are located within the road reserve, these trees will need to be removed.

9.4.2 Operational effects

Once the Project has been constructed, no further effects on trees are anticipated. Ongoing maintenance of street trees and trees retained adjacent to the road corridor is a standard operational requirement that does not generate adverse environmental effects.

9.4.3 Measures to avoid, remedy or mitigate potential adverse arboricultural effects

To address the potential effects identified, a Tree Management Plan (**TMP**) will be prepared prior to construction to identify the existing trees protected under the District Plan, confirm the construction methods and impacts on each tree and detail methods for all work within the root zone of trees that will be retained. The TMP will include:

- Confirmation that protected trees identified in the Assessment of Arboricultural Effects still exist;
- Advice on how the design and location of works can avoid, remedy or mitigate effects on the existing trees;
- Recommended planting to replace protected trees that require removal;
- Establishing tree protection zones and specifying tree protection measures such as protective fencing, ground protection and physical protection of roots, trunks and branches;
- Detailing methods for all work within the root zone of trees that are to be retained in line with appropriate arboricultural standards; and
- Where good quality trees in the road reserve are identified for removal, consideration of tree transplanting will be included in the TMP. An assessment of the quality of the trees and the feasibility of transplantation will form part of the plan.

The TMP is limited to trees identified in the Arboricultural Assessment that are protected under the District Plan. Trees protected under Regional Plan provisions will be addressed as part of a future consenting process.

The effects of tree loss can be mitigated by comprehensive planting within the new berms, and areas identified in the Urban Design Evaluation i.e. area to the west of SH20, next to Manukau Memorial Gardens. Replacement planting will be decided through a planting plan for the Project under the proposed Urban Landscape and Design Management Plan (**ULDMP**) condition. The ULDMP will also include methodologies to establish new trees within the road reserve, including creation of quality below ground environments, correct planting methods and appropriate maintenance. Replanting of the stream embankment and road reserve will mitigate potential effects on amenity, ecology, stormwater and land stability.

9.5 Landscape

The Assessment of Landscape Effects, included in Appendix C of Volume 4, assesses the potential effects on landscape character, natural character and visual effects associated with the construction and operation of the Project and recommends measures to mitigate these effects.

This assessment was undertaken in accordance with Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines (2021) and the Quality Planning Landscape Guidance Note (2013).

Landscape effects were assessed under the following two categories:

Temporary effects – describes the anticipated impacts on the natural and landscape characteristics and values resulting from the construction of the Project. It also includes visual amenity effects for both public and private viewing audiences from construction works.

Permanent effects – Describes the effects on the landscape of completed works (including integrated landscape mitigation measures), the significance of physical landscape change and ultimately the resulting effects of the Project on landscape character, natural character and visual amenity for both public and private viewing audiences.

9.5.1 Construction effects

Effects on landscape character and values

During construction, potential adverse effects on landscape character, values and landform features include vegetation clearance, construction areas, construction of the proposed stormwater wetlands and bridge construction. However, these effects are limited as the Project traverses through a predominantly urban environment.

Given the proposed earthworks will occur within or alongside the existing road corridor, in a highly modified environment, effects with mitigation are considered to be very low to low. All cut and fill slopes will be integrated with the surrounding landscape and will be absorbed within the existing modified landform adjacent to the existing road corridors. There is also potential for cut and fill slopes to be integrated with future development as land is urbanised, particularly in NoRs 4a and 4b.

The Project will result in the removal of trees and vegetation during construction. While exotic species make up a good portion of the trees to be removed, it is noted that Pōhutukawa and native bush vegetation which are considered to have a higher landscape value are likely to be removed. During construction and prior to mitigation (such as replacement tree planting), it is considered that the temporary adverse effect of the removal of trees and vegetation will vary across the corridor. This will range from low adverse effects to moderate-high adverse effects depending on whether the trees or groups of trees are locally noteworthy, contribute to an established or unique pattern, are scheduled as Notable Trees under the AUP:OP, the type (native or exotic) and maturity of the trees.

Indicative construction areas will temporarily occupy land across the Project (in all NoRs). These areas will be reinstated at the completion of the construction period, therefore the physical landscape effects associated with the establishment and use of construction areas are very low to low.

The Project proposes a range of structures and associated earthworks. In summary, these include:

- Widening of the existing Otara Creek Bridge (NoR 1);
- Widening of the existing SH1 bridge (NoR 2);
- Widening of the existing bridge crossing the NIMT (NoR 3);
- New BRT bridge crossing the NIMT to connect to Puhinui Station (NoR 3);
- New southbound ramp structure from SH20B to SH20 (NoR 4b); and
- Widening of existing Waokauri Creek Bridge (NoR 4a).

The construction of bridges over streams is likely to require temporary works within the terrestrial margins of the stream. This will have a temporary effect on the existing landform of the riparian environment. Landscape impacts will be remedied through riparian and native reinstatement planting which will be confirmed as part of a future consenting process.

Potential effects on private properties within and adjacent to the Project corridor during the construction period will be very low to low. Potential effects include:

- Surface level changes between private property boundaries and the upgraded road corridor, requiring existing driveways and private accessways to be regraded;
- Encroachment into private yard areas and the removal of private garden plantings and trees, ancillary buildings and boundary fences;
- Potential construction of retaining walls; and
- Removal of existing dwellings and ancillary buildings on properties to be partially required.

It is considered that these effects can be adequately managed from a landscape perspective with the mitigation measures proposed in Section 9.5.3.

Temporary visual amenity effects

As established, the anticipated duration of construction for the Project is as follows:

- **NoR 1:** 4 to 5 years
- **NoR 2:** 4 to 6 years
- **NoR 3:** 3 to 4 years
- **NoRs 4a and 4b:** 3 to 4 years

Visual effects are anticipated to occur progressively through the Project areas during the construction period.

Some vantage points within the Project areas are likely to witness heightened adverse visual effects through the construction phase. This is due to the magnitude of vegetation removal, the proximity of the Project corridor in relation to houses and the scale of structures proposed.

It is anticipated that construction activities required to implement the Project are generally consistent with the nature and scale of road works and infrastructure activities that is commonly viewed by transient viewing audiences within the existing transport corridors, centres and industrial areas nearby. The physical works are also anticipated to occur within a broader landscape where there is existing urban development or development is underway or imminent.

The nature and significance of the potential adverse visual effects will also be moderated through the Project area when considering the following matters:

- Road works and construction activities can generally be expected to occur within existing roads;

- The presence of existing bridges and the likelihood of maintenance works being carried out from time to time;
- The presence of overhead structures such as pedestrian overbridges in NoR 2;
- There is generally low visual amenity through the existing commercial/industrial area across the Project corridor; and
- The existing structures associated with the state highway network in NoRs 4a and 4b are already dominant elements within the visual landscape, and visual amenity is relatively low within the adjoining landscape which is transitioning from rural to industrial.

Therefore, visual effects during construction for transient viewing audiences will be low to moderate and for private viewing audiences will be low-moderate to moderate. However, for viewing audiences opposite the proposed BRT bridge, the size and scale of the bridge may not be fully anticipated. Residential viewing audiences would experience views of the overhead structure being built, including any abutment walls, columns, and the underside of the bridge. Whilst the bridge will appear clearly associated with the road corridor environment, the height and scale of construction activities along with the size of the bridge will not directly relate to the established scale of the road environment. For these reasons, it is anticipated that adverse effects during construction would be high for residents on the northern side of Puhinui Road that are located directly adjacent to the bridge.

9.5.2 Operational effects

Landscape effects

The potential permanent changes to the existing landform associated with the Project are limited and will typically arise from the earthworks to accommodate the new road levels and surfaces. These effects are sufficiently covered in the construction effects section above and it is considered that there would not be further change to the landform during operation of the Project. Therefore, the effects on the landform during operation would be very low to low.

With regard to effects on vegetation, once the Project is in operation, a substantial number of trees would be established. It is proposed that this will include a combination of street trees within the Project corridor as well as mass planted vegetation within the proposed designation boundary and within adjoining open spaces. Although initially, these trees would not be of a size and scale comparable to some of the trees removed as part of the construction of the Project, in time (once fully mature), these would provide a greater contribution to the areas adjacent to the Project in terms of vegetated cover.

Visual amenity effects

Overall, there are likely to be a range of visual amenity effects on public and private viewing audiences relative to the Project corridor. These include:

- For existing properties that are set back from the Project corridor, the visual amenity effects will discern little to no perceivable change in effects from the existing road corridors;
- Residual adverse visual effects are anticipated for some private residential and industrial properties, adjacent to the Project corridor. Viewers may experience some level of material change to the visual composition and amenity of the road corridor. However, it is proposed that vehicular traffic would be located at a similar distance from the property boundaries as currently observed;
- Impacted properties may experience heightened visual amenity and residential character effects as a direct result of driveway regrading, potential loss of yard space and by the greater proximity of

the carriageway, footpaths and cycleways to private dwellings. However, in the context of a future high density urban environment in the long term, this is considered to be appropriate; and

- Public viewing audiences will continue to engage with a similar transport environment, within the backdrop of an urban environment. Over time, visual amenity and appeal for users will improve, due to an improved streetscape design, maturing street trees and berm plantings, and greater accessibility to active modes of transport.

Notwithstanding the above, for residents directly opposite to the proposed BRT bridge crossing the NIMT, i.e. east of Raymond Road, there will be a greater level of permanent change. Depending on their position along the corridor, they would view one or a combination of the bridge features including ramp abutments or columns with the underside of the bridge visible near the crossing of Kenderdine Road. It is considered that for these viewing audiences there will be high adverse effects as the size and scale of the bridge will be contrary to the established character of their outlook.

9.5.3 Measures to avoid, remedy or mitigate

To address the modification to the landscape arising from the Project, prior to construction, an ULDMP will be prepared. The ULDMP will include the following matters which address the principal elements of the Project that are likely to give rise to temporary and permanent adverse effects on landscape character, natural character and visual amenity:

1. **Construction and site compound areas**: reinstate these areas by removing any left-over fill and shaping ground to integrate with surrounding landform. Reinstate with grass at the completion of works;
2. **Bridges and structures:** demonstrate visual integration and sense of place considerations for the proposed bridge structures. This will involve relating the structures to the character and scale of surrounding future urban form and proposed landscape treatments, for example there is an opportunity for the SH20B ramp structure to celebrate the historic gateway context and associative values of the landscape through architectural design;
3. **Active transport connectivity:** investigate opportunities to integrate active transport facilities with existing and future open space within the proposed designation, including Rongomai Park, Hayman Park, Puhinui Domain;
4. **Planting design details:** landscape design and planting design details will be prepared for the Project that demonstrate the following:
    a. Street trees along the full length of the proposed Project corridor in conjunction with shrubs and ground cover species appropriate for the use within stormwater treatment areas and berms;
    b. Integration of Manawhenua preferred design principles in relation to planting;
    c. Identification of existing trees and vegetation that will be retained. Where practicable, mature trees and indigenous vegetation should be retained;
    d. Reinstatement planting within private property boundaries in consultation with property owners; and
    e. Stormwater wetland design and planting.

9.6 Social

The Social Impact Assessment, included in Appendix D of Volume 4, identifies and assesses the potential social impacts of the construction and operation of the Project and recommends strategies to manage these impacts.

The positive social impacts are set out in Section 9.1 above.

The methodology used to assess social impacts includes:

- **Step 1:** A review of literature on social impacts of rapid transit projects;
- **Step 2:** Development of an initial social baseline;
- **Step 3:** Engagement with Social Impact Assessment stakeholders (Manawhenua, interviews with key stakeholders and community members;
- **Step 4:** Categorisation of social impact based on Project information, the literature review and engagement;
- **Step 5:** Update of the social baseline based on *Step 4*; and
- **Step 6:** Identification and evaluation of social impacts.

The subsequent sections provide a summary of social impacts and proposed management strategies.

9.6.1 Pre-construction

The Project may result in changes to people's way of life. As properties within the proposed designation boundary are acquired for the Project, people and businesses are likely to move away from the area if alternative sites cannot be found. Within the Puhinui and Papatoetoe area, a number of businesses that are considered important to the community will potentially be lost, including:

- Mobil Puhinui Road;
- Hari Superette;
- Puhinui Superette; and
- Pukeko Preschool Papatoetoe.

A loss of businesses will mean changes to routines and convenience for some residents. These residents will then need to access those same goods and services from businesses located further away.

As properties are acquired, in the period prior to construction, some properties might remain vacant. These properties can attract anti-social behaviour which can adversely affect people's perceptions of personal safety. Currently, anti-social behaviour has been identified with the vacant Gardner's Cottage on Puhinui Road, which many in the community would like to see demolished.

Over the period prior to construction, people's health and wellbeing will potentially be affected through increased stress and anxiety for landowners and occupiers, business owners and operators and those employed by directly affected businesses.

Directly affected property owners and occupiers, including business owners and operators, can remain on their properties in the period prior to construction. However, having a designation on a

property does place some restrictions[11] on how the property can be used, particularly in relation to changes or improvements. This could feel to some landowners as an impact on their personal and property rights. This feeling might also be present during the active acquisition stage if properties have to be compulsorily acquired.

As businesses close and leave the area it will also result in a loss of employment and livelihood for people working within those businesses, unless the businesses are able to relocate and retain their existing staff.

9.6.2 Construction

Construction activity can impact people's way of life as a result of changes, both temporary and permanent to existing travel patterns. This will be disproportionally experienced by those who work for or visit social services or places that cater to people with disabilities. This is likely to be more prevalent in Manukau Central.

Roads that don't usually have a lot of activity may be used as temporary detours which could affect both the amenity of those roads, but also the ability for those residents and businesses to undertake their typical activities.

Parking and access to some businesses or facilities that are important to the community will be impacted during construction. This is particularly evident in Manukau Central where there is on- street and on-site parking impacted by the Project which may lead to disruption for businesses.

People living and working in areas subject to construction can feel less safe, especially at night. Changes to access and sightlines as a result of hoardings can reduce access to and the visibility of businesses leading to a potential loss of business for some.

Noise, dust and vibration can also reduce the amenity of an area, especially community facilities and open spaces. Construction of the BRT corridor and associated structures may reduce the amenity in some areas, such as:

- Manukau Memorial Gardens;
- Hayman Park; and
- Adjoining properties along Puhinui Road, in the vicinity of Puhinui Station.

9.6.3 Operation

There will be permanent changes to property access along the corridor given the restriction of right-turn vehicle movements.

There will be increased community severance as a result of the Project. This is particularly evident on Puhinui Road where the centre running BRT corridor will restrict the ability of pedestrians to cross the road.

9.6.4 Measures to manage social impact

As established, the Project will result in a change to people's way of life and impact businesses during construction. Based on learnings from previous Auckland Transport projects and an international

[11] In accordance with section 176(1)(b) of the RMA, anyone (other than a requiring authority with a designation) is restricted from carrying out work on the designated land that would prevent or hinder the designated work without first obtaining the requiring authority's consent.

literature review, a range of measures have been identified to manage social impacts for communities and businesses prior to and during construction. A summary of these methods are detailed in the *Airport to Botany: Social Impact Assessment* (Appendix C, Volume 4). Methods that have been developed into conditions of the proposed designations are described below:

- With respect to the impact of properties remaining vacant as they are acquired, it is noted that Auckland Transport will undertake its best endeavours to ensure properties are managed in a manner that does not adversely affect the surrounding area and this is a condition on the proposed designations (NoRs 1 – 3). In addition, Auckland Transport have an internal team which proactively tenant properties that have been acquired;
- The implementation of a Stakeholder Communication and Engagement Management Plan (**SCEMP**) prior to the start of construction to identify how the public and stakeholders (including directly affected and adjacent owners and occupiers of land) will be communicated and engagement with immediately prior and throughout the Construction Works. This will include:
    - Determining adequate notice periods for the commencement of construction activities and works that affect access to properties;
    - Informing parties of the expected timing, duration and staging of works and regular updating of progress; and
    - Providing feedback, inquiries and complaints prior to and during the construction process.
- The implementation of a Development Response Management Plan (**DRMP**) prior to the start of construction to provide a framework to assist businesses affected by the Project during construction. This will include:
    - Recommendations for measures to be undertaken to manage the impacts of Construction Works on the identified businesses;
    - A summary of any proactive assistance provided to impacted businesses; and
    - Identification of opportunities to co-ordinate the forward work programme, where appropriate with infrastructure providers and development agencies;
- A Project website (or equivalent virtual information source) will be set up with information on the Project during the period prior to construction. The website will be updated throughout the Construction Works.
- Implementation of a CTMP (as set out in Section 9.3.3.2) to manage construction traffic and disruption to the local transport network including methods to:
    - Maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be; and
    - Communicate traffic management measures to affected parties.
- Implementation of a Construction Noise and Vibration Management Plan (**CNVMP**) to provide a framework for the development and implementation of best practicable options to avoid, remedy or mitigate the adverse effects on receivers of noise and vibration resulting from construction and to manage any adverse construction noise and vibration effects on sensitive receivers (Refer to Section 9.10), including methods to:
    - Communicate and engage with nearby residents and stakeholders; and
    - Minimise construction disruption for affected properties during construction.

- In addition to a CNVMP, it may be necessary to produce Site Specific or Activity Specific Construction Noise and Vibration Management Schedules (Schedules) where noise and/or vibration standards are predicted to be exceeded for a more sustained period or by a large margin.
- Implementation of an overall Construction Environmental Management Plan (**CEMP**) to manage potential construction effects.

9.7 Property

Potential adverse effects on existing private properties and businesses have been reduced, where practicable through the development of the Project concept design and the proposed designation boundary. Notwithstanding this, there is a strategic need to protect the Project corridor to address the existing and future demand for public transport in the southern and eastern areas of Auckland.

Where impacts on properties and businesses cannot be avoided, the potential effects are discussed in this section and detailed above in Section 9.5 and the *Airport to Botany – Social Impact Assessment* in Appendix C, Volume 4.

The proposed NoRs require land to provide a sufficient footprint to enable the construction and operation of the Project. An NoR breakdown of these properties is set out in Section 7.6.

The land required for the Project is shown in the general arrangement layout plans included with the NoR (refer to Volume 3). Land required for the permanent work will be acquired prior to construction. Following the Completion of Construction, the designation boundary will be reviewed and any land that is not required for the permanent work or for the on-going operation, maintenance or mitigation of effects of the Project will be reinstated in coordination with directly affected landowners or occupiers.

This will include:

- Reinstatement of construction areas and reintegrating with the surrounding landform;
- Reinstatement of driveways, accessways, fences and gardens; and
- Integration of batters and cut/fill slopes with the landscape.

These matters will be discussed prior to or during construction with directly affected landowners and will follow the provisions under the Public Works Act 1981 which is a process separate from the requirements of the RMA.

9.8 Urban design evaluation

An Urban Design Evaluation (**UDE**), included in Appendix E of Volume 4 has been undertaken for the Project based on the principles set out in the Urban Design Framework (appended to the Urban Design Evaluation). The UDE provides urban design commentary on the concept design of the proposed BRT corridor and recommends how urban design opportunities and outcomes could be considered in future design stages of the Project. The opportunities and outcomes identified are either required to mitigate the effects of the Project (mapped as outcomes in purple in Appendix E of Volume 4) or could be considered by Auckland Transport, Waka Kotahi or other parties at future stages of design and development but are not required to mitigate effects of the Project (mapped as opportunities in blue in Appendix E of Volume 4).

Overall, the UDE concluded that the Project is generally supportive of the principles in the Urban Design Framework. In summary the opportunities and outcomes for the Project include:

- Permeability of the corridor for active modes that addresses cross corridor connectivity, modal priority and permeable access to destinations such as centres, transport interchanges, open spaces and community;
- Legibility, connectivity demands, safety and modal priority for active modes should be addressed for intersections across the Project corridor. Demonstration of specific intersection responses to ensure connectivity between the proposed BRT stations, local centres and other community facilities;
- An urban interface approach within the corridor that:
    - Provides an appropriate interface to the existing local, neighbourhood and town centres and enables buildings and spaces to positively address and integrate with the BRT corridor and stations;
    - Responds to the spatial character of proposed centre environments and supports quality public realm infrastructure;
    - Demonstrates the proposed modal hierarchy, built form interfaces and arrangements at the proposed BRT station locations;
    - Recognises the transition of residential densities and provides a corridor interface that supports permeable pedestrian access, responding to the changing built form interface and spatial character; and
    - Supports the integration of the proposed BRT stations and surrounding land uses.
- The identification, development and integration of key local community and identity drivers across the corridor with the Project;
- Supporting direct access to existing local, neighbourhood and town centres, schools, community functions and open spaces;
- A Crime Prevention Through Environmental Design (**CPTED**) review of the Project which includes (but is not limited to):
    - Under bridge environment
    - Public access walkways
- In future design stages, Manawhenua will be invited as Partners to provide input into relevant cultural, landscape and design matters including how desired outcomes reflect their identity and values;

- A landscape plan that considers recommendations from the landscape, arboricultural, flooding and ecological assessments including:
    - Street tree and stormwater raingarden and wetland planting;
    - Construction compound and private property reinstatement and treatment of batter slopes;
    - Integration of Otara Creek, Puhinui Stream, Waokauri Creek and Pūkaki Creek and their tributaries; and
    - Reinforcing the wider vegetation patterns of the local landscape and create connections to proposed greenways and the wider walking and cycling network.
- Integration of the stormwater management devices to achieve an appropriate interface with adjacent land uses, specifically where wetlands are proposed in areas zoned for high density.
- Measures to demonstrate that the project has adapted to the changing climate such as reducing urban heat island effects in future urbanised areas, supporting modal shift and accounting for flood hazard risks.

The measures to achieve these outcomes will be confirmed at the detailed design stage and form part of the ULDMP as a condition on the proposed designations.

9.9 Flooding

The Assessment of Flood Hazard Effects in Appendix F of Volume 4 assesses the actual and potential effects of the future construction and operation of the Project as it relates to flooding.

The assessment draws a distinction between stormwater effects and flood hazard effects, which are a subset of potential stormwater effects.

Stormwater effects are broadly divided into stormwater quantity effects which may cause effects onstream habitat, baseflow and sediment movement in streams), stormwater discharge quality which may cause effects on aquatic fauna, public health and amenity values) and the effects on streams due to the presence of in-stream structures. Effects of stormwater quantity, quality and effects on streams will be considered as part of a future consenting process.

This assessment is limited to flood hazard effects being the specific matters that would trigger a District Plan consent requirement.

While stormwater effects apart from flood hazard effects are not assessed, provision is made for the future mitigation of potential stormwater effects (stormwater quality and retention/detention) by identifying the space required for stormwater management devices (for example rain gardens and wetlands) and incorporating sufficient land for that purpose into the proposed designation boundaries.

The methodology for the assessment of flood hazard effects has involved:

- Desktop assessments to identify potential flooding locations;
- Review of flood extent maps to identify flooding effects at key locations such as existing culverts, properties and buildings;
- Flood modelling of the pre-development terrain with Maximum Probable Development (**MPD**) and future 100 year Average Recurrence Interval (**ARI**) plus climate change rainfall; and
- Modelling of two climate scenarios – one considering an increase in temperature of 2.1 degrees and a sensitivity analysis considering an increase in temperature of 3.8 degrees.

9.9.1 Construction effects

The following construction effects apply to the full extent of the Project. Considering the location of proposed works in relation to overland flows and known flood extents, the proposed construction works which could result in flooding effects include:

- Upgrading of existing culvert or bridge crossings;
- Realignment of existing overland flow paths;
- Works, such as regrading and raising levels, within existing floodplains; and
- Storage of materials and use of lay down areas within floodplains.

9.9.2 Operational effects

The assessment of operational effects for the Project is based on the 100 year flood model results for the pre-development (existing) terrain and considers the flooding extents at existing culvert crossings and along existing roads. The following matters have been considered as part of this assessment:

- Existing flooding and freeboard at key points identified from modelling the existing terrain;

- The potential of flooding on existing properties due to the proposed concept design of the Project; and
- Incremental changes to the corridor impervious area.

9.9.3 Measures to avoid, remedy or mitigate potential adverse flooding effects

The sections to follow provide the proposed measures to manage the construction and operational flood hazard effects.

9.9.3.1 Construction

Flood hazard risks for the construction phase will be addressed in a Construction Environmental Management Plan (**CEMP**) proposed as a condition on the designations and alteration to designation. In preparing the CEMP, key issues to consider include:

- Siting construction yards, laydown areas and stockpiles outside the predicted flood plains;
- Maintaining overland flow paths around / through areas of work;
- Minimising the physical obstruction to flood flows at the low points;
- Staging and programming to provide new drainage prior to raising existing road design levels and carrying out work when there is less risk of extreme flood events; and
- Actions to take in response to heavy rain warnings which may include reducing the conveyance of materials and plant that are considered necessary to be stored or sited within the predicted flood plain or significant overland flow path.

9.9.3.2 Operational

It is recommended that during detailed design, additional flood modelling is carried out and measures implemented to achieve the following outcomes:

- No increase in flood levels for existing authorised habitable floors that are already subject to flooding (that is, no increase in flood level where the flood level using the pre project model scenario is above the habitable floor level);
- No more than a 10% reduction in freeboard for existing authorised habitable floors (that is, if existing freeboard was 500mm, an acceptable change would be to reduce freeboard to 450mm);
- No increase of more than 50mm in flood level on land zoned for urban or future urban development where there is no existing habitable dwelling;
- No new flood prone areas (with a flood prone area defined as a potential ponding area that relies on a single culvert for drainage and does not have an overland flow path); and
- No more than a 10% average increase of flood hazard (defined as flow depth times velocity) for the main access to authorised habitable dwellings.

Where the above outcomes can be achieved through alternative measures outside of the designation such as flood stop banks, flood walls and overland flow paths, this may be agreed with the affected property owner and Auckland Council.

The above outcomes are included as conditions on the proposed designations and alteration to Designation 6717.

9.10 Noise and vibration

The Assessment of Construction Noise and Vibration Effects, included in Appendix G of Volume 4 contains predictions for construction noise and vibration levels carried out using the method recommended in the NZS 6803 in accordance with the AUP:OP. The methodology included:

- Reviewing noise and vibration emission data for each construction task based on equipment data previously measured for similar activities;
- Predicting the noise and vibration levels from construction based on relevant standards and guidelines; and
- Determining setback distances where compliance with the relevant standards can be achieved.

The Assessment of Effects on Traffic Noise, included in Appendix H of Volume 4, sets out predictions of road traffic noise carried out using the method in NZS 6806 in accordance with rule E25.6.33 in the AUP:OP. The assessment of effects was twofold and considered NZS 6806 noise criteria categories as well as the anticipated noise level change with and without the Project.

9.10.1 Construction noise effects

Construction noise and vibration is generally higher than that of ongoing continuous activities. Therefore, while effects are based on how people are likely to react to equivalent internal noise levels, construction is a temporary activity with a finite duration. Most people are more likely to accept increased noise (or vibration) levels if durations and magnitudes are well communicated prior to works occurring.

Overall, predicted noise levels for the majority of works will be able to comply with the relevant daytime standards, which means that effects are generally acceptable inside neighbouring buildings. Where high noise activities are likely (e.g. demolition of close by buildings, piling of bridges or retaining walls, and earthworks), these activities would occur for short periods only close to any one building, generally extending over a few days at most, before moving along the alignment or being completed.

Some limited night-time works are likely to be required for the construction of the new bridge across SH1, the SH20B to SH20 ramp structure and the construction of the BRT bridge across the NIMT at Puhinui Station as road closures and a block of line would be required.

Overall, it is considered that effects will generally be reasonable for the majority of activities.

9.10.2 Construction vibration effects

Initial predictions indicate that many buildings in NoR 1, 2 and 3 are within 15 metres from the closest extent of the works. This means that a large number of buildings will likely be affected by construction vibration. The effects are anticipated from:

- The demolition of the first row of dwellings in NoR 2 and 3;
- Road preparation – the use of vibratory rollers along the full corridor are close to dwellings fronting the existing road corridors; and
- The construction of bridge piles and retaining walls.

For the majority of dwellings, compliance with the 5 mm/s PPV limit to avoid any buidling damage can be achieved. However, vibration levels may exceed the amenity criterion of 2 mm/s PPV for brief

durations while the vibratory roller passes. This is likely to occur for one or two days at a time and will be similar to what is expected for road resurfacing.

A small number of buildings in NoRs 2 and 3 are predicted to receive vibration levels above 5 mm/s PPV without mitigation, and the construction methodology will be reviewed at the time to avoid any exceedance.

9.10.3 Traffic noise effects

In accordance with NZS 6806, the Project only consists of “altered roads”.

Existing Protected Premises and Facilities (**PPFs**) within 100 m from the proposed new road edge were assessed based on NZS 6806. The number of PPFs for each NoR is shown in Table 7 below:

Table 7: Number of PPFs in each NoR

NoR	Number of PPFs
NoR 1	628
NoR 2	768
NoR 3	380
NoR 4a	5
NoR 4b	0

The individual traffic noise level predictions were compared with the noise criteria categories A, B and C of NZS6806, and the anticipated noise level change due to the Project was calculated.

Overall, the change in noise level was predicted to be minimal due to the traffic generation itself. However, many dwellings are intended to be removed to facilitate the Project. The removal of the first row of houses will result in noise level changes to PPFs behind the dwellings that will be removed.

Mostly, those PPFs would still receive noise levels within Category A (the desired noise criteria category), however, there is a small number of PPFs where noise levels are predicted to be in Category B and Category C. These PPFs are located in NoRs 1, 2 and 3.

For the vast majority of PPFs (1,536 of the total of 1,781 PPFs assessed across all NoRs), the noise level changes due to the Project will be insignificant (ranging from +2 to -2 dB).

9.10.4 Recommended measures to avoid, remedy or mitigate noise and vibration effects

The sections to follow provide the proposed measures to manage the effects of construction noise and vibration and traffic noise.

9.10.4.1 Construction

In order to determine and implement the BPO management of construction noise and vibration, and reduce, as far as practicable, any exceedance of the noise of vibration standards a CNVMP should be

prepared. The Assessment of Construction Noise and Vibration Effects in Appendix G of Volume 4 sets out the minimum level of information that must be provided in the CNVMP. This includes:

- Description of the works and anticipated equipment/processes;
- Hours of operation, including times and days when construction activities would occur;
- The construction noise and vibration standards for the Project;
- Identification of receivers where noise and vibration standards apply;
- Management and mitigation options, including alternative strategies adopting the BPO where full compliance with the relevant noise and/or vibration standards cannot be achieved;
- Methods and frequency for monitoring and reporting on construction noise and vibration, including:
    - Updating the predicted noise and vibration levels based on the final methodology and construction activities;
    - Confirming which buildings are to be subject to a pre and post building condition survey;
    - Identifying appropriate monitoring locations for receivers of construction noise and vibration;
    - Procedures to respond to complaints received on construction noise and vibration, including methods to monitor and identify noise and vibration sources;
    - Procedure for responding to monitored exceedances; and
    - Procedures for monitoring construction noise and vibration and reporting to the Auckland Council Consent Monitoring officer
- Procedures for maintaining contact with stakeholders, notifying of proposed construction activities, the period of construction activities, and handling noise and vibration complaints
- Contact details of the site supervisor or Project manager and the Requiring Authority's Project Liaison Person (phone, postal address, email address);
- Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers;
- Identification of areas where compliance with the noise and/or vibration standards will not be practicable and where a Site Specific Construction Noise and/or Vibration Management Schedule will be required;
- Procedures for how remedial works will be undertaken, should they be required as a result of the building condition surveys; and
- Procedures and timing of reviews of the CNVMP.

9.10.4.2 Operational

To mitigate traffic noise effects, it is recommended that a low noise road surface is applied across NoRs 1, 2, 3 and 4a (this surface is currently in place for the existing carriageways across all NoRs). This mitigation is considered to be the most effective noise mitigation measure for existing PPFs but will also benefit any future PPFs.

For NoRs 1, 2, 3 and 4a, it is noted that Auckland Transport adheres to road resealing guidelines[12] which sets out the requirements where asphaltic concrete (low noise road surface) must be used. The requirements include minimum traffic volumes and consideration of adjoining land use.

As noted, for PPFs where noise levels are predicted to be within Category C, such as in NoR 1, acoustic boundary fences may reduce noise levels to be within Category A or B. However, such

[12] Auckland Transport Reseal Guidelines, Asset Management and Systems 2013

fences may not be practicable if the existing slip lanes along Te Irirangi Drive are repurposed into integrated lane for walking and cycling and stormwater infrastructure (as set out in Section 9.8). As such, the use of barriers for traffic noise mitigation should be reassessed at the time of construction, to confirm if an acoustic boundary fence represents the BPO.

9.11 Terrestrial ecology

The Assessment of Terrestrial Ecological Effects, in Appendix I of Volume 4, assesses the actual and potential terrestrial ecological effects of the Project on the environment, where these relate to District Plan matters.

For information, freshwater habitats have been delineated in the assessment (in Appendix I of Volume 4). Ecological matters that trigger Regional Plan and National Environmental Standard for Freshwater (**NES:FW**) consents will be assessed and approvals sought prior to construction.

The assessment follows the Ecological Impact Assessment (**EcIA**) Guidelines, which provide a standardise matrix framework to assess the ecological value of identified features and evaluate the magnitude of potential effects that the Project could have on these features.

9.11.1 Construction effects

Terrestrial vegetation

Vegetation to be removed in NoRs 1 to 3 that is subject to District Plan rules includes predominantly trees within road reserves and open space zones. This vegetation is highly fragmented and is of low and negligible ecological value. The removal of this vegetation will not introduce additional edge effects, as such the magnitude of effect will be low.

Bats

In NoR 1 and some parts of NoR 2, there will potentially be a moderate level of effect for long-tailed bats (of very high ecological value) during construction activities. Night works may be required as part of construction, and lighting at night has the potential to disturb the bats utilising the stream (which the NoR crosses) as flight corridors.

Birds

In NoR 1, construction activities may have a moderate level of effect on the At-Risk wetland bird species pāteke, as it may lead to disturbance and displacement. Although the pāteke are likely habituated to a level of disturbance already due to the urban environment in which they are found, the magnitude of effect is expected to be high, especially as nest abandonment could result in the death of birds. Loss of District Plan vegetation may also lead to removal of nests and foraging habitat, and bird injury or death.

In NoRs 4a and 4b, construction activities may also lead to disturbance and displacement of birds adjacent to the Project area. The level of effect will be high for At Risk – Declining wetland bird species, moderate for Pipit, and low for Not-Threatened birds. In addition, birds may lose roosting/foraging habitat, abandon or lose nests and also be at risk of mortality or injury during tree felling when the District Plan vegetation is removed. This effect will be limited to Not-Threatened birds only.

Lizards

In NoRs 4a and 4b, construction activities may have a very high level of effect to lizards. Under the current ecological baseline, lizards are not expected to be present within any of the District Plan vegetation to be removed. However, there is a reasonable probability that copper skinks will utilise

these PL.1 habitats in the likely future environment. Construction activities may therefore result in injury or death of lizards.

9.11.2 Operational effects

The Project involves the addition of a BRT corridor within a predominately urban landscape. As such, many of the potential operational effects of the Project such as habitat fragmentation, noise and light pollution are pre-existing.

Potential operational effects include reductions in habitat connectivity and impacts from noise, light and vibration upon indigenous fauna, as well as potential mortality from vehicle strike.

Bats

In NoR 1 and parts of NoR 2, a moderate level of effect to bats during operation may occur. This is due to the presence of the upgraded roadway leading to fragmentation of habitat, and impacts of lighting spillage and noise which may impact behaviour of both bats and insects (their prey).

9.11.3 Recommended measures to avoid, remedy or mitigate actual or potential adverse effects

To mitigate the potential construction and operational effects on bats, pre-construction surveys should be undertaken to confirm bat presence. If bats are identified to be present, then a management plan framework should be implemented. This plan incorporates mitigation measures such as reduction of light spill and works at night near bat habitats, and siting of compounds and laydown areas away from bat habitats.

For birds, pre-construction bird surveys should be undertaken to determine which Threatened or At-Risk bird species are present. If present, a management plan should be developed to manage and mitigate adverse construction effects.

If pipit are present within the nearby grassland habitats, these should be mown outside of the pipit breeding season and managed as short grass thereafter to prevent pipits nesting adjacent to the Project area.

To manage the effects of vegetation removal resulting in loss of habitat and bird injury or death, Under the Wildlife Act 1953, impact management measures will be required to prevent killing or injuring native birds during tree felling.

If the mitigation detailed above are implemented, it is considered that the magnitude of construction and operational effects from the Project on terrestrial ecology within and adjacent to the Project area would be reduced to low.

To address the potential construction effects on terrestrial ecology an Ecological Management Plan (**EMP**) will be prepared if the above fauna is present following a pre-construction survey. The EMP will set out methods to minimise impacts of construction and operational activities on the ecological values of Identified Biodiversity Areas as far as practicable.

Regional Plan and National Environmental Standard consents will be sought prior to construction with respect to the following matters:

- Removal of riparian vegetation;

- Streamworks;
- Earthworks;
- Works within wetlands; and
- Discharges.

For lizards, it is noted that these are located to the north of the existing SH20B. Whilst the proposed designation boundaries extend to this area, vegetation clearance is not proposed as the BRT corridor and walking and cycling facilities will be constructed to the south of the existing SH20B. It is also noted that vegetation clearance in this area would require a consent under the Regional Plan.

9.12 Archaeological and built heritage

The Assessment of Effects on Archaeology and the Assessment of Effects on Built Heritage, included in Appendix J and K of Volume 4, assesses the actual and potential effects of the future construction and operation of the Project as it relates to archaeology and historic heritage effects. This section does not provide an assessment of Māori cultural values.

The assessments found that there are twelve recorded archaeological sites and nine historic heritage sites within 200 m of the NoRs. Eleven of the twelve archaeological sites are outside of the proposed scope of works and/or destroyed. One site (R11/1973) was not able to be located during field survey, so it cannot be determined if it will be affected by any future works associated with the Project.

Two of the nine historic heritage sites are trees (the effects on these trees are discussed in more detail in Section 9.4), one site is a milepost on Great South Road which was removed in the 20th Century, and the remainder are built heritage items.

With respect to built heritage, NoR 3 contains Cambria House at 250 Puhinui Road, a Category A* Scheduled place. Two non-scheduled built heritage sites have been recorded as having moderate historic heritage significance:

- The fire-damaged former Gardener's Cottage at 250 Puhinui Road, associated with Cambria House; and
- A stone/bronze memorial in the road reserve at the junction between Puhinui Road and Kenderdine Road.

The Project does not affect any scheduled or nationally listed built heritage places of historic heritage significance in NoRs 1, 2, 4a and 4b.

9.12.1 Construction effects

There are no identified archaeological or historic heritage items which will be directly affected by the Project. However, it is assumed that the entire extent of works would be subject to topsoil stripping and pavement removal, and any previously unrecorded sub-surface archaeological material that may be encountered during construction within the extent of works would be destroyed and would not be able to be preserved or avoided.

The greatest level of effect for built heritage would be generated through the likely removal or demolition of the fire-damaged former Gardener's Cottage, resulting in moderate, permanent adverse effects on built heritage values. Likely loss of landscaping and mature trees within the road reserve associated with the Cambria House scheduled historic heritage place may also result in low, permanent adverse effects on context and aesthetic values.

Construction works may also lead to potential or accidental damage of the Memorial Stone and potential demolition or removal of pre-1940 buildings. However, the adverse effects of this on built heritage values are low.

9.12.2 Operational effects

There are no known operational effects on archaeology or historic heritage.

9.12.3 Recommended measures to avoid, remedy or mitigate construction effects

To address the potential construction effects on archaeology and built heritage, a Historic Heritage Management Plan (**HHMP**) will be prepared prior to the start of construction. The HHMP will:

- Set out the methods for the identification and assessment of historic heritage within the designation to inform detailed design;
- Identify the known and potential historic heritage sites within the designation; and
- Set out the Heritage New Zealand Pouhere Taonga Act 2014 (**HNZPTA**) authority requirements for any pre-1900 sites.

Since archaeological survey cannot always detect sites of traditional significance to Māori, or wāhi tapu, the appropriate Manawhenua authorities will be consulted regarding the possible existence of such sites.

Any potential adverse effects on previously unrecorded archaeological deposits that are exposed during the works can be mitigated by obtaining a precautionary General Archaeological Authority under the HNZPTA authority. Where effects on known (or unknown) archaeological sites cannot be avoided, an archaeological investigation will be undertaken and standard archaeological practice of any affected archaeological sites will be undertaken in accordance with the Authority.

The built heritage effects associated with the demolition of the Gardener's Cottage will be mitigated through the implementation of the HHMP.

9.13 Network utilities effects

The table below summarises the existing utilities within and around the proposed designations for the Project:

Table 8: Summary of network utilities within the proposed designation boundaries

Utility Provider	Asset	Designation
Transpower New Zealand Ltd	Transmission lines and substation	8516, 8517
First Gas Ltd	Gas pipeline	9104
Wiri Oil Services Ltd	Jet fuel pipeline	9700
Channel Terminal Services Ltd	Petroleum pipeline	6501
Vector Ltd	Medium voltage overhead lines	-
Chorus Ltd	Communication lines	-

Some of the land to be designated for the Project is already subject to existing designations which are generally other network utility operators (refer to Table 8 above).

In order to undertake work in accordance with a designation on land where there is an existing designation in place, the written consent of the requiring authority for the earlier designation is required under section 177(1)(a).

This written approval is required in order for Auckland Transport and Waka Kotahi to be able to undertake works in accordance with the later designations and alteration to Designation 6717 (the Project). It is not required in order to designate the land for those later works. For this reason, written approval under section 177(1)(a) of the RMA has not yet been obtained.

Consultation with all the requiring authorities, whose approval will be required in the future, has taken place and will continue as the Project is developed. Written approval from these requiring authorities will be obtained by Auckland Transport and Waka Kotahi at a later date during the detailed design stage of the Project.

9.13.1 Mitigation measures

Engagement with network utility operators has been ongoing throughout the Project as detailed in Section 11 of the AEE. Engagement will continue throughout the detailed design and construction of the Project.

To mitigate effects on network utilities, a Network Utilities Management Plan (**NUMP**) will be prepared prior to construction of the Project. The NUMP will set out a framework for protecting, relocating and working in proximity to existing network utilities. The NUMP will be prepared in consultation with the relevant network utility operators and will include methods to:

- Provide access for maintenance at all reasonable times, or emergency works at all times during construction activities;
- Manage the effects of dust and any other material potentially resulting from construction activities and able to cause material damage, beyond normal wear and tear to overhead transmission lines in the Project area; and
- Demonstrate compliance with relevant standards and Codes of Practice including, where relevant, the NZECP 34:2001 New Zealand Electrical Code of Practice for Electrical Safe Distances 2001; AS/NZS 4853:2012 Electrical hazards on Metallic Pipelines; and AS/NZS 2885 Pipelines – Gas and Liquid Petroleum.

Prior to construction, Network Utility Operators with existing infrastructure located within the proposed designations and alteration to Designation 6717 will not require written consent under section 176 of the RMA for the following activities:

- Operation, maintenance and urgent repair works;
- Minor renewal works to existing network utilities necessary for the on-going provision or security of supply of network utility operations;
- Minor works such as new service connections; or
- The upgrade and replacement of existing network utilities in the same location with the same or similar effects as the existing utility.

This is a condition on the proposed designations and alteration to Designation 6717. Given the proposed designation boundary for NoR 4a extends onto Auckland Airport (a programme partner) land, specific provision has been made for Auckland Airport under this condition with respect to their existing infrastructure.

10 Summary of key proposed mitigation

The table below sets out the proposed designation conditions by matter to manage the actual and potential effects on the environment as a result of the Project.

Matter	Condition
Transport	• Construction Traffic Management Plan (**CTMP**); and • Existing Property Access.
Manawhenua partnership	• Outline Plan; • Management Plan; • Mana Whenua Partnership; • Stakeholder and Communication Engagement Management Plan (**SCEMP**); • Urban Landscape Design Management Plan (**ULDMP**); • Cultural Monitoring Plan; • Historic Heritage Management Plan (**HHMP**); • Pre-Construction Ecological Survey; and • Ecological Management Plan (**EMP**).
Arboriculture	Tree Management Plan (**TMP**).
Social	• Stakeholder and Communication Engagement Management Plan (**SCEMP**); • Development Response Management Plan (**DRMP**); and • Property Management.
Property	Designation Review.
Urban design	Urban Landscape Design Management Plan (**ULDMP**).
Landscape	
Flooding	• Construction Environmental Management Plan (**CEMP**); and • Flood Hazard.
Noise and vibration	• Construction Noise and Vibration Management Plan (**CNVMP**); • Site Specific Construction Noise and Vibration Management Plans (**SSCNMP**); and • Low Noise Road Surface (**LNRS**).
Terrestrial ecology	• Pre-Construction Ecological Survey; and • Ecological Management Plan (**EMP**).
Archaeology and built heritage	Historic Heritage Management Plan (**HHMP**).
Network utilities	• Network Utilities Management Plan (**NUMP**); and • Network Utility Operators (**Section 176 Approval**).

11 Engagement

This section provides an overview of partner, stakeholder and public engagement for the Project. It summarises engagement during each phase of the Project and sets out the common feedback themes raised and how this has informed the development of the Project.

The Project has been through various phases of engagement. These phases are summarised in the table below:

Project stage	Timing	Engagement purpose
Southwest Gateway Programme – Airport to Botany Rapid Transit Single Stage Business Case	December 2017 to December 2018	The purpose of this engagement was to introduce the Programme, projects and seek feedback on options being considered for the 20Connect and Airport to Botany Rapid Transit projects. The engagement involved hui with Manawhenua and stakeholder workshops/
	January 2019 to December 2019	The purpose of this engagement was to provide an update on how feedback from the previous round of engagement was incorporated in the option assessment process and provide an update on the preferred options for the 20Connect and Airport to Botany Rapid Transit projects.
Notice of Requirement	June 2022 to December 2022	Engagement at this phase commenced with an update on the NoR scope to Local Boards, elected representatives and key stakeholders. This phase then moved to discussing potential impacts of the Project on directly affected landowners.

11.1 Previous engagement undertaken for the Project

As set out in the table above, during the previous business case stage, engagement was undertaken with the following partners, stakeholders, and community:

- Programme partners – Te Ākitai Waiohua, Auckland Transport, Waka Kotahi and Auckland Airport;
- Manawhenua;
- Internal stakeholders from Waka Kotahi, Auckland Transport, and Auckland Airport;
- Auckland Council Controlled Organisations and relevant local boards;
- Government agencies;
- Advocacy groups;
- Network utility providers;
- Emergency services;
- Business associations and individuals;
- Local community/residents; and
- General public.

Various methods of engagement were carried out during the previous business case engagement period. This is, summarised below:

- Regular hui were held with Manawhenua through the Auckland Transport Southern Manawhenua Table at key points in the development of the business case process including optioneering;
- The Southwest Gateway Integration Group representatives (Te Ākitai Waiohua, Waka Kotahi, Auckland Transport, Auckland Airport, and Auckland Council) met on a regular basis to provide project updates, align programmes, and coordinate engagement activities;
- Sessions were held for key stakeholders and Auckland Transport, Waka Kotahi and Auckland Council staff to introduce the Programme and projects;
- Presentations, small group meetings, and one-on-one meetings were held with key stakeholders. This engagement sought feedback during the development of the business case and included workshops on the long list and short list option development and assessment;
- Mail drops and flyers were sent to communities, potentially affected property owners/occupiers, and businesses within the Project area involved. These provided information on the Project and set out opportunities for the community to be involved. This was followed by community open days, emails, phone calls, and one-on-one meetings as required; and
- Media releases and regular information on websites and social media was provided for the general.

Key feedback points received were summarised into the following themes:

- **Customer-focused public transport:** Feedback received noted that service hours should cater for a wide range of users, including shift workers. The service needs to be frequent, reliable and operate for extended hours;
- **Improved access:** Support for the Project connecting to the Manukau bus and train station, Botany Town Centre and Puhinui allowing for efficient train/bus changes;
- **Safety:** there was support for improvements that provide safe, separated cycling facilities alongside and connecting to the rapid transit corridor between the Airport, Puhinui, Manukau, and Botany. Feedback also recommended that rapid transit stations be well-lit, easily accessible, provide shelter and be well connected to locate bus services and walking and cycling routes;
- **Potential environmental and social opportunities and effects:** Manawhenua expressed their aspirations of recognising the cultural landscape adjacent to the Project area and enhancing and protecting the natural environment where possible, particularly waterways. Manawhenua also indicated their preferred approach for stormwater treatment which included prioritising green infrastructure and taking into account the wider catchment. The wider community supported sustainable transport options including the electric BRT that is proposed for the Airport to Botany project; and
- **Growth and development:** there was general recognition that the southern and eastern areas of Auckland have experienced significant growth in population and employment. There was strong support for a rapid transit network to enable workers and others to access the Airport Precinct, an area set for significant growth over the next 30 years.

Specific feedback on the option development and assessment process and how this has been considered in the development of the Project is set out in Appendix A of this AEE.

11.2 Engagement during NoR phase of the Project

The sections to follow summarise the engagement undertaken for the NoR phase of the Project with partners, key stakeholders and directly affected landowners. The sections identify key matters raised through engagement and how these have been addressed by the Project Team where practicable.

11.2.1 Engagement with programme partners

11.2.2 Te Ākitai Waiohua

The partnership with Manawhenua, including Te Ākitai Waiohua is discussed in detail in Section 2 of this AEE.

11.2.2.1 Auckland Airport

As established, Auckland Airport are partners in the programme[13] and have been involved through the previous business case phase and more recently through the preparation of the NoRs.

In recognition of the overall Project continuing from Orrs Road to the Airport terminals, monthly integration meetings with Auckland Airport have been held through the NoR phase of the Project. Through these meetings, the Project Team provided updates on technical assessments, timeframes and identified opportunities to coordinate assessments.

11.2.3 Engagement with Te Tupu Ngātahi partners

11.2.3.1 Manawhenua

The partnership with Manawhenua is discussed in detail in Section 2 of this AEE.

11.2.3.2 Auckland Council

Auckland Council Integration Forum

Regular integration meetings with Auckland Council have been held as part of the Te Tupu Ngātahi programme wide forum. The Project Team have provided updates for these meetings in relation to key Project milestone and decisions.

11.2.4 Engagement with key stakeholders

11.2.4.1 Local Boards and Elected Members

The Project Team have provided regular updates to Local Boards within the Project area. These include:

- Ōtara-Papatoetoe Local Board;
- Howick Local Board;
- Māngere-Ōtāhuhu Local Board;
- Papakura Local Board; and
- Manurewa Local Board.

[13] Southwest Gateway Programme

The purpose of these updates were to provide an overview of the Project, including key social opportunities and outcomes for their communities. Potential effects of the Project on community facilities and open space land were discussed and opportunities were provided to seek clarification about these effects.

Briefings were provided to Members of Parliament and Elected representatives as requested.

Key matters that were raised through this engagement included:

- Safety of pedestrians crossing the roads;
- Potential impacts associated with construction, i.e. traffic impacts, noise and dust;
- The draft Manukau Sports Bowl Masterplan;
- Level of engagement with directly affected landowners;
- Property acquisition process and associated timeframes; and
- Opportunities for enhancing environmental outcomes such as tree replanting, green stormwater infrastructure.

Members of Parliament, Elected representatives and Local Boards raised the absence of rapid transit and walking and cycling facilities in their areas. Overall, there was general support for the Project.

11.2.4.2 Auckland Council Community Facilities – Parks

The Project Team has met with Auckland Council Parks to discuss the Project and potential impacts of the Project to parks adjoining the corridor. These discussions also provided an opportunity for Auckland Council Parks to share information on the future uses and upgrades planned for parks and reserves. A key discussion point was the proposed upgrade within Puhinui Domain. The Project would look to naturalise the existing concrete channel and improve the quality of stormwater discharged to Puhinui Stream. The Project Team noted that these proposed upgrades were integrated with Te Whakaoranga o te Puhinui regeneration programme and was supported by Manawhenua.

Auckland Council Parks are involved in ongoing discussions with the Project Team, Eke Panuku and Healthy Waters with respect to a proposed integrated stormwater treatment device within Hayman Park.

11.2.4.3 Healthy Waters

The Project Team have met with Healthy Waters to discuss the Project and in particular Hayman Park and the Manukau Sports Bowl. Several meetings have been held at both a strategic and technical level with respect to stormwater treatment in these locations.

As part of the Transform Manukau programme, Auckland Council and Eke Panuku have proposed a wetland project in Hayman Park to address sediment build up, bank stability and litter issues associated with the existing pond. The Project Team has sought to integrate the treatment of stormwater from the Project with the proposed upgrade.

Healthy Waters and Eke Panuku are involved in ongoing discussions with the Project Team in relation to the stormwater treatment for Manukau Central.

11.2.4.4 Eke Panuku

The Project Team held several workshops with Eke Panuku to discuss the Project and the interface with the development plans Eke Panuku have in the vicinity of the Project. Eke Panuku indicated Manukau Central, Puhinui Station and the Manukau Sports Bowl as key areas of interest.

Eke Panuku is leading the Transform Manukau project which is proposing a number of short, medium, and long-term projects in Manukau Central. As part of the programme, walking and cycling upgrades are proposed adjacent to the Project. Through engagement, it was noted that there were opportunities to integrate the walking and cycling proposed by the Project with the wider network planned for Manukau.

With regard to Puhinui Station, Eke Panuku recognised the potential development opportunities that were facilitated by the Project at key existing and proposed stations.

As set out above, the Project Team will continue working with Eke Panuku on the Project including the integrated stormwater treatment device in Hayman Park and Manukau Sports Bowl.

11.2.4.5 Kāinga Ora

The Project Team has engaged with Kāinga Ora to discuss the Project and its relationship with Kāinga Ora properties. Kāinga Ora have a large landholding along the Project corridor.

A joint workshop was held with Kāinga Ora and Eke Panuku to discuss potential opportunities to coordinate and align the timeframes of the Project with their future development plans.

There was general support for the Project, particularly related to the transport and access benefits provided through the Project.

11.2.4.6 KiwiRail

KiwiRail has been engaged on the interface between the Project and the KiwiRail network, particularly relating to construction impacts of the Project on the Lambie Drive rail box, the Puhinui Station BRT bridge structure, and works on Bridge Street. The key matter raised by KiwiRail was in relation to their future aspirations for the North Island Main Trunk and ensuring that the Project does not preclude the provision of additional tracks. The Project Team acknowledged this matter and noted that the piers associated with the BRT bridge structure would be confirmed through the detailed design stage. Any proposed works within the rail corridor will be discussed with KiwiRail including permission to work within their designation for bridge construction activities.

11.2.4.7 Auckland University of Technology (AUT)

The AUT South Campus on 640 Great South Road (within NoR 2) is designated by the Minister for Tertiary Education, Skills and Employment. The Project Team has met with AUT to discuss the Project and seek feedback. Key matters raised by AUT was in relation to the potential impacts on their site, including infrastructure upgrades which was shared with the Project Team. AUT was also concerned about the construction impacts of the Project, particularly in relation to noise, loss of vegetation and access. The Project has been involved in ongoing discussions with AUT to address these matters and will continue engaging with AUT as a key stakeholder in future phases of the Project. Notwithstanding the above, AUT recognised the improved public transport and active mode access for staff and students as a result of the Project.

11.2.4.8 Fire and Emergency NZ (FENZ)

Papatoetoe Fire Station is located in NoR 2. The Project Team met with FENZ to discuss the Project and seek feedback. Given the large catchment served by the Papatoetoe Fire Station, the key area of interest for FENZ was ensuring that access in all directions and without delays to emergency response times could be retained. In response and as set out in Section 9.3, the Project retains safe, all-movement access from the Fire Station (for emergency vehicles only).

11.2.4.9 Manukau Institute of Technology (MIT)

The Project Team has engaged with MIT to discuss the Project and seek feedback. Through engagement, MIT raised that the loading area to the rear of the site is an important operational part of the site as this is where prefabricated house components built on site are loaded. The Project Team has taken this into consideration in the development of the concept design and proposed designation boundary.

11.2.4.10 Business associations

The Project Team has engaged with three business associations along the Project corridor:

- Business Manukau;
- Wiri Business Association; and
- Business East Tamaki.

The Project Team provided an update on the Project and discussed potential impacts on their association members arising from future construction works. Discussions focussed on how to manage business disruption during construction. Opportunities were also identified for local businesses to participate in the future construction of the Project, for example through procurement of local suppliers.

As a condition on the proposed designations, the preparation and implementation of a Development Response Management Plan (**DRMP**) to manage construction effects has been proposed. The matters in the DRMP were shared with representatives of each business association and there was general support for this approach.

11.2.4.11 Network utility providers

Transpower

Engagement with Transpower has been ongoing throughout the development of the Project, with regular meetings to discuss issues and opportunities for managing and operating the Transpower Grid. General matters of interest for Transpower include:

- Project overview, updates and information sharing; and
- Potential impacts on Transpower assets.

Feedback from Transpower was taken into consideration in the development of the concept design and proposed designation boundary.

Vector, First Gas, Wiri Oil Services Limited

Engagement with these network utility providers has been ongoing throughout the development of the Project. Areas of interest that relate to the Project include:

- The Project extent including proposed designation boundaries;
- Timeframes and likely commencement of construction; and
- Conditions – specifically those relating to network utility operators.

Works in relation to any network utility will be undertaken in accordance with the NUMP and any agreements made with each network utility operator to ensure compliance with their methodologies, standards and requirements. The exact scope of works will be confirmed through site investigations and the respective utility operators will be consulted once detailed design of the Project is complete.

11.2.5 Landowners

Engagement with potentially affected landowners and the community has been undertaken in three stages:

- An information flyer was distributed to approximately 1000 properties adjacent to the Project area between June and July 2022. The flyer included an overview of the Project and a map showing the proposed corridor and BRT stations;
- Letters with an accompanying information sheet about the Project were sent to all potentially affected landowners in July 2022. The information sheet included a map showing the proposed corridor and an indicative cross section for the Project. Landowners were invited to meet with the Project Team; and
- Between August and September 2022, letters were sent to directly affected landowners. The letter included a plan of the affected property, showing the property boundary and the extent of the proposed designation within the property. Directly affected landowners were invited to meet with the Project Team to discuss the impacts to their property.

81 landowners, both residential and commercial, requested a meeting with the Project Team. In the meetings, the Project Team assisted landowners by:

- Introducing the Project;
- Explaining the rationale for the concept design of the Project; and
- Explaining the NoR process, including lodgement timing, the ability to make a submission and attend a hearing.

During landowner engagement, questions were raised around property (including acquisition process, loss of value, and access), timing and likelihood of construction. Specific queries regarding ongoing tenure of property, noise and privacy were also raised.

The Project Team will continue to meet and engage with directly affected landowners as required, to ensure landowners have adequate information about the Project.

As conditions on the proposed designations and alteration to Designation 6717, a project website or equivalent virtual information source will be established to provide information on the Project during the period prior to construction. In addition, a Stakeholder and Community Engagement Plan will be prepared to identify how the public and stakeholders (including directly affected landowners and

adjacent owners and occupiers of land) will be communicated with, prior to and throughout the construction of the Project.

12 Assessment of relevant objectives and policies

This section acknowledges the recent changes to the RMA which have come into effect and sets out an assessment of section 171(1)(a) and section 171(1)(d) RMA matters.

12.1 Resource Management Amendment Act 2020

To date, the overlap between the RMA regime and climate change has been limited as sections 104E and 70A of the RMA have constrained the ability of local authorities to account for climate change considerations in exercising their roles and functions. However, the amendment to the RMA that came into effect on 30 November 2022 is intended to better align the RMA with the Climate Change Response Act 2022 (**CCRA**). The Resource Management Amendment Act 2020 repeals the restrictions under the RMA in relation to climate change with the following consequences:

- The repeal of section 104E means that effects on climate change of a discharge to air of greenhouse gases can in future be considered in the context of an application for a discharge permit or coastal permit to do something that would otherwise contravene section 15 or section 15;
- The repeal of section 70A means that when making a rule to control the discharge into air of greenhouse gases a regional council may now have regard to the effects of such a discharge on climate change; and
- An amendment to section 74(2)(c) means that when preparing or changing a District Plan, a territorial authority must now have regard to any Emissions Reduction Plan (**ERP**), or national adaptation plan made in accordance with the CCRA.

The above RMA amendments do not directly affect the Project as no resource consent is sought or required for the discharge of contaminants to air. The control of discharges of contaminants into air remains a regional council function in accordance with s 30(1)(f) of the RMA. As such, the effects associated with a discharge to air will remain a Regional Plan matter. The proposed implementation timeframe for the Project (15 years) means that only designations are proposed at this stage and the designations will not authorise Regional Plan consenting requirements. Resource consents will be required in the future to authorise activities controlled under the Regional Plan matters of the AUP:OP or the relevant planning document that applies at the time of implementation.

12.2 Section 171(1)(a)

In accordance with section 171(1) and section 181(2) of the RMA, an assessment has been undertaken of the relevant statutory provisions. This is set out in full in Appendix B of the AEE. A summary assessment of the key themes identified in the context of the Project is set out in the subsequent sections.

12.2.1 Enabling infrastructure

The AUP:OP recognises the role that resilient, effective and efficient transport infrastructure has in improving Auckland's social, economic and cultural wellbeing. As part of this, the construction, operation and maintenance of infrastructure is anticipated[14].

[14] AUP:OP B3.2.1(1), (2), (4), B3.2.2(1), B3.3.1(1), B3.3.2(1), B3.3.2(1), (3)

In giving effect to this policy direction, Chapter E26 of the AUP:OP acknowledges that:

- Infrastructure is critical to the social, economic, and cultural well-being of people and communities and the quality of the environment;
- Infrastructure can have a range of adverse effects on the environment;
- When assessing the adverse effects of infrastructure, consider the need and benefit of the infrastructure;
- Infrastructure and in particular linear infrastructure often has a functional and operational need to traverse or locate within or across different environments, including areas of identified value.

As set out in Section 1.3 there is a need for the Project and the Project provides a range of transport benefits for the community both individually and as part of the wider network, including:

- Improving access in southern and eastern Auckland;
- Increasing public transport mode share;
- Improving the safety, reliability, and efficiency of the public transport network; and
- Enabling opportunities for transit-oriented development around the BRT corridor.

The Project has sought to largely address adverse effects of the Project through the implementation of proposed conditions on the designations.

Not all effects of the Project can be avoided or mitigated. In particular, as set out in Section 9.5, the visual impact of the proposed BRT bridge is high. Notwithstanding this, it is considered that the Project will benefit the wider communities within Auckland and beyond[15] whilst also addressing the gap in the rapid transit network[16].

Chapter E26 also recognises that linear infrastructure may have an operational need to traverse features or areas of value identified in the AUP:OP.[17] As set out in Section 9.4, two Notable Trees are required to be removed to facilitate the Project. Both trees are located in the road reserve in close proximity to the existing carriageway. Given this, there is an operational need to widen the corridor to provide for the BRT corridor. In addition to above, the same policy recognises the benefits derived from infrastructure, the adverse effects of not providing the infrastructure[18] and seeks consideration of how the proposed infrastructure contributes to the strategic form or function, or enables the planned growth and intensification, of Auckland.[19] As established the Project will enable intensification and growth of Auckland.

12.2.2 Urban growth, amenity and form

The objectives and policies of the NPS:UD (of which the AUP:OP has been updated to reflect) seek that urban environments are well-functioning and that people and communities are enabled to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future.

As set out in Section 9.1 of the AEE, the Project will:

[15] AUP:OP E26.2.2 (5)(e)
[16] AUP:OP E26.2.2 (5)(d)
[17] Policy E26.2.2(6)(b)
[18] Policy E26.2.2(6)(a)
[19] Policy E26.2.2(6)(f)

- Provide better access to jobs and education for southern and eastern Auckland and increase labour and customer catchments for business;
- Enable a significant increase in public transport usage in the area, increasing the public transport mode share and decreasing travel by light vehicles; and
- Improve integration with existing and future public transport networks.

Therefore the Project will contribute to achieving a well functioning urban environment by providing people and communities with improved public transport access and walking and cycling facilities.

The NPS:UD also recognises that urban environments including their amenity values develop and change over time in response to the diverse and changing needs of people, communities and future generations[20]. The AUP:OP objectives and policies seeks that the form and design of development achieves a high level of amenity and safety for pedestrians and cyclists.[21]

The BRT corridor constitutes a significant infrastructure project in a predominantly existing urban environment which as set out in Section 1.3 is a response to the diverse and changing needs of people, communities and future generations. This will result in varying changes to amenity values over time throughout the corridor primarily related to the removal of existing trees and vegetation and the construction of new structures. As set out in Section 9.4 and 9.5 a management plan approach is proposed to:

- Mitigate the effects of the proposed tree removal; and
- Manage potential adverse landscape and visual effects as far as practicable to contribute to a quality urban environment.

The planning response[22] to Policy 3 of the NPS:UD requires that zoning enables buildings of a minimum of six storeys within a walkable catchment of rapid transit stops. By designating a rapid transit network and nine BRT stations, the Project will facilitate the enablement of intensification along the corridor in a manner consistent with the NPS:UD.

In conclusion, the Project will provide a BRT corridor and high-quality walking and cycling facilities, replanting and green stormwater infrastructure which will integrate and contribute to Auckland's planned urban built form.

12.3 Section 171(1)(d)

Section 171(1)(d) requires the territorial authority to have particular regard to:

> *'Any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement'*

It is considered that there are no other matters under s171(1) d) that are reasonably necessary to make a recommendation on the NoRs.

[20] NPS:UD Objective 4
[21] AUP:OP B2.3.2(1)(d)
[22] Intensification Streamlined Planning Process

12.4 Other policy considerations

Other legislation and policy that has been considered in the development of the Project and will inform future implementation is set out in Table 9 below:

Table 9: Assessment against other policy considerations

National
Government Policy Statement on land transport (GPS) for 2021/22 – 2030/31
The Government Policy Statement on Land Transport 2021 (GPS) outlines the Government's strategy to guide land transport investment over the next 10 years, influencing decisions on how money from the National Land Transport Fund will be invested across activity classes, such as state highways and public transport. The overall strategic priorities for the GPS are: • Safety – a safe system, free of death and serious injury; • Access – a system that provides increased access to economic and social opportunities; • Climate change – a low carbon transport system that supports emissions reductions, while improving safety and inclusive access; and • Improving freight connections – improving freight connections for economic development. The Project provides a BRT corridor and high quality walking and cycling facilities that will encourage intensification surrounding proposed BRT stations. The corridor improves access to employment and community facilities. The Project will reduce the risk of DSI's and improve road safety for all users. The GPS prioritises reduction of greenhouse gas emissions and a shift to active modes, public transport and low emission vehicles. This focus is well aligned to the Project which is forecasted to increase mode shift to public transport and walking and cycling. Overall, the Project positively contributes towards the strategic priorities in the GPS.
Climate Change Response Act 2002
The main regulatory tool for managing New Zealand's climate change response is the CCRA. The CCRA sets a system of emissions budgets to meet a long term 2050 emissions target (net zero GHG emissions, other than biogenic methane). The CCRA sets the overarching legal framework to drive domestic emissions reductions to enable New Zealand to meet its international climate change commitments, and to provide a means for identifying and adapting to the effects of climate change that pose a material level of risk to New Zealand now and in the future. Waka Kotahi and Auckland Transport work within this framework and actively consider climate change considerations throughout the business case, optioneering and planning phase of project development. This includes considering how an efficient transport network can be developed that: • Seeks to reduce carbon emissions from transport infrastructure, particularly in the context of vehicle kilometres travelled (VKT), and • Seeks to ensure both existing and new transport infrastructure can adapt and be resilient to the effects of climate change. The CCRA also sets a framework to enable New Zealand to adapt effectively to the consequences of climate change. The CCRA requires risks and opportunities arising from the effects of climate change to be identified

through National Climate Change Risk Assessments, and appropriate policy responses to be developed through National Adaptation Plans.

Emissions Reduction Plan 2022

Section 5ZN of the CCRA provides that a person or body may, in exercising or performing a public function, power, or duty conferred on that person or body by, or under law, take into account the following matters "if they think fit":

- The 2050 target; or
- An emissions budget; or
- An emissions reduction plan.

In May 2022 the Government published the first three emissions budgets (for 2022-25, 2026-30 and 2031-35), as well as the national Emissions Reduction Plan (ERP) setting out policies and strategies for meeting emissions budgets.

The first ERP sets the following specific transport targets (relevant targets are bolded):

1. **Reduce total vehicle kilometres travelled (VKT) by the light fleet (private vehicles) by 20 per cent by 2035 through improved urban form and providing better travel options, particularly in our largest cities;**
2. Increase zero-emissions vehicles to 30 per cent of the light fleet by 2035;
3. Reduce emissions from freight transport by 35 per cent by 2035; and
4. Reduce the emissions intensity of transport fuel by 10 per cent by 2035.

The Project has taken into account transport target 1 as it seeks to connect communities in a manner that assists in reducing vehicle kilometres travelled by light fleet by providing a safe, reliable BRT corridor and high quality walking and cycling facilities.

Transport targets 2, 3 and 4 in the ERP are more effectively addressed through the other national and regional policy and economic levers set out above which sit outside the RMA and form part of the CCRA framework which is the primary mechanism for regulating responses to climate change in New Zealand.

The Thirty Year New Zealand Infrastructure Plan 2015

The Thirty Year New Zealand Infrastructure Plan makes changes to the current approach to planning and management and to encourage investment in New Zealand's infrastructure while recognising the challenges the country needs to navigate. The Plan envisages that by 2045 New Zealand's infrastructure will be resilient, co-ordinated and contribute to a strong economy and high living standards.

The Plan signals improved public transport connections to Auckland Airport of which this Project will provide a BRT corridor and high quality walking and cycling facilities.

Waka Kotahi Statement of Intent 2021-2026

This document sets out the vision of te kāpehu – the new strategic direction for Waka Kotahi which is of a land transport system that connects people, products and places for a thriving Aotearoa New Zealand.

The Project provides a safe and reliable BRT corridor and high quality walking and cycling facilities which enables sustainable travel choice, addresses safety concerns and improves access to employment and social facilities and is consistent with the Waka Kotahi Statement of Intent.

Road to Zero: New Zealand's Road Safety Strategy 2020-2030
Road to Zero outlines a strategy to guide improvements in safety on our roads, streets, footpaths, cycleways, bus lanes and state highways in New Zealand over the next 10 years. The vision of the strategy is a *New Zealand where no one is killed or seriously injured in road crashes*. The strategy focuses on achieving this vision through system management, road user choices, vehicle safety, work-related road safety and infrastructure improvements and speed management. The Project will provide new separated BRT and walking and cycling facilities, resulting in improved safety for those that travel by active mode and public transport as well as private and commercial vehicles.
Regional
Auckland Transport Alignment Project 2021 – 2031
The Auckland Transport Alignment Project (**ATAP**) is a joint project involving Auckland Council, the Ministry of Transport, Auckland Transport, Waka Kotahi, the Treasury and the State Services Commission. The final report (April 2018) sets out a clear direction for the development of Auckland's transport system over the next 10 years which is to focus investment on transport projects that that deliver broad economic, social, environmental and cultural benefits to Auckland. The ATAP package specifically notes investment for the route protection of the Project and the purchase of land required for future implementation of the Project.
Auckland Regional Land Transport Plan 2018-2028
The Regional Land Transport Plan (**RLTP**) sets out the funding programme for Auckland's transport services and activities over a 10-year period. Planned transport activities for the next three years are provided in detail while proposed activities for the following seven years are outlined. The RLTP is jointly delivered by Auckland Transport, Waka Kotahi and KiwiRail, and forms part of the National Land Transport Programme. The RLTP specifically notes investment for the route protection of the Project and the purchase of land required for future implementation of the Project.
Auckland Plan 2050
The Auckland Plan is the long-term spatial plan for Auckland which looks ahead to 2050. The plan outlines the key issues facing Auckland and recommends the way in which Aucklanders and others involved in the future of Auckland can best respond to them. The Plan identifies the Project as a key public transport investment to be implemented over the next two decades. It also recognises that Manukau is the node for southern Auckland. The civic, retail, education and cultural facilities in Manukau Central provide for the wider population of southern Auckland.
Vision Zero for Tāmaki Makaurau: a transport safety strategy and action plan to 2030
Vision Zero has a goal to eliminate transport deaths and serious injuries by 2050 (in line with the Auckland Plan 2050). The Project will provide new separated BRT and walking and cycling facilities, resulting in improved safety for those that travel by active mode and public transport as well as private and commercial vehicles.
Te Tāruke-ā-Tāwhiri: Auckland's Climate Action Framework and Plan

Te Tāruke-ā-Tāwhiri focuses on three key elements to drive climate action:

- an overarching Tāmaki response
- a focus on clear greenhouse gas (GHG) emissions reduction targets
- preparing Auckland for the impacts of climate change.

The Project will deliver better accessibility and mode choice by providing a fast, high capacity, reliable and frequent BRT corridor, and high quality walking and cycling facilities, therefore reducing the reliance on low occupancy vehicles.

A number of design measures to provide resilience to flooding, inundation and climate change have been adopted across the Project. The flooding assessment has made recommendations which are to be implemented at detailed design so that:

- There is no increase in flood levels for existing authorised habitable floors that are already subject to flooding; and
- There are no new flood prone areas created.

Auckland's Urban Ngahere (Forest) Strategy

The strategy recognises the social, environmental, economic, and cultural benefits of our urban ngahere, and sets out a strategic approach to education, increasing canopy cover and protecting existing trees within urban areas.

The inclusion of berms and green stormwater infrastructure within and adjoining the corridor will provide an opportunity to establish street trees and vegetation suited to the environment which in turn will increase canopy cover in southern Auckland;

Local

Local Board Plans

The Project is situated within two local board areas: Ōtara-Papatoetoe and Howick. Both Local Board Plans identify outcomes relating to an improved and well-connected transport system, including active modes, managing growth, economic prosperity and protection and care for the environment.

The Project is consistent with the outcomes of the Local Board Plans as it will provide a BRT corridor and high quality walking and cycling facilities that integrates with surrounding land uses and the wider transport network.

13 Assessment of Part 2 of the RMA

Section 171(1) states that when considering a NoR, a territorial authority must consider the effects on the environment having particular regard to a number of matters (assessed above) and subject to Part 2 of the RMA.

Section 5(1) of the RMA states that the purpose of the RMA is to promote the sustainable management of natural and physical resources.

Section 5(2) of the RMA then provides a definition of sustainable management. In our view, in determining whether the Network promotes sustainable management, consideration of Sections 6, 7 and 8 of the RMA is required before drawing any conclusions regarding consistency with Section 5 of the RMA.

The following section provides an assessment of the effects of the Network subject to Part 2 of the RMA.

13.1 Matters of national importance

Section 6 of the RMA states that in achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for specified matters of national importance. We consider the following matters of national importance to be relevant to the Project:

Matter of national importance	**Assessment**
the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development	The Project will preserve the natural character of the stream environments through reinstatement and mitigation planting at the completion of works.
the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development	The Project avoids outstanding natural features and landscapes.
the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna	The Project traverses a predominantly urban environment and avoids significant ecological areas. Potential impacts on natural wetlands will be assessed and managed through a future consenting process.
the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers	The Project does not impact on public access to and along the coastal marine area, lakes and rivers.
the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Manawhenua have been actively involved throughout the development of the Project. This has included through the alternatives assessment and identification of the preferred options. The partnership with Manawhenua has involved the identification of opportunities to acknowledge and respond to the cultural landscape along the Project

	corridor and restore and enhance the natural and cultural landscapes. The Project has also recognised Manawhenua cultural values, particularly with regards to the mauri of, and the relationships of Manawhenua with natural and physical resources including freshwater, land, air and coastal resources. Significant adverse effects on these values are required to be avoided, with adverse effects avoided, remedied or mitigated as appropriate.
the protection of historic heritage from inappropriate subdivision, use, and development	The Project will not adversely affect scheduled historic heritage sites.
the protection of protected customary rights	The Project does not impact upon any known protected customary rights.
the management of significant risks from natural hazards	A number of design measures to provide resilience to flooding, inundation and climate change have been adopted across the Project. The flooding assessment has made recommendations which are to be implemented at detailed design so that: • There is no increase in flood levels for existing authorised habitable floors that are already subject to flooding; and • There are no new flood prone areas created. There is sufficient space within the proposed designations for stormwater and flood mitigation.

13.2 Other matters

Section 7 of the RMA states that, in achieving the purpose of the RMA, particular regard shall be had to specified other matters. We consider the following other matters to be relevant to the Project:

Other matter	Assessment
kaitiakitanga:	Manawhenua have been actively involved through the NoR phase of the Project and will continue to exercise kaitiakitanga through the future phases of the Project. This includes the preparation of management plans and the involvement of Manawhenua as partners in the detailed design and consenting phases of the Project.
the ethic of stewardship:	This has been recognised through engagement with key stakeholders, business associations, community groups and the wider community who exercise stewardship over particular resources.
the efficient use and development of natural and physical resources:	Through the assessment of alternatives process, the Project was determined to be the most efficient use of natural and physical resources, particularly as it utilises existing transport corridors.
the efficiency of the end use of energy:	Not considered relevant to the Project.
the maintenance and enhancement of amenity values:	The Project has sought to maintain and enhance amenity values through the alternatives assessment and the development of the concept design. This will primarily be achieved through the implementation of the ULDMP which is a condition on the proposed designations.
intrinsic values of ecosystems:	The recommended option and concept design has sought to avoid adverse effects on ecosystems as far as practicable while providing sufficient width within the proposed designation boundaries for further refinement during detailed design.
maintenance and enhancement of the quality of the environment	The Project has sought to maintain and enhance the quality of the environment through the implementation of the ULDMP which is a condition on the proposed designations.
any finite characteristics of natural and physical resources:	Not considered relevant to the Project
the protection of the habitat of trout and salmon:	Not considered relevant to the Project.
the effects of climate change:	The Project responds to the effects of climate change and the reduction of greenhouse gas emissions by providing improved reliability for public transport and high quality walking and cycling facilities. The Project responds to the effects of climate change through the provision of replanting that, when delivered, will contribute to reducing urban heat island effects.
the benefits to be derived from the use and development of renewable energy.	Not considered relevant to the Project

13.3 Te Tiriti o Waitangi | Treaty of Waitangi

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

Manawhenua have been involved as a partner throughout the development of the Project. To date this has involved identifying the recommended Project corridor, input into the technical assessments and the development of the NoR conditions.

Manawhenua will be involved as partners in the future phases of the Project and this has been provided for through the conditions on the proposed designations and alteration to Designation 6717.

Accordingly, the Project is considered to take into account the principles of Treaty of Waitangi (Te Tiriti o Waitangi).

13.4 The purpose of the Act

Section 5 of the RMA sets out the purpose of the RMA which is to promote the sustainable management of natural and physical resources.

The Project will result in some adverse effects, however, when considering the significant regional and local benefits of the Project, and the measures proposed to avoid, remedy and mitigate the adverse effects, the Project achieves the purpose and principles of the RMA.

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Appendix A

Assessment of Alternatives

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

TE TUPU NGĀTAHI
SUPPORTING GROWTH

VOLUME 2 – APPENDIX A

Airport to Botany Assessment of Alternatives

December 2022

Version 1

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

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Acronym/Term	Description
AIAL	Auckland International Airport
ANNA	Aircraft Noise Notification Area
ATAP	Auckland Transport Alignment Project
AUP:OP	Auckland Unitary Plan (Operative in Part)
BRT	Bus Rapid Transit
CMA	Coastal Marine Area
HANA	High Aircraft Noise Overlay
ILM	Investment Logic Map
KPI	Key Performance Indicators
MANA	Moderate Aircraft Noise Area
MCA	Multi-Criteria Analysis
MMG	Manukau Memorial Gardens
NOP	Network Operating Plan
NoR	Notice of Requirement
Programme Partners	Te Ākitai Waiohua, Auckland Transport, Waka Kotahi, AIAL
PPF	Protected premises and facilities
PT	Public transport
RMA	Resource Management Act 1991
RTC	Rapid Transit Corridor
RTN	Rapid Transit Network
SH	State Highway
SME	Subject Matter Expert
SPBC	Supplementary Programme Business Case
SSBC	Single Stage Business Case
SUP	Shared use path
STAAI	Short Term Airport Access Improvements Project – included improvements to Puhinui Station, bus services from Manukau to the Airport, and SH20B roading improvements as part of the Southwest Gateway Programme.
SWGP	Southwest Gateway Programme

Acronym/Term	Description
TDM	Transport Demand Management
Waka Kotahi	Waka Kotahi NZ Transport Agency
20Connect	20Connect Project – state highway improvements on SH20, SH20A and SH20B to improve journey reliability as part of the Southwest Gateway Programme.

1 Introduction

1.1 Purpose of this report

This assessment of alternatives report has been prepared by Te Tupu Ngātahi to support the Notices of Requirement (**NoRs**) for the Airport to Botany Rapid Transit Project (**the Project**) lodged by Auckland Transport and Waka Kotahi NZ Transport Agency (**Waka Kotahi**) as requiring authorities under the Resource Management Act 1991 (**RMA**). The Project includes five NoRs (outlined in Table 1 and Figure 1 below) which seek to protect land to enable the construction, operation and maintenance of transport infrastructure.

Table 1: Five NoRs for the Project

Notice	Description	Requiring Authority
NoR 1	Widening of the existing Te Irirangi Drive between Botany Town Centre and Rongomai Park to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities.	Auckland Transport
NoR 2	Widening of the following existing roads to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities: • **Te Irirangi Drive** (between Rongomai Park to SH1), Great South Road (between SH1 and Ronwood Avenue intersection) • **Ronwood Avenue** (between Great South Road intersection to Davies Avenue) • **Davies Avenue** (between Ronwood Avenue intersection and Manukau Station Road) • **Manukau Station Road** (between Davies Avenue intersection an Lambie Drive) • **Lambie Drive** (between Manukau Station Road intersection and Puhinui Road) • **Puhinui Road** (between Lambie Drive intersection and Plunket Avenue)	
NoR 3	Widening of the existing Puhinui Road between Plunket Avenue and SH20/20B Interchange, including a bridge connecting to the newly constructed Puhinui Station to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities.	
NoR 4a	Widening of Puhinui Road between SH20/20B Interchange and Orrs Road to provide for a Bus Rapid Transit corridor and high quality walking and cycling facilities.	
NoR 4b	Proposed widening of existing State Highway 20B from the SH20/20B Interchange to the intersection of Manukau Memorial Gardens (alteration to Waka Kotahi designation 6717) to provide eastbound lanes to Auckland Airport, high quality walking and cycling facilities and a ramp from SH20B onto SH20 for eastbound traffic while enabling the provision of a Bus Rapid Transit corridor.	NZ Transport Agency

Figure 1: Airport to Botany proposed NoRs

Section 171(1)(b) of the RMA requires that when making a recommendation on a NoR, a territorial authority shall consider whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work in circumstances where the requiring authority does not have an interest in the land sufficient for undertaking the work, or it is likely that the work will have significant adverse effects on the environment.

There are several principles and key considerations for a requiring authority to apply and adhere to when undertaking an assessment of alternatives and identifying a preferred option. Of note are the following:

a) The process should be adequately transparent and robust, and clearly recorded so that it can be understood by others;
b) An appropriate range of alternatives should be considered; and
c) The extent of options considered, and the assessment of these options, should be proportional to the potential effects of the options being considered.

Auckland Transport and Waka Kotahi do not have sufficient interest in the land required for the Project and as such are required to give adequate consideration to alternatives. The purpose of this report is to document the development of alternative options to undertake the works and the process used to assess and compare the options.

Accordingly, this report covers the processes and methodology for the consideration of alternatives for the Project including:

- Long list and short list optioneering of the preferred route (Section 4);
- Puhinui Station Rapid Transit Bridge (Section 5)
- Selection of preferred mode (Section 6);
- Preferred RTC placement within the corridor (Section 7);
- Selection of preferred station locations (Section 8);
- Preferred side of road widening (Section 9);
- Active modes (walking and cycling) (Section 10);
- Route and design refinement following the gap analysis (Section 11);
- Approach to Stormwater (Section 0); and
- Consideration of alternative statutory methods for implementing the Project (Section 14).

A high-level summary of the process used to develop and consider the alternatives is detailed in Figure 2 on the following page. It is noted that the optioneering process was an iterative one which included the addition and discovery of new information feeding back into assessments to inform outcomes. The process diagram on the following page depicts the optioneering process in a simplified, linear way for the purpose of transparency and in the interest of understanding the process. For a full, more detailed timeline of processes, refer to **Appendix A**.

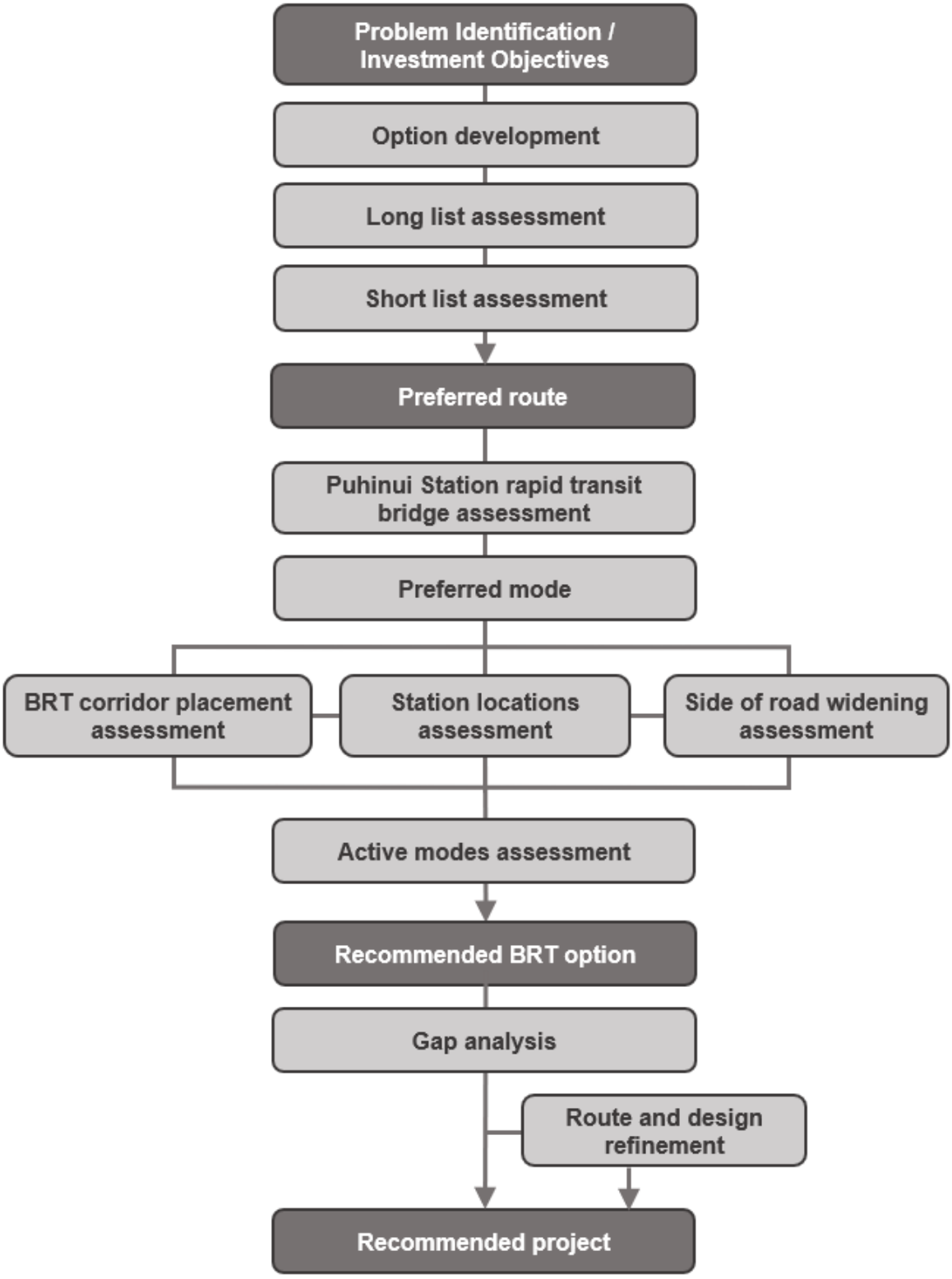

Figure 2: Overview of the Airport to Botany alternatives assessment process

Note: This report covers the consideration of alternatives to the extent needed for designations. The detail required for resource consents (Section 105 of the RMA) is a forthcoming process and will build on the conclusions drawn in this report.

1.2 Report structure

The report is structured as follows:

Section	Heading	Description
1	Introduction	Purpose and structure of the report
2	Strategic Context	Identification of the transport-related problems in southern and eastern Auckland Formation of Investment Objectives and identification of the Project as the strategic infrastructure response
3	Method for Assessing Alternatives	Summary of the methodology applied to the assessment of alternatives
4	Rapid Transit Route Selection Long List Assessment Short List Assessment	Description of all initial options generated and reasons for exclusion / inclusion to the long list Overview of the assessment of long list options and reasons for exclusion / inclusion to the short list. Outlines public and internal engagement input. Overview of the assessment of short list options and reasons for exclusion / inclusion to the preferred route. Outlines public and internal engagement input.
5	Puhinui Station Rapid Transit Bridge Assessment	Overview of the assessment of the rapid transit connection to Puhinui Station
6	Confirmation of Preferred Mode	Summary of the process confirming the preferred mode for the Project
7	Bus Rapid Transit Corridor Placement Assessment	Overview of the assessment confirming the placement of the bus rapid transit corridor within the cross section along the Project alignment
8	Station locations	Summary of the station location options development and assessment
9	Side of Road Widening Assessment	Overview of the assessment confirming the side of road to be widened to accommodate the Project cross section
10	Walking and Cycling Puhinui Walking and Cycling Assessment SH20B Walking and Cycling Assessment	Overview of the assessment of the walking and cycling alignment around Puhinui Station Overview of the assessment of the walking and cycling alignment along SH20B
11	Route and Design Refinement Manukau City Centre Alignment Puhinui Station Walking and Cycling Alignment Puhinui Road Widening	Overview of route refinement process for each route refinement area (identified through the gap analysis) including option development and assessment, engagement, and discussion of preferred and discounted options

Section	Heading	Description
12	Approach to Stormwater Infrastructure	Approach to Stormwater Infrastructure
13	Recommended Project	Identification of the recommended project for lodgement
14	Consideration of Alternative Statutory Methods	Consideration of alternative statutory methods
15	Conclusion	Conclusion

2 Strategic context

2.1 Problem identification

Auckland's south-western, southern and eastern areas (see Figure 3) is home to a significant population of 360,000 and includes two of the seven metropolitan centres in Auckland, a substantial growth area at Ormiston and two of Auckland's largest employment areas at the Airport and in East Tāmaki.

Figure 3: Southern and eastern areas of Auckland

Much of the area has poor access to public transport (**PT**) which has resulted in high car dependency and other associated transport issues. Investigating accessibility constraints, a number of strategic transport-related issues were identified facing the area:

A gap in the Rapid Transit Network (RTN)

A large gap in the RTN between the Auckland Airport and Botany Town Centre (Figure 4) has resulted in a lack of rapid, efficient and reliable public transport and poor mode share. Public transport is currently provided by standard bus services, with no direct connection to Manukau or the Airport from eastern Auckland.

This has resulted in a prevalence of cross-town journeys, a dispersed land use pattern and the only rapid transit link being a north-south rail line. This means that journeys for people in southern and eastern Auckland often require transfers between low frequency local services which introduces a layer of time and risk into a journey.

Figure 4: Auckland's existing and planned rapid transit network

Poor quality access

Poor quality access to opportunities exacerbates and reinforces existing deprivation in the rapidly growing south Auckland population who already experience high levels of unemployment and reliance on government support and Kāinga Ora housing. When compared to the rest of the region, eastern and southern Auckland have had relatively low investment in public transport, and have few transport alternatives other than the private car.

Poor and worsening access to the Airport

Auckland Airport and its surrounds are a nationally significant economic driver and a regionally significant employment zone. The forecasted growth of passenger and employment numbers will result in increased pressure on the land transport network, including on the state highway network.

Perceptions of poor personal safety limiting uptake of public transport and active modes

Research has found that people have negative perceptions and experience of safety when taking public transport, particularly in hours after dark. These concerns for personal safety can deter people from utilising public transport and create barriers to access.

Public transport journeys involve walking or cycling and waiting in a public space. The lack of safe, separated cycling facilities in the active mode network require cyclists to share road space with general vehicles and buses, which can also lead to perceptions of poor personal safety.

Opportunities exist to promote behaviour change through provision of safe walking and cycling facilities and improved access to public transport stations.

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

Southern and eastern Auckland have and continue to experience significant urban growth. The Auckland Transport Alignment Project 2018 (**ATAP**) confirms that the transport challenge for Auckland is not just one of congestion, but also of enabling and supporting a rapid acceleration in the rate of housing construction and building strong and healthy communities.

Over-reliance on the private vehicle combined with rapid population growth in and around southern and eastern Auckland will reduce the ability of the transport system to move people and goods efficiently. Car dependence may also lead to higher car ownership and become disproportionately costly for lower-income families. If not addressed, the existing transport system will constrain the levels of access for communities, limit development potential, decrease regional productivity and undermine the quality of life for residents and employees in the area.

The need for the transport system in southern and eastern Auckland to address environmental effects and recognise cultural identity and taonga

The Puhinui area is part of a cultural landscape which is considered a taonga by the people of Te Ākitai Waiohua. The cultural associations Te Ākitai Waiohua maintains with the land and waterways of Puhinui reflect the history, whakapapa (genealogy), values and significance of the area to the iwi. Specifically, the Pūkaki and Waokauri Creeks are viewed as taonga of great cultural and spiritual significance to Te Ākitai Waiohua.

There are opportunities to acknowledge and better represent cultural narrative through the design and operation of the future transport network, and to reduce the current impacts the transport system has on the environment and cultural values.

2.2 Strategic response

In response to these transport issues, Te Ākitai Waiohua, Auckland Transport, Waka Kotahi and Auckland Airport established the Southwest Gateway Programme (**SWGP**) with the aim to deliver transformative transport improvements for Auckland's south-western, southern, and eastern suburbs. As part of delivering these improvements, a number of key investment objectives and associated benefits were developed to guide investment and optioneering decisions (Table 2).

Table 2: Investment objectives and benefits

Investment Objective	Benefit
1: More equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland, as well as the Airport area.	More equitable access to jobs, learning, social activities.
2: Reliable, resilient and easy to use transport system in south and east Auckland that also forms a gateway to the region from Auckland Airport.	Travel is easier and more affordable.
3: To improve economic performance of the Airport area, Auckland and New Zealand.	Economic potential and opportunity increased for all.
4: Reduce the effects of the transport system on the environment and taonga	Local taonga is enhanced.
5: Improve health, safety and security of people	Healthier, safer people.

The following strategic considerations influenced the development and optioneering of the SWGP:

- The SWGP Network Operating Plan (**NOP**) identified a mass rapid transit corridor between Auckland Airport and Botany Town Centre as a network opportunity.
- The ATAP strategy identified the development of Auckland's Rapid Transit Network was a priority for Auckland Council and Central Government, particularly to "unlock housing and urban development opportunities"[1]. The strategy referred to opportunities to connect with existing and proposed transit corridors, including the Eastern Busway, the rail lines and City Centre to Māngere rapid transit.
- Within the SWGP study area, the legacy Manukau City Council planned for future delivery of a RTC along Te Irirangi Drive. The plan[2] noted that by noting that Te Irirangi Drive provided a 'wider than usual median to accommodate Light Rail infrastructure'. The majority of the Te Irirangi Drive corridor was constructed with an extra wide central median to be utilised for a public transport corridor.
- Alongside the key employment centres at Auckland Airport and Botany Town Centre, Manukau Central was also identified as a priority location for mode shift in the ATAP publication "Better Travel Choices" for the below reasons:
    - Manukau Central suffers from access deficiencies with limited rapid and public transit options for a growing, highly disadvantaged population.
    - Manukau is a core growth node and an important economic, social and cultural hub in south Auckland which provides significant opportunity to deliver transit-led development and urban regeneration.

  Providing connections to these strategic employment centres within the SWGP study area (Auckland Airport, Manukau Central and Botany) was thus considered critical to the rapid transit solution.

[1] ATAP, 2019

[2] Manukau District Plan Transportation Chapter 8, p.17. http://www.aucklandcity.govt.nz/council/documents/districtplanmanukau/text/chap08transport.pdf

Based on the above considerations, it was concluded rapid transit solution was needed for the study area, forming the basis of this Project.

Alongside the RTC element of this Project, the SWGP also included the 20Connect Project (which sought to improve journey reliability along SH20, SH20A and SH20B through state highway improvements), and the Short Term Airport Access Improvements Project (**STAAI**) (which included upgrades to Puhinui Station, bus services from Manukau to the Airport, and SH20B early roading improvements).

These projects are all within the wider SWGP to identify and deliver access improvements in eastern and southern Auckland.

3 Method for assessing alternatives

3.1 Overview

To define the preferred rapid transit corridor alignment, mode and form, a number of optioneering assessments were completed. This section provides an overview of the assessment of alternatives methodology used to develop and assess options for the Project.

The general methodology for each assessment used the following steps:

1. Agree on the Multi-Criteria Analysis (MCA) methodology (including the criteria and scoring approach) to be used to assess the options;
2. Develop and confirm the options to be evaluated;
3. Complete preliminary scoring of options by the Project Team (including technical specialists required to appropriately assess the selected criteria);
4. Undertake an MCA workshop with stakeholders to discuss specific MCA scoring, including consideration of internal and external engagement feedback.
5. Determine the preferred option (or list of preferred options) supported by a clear justification for option selection.

As detailed in Figure 2, optioneering for the Project included the following key assessments:

- Long List Route Assessment
- Short List Route Assessment
- Preferred Mode Assessment
- Bus Rapid Transit Corridor Placement Assessment
- Station Locations Assessment
- Side of Road Widening Assessment
- Puhinui Station BRT Bridge Assessment
- Walking and Cycling Assessment
- Route and Design Refinement Assessments

The options assessment was an iterative process which included inputs from internal and external engagement with partners, stakeholders, and the public. Once these assessments were completed, the preferred output informed the recommended Project.

3.2 Assessment framework

An MCA framework was mainly used to evaluate and compare options for the Project. MCA's are a common tool that is often used to assist in the alternatives assessment decision-making process and provides an opportunity to understand how different options compare against a set of criteria.

Some assessments utilised different approaches to the MCA, including the preferred mode (Section 6) and station location assessments (Section 7). These relied on the outputs of technical reports and a priority framework to inform the preferred options.

The MCA framework was developed in a series of workshops with Te Ākitai Waiohua, Auckland Transport, Waka Kotahi, Auckland Airport, Manawhenua representatives, the Project Team, Auckland Council, KiwiRail, Eke Panuku, Te Tupu Ngātahi, and The Southern Initiative.

The MCAs comprised of three primary groups of assessments:

- Transport planning assessment;
- Environmental and planning assessment; and
- Engineering feasibility and implementation assessment.

Table 3 below sets out the list of criteria included in each assessment. Specific measures for each assessment criteria and the detailed scoring scales are set out in **Appendix B**.

Table 3: List of criteria included in each assessment

Transport assessment	Environmental and planning assessment	Engineering feasibility and implementation assessment
• Investment Objective 1: Provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland • Investment Objective 2: Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable • Investment Objective 3: Promote urban regeneration, improved built environment, and economic opportunities • Investment Objective 4: Reduce the effects of the transport system on the environment and taonga • Investment Objective 5: Improve health, safety and security of people	• Ecology • Coastal processes • Stormwater • Landscape, visual and urban design • Social / community impact • Geology • Noise and vibration • Archaeology and built heritage • Contaminated land • Air quality	• Constructability • Construction disruption • Construction cost and risk • Safety in design and construction • Operation and maintenance • Property • Consentability

For each assessment, a set of criteria were selected to suit the purpose of the assessment, and criteria which were not likely to differentiate between the options were discounted and not assessed.

Table 4 below sets out an overview of the purpose of each MCA and the assessment approach taken. The specific criteria included in each assessment is set out in **Appendix B**.

Table 4: Overview of assessments and approaches

Assessment	Purpose	Assessment approach
Long list	To determine and assess a long list of rapid transit route options, forming a short list to progress to the next stage of assessments.	The long list MCA assessed all transport, environmental, and engineering criteria at a high level.

Assessment	Purpose	Assessment approach
Short list	To assess the short list of rapid transit route options and determine the preferred rapid transit route.	Options were developed further and became more fine-grained as they progressed from the long list to the short list. Therefore, all the same criteria were assessed for the short list as the long list, but some at an increased level of detail. The short list assessment for the West segment included a few additional criteria than the Central segment to reflect the highway considerations. This was due to the West segment assessment being integrated with the 20Connect project jointly assessing the Environmental and planning assessment; and Engineering feasibility criteria.
Preferred mode	To determine the preferred mode for the rapid transit service.	The preferred mode was determined by customer research, partner engagement, and technical assessments confirming mode capacity and service level (frequencies) necessary to meet forecast demand.
Puhinui Station	To determine the preferred Puhinui Station rapid transit bridge option.	The transport planning criteria assessed were informed by the Short Term Airport Access Improvements Project Objectives which were developed in parallel to the Airport to Botany Objectives. A high level and preliminary assessment of the environmental / planning criteria were assessed, alongside engineering feasibility criteria.
BRT corridor placement	To determine the preferred placement for the bus rapid transit service within the road corridor.	Options were scored against transport planning criteria related to Investment Objective 1 (IO 1) (more equitable access to jobs, learning, social activities) and IO 2: (travel time is easier and more affordable), as well as technical engineering feasibility criteria. Only IO 1 and IO 2 were considered relevant for this assessment as the other IO's would not differentiate between the options. Environmental and planning criteria were not assessed as the BRT placement was primarily driven by operational and technical engineering feasibility, with all placement options resulting in broadly similar footprints and environmental outcomes, therefore having little differentiation.
Station locations	To determine the preferred station numbers and locations.	Station locations were assessed and determined through a priority framework which relate to IO's: • Major demand destinations; • Interchange points and transfer nodes; and • Additional residential land local coverage.
Side of road widening	To determine which side of the road to widen where the cross section cannot be contained within the road corridor.	Given this assessment was related to property impacts and/or acquisition to accommodate the desired RTC cross section, criteria assessed included amenity criteria (e.g. landscape and visual, social, noise and vibration), property criteria, and engineering feasibility criteria. An integrated side of road widening and BRT placement assessment for the SH20B section of the alignment was also undertaken which assessed similar criteria.

Assessment	Purpose	Assessment approach
Walking and cycling	To determine the placement of the walking and cycling facilities within the Project corridor.	The walking and cycling MCA for the SH20B section was assessed alongside the integrated side of road widening and BRT placement assessments for the SH20B section. The same criteria were therefore considered appropriate to differentiate options.
Route refinement	Identified parts of the alignment requiring further assessment, route and design refinement optioneering was undertaken prior to the confirmation the recommended Project.	To maintain consistency and comparability: • The Short list route selection assessment criteria was used for the Manukau Central and Puhinui Station Walking and Cycling assessments. • The Puhinui Road side of road assessment used the side of road assessment criteria. The route refinement assessment for Manukau Central and the Puhinui Road side of road variant options included a comparison against the previously preferred options and the identified option variant(s).

3.3 Optioneering engagement

Assessment of the options against the criteria was not the sole means of assessing options but was a tool that informed and was complementary to the decision-making process for the preferred option. Manawhenua representatives have expressed views, provided specialist advice and raised key issues though workshops and hui held throughout the process. The process incorporated input from Manawhenua, feedback from the consultation and engagement process and technical experts.

Throughout the options assessment process, engagement was undertaken over the following key periods:

- From December 2017 to December 2018;
- From January to December 2019; and
- From December 2021 to November 2022.

The three-staged approach allowed the Project Teams to collect initial feedback from partners, stakeholders, communities, and affected landowners in the first round of engagement, then provide an update on the Project and details on how initial engagement feedback have influenced the Project in the second round. The third round utilised partner and stakeholder feedback to inform the route and design refinement of the Project.

3.3.1 Programme Partners

The engagement activities with Programme Partners (Te Ākitai Waiohua, Auckland Transport, Waka Kotahi and Auckland Airport) were centred on presentations, small group hui, and one-on-one hui. This engagement sought feedback, information, and assistance with decision making at key points in the development of the Project where possible.

3.3.2 Ngā Manawhenua

Regular hui were held with Manawhenua of the southern Auckland area through the existing Auckland Transport Southern Manawhenua Table during the development and assessment of options. At hui, the Project Team presented and sought feedback on the initial problems definition, the development and assessment of the long list and short list of options, the BRT placement and side of road widening assessments, the final preferred option, and any public engagement material prior to public release.

3.3.3 Stakeholders

Engagement with key stakeholders involved presentations, stakeholder workshops, and small group or one-on-one meetings as required. Key stakeholders included Auckland Council and other Council-Controlled Organisations, Government agencies, utilities providers, advocacy groups and business associations.

3.3.4 Communities, businesses and the general public

Communities, businesses and the general public were engaged through the methods outlined in Table 5 below:

Table 5: Engagement methods for communities, businesses and the public

Engagement groups	Engagement method
Communities, potentially affected property owners/occupiers, and businesses within the Project area	Mail drops and flyers, property owner letters, community open days, emails and phone calls, online information, visualisation, and one-on-one meetings as required
General public	Media releases, information on websites and social media, visualisation, and community open days

The launch of online feedback forms between November and December 2018 provided opportunities for the public to give feedback on the short list route options. A summary of the feedback is summarised in Section 4.1.4.

Between November and December 2019, another round of online feedback was sought on the preferred Project alignment. This feedback is detailed in Section 4.2.3.

3.3.5 Project Team workshops

Throughout the options assessment process, workshops were held with the Project Team to discuss findings and undertake decision making.

Workshops were held once technical specialists had individually assessed each of the options. The purpose of these workshops was to discuss and respectfully challenge results of initial options assessment findings. During these workshops the scores and/or findings of each specialist was shared with the Project Team and discussed. Based on discussions in the workshop, where appropriate, changes to scores or assessment were made prior to final recommendations being identified.

Internal Project Team workshops were also undertaken to challenge results of specialist options assessment. Following this a consensus was generally reached on the emerging preferred option based on the technical assessments undertaken.

4 Rapid transit route selection

4.1 Long list assessment

4.1.1 Overview

The long list assessment for a rapid transit route within the study area began with option generation and development.

28 initial potential route and mode options were generated which aimed to conceptualise all the possible geographical alignments within the study area. This process was informed by consideration of the following:

- The National Land Transport Fund intervention hierarchy, which assesses the suitability of low-cost interventions and options (e.g. non-infrastructure alternatives) prior to higher cost interventions (e.g. new infrastructure);
- The SWGP Network Operating Plan, a key driver for shaping investment and optioneering;
- The ATAP, which strategically aligned Central Government and Auckland Council on transport investment priorities; and
- Mode and operational requirements based on demand and service level modelling.

These options were then assessed through a high-level sieving process which discarded the options that were clearly infeasible, too expensive, or have high implementation risks.

The 10 remaining route options formed the long list, and progressed through MCAs for transport planning, environmental/planning, and engineering feasibility. Each option allowed for Bus Rapid Transit (**BRT**) or Light Rail Transit (**LRT**), except for Option West 6 which was Heavy Rail. Partner, stakeholder, internal and public engagement were undertaken to inform option selection. The preferred long list options were then progressed to form the short list.

The steps associated with the long list option development and assessment process are detailed in Figure 5 below:

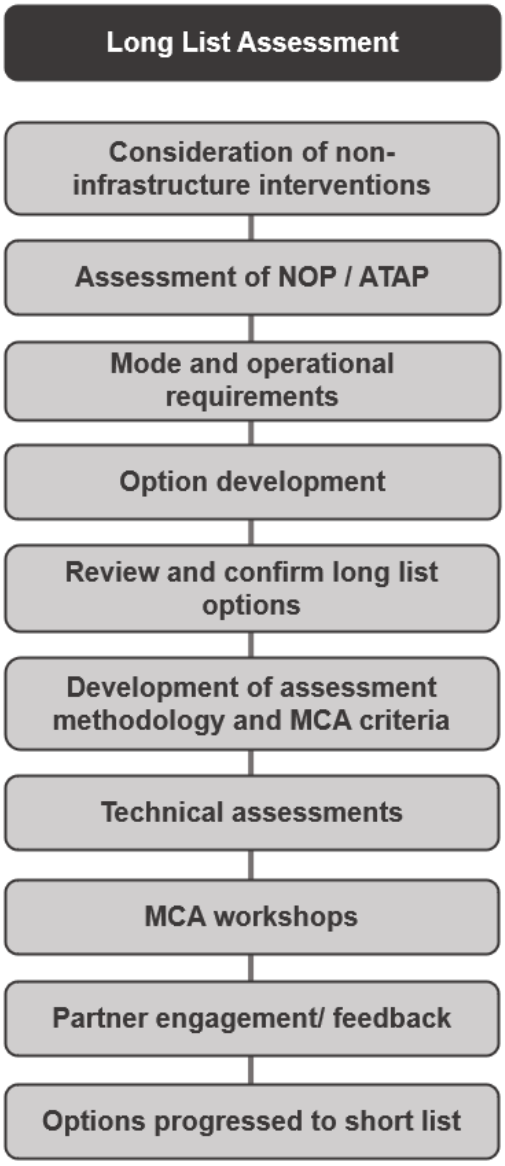

Figure 5: Long list option development and assessment process

4.1.2 Options development

4.1.2.1 Non-infrastructure interventions

Integrated planning and non-infrastructure interventions such as different forms of transport demand management (**TDM**) were considered prior to new infrastructure, in accordance with the Waka Kotahi National Land Transport Fund intervention hierarchy (see Figure 6 below). These interventions included land use changes, congestion charging, public transport pricing, parking pricing, park and ride facilities, bus schedule changes.

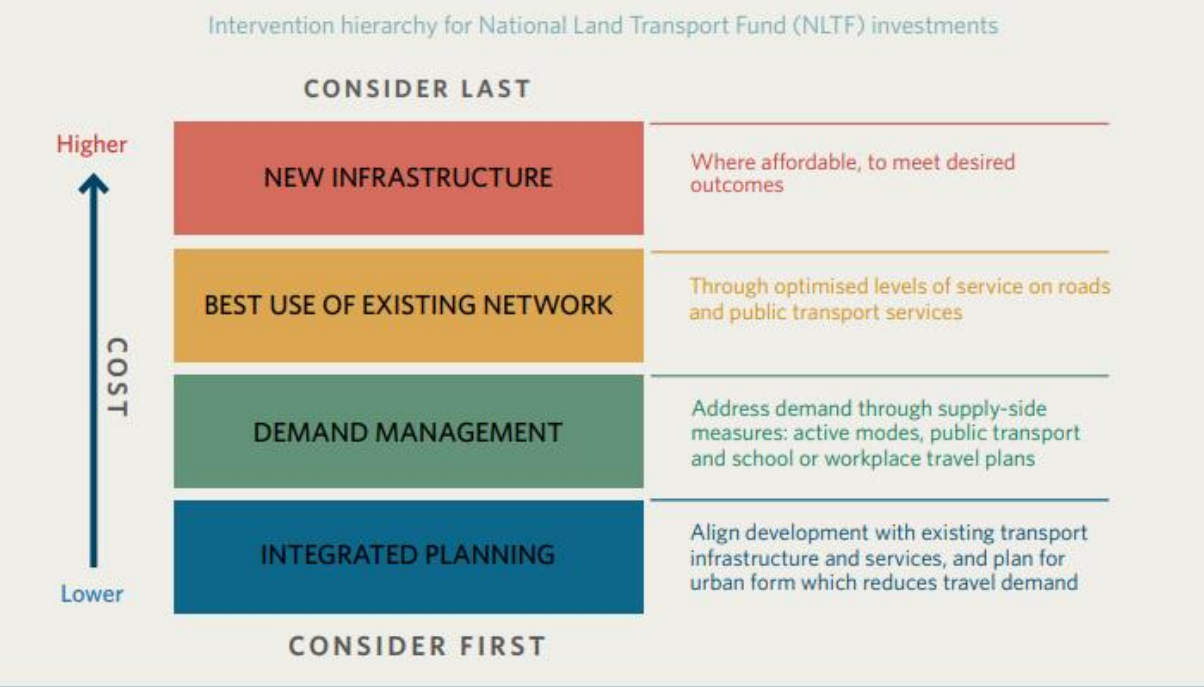

Figure 6: National Land Transport Fund intervention hierarchy

However, it was determined that in isolation, these interventions would be insufficient to meet growing demand and would be more effective when complementing new infrastructure interventions (including rapid transit) to encourage behaviour change and improve transport choices.

The options development and assessment process therefore focused on new infrastructure in the form of rapid transit as well as active mode improvements. Non-infrastructure interventions such as congestion charging and bus schedule changes were retained as opportunities, to be explored in the future.

4.1.2.2 Mode and operational requirements

Prior to development of options, an understanding of the potential modes and capacities for the Project was required. It was acknowledged that one of the key purposes and objectives of the SWGP was to achieve mode shift. To achieve this, the service must:

- Provide competitive journey times with ‘turn up and go’ service frequencies;
- Be reliable and have a narrow range of journey time variability by providing dedicated rapid transit lanes, signal priority, and faster boarding to reduce dwell times at stations;
- Be legible and easy to understand by having a simple and regular service pattern;
- Provide for safety and personal security of customers;
- Be affordable; and
- Be easy to access by providing simple stations and all-door boarding experiences like a train or light rail.

Based on the above, for the purposes of route selection, it was assumed that the mode was likely to be one capable of running within the road corridor, with at-grade intersections. It was likely to be a BRT, with the potential for LRT.

4.1.2.3 RTC route options

In response to the problems identified in the NOP and ATAP and the preliminary understanding of mode and operational requirements, the Project Team generated a list of initial potential route options for the study area. As part of this process, an Option Generation and Problem Definition Workshop was held with the Project Team, Project Partners, Manawhenua and stakeholders on 28 June 2018 to develop a shared understanding of potential issues and discuss potential options.

The initial route options generation was also informed by customer insight surveys undertaken by Auckland Transport in February 2018, which provided feedback on transport problems and barriers as well as desired transport improvements.

28 possible route options were developed, categorised as follows:

- Street corridor options (whereby the study area was broken down into three segments for the purpose of this Project, shown in Figure 7 below):

– **West** (Airport to Puhinui)
– **Central** (Puhinui to Manukau)
– **East** (Manukau to Botany)

- Alternate street corridor options not via Puhinui-Manukau
- Off-street options connecting the Airport and Botany

Figure 7: West, Central, East segments for route selection

The 28 initial options are set out in Figure 8 and Table 6 below.

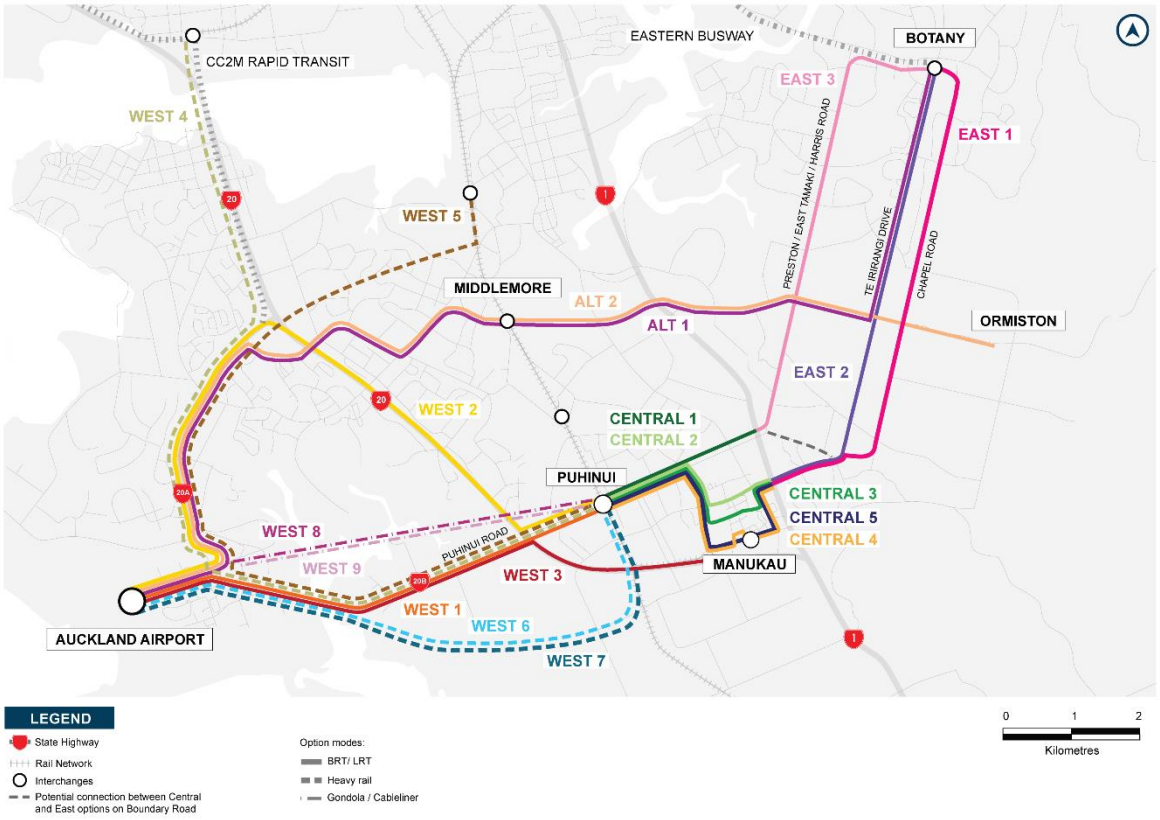

Figure 8: Initial options

Note: The locations of the options shown in Figure 8 above are indicative only to provide a visual depiction of all initial options as described in Table 6 below.

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

- Potential to provide benefits established during Investment Logic Mapping
- Potential to provide the required capacity
- Major environmental risks
- Cost impacts and feasibility of delivery

Table 6 below sets out descriptions of each initial option and the reasons for exclusion or inclusion from the long list assessment.

Table 6: Summary of all initial options developed (options progressed to long list assessment shown in bold)

Name	Mode	Description	Reason for exclusion / inclusion from long list
West: Airport to Puhinui			
West 1	**BRT or LRT**	**Puhinui Road from Puhinui Station to Airport**	**Progressed to long list due to:** • Direct connection between Airport and Puhinui • Moderate cost

Name	Mode	Description	Reason for exclusion / inclusion from long list
			• Low to moderate environmental impact • Sufficient capacity for expected demands
West 2	**BRT or LRT**	**Route to north via Māngere Town Centre**	**Progressed to long list due to:** • Lower environmental impact on Pūkaki Creek • Access for wider catchment • Moderate cost • Connects with important interchanges at Māngere
West 3	BRT or LRT	Direct alongside SH20 motorway corridor from Manukau to SH20B; skips Puhinui	Does not provide connection to Southern Line heavy rail services
West 4	Heavy Rail	Heavy Rail Onehunga Line extending Onehunga to Puhinui via Airport	Very high cost, duplication of transport infrastructure, inconsistent with planned City Rail Link network operating plan
West 5	Heavy Rail	Heavy Rail Eastern Line extension from Ōtāhuhu to Puhinui via Airport	Very high cost, high environmental and social impacts of a new heavy rail line, inconsistent with planned City Rail Link network operating plan
West 6	**Heavy Rail**	**Heavy Rail, spur line Puhinui to Airport with new rail service pattern from Britomart to Airport**	**Progressed to long list due to:** • Direct connection to Southern Line • Lowest cost and feasibly constructible of the heavy rail options • Strong stakeholder support
West 7	Heavy Rail	Heavy Rail, spur line Puhinui to Airport with rail shuttle service	Relatively high cost of operating a rail shuttle service over a short distance, excessive capacity
West 8	Gondola	Elevated suspended gondola line running Airport to Puhinui direct	New system with procurement and delivery risks, forced change at Puhinui
West 9	Peoplemover / cableliner	Elevated supported cableliner “airport peoplemover” Airport to Puhinui direct	New system with procurement and delivery risks, forced change at Puhinui
Central: Puhinui to Manukau			
Central 1	**BRT or LRT**	**Direct alignment to Puhinui (along Puhinui Road / Reagan Road) skipping Manukau Metropolitan Centre**	**Progressed to long list due to:** • Direct alignment with shorter travel times (particularly when paired with Option East 3 Springs-Harris Road); prioritises speed
Central 2	BRT or LRT	Routes via Cavendish Drive giving access to north side of Manukau Metropolitan Centre	Lack of Interchange opportunities at Manukau Station.

Name	Mode	Description	Reason for exclusion / inclusion from long list
		but not connecting to bus and rail station	
Central 3	**BRT or LRT**	**Routes via Ronwood Ave giving access to Manukau Metropolitan Centre, with long walk to access bus and rail station**	**Progressed to long list due to:** • Alignment through the core of Manukau Central while maintaining a relatively direct route • Indirect access to bus and rail stations
Central 4	BRT or LRT	Route via Putney Way giving access to Manukau Metropolitan Centre, with direct access bus and rail station	High cost, significant social and environmental impact associated with alignment through Putney Way
Central 5	**BRT or LRT**	**Route via Manukau Station Road giving access to Manukau Metropolitan Centre, with direct access to bus and rail station**	**Progressed to long list:** • Increased travel time but direct access and connection to bus and rail stations at Manukau
East: Manukau to Botany			
East 1	**BRT or LRT**	**Manukau to Botany via Chapel Road, using modification of road corridor**	**Progressed to long list due to:** • Many residential areas and some neighbourhood and town centres within catchment (including Ormiston Town Centre)
East 2	**BRT or LRT**	**Manukau to Botany via Te Irirangi Drive, using central reservation on Te Irirangi Drive**	**Progressed to long list due to:** • Makes use of existing public transport reservation within road corridor • Connects residential and neighbourhood and town centres • Reduces level of property conflict • Most direct route (when paired with Central 3 or Central 5) • Passes through Botany Junction and central Botany
East 3	**BRT or LRT**	**Manukau to Botany via Preston Road-Harris Road, using modification of road corridor**	**Progressed to long list due to:** • Connects houses from Puhinui, Manukau and Preston Road to commercial and industrial areas on Springs Road in East Tāmaki
Alternate Street Corridor Options			
Alt 1	BRT or LRT	Route via SH20A to Māngere Town Centre, Ormiston Road, Te Irirangi Drive and Botany Town Centre	Does not serve Manukau Metropolitan Centre, high cost and environmental and social impacts

Name	Mode	Description	Reason for exclusion / inclusion from long list
Alt 2	**BRT or LRT**	**Route via SH20A to Māngere Town Centre, Ormiston Road, and terminating at Ormiston Town Centre**	**Progressed to long list due to:** • Connects several neighbourhood and town centres (Māngere, Middlemore Hospital, Ōtara and Ormiston)
Integrated Off-Street Options			
Off-street 1	LRT	Metro-style grade separated LRT line	High cost, high landscape and visual impacts, excessive capacity
Off-street 2	Busway	Northern Busway style grade separated busway	High cost, high landscape and visual impacts, excessive capacity
Off-street 3	Heavy Rail	Heavy rail, new dedicated alignment from Botany to Manukau, Puhinui, and Airport	High cost, high environmental and social impacts to establish new heavy rail line, excessive capacity
Off-street 4	Automated Metro	New fully grade separated rail line dedicated to high frequency automated metro operations	Very high cost, excessive capacity

In summary:

- Off-street options were all discounted from the long list as they were all very high cost.
- Options that had high environmental and social costs and/or provided excess capacity were also discounted (including four of the five heavy rail options).
- Option West 6 (Heavy Rail Airport Spur Line) was progressed to be tested more comprehensively during the long list assessment stage despite scoring negatively, given it had exceptional stakeholder support.

The 10 options which formed the long list are as shown in Figure 9 below:

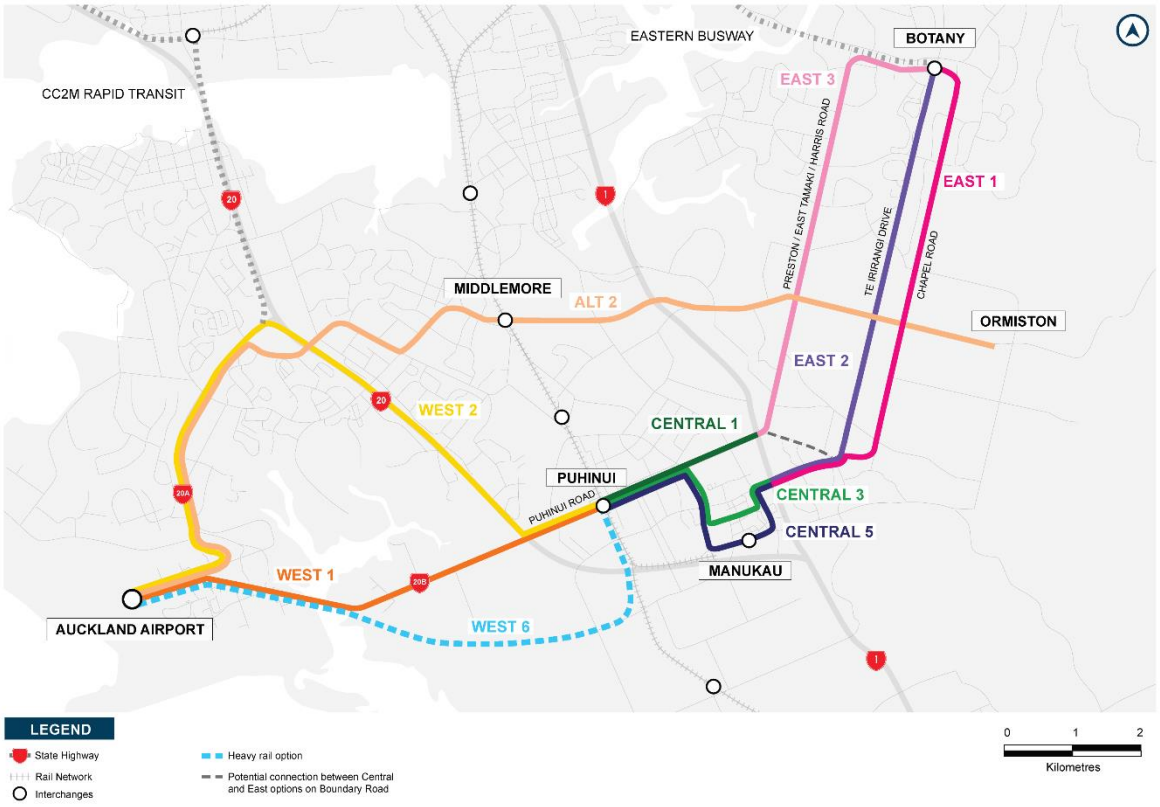

Figure 9: Rapid transit long list route options

A description of each long list option is provided in Table 7 below.

Table 7: Summary of all initial options developed

Mode	Code	Description
West: Airport to Puhinui		
BRT or LRT	West 1	• The BRT/LRT corridor will run along SH20B and down the central median along the remainder of Puhinui Road towards Puhinui Station • A shared use path (**SUP**) will run along the north side of the BRT/LRT corridor along SH20B. Segregated walking and cycling facilities will run along the remainder of Puhinui Road to Puhinui Station
BRT or LRT	West 2	• The BRT/LRT will run down the central median of SH20A, the eastern side of SH20, and Puhinui Road • A SUP will run along the eastern side of SH20A and SH20. Segregated walking and cycling facilities will run along the remainder of Puhinui Road to Puhinui Station • A new interchange ramp will be constructed to connect the BRT/LRT corridor from SH20A over SH20
Heavy Rail	West 6	• The rail corridor runs on the south side of SH20B until it diverts to connect to the existing line to the south of Puhinui Station • The rail corridor will transition into an underground tunnel at Pūkaki Creek towards the Airport

Mode	Code	Description
		• There will be an offline four lane carriageway along the south side of SH20B
Central: Puhinui to Manukau		
BRT or LRT	Central 1	• The BRT/LRT corridor will run down the central median throughout the entirety of the route • Segregated walking and cycling facilities will run on both sides of the route
BRT or LRT	Central 3	• The BRT/LRT corridor will run down the central median throughout the entirety of the route • Segregated walking and cycling facilities will run on both sides of the route
BRT or LRT	Central 5	• The BRT/LRT corridor will run down the central median throughout the entirety of the route • Segregated walking and cycling facilities will run on both sides of the route
East: Manukau to Botany		
BRT or LRT	East 1	• The BRT/LRT corridor will run down the central median throughout the entirety of the route • Segregated walking and cycling facilities will run on both sides of the route
BRT or LRT	East 2	• The BRT/LRT corridor will run down the central median throughout the entirety of the route • Segregated walking and cycling facilities will run on both sides of the route
BRT or LRT	East 3	• The BRT/LRT corridor will run down the central median throughout the entirety of the route • Segregated walking and cycling facilities will run on both sides of the route
Alternative Street Corridor Option		
BRT or LRT	Alt 2	• The BRT/LRT corridor will run down the central median of SH20A. SH20A will have additional lanes in each direction • The BRT/LRT corridor will run down the central median from Māngere to Ormiston, and walking and cycling facilities will run on both sides of the route • The BRT/LRT corridor will cross the rail lines at Middlemore hospital • The BRT/LRT corridor will go off-road between Massey Road and Gray Avenue, across the Grange Gold Club and between East Tāmaki Road and Ormiston Road

4.1.3 Option assessment

4.1.3.1 West segment – Airport to Puhinui

Three long list options were included for the West segment between Auckland Airport to Puhinui Station (see Figure 10 below):

- Option West 1 (Airport to Puhinui via SH20B)

- Option West 2 (Airport to Puhinui via SH20A and SH20)
- Option West 6 (Heavy Rail Airport Spur Line)

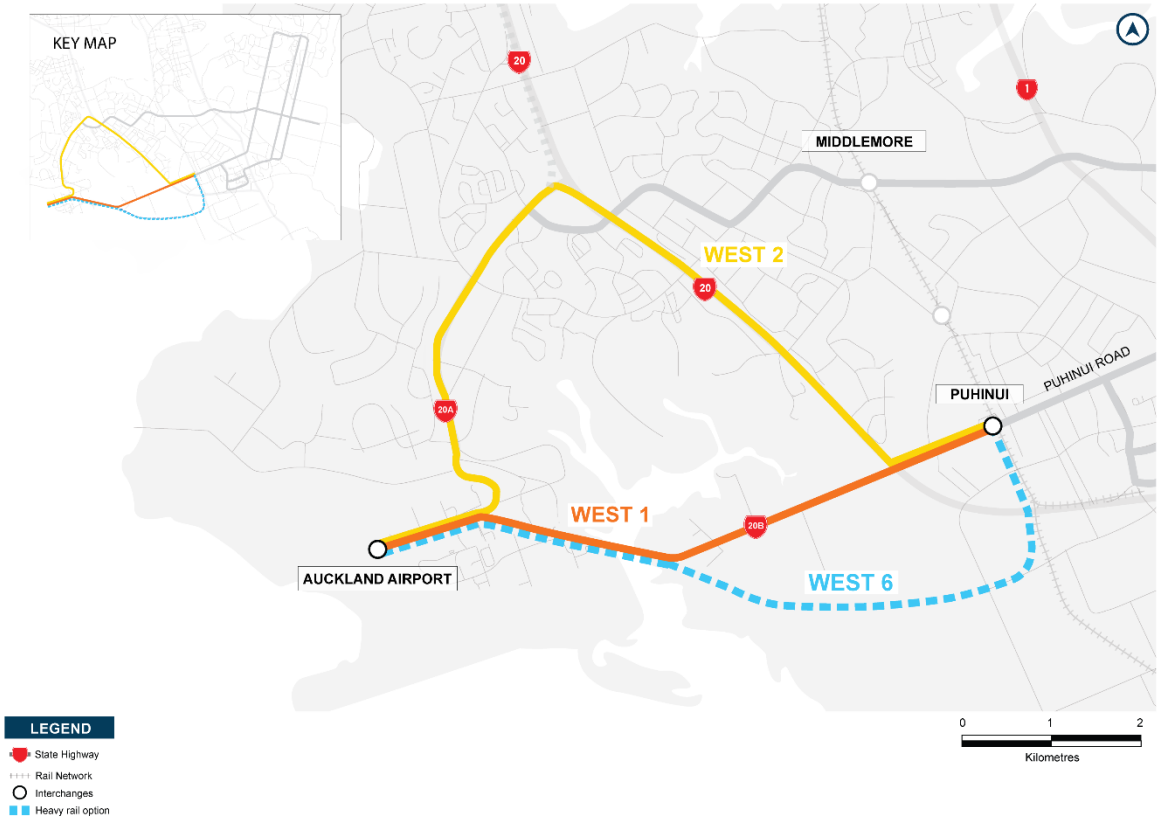

Figure 10: Long list West segment options

The long list assessment for the western segment is summarised in Table 8 below. The detailed MCA scoring is included in **Appendix C**.

Table 8: West options long list assessment summary

West: Airport to Puhinui	
Transport Planning – Performance against Investment Objectives [3]	
Investment Objective 1	*More equitable access to job, learning and social activities* **Population accessible to key employment precincts:** population accessibility to key employment precincts was a key differentiator, in particular access to Auckland Airport and to a lesser extent Manukau. Option West 1 scored the highest as the most direct route. **Jobs accessible to key residential locations:** all three options performed well for improved access to jobs from the catchments of residential centres. **Access to education and healthcare:** for access to education and healthcare, Option West 6 scored higher due to an uplift in population catchments, particularly regarding access to hospitals. Option West 1 scored lowest due to its direct route between the Airport and east of Manukau, therefore not directly connecting with many origins being assessed.

[3] Investment Objective 4 (local taonga enhanced) was assessed as part of the planning and environmental criteria in this assessment.

West: Airport to Puhinui	
Investment Objective 2	*Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable* **Peak travel time reliability:** for peak travel time reliability, whilst Options West 1 and West 2 performed well due to their high degrees of separation, Option West 6 scored the highest as the fully separated mode option. **Directness of key journeys:** for directness, Options West 1 and West 2 performed well as they removed the need to transfer on the journey to the Airport. Option West 6 scored neutrally as a transfer would be required at Puhinui Station from the heavy rail service to the bus service. **Travel time for key journeys:** for travel time, Option West 1 scored the highest as it was estimated to deliver the biggest reductions in travel times between Botany and the Airport, and Papakura and the Airport.
Investment Objective 3	*Promote urban regeneration improved bult environment and economic opportunities* **Improved access to Auckland Unitary Plan Centres:** for improved access to AUP:OP centres, all three options performed well. Option West 2 scored particularly high as it provided better access to Māngere Town Centre. **Potential for land development:** for land development opportunities of public land around stations, Option West 2 scored higher due to the large amount of Kāinga Ora land accessible within the walking catchments of the option's stations.
Investment Objective 5	*Healthier and safer people* **Improved walking access to the RTN:** for walking access to stations, whilst Options West 1 and West 6 would result in modest increases in the population catchment, Option West 2 scored higher as it would bring about a greater increase.
Environmental and Planning Assessment	
Ecology	**Aquatic ecology**: all options scored negatively as they were likely to require a number of stream crossings or extensions of culverts, including works in the freshwater / coastal marine area (**CMA**) interface for Options West 1 and West 6. **Terrestrial ecology**: all options had areas which contained established vegetation that could support herpetofauna. The Significant Ecological Area (**SEA**) along parts of Puhinui Creek which could be impacted by Option West 6 required vegetation removal. **Marine ecology**: the proposed designs for Options West 1 and West 6 potentially required works very close to the CMA. Works could result in adverse impacts to the CMA and SEA at Pūkaki and Waokauri Creeks. **Arboriculture**: all options result in adverse arboricultural effects primarily due to tree removal on Tom Pearson Drive or Puhinui Road. Option West 2 would impact large trees located within and adjacent to the historic house located at 5 Nixon Road in the Airport Precinct. The site is partially covered by a historic heritage overlay.

West: Airport to Puhinui	
Stormwater	**Stormwater quality**: all options were likely to have a minor adverse effect for stormwater quality as no treatment had been considered as part of the long list options assessment. Parts of SH20, SH20A and SH20B as well as segments of the local road network do not receive stormwater treatment currently. **Stormwater quantity**: all options would require additional areas of impervious surfaces and therefore would increase in the quantity of stormwater runoff. All options crossed flood plains, which was seen as a minor adverse effect as the extents of the flood plains were small. All options also potentially required widening of the road over channels / overland flow paths, and needed to consider the management of stormwater to avoid or minimise impacts to other properties.
Landscape, visual and urban design	**Natural character and landscape**: all options would potentially cause similar levels of adverse effects on natural character due to the proximity of several identified landscapes and features, including Pūkaki Creek, Ngā Kapua Kohuora (Crater Hill), and the CMA. **Visual**: Option West 2 had major visual impact along the majority of the route. The option traversed through residential areas, bordering private properties and potentially resulting in loss of extensive boundary vegetation with little room to mitigate. **Urban design**: Option West 2 provided more potential to deliver urban design outcomes due to its proximity to key destinations, centres and trip generators. The option also provided a significant opportunity for growth and intensification within Māngere Town Centre.
Social and community impact	**Accessibility**: all options would provide positive social effects due to an increase in mode choice and improved accessibility to the Airport. **Community**: all options scored negatively as additional traffic lanes required to accommodate BRT/LRT may directly affect sensitive receivers and private property along the corridor. **Health and safety**: all options scored negatively as sensitive receivers may experience adverse amenity impacts during construction associated with restricted access, air quality, and noise and vibration.
Noise and vibration	**Operational noise and vibration**: Options West 1 and West 2 would likely have a minor adverse effect caused by increased noise from BRT/LRT or by traffic lanes being sited closer to properties. Option West 6 would introduce adverse noise and vibration effects compared to what is currently experienced by sensitive receivers, at greenfield sites, and in Recreation Zones. **Construction noise and vibration**: during construction, adverse noise and vibration effects would likely be experienced by sensitive receivers along all options.
Archaeology and built heritage	**Archaeology and built heritage**: numerous registered archaeological sites associated with Papahinau in the area. All three options would potentially impact on the archaeological landscape. Option West 2 would pass near Ngā Kapua Kohuora, a heritage landscape of outstanding archaeological and heritage value as well as having significance at a local, regional and national level.
Contaminated land	**Contaminated land**: contamination would be encountered along Option West 6 as the alignment traversed the McLaughlins Road Landfill containing industrial waste products. There was also potential of encountering contaminated soils, particularly near the Wiri Industrial area.

West: Airport to Puhinui	
Air quality[4]	**Operational air quality**: it was not expected that the operation of BRT/LRT would result in any adverse air quality effects. **Construction air quality**: adverse effects resulting from discharges to air from construction activities were likely to occur for all options. Construction within the McLaughlins Road Landfill for Option West 6 presented greater adverse effects as it may result in the release of landfill gases.
Engineering Feasibility and Implementability Assessment	
Constructability: Option West 1 comprised a standard construction process that is straightforward to implement. The other options utilised more complex construction processes which were more complex to implement. **Construction disruption**: all Options would result in construction impacts. Option West 6 would have the greatest impact (due to commercial and industrial land use) and Option West 1 would have the least and most manageable impact (as the majority of the works were undertaken off-line). **Construction cost and risk**: Option West 6 expected to have higher costs for construction than Options West 1 and West 2 due to rail infrastructure and tunnelling. Option West 1 was expected to be the lowest cost option. **Safety in design and construction**: Options West 1 and West 2 had moderate to high levels of health and safety design and construction risks but nothing unusual. Option West 6 had a high level of health and safety design and construction risks associated with tunnelling. **Operation and maintenance**: Option West 6 would have the greatest operation and maintenance cost due to maintenance of the tunnel, and Option West 1 would have the lowest as the long-term maintenance is within capability. **Consentability:** Option West 1 and 2 are considered to have complex consenting risks with the Rail spur option (West 6) having the greatest risk associated with tunnelling under Pūkaki Creek.	

In summary, Options West 1 and West 2 were progressed to the short list due to positive performance against the Investment Objectives and transport planning assessment.

The two options performed relatively similarly across many of the metrics, and the finer details of these benefits and complexities would be best assessed in more detail at the short list stage.

Option West 6 was discarded at the long list stage due to its poor performance against engineering feasibility metrics and environmental effects, in particular:

- **Contaminated land**: contamination would be encountered as the Option West 6 alignment traverses the McLaughlins Road Landfill containing industrial waste products.
- **Construction cost and risk**: due to the rail infrastructure and tunnelling required to enable the heavy rail.
- **Construction disruption**: due to the commercial and industrial land use adjacent to West 6.

[4] The long list air quality assessment was a broad qualitative assessment carried out by the planning team and did not involve an air quality specialist. The assessment considered proximity and scale of likely construction works and operational alignments in relation to sensitive receivers.

4.1.3.2 Central segment – Puhinui to Manukau

Three long list options (see Figure 11 below) were included for the Central segment:

- Option Central 1 (Puhinui to Clover Park via Puhinui Road)
- Option Central 3 (Puhinui to Manukau via Ronwood Ave)
- Option Central 5 (Puhinui to Manukau via Manukau Station Road)

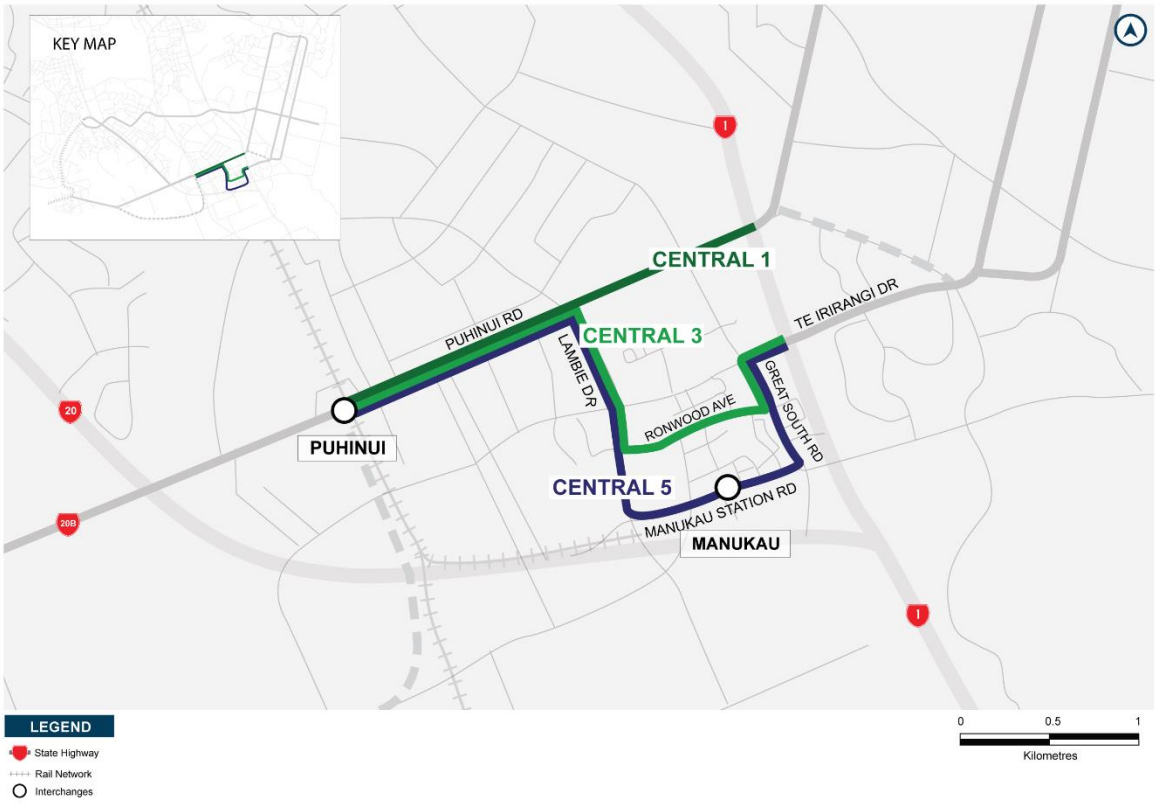

Figure 11: Long list Central segment options

The long list assessment for the central segment is summarised in Table 9 below. The detailed MCA scoring is included in **Appendix C**.

Table 9: Central options long list assessment summary

Central: Puhinui to Manukau
Transport Planning – Performance against Investment Objectives [5]

[5] Investment Objective 4 (local taonga enhanced) was assessed as part of the planning and environmental criteria in this assessment.

Central: Puhinui to Manukau	
Investment Objective 1	*More equitable access to job, learning and social activities* **Population accessible to key employment precincts:** all three options performed well for population accessibility to key employment centres, particularly Options Central 3 and Central 5. **Jobs accessible to key residential locations:** all three options performed well for improved access to jobs from the catchments of residential centres. **Access to education and healthcare:** for access to education and healthcare, Central options differed only slightly. Option Central 1 would generate a bigger increase in population catchment for hospitals but a lower catchment for tertiary institutes.
Investment Objective 2	*Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable* **Peak travel time reliability:** for peak travel time reliability, Options Central 3 and Central 5 performed well due to the assumed alignment of the BRT/LRT down the median or along one side of arterial roads. Option Central 1 scored neutrally due to the narrow alignment to the east of Lambie Drive (particularly when it turns into Reagan Road and Boundary Road) unlikely having sufficient space available to construct a fully separated public transport service as is expected for Central 3 and Central 5. **Directness of key journeys:** for directness, all three options scored the same as they could all be paired with any of the West options, therefore all having the potential to remove the need to transfer for the Botany to Airport journey. **Travel time for key journeys:** reductions in PT travel times in key journeys between the Airport and Botany would be achieved by all three options, particularly for Options Central 3 and Central 5.
Investment Objective 3	*Promote urban regeneration improved bult environment and economic opportunities* **Improved access to Auckland Unitary Plan Centres:** for improved access to AUP:OP centres, Options Central 3 and Central 5 performed well, with all centre types (Neighbourhood, Local, Town, and Metropolitan) within walking catchments of the routes. Option Central 1 scored neutrally as it bypasses Manukau Metropolitan Centre within the walking catchment of its stations. **Potential for land development:** for land development opportunities of publicly owned land around stations, all three options had moderate amounts of Kāinga Ora land accessible within the walking catchments of their stations.
Investment Objective 5	*Healthier and safer people* **Improved walking access to the RTN:** for walking access to stations, Option Central 1 would result in the largest increase in population catchment out of the three options, so scored the highest.
Environmental and Planning Assessment	

Central: Puhinui to Manukau	
Ecology	**Aquatic ecology**: Options Central 1 and Central 5 options scored negatively as they were likely to require a number of stream crossings or extensions of culverts. Option Central 3 scored neutrally as its entire stream network appeared to be piped. **Terrestrial ecology**: all options scored neutrally as there were no extensive areas of established vegetation within the Central segment that were likely to be impacted. **Marine ecology**: all options scored neutrally as there were no potential works within or in close proximity to the CMA. **Arboriculture**: all options would result in adverse arboricultural effects – Option Central 1 would impact protected trees on Puhinui Road; Option Central 3 would impact protected trees on the entire Lambie Drive and Ronwood Avenue; and Option Central 5 would impact protected trees on the entire Lambie Drive streetscape.
Stormwater	**Stormwater quality:** all options were likely to have a minor adverse effect for stormwater quality as no treatment had been considered as part of the long list options assessment. Potential existing stormwater treatment was identified in Puhinui Domain – further assessment was needed to confirm the level of treatment. **Stormwater quantity**: all options would require additional areas of impervious surfaces and therefore would increase in the quantity of stormwater runoff. All Central options had adverse effects as they all intercepted floodplains, with little space available within the road corridor to provide detention during large flood events due to heavy urbanisation in this catchment.
Landscape, visual and urban design	**Natural character and landscape**: all options scored neutrally as they were not identified as having any natural character values or landscape features along or near the alignment that could be impacted. **Visual**: Option Central 1 had an adverse impact on visual amenity as the corridor width had a major impact on loss of trees and front garden amenity along most of the route. **Urban design**: Options Central 3 and Central 5 scored positively as they provided more substantial potential to deliver urban design outcomes due to their proximity to Manukau Central and Manukau Stations as key destinations and trip generators.
Social and community impact	**Accessibility**: all options would provide positive social effects due to an increase in mode choice between Botany and Auckland Airport and improved accessibility. **Community**: all options scored negatively as additional traffic lanes required to accommodate BRT/LRT may directly affect sensitive receivers and private property along the corridor, having adverse effects on the community. **Health and safety**: all options scored negatively as sensitive receivers may experience adverse amenity impacts during construction associated with restricted access, air quality, and noise and vibration.

Central: Puhinui to Manukau	
Noise and vibration	**Operational noise and vibration**: all options would likely have a minor adverse effect caused by increased in noise from BRT/LRT or by traffic lanes being sited closer to properties. It is noted that traffic noise and vibration caused from road traffic is already dominant along the proposed routes and many commercial and industrial receivers are likely to be desensitised to any increase in operational noise and vibration. **Construction noise and vibration**: during construction, adverse noise and vibration effects would likely be experienced by sensitive receivers along all options.
Archaeology and built heritage	**Archaeology and built heritage**: although there were no registered archaeological sites within the Central segment, construction and associated earthworks had the potential to uncover previously unrecorded sites.
Contaminated land	**Contaminated land**: Option Central 5 would potentially encounter or pass near Wiri Industrial area which had a history of contamination and would result in a potential adverse impact.
Air quality[6]	**Operational air quality**: it was not expected that the operation of BRT/LRT would result in any significant adverse air quality effects, so all options scored neutrally. **Construction air quality**: minor / moderate adverse effects resulting from discharges to air from construction activities were likely to occur for all options.
Engineering Feasibility and Implementability Assessment	
Constructability: all three options required major construction works but nothing unusual. Options would be straightforward to implement, with non-challenging construction methods and staging. Option Central 5 required additional works over the rail trench at Lambie Drive. **Construction disruption**: all three options had moderate construction disruption as they passed through narrow sections of residential and commercial areas which required property acquisition to provide working space. All three options would also cause disruption to Puhinui Station, and Option Central 6 would potentially disrupt Manukau Rail and Bus Stations. **Construction cost and risk**: a construction cost estimate had not been undertaken; moderate costs for construction were assumed with no clear differentiation between the Central options. **Safety in design and construction**: all three options had moderate to high level of health and safety design impacts but nothing unusual. **Operation and maintenance**: all three options had minor to moderate levels of maintenance and operation costs as the long-term maintenance was within capability and no major ongoing costs were expected. **Consentability:** All Central options are considered to have complex consenting risks associated with delivering an RTN through an urban area.	

[6] The long list air quality assessment was a broad qualitative assessment carried out by the planning team and did not involve an air quality specialist. The assessment considered proximity and scale of likely construction works and proximity and scale of operational alignments in relation to sensitive receivers.

Option Central 1 (bypassing Manukau via Puhinui Road) was discounted for the following reasons:

- Bypassing Manukau Central improved travel time, but generally worsened the option's performance against the other key Investment Objectives, such as population accessibility to jobs and centres.
- The option also performed worse than the other Central options against landscape, visual and urban design criteria.

Options Central 3 and Central 5 were progressed to the short list due to their positive performance in the transport planning assessment against Investment Objectives, particularly in relation to population access to key employment precincts and travel time for key journeys. The two options were very similar, differentiated by the alignment through Manukau. The finer details of differences between the options would be best assessed in more detail at the short list stage.

4.1.3.3 East segment – Manukau to Botany

Three long list options (see Figure 12 below) were included in East segment:

- Option East 1 (Manukau to Botany via Chapel Road);
- Option East 2 (Manukau to Botany via Te Irirangi Drive); and
- Option East 3 (Manukau to Botany via Preston Road-Harris Road).

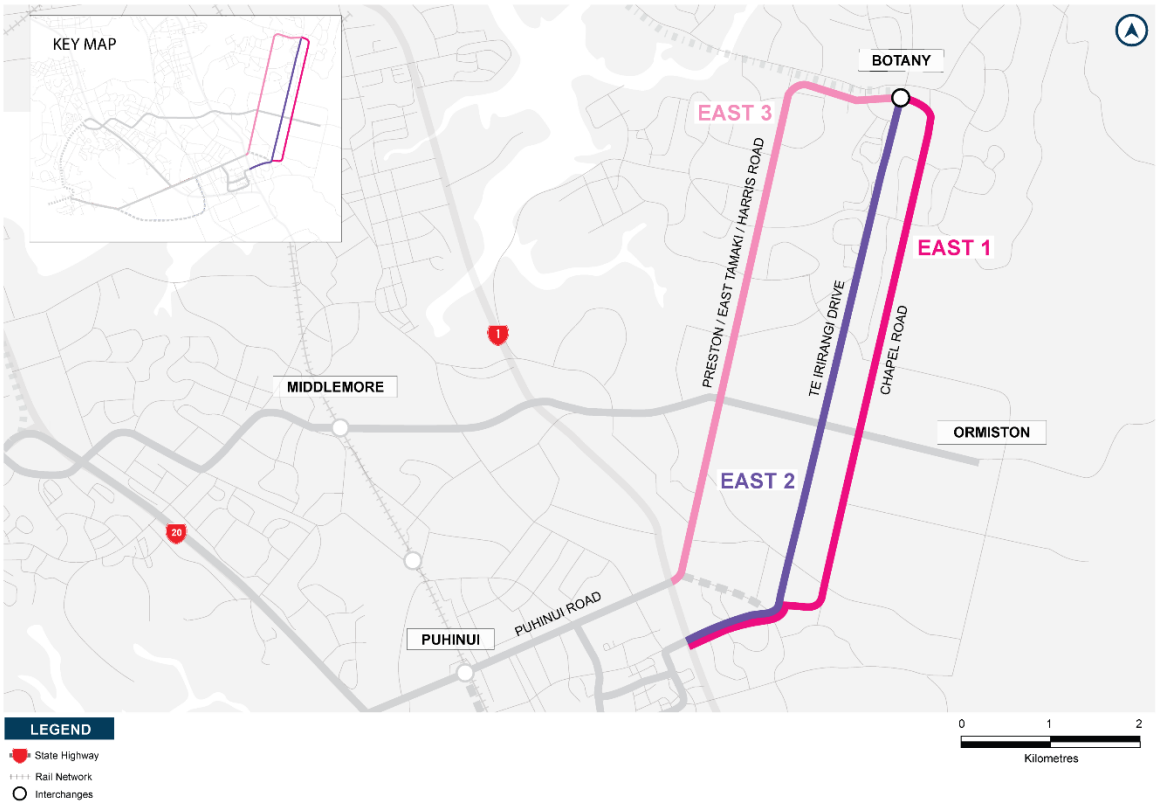

Figure 12: Long list East segment options

The long list assessment for the eastern segment is summarised in Table 10 below. The detailed MCA scoring is included in **Appendix C**.

Table 10: East options long list assessment summary

East: Manukau to Botany	
Transport Planning – Performance against Investment Objectives [7]	
Investment Objective 1	*More equitable access to job, learning and social activities* **Population accessible to key employment precincts:** all three options scored highly for population accessibility to key employment precincts. Option East 2 scored the highest primarily due to having the largest population catchment with access to the Airport. **Jobs accessible to key residential locations:** access to jobs from catchments of residential centres was a key differentiator between the options. Option East 3 scored the highest as it was forecasted to generate the most significant increases in job accessibility from Botany to Manukau, as well as generating larger increases in job accessibility from Ōtara than the other East options. **Access to education and healthcare**: East options differed only slightly and were scored the same.
Investment Objective 2	*Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable* **Peak travel time reliability:** Option East 2 performed very positively for peak travel time reliability as it would have a high level of separation running down the median of Te Irirangi Drive. Options East 1 and East 3 may not achieve complete segregation of the BRT/LRT from general traffic along the entire route, therefore reducing travel time reliability. **Directness of key journeys:** for directness, all three options scored the same as they could all be paired with any of the Central options, therefore all having the potential to remove the need to transfer for the Botany to Airport journey. **Travel time for key journeys:** for travel time, all East options scored positively as they were modelled to deliver similar, large reductions in PT travel times for all key journeys.
Investment Objective 3	*Promote urban regeneration improved bult environment and economic opportunities* **Improved access to Auckland Unitary Plan Centres:** for improved access to AUP:OP centres, Option East 2 scored the highest as a large extent of all Centre types would be within walking catchment of its stations. **Potential for land development:** for land development opportunities of publicly owned land around stations, Option East 3 scored highest as it would provide walking access to large amounts of Kāinga Ora land, while the other two options scored neutrally.
Investment Objective 5	*Healthier and safer people* **Improved walking access to the RTN:** Option East 3 generated the largest increase in population catchment with walking access to stations, then Option East 1, and Option East 2.
Environmental and Planning Assessment	

[7] Investment Objective 4 (local taonga enhanced) was assessed as part of the planning and environmental criteria in this assessment.

East: Manukau to Botany	
Ecology	**Aquatic ecology**: all options scored negatively as they were likely to require a number of stream crossings or extensions of culverts. **Terrestrial ecology**: all options scored negatively as they had areas which contained established vegetation that could support herpetofauna that could be adversely impacted by vegetation removal. **Marine ecology**: all options scored neutrally as there were no potential works within or in close proximity to the CMA. **Arboriculture**: Option East 1 would have significant impacts on the Norfolk Pine trees on Manukau Station Road and Option East 2 would impact the Washingtonia Palm trees which line the majority of Te Irirangi Drive and would require significant replacement planting to offset effects. As a result, both options would have adverse arboricultural impacts.
Stormwater	**Stormwater quality**: all options were likely to have a minor adverse effect for stormwater quality as no treatment had been considered as part of the long list options assessment. The proposed options were assumed to have no existing treatment as no devices were identified. **Stormwater quantity**: all options would require additional areas of impervious surfaces and therefore would increase in the quantity of stormwater runoff. All options crossed flood plains, which was seen as a minor adverse effect as the extents of the flood plains were small. All options also potentially required widening of the road over channels / overland flow paths, and needed to consider the management of stormwater to avoid or minimise impacts to other properties.
Landscape, visual and urban design	**Natural character and landscape**: all options scored neutrally as they were not identified as having any natural character values or landscape features along or near the alignment that could be impacted. **Visual**: the private properties along all three options may experience significant adverse visual effects and reduction in amenity as a result of the likely loss of landscaping along the central median and roadside berms. There would also be a likely loss of front and side yards for some residential properties, as well as minor impacts on open spaces along those alignments. **Urban design**: Options East 1 and East 2 provide more substantial potential to deliver urban design outcomes due to their proximity to key destinations, centres and trip generators. These two options would also provide connections to and between suburban housing within Clover Park and Chapel Downs and key employment areas such as East Tāmaki Industrial Area and Ormiston Town Centre.
Social and community impact	**Accessibility**: all options would provide positive social effects due to an increase in mode choice between Botany and Auckland Airport and improved accessibility. **Community**: all options scored negatively as additional traffic lanes required to accommodate BRT/LRT in the central median may directly affect sensitive receivers and private property along the corridor, having significant adverse effects on the community. **Health and safety**: all options scored negatively as sensitive receivers may experience adverse amenity impacts during construction associated with restricted access, air quality, and noise and vibration.

East: Manukau to Botany	
Noise and vibration	**Operational noise and vibration**: all options would likely have a minor adverse effect caused by increased noise from BRT/LRT or by traffic lanes being sited closer to properties. It is noted that traffic noise and vibration caused from road traffic is already dominant along the proposed routes and many commercial and industrial receivers are likely to be desensitised to any increase in operational noise and vibration. **Construction noise and vibration**: during construction, adverse noise and vibration effects would likely be experienced by sensitive receivers along all options.
Archaeology and built heritage	**Archaeology and built heritage**: although there were no registered archaeological sites within the East segment, construction and associated earthworks had the potential to uncover previously unrecorded sites which was considered to be a minor adverse impact.
Contaminated land	**Contaminated land**: Option East 3 would potentially encounter or pass near Greenmount Closed Landfill which had a history of contamination and could result in adverse impacts.
Air quality[8]	**Operational air quality**: it was not expected that the operation of BRT/LRT would result in any adverse air quality effects, so Options East 1 and East 2 scored neutrally. Option East 3 may experience reverse sensitivity effects relating to odour during the operation of the walking and cycling facilities near the Greenmount Closed Landfill, so scored negatively. **Construction air quality**: adverse effects resulting from discharges to air from construction activities were likely to occur for all options.
Engineering Feasibility and Implementability Assessment	
Constructability: all three East options comprised standard construction processes that were straightforward to implement. **Construction disruption**: Option East 2 had the lowest construction disruption as the majority of Te Irirangi Drive had previously been future-proofed for an RTC, providing construction space, and good alternate access would be provided via Chapel Road and Harris Road. **Construction cost and risk**: a construction cost estimate had not been undertaken; moderate costs for construction were assumed with no differentiation between the East options. **Safety in design and construction**: all three options had moderate to high level of health and safety design but nothing unusual. **Operation and maintenance**: all three options had minor to moderate levels of maintenance and operation costs as the long-term maintenance was within capability and no major ongoing costs were expected. **Consentability:** All options have a complex consenting risk, no differentiation between options.	

[8] The long list air quality assessment was a broad qualitative assessment carried out by the planning team and did not involve an air quality specialist. The assessment considered proximity and scale of likely construction works and proximity and scale of operational alignments in relation to sensitive receivers.

Overall, whilst the East options performed comparatively in most criteria, a primary differentiator was in the engineering feasibility assessment.

Options East 1 and East 3 were discounted at the long list stage due to:

- Greater property acquisition necessary for construction;
- Greater construction disruption to local residents and businesses;
- Poorer access to residences and/or employment opportunities; and
- Less interaction with neighbourhood and local centres.

The presence of the wide median future-proofed for a rapid transit line within the majority of the Te Irirangi Drive corridor resulted in Option East 2 having fewer direct property impacts and lower construction disruption compared to the other two alignments.

Option East 2 was considered the most appropriate alignment to be progressed to the next phase of optioneering for the reasons stated above. With other East options discounted, East 2 was included in the preferred alignment.

4.1.3.4 Alternate street corridor option

The Alternate Street Corridor Option Alt 2 (not via Puhinui-Manukau) comprised a route from SH20A through Māngere Town Centre, connecting across town to Ormiston Town Centre. This option was assessed as it connected several neighbourhood and town centres, including Māngere, Middlemore Hospital, Ōtara and Ormiston. The assessment summary is set out in Table 11 below.

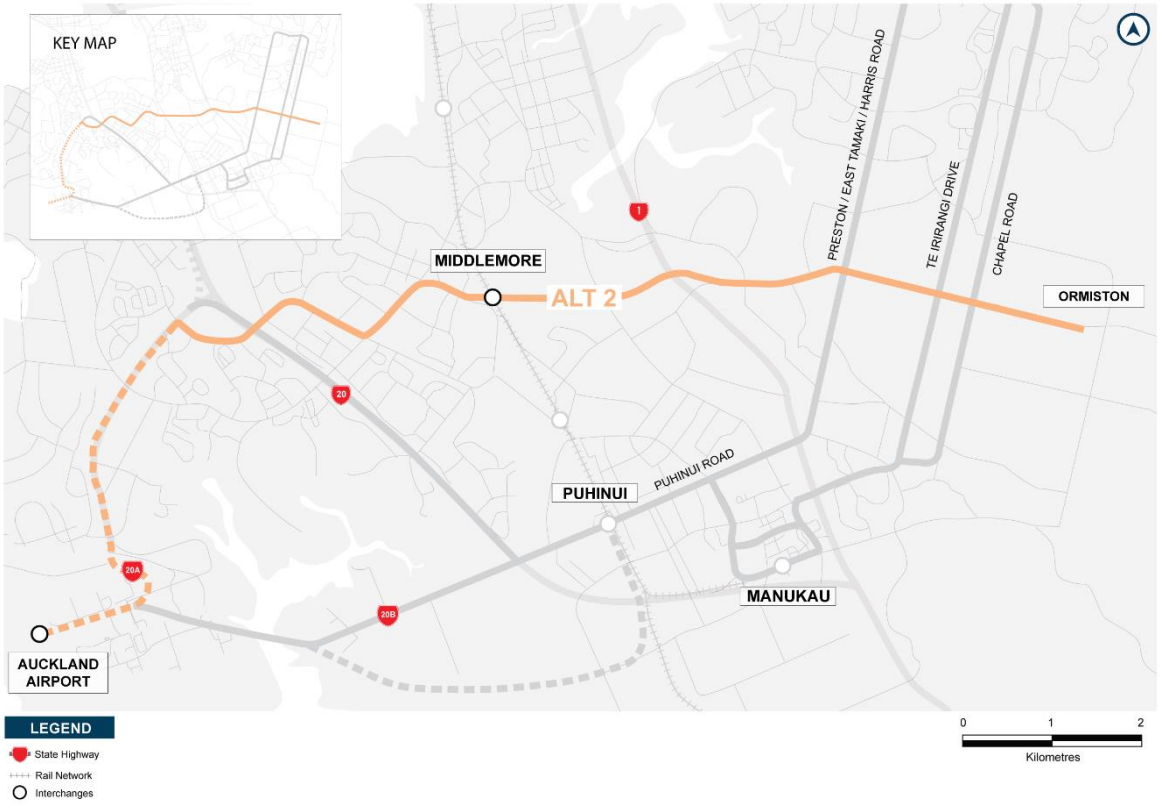

Figure 13: Alternative street corridor option

Table 11: Option Alt 2 long list assessment summary

Alt 2: Alternate Street Corridor Option	
Transport Planning – Performance against Investment Objectives [9]	
Investment Objective 1	*More equitable access to job, learning and social activities* **Population accessible to key employment precincts:** Option Alt 2 decreased or only marginally increased access to destinations relative to the do-minimum, scoring the lowest across all long list options. **Jobs accessible to key residential locations:** Option Alt 2 was forecast to result in some improved and some worsened job accessibility to each of the centres assessed, coming to a net neutral effect. **Access to education and healthcare:** Option Alt 2 scored positively for access to education and healthcare due to the significant population catchment increases it would bring about for tertiary institutes (particularly MIT Ōtara) and hospitals (particularly Middlemore Hospital).
Investment Objective 2	*Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable* **Peak travel time reliability:** Option Alt 2 scored lowest across all long list options, as it was unlikely to have significant priority along the majority of its alignment. **Directness of key journeys:** Option Alt 2 scored neutrally as it would offer a 'single-seat' journey (no transfers) from the Airport via Māngere, Middlemore, Ōtara, and Ormiston, but would not provide the final connection to Botany. **Travel time for key journeys:**[10] Option Alt 2 was modelled to deliver the lowest reductions in journey times of all the long list options, including no reductions achieved for the Botany to Manukau journey.
Investment Objective 3	*Promote urban regeneration improved bult environment and economic opportunities* **Improved access to Auckland Unitary Plan Centres:** Option Alt 2 scored minorly positively for access to Auckland Unitary Plan Centres as it provided walking access to a large extent of all Centre types apart from Metropolitan Centres. **Potential for land development:** For land development opportunities of publicly owned land around stations, Option Alt 2 scored very positively as it would provide walking access to a very large amount of Kāinga Ora land, particularly in Māngere and Ōtara.
Investment Objective 5	*Healthier and safer people* **Improved walking access to the RTN:** For walking access to stations, Option Alt 2 scored positively due to the moderate increase in population catchment it was forecasted to deliver.
Environmental and Planning Assessment	

[9] Investment Objective 4 (local taonga enhanced) was assessed as part of the planning and environmental criteria in this assessment.

[10] For this assessment, it was assumed that:

- BRT/LRT speeds on dedicated space on state highways travel at an average speed of 45km/h;
- BRT/LRT speeds on fully separated corridors travel at an average of 35km/h;
- BRT/LRT speeds on 'bus lanes' with some vehicle interaction travel at an average of 20kmh; and
- Heavy rail on spur line between the Airport and Puhinui travels at 40kmh

Alt 2: Alternate Street Corridor Option	
Ecology	**Aquatic ecology**: most options including Option Alt 2 scored negatively as they were likely to require a number of stream crossings or extensions of culverts. **Terrestrial ecology**: Option Alt 2 scored negatively as it had areas which contained established vegetation that could support herpetofauna that could be adversely impacted by vegetation removal. This option may impact an area of SEA near Middlemore Station. **Marine ecology**: the proposed designs for Option Alt 2 potentially required works within the SEA Marine 2 near Middlemore Station. **Arboriculture**: Option Alt 2 resulted in significant adverse arboricultural effects as widening of lanes through Māngere to Ormiston would impact a large number of street trees growing on the edge of the existing carriageway, particularly at Massey Road. There would also be private property tree removal and potential impacts on the Grange Golf Course.
Stormwater	**Stormwater quality**: all options including Option Alt 2 were likely to have a minor adverse effect for stormwater quality as no treatment had been considered as part of the long list options assessment. The proposed option was assumed to have no existing treatment as no treatment devices were identified from a review of Auckland Council GeoMaps. **Stormwater quantity**: Option Alt 2 may require major stream diversion works to the south of Middlemore hospital, so was scored as significant adverse until a refined alignment proved that interaction of this option with watercourse was fully understood.
Landscape, visual and urban design	**Natural character and landscape**: most options including Option Alt 2 scored neutrally as they were not identified as having any natural character values or landscape features along or near the alignment that could be impacted. **Visual**: significant adverse visual amenity effects as corridor width would reduce front gardens amenity and had major impact along 80% of the route. **Urban design**: Option Alt 2 provided more substantial potential to deliver urban design outcomes due to its proximity to key destinations and trip generators, including Ormiston town centre, Botany junction retail centre, Ōtara town Centre, Middlemore Hospital, and Māngere town centre.
Social and community impact	**Accessibility**: all options would provide positive social effects due to an increase in mode choice between Botany and Auckland Airport and improved accessibility. **Community**: additional traffic lanes required to accommodate BRT/LRT in the central median may directly affect sensitive receivers and private property along the corridor, having significant adverse effects on the community. **Health and safety**: sensitive receivers may experience adverse amenity impacts during construction associated with restricted access, air quality, and noise and vibration.

Alt 2: Alternate Street Corridor Option	
Noise and vibration	**Operational noise and vibration**: all options would likely have a minor adverse effect caused by increased in noise from BRT/LRT or by traffic lanes being sited closer to properties. It is noted that traffic noise and vibration caused from road traffic is already dominant along the proposed routes and many commercial and industrial receivers are likely to be desensitised to any increase in operational noise and vibration. **Construction noise and vibration**: during construction, adverse noise and vibration effects would likely be experienced by sensitive receivers along all options.
Archaeology and built heritage	**Archaeology and built heritage**: although there were no registered archaeological sites within the corridor of Option Alt 2, construction and associated earthworks had the potential to uncover previously unrecorded sites which was considered to be a minor adverse impact.
Contaminated land	**Contaminated land**: Option Alt 2 performed similarly to the other options as shallow disturbance of soil bound contamination was likely to occur across the whole route.
Air quality[11]	**Operational air quality**: it was not expected that the operation of BRT/LRT would result in any significant adverse air quality effects, so all options scored neutrally. **Construction air quality**: minor / moderate adverse effects resulting from discharges to air from construction activities were likely to occur for all options.
Engineering Feasibility and Implementability Assessment	
Constructability: Option Alt 2 comprised a standard construction process that is straightforward to implement. SH1 and SH20 and rail crossings would be required for this option. **Construction disruption**: Option Alt 2 had moderate construction impacts as the whole route required land take to provide working space. A large number of local roads affected would lead to some disruption in access. **Construction cost and risk**: as a construction cost estimate had not been undertaken, Option Alt 2 was assumed moderate costs for construction. **Safety in design and construction**: Option Alt 2 had moderate to high levels of health and safety design but nothing unusual, with no significant risks associated with the option. **Operation and maintenance**: Option Alt 2 had minor to moderate maintenance and operation costs as the long-term maintenance was within capability. **Consentability:** Option Alt 2 has complex consenting risks associated with implementing the proposed BRT / LRT cross section along this alignment.	

Overall, the alternative street corridor option Alt 2 generally performed poorly in all assessment

[11] The long list air quality assessment was a broad qualitative assessment carried out by the planning team and did not involve an air quality specialist. The assessment considered proximity and scale of likely construction works and proximity and scale of operational alignments in relation to sensitive receivers

groups. While it did not deliver against the project objectives, this corridor provided some benefits that other options were unable to achieve (such as significant population catchment for tertiary institutes along the Alt 2 route, single seat journey for different routes, good walking access to Kāinga Ora land etc). Although Option Alt 2 maybe worthwhile as a frequent service bus route or other transit line, it was not progressed to the short list assessment stage.

4.1.4 Long list engagement

4.1.4.1 Manawhenua engagement

Throughout the long list option development and assessment process, feedback from Manawhenua were received at the Southwest Gateway hui.

At the hui on 26 July and 8 August 2018, the long list options and MCA methodology were presented to Manawhenua. Feedback highlighted the importance of improving access between Puhinui and Manukau as community hubs, including walking and cycling connections. How options would interact with / impact existing and planned land uses in the area, such as AUT and train stations, should also be considered. Manawhenua indicated a preference for a non-heavy rail mode.

A hui was held on 30 August 2018 to provide a review of the long list options assessments in preparation for the Long List to Short List Workshop with the Project Partners and stakeholders. No feedback was provided on fatal flaws with the options, but it was suggested to consult with mātāwaka as part of the social and community criteria as Manawhenua have traditionally only provided input on cultural and heritage criteria only.

4.1.4.2 Public engagement

Following the long list assessment, an online feedback form was made available for public and stakeholders to submit feedback between November and December 2018. The form asked about the issues and opportunities for four options:

- Manukau via Ronwood Avenue (Option Central 3)
- Manukau via Manukau Station Road (Option Central 5)
- Airport to Puhinui via SH20B (Option West 1)
- Airport to Puhinui via SH20A (Option West 2)

The first two options relate to the Central segment and the last two options relate to the West segment of the rapid transit corridor (Figure 14)

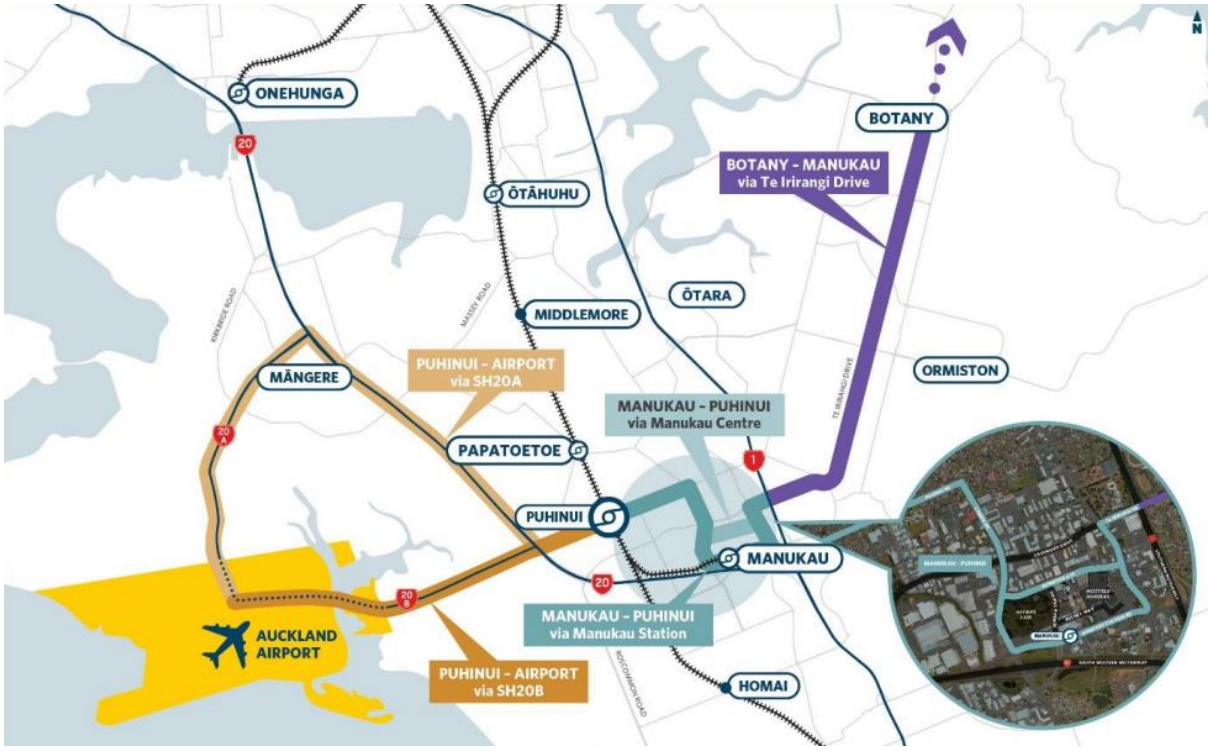

Figure 14: Route options for public feedback

In total, 77 responses were received. The outcomes are summarised in Figure 15 below.

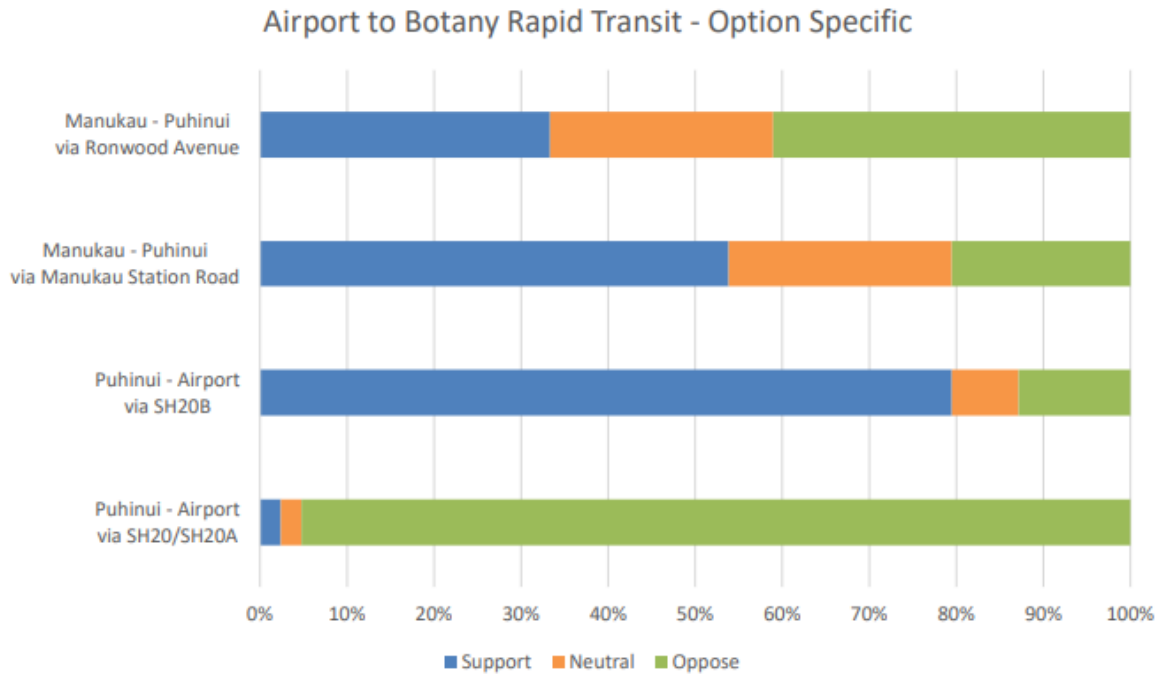

Figure 15: Public feedback response

There was very strong public support to go from Airport to Puhinui via SH20B (West 1) as it provided a much more direct route connecting with industrial employment areas. On the other hand, there was strong public opposition to go via SH20A (West 2) as the indirect services would take much longer

than the SH20B option and would not appeal to people travelling from the south. It was also noted that going via SH20A would duplicate the proposed City Centre to Māngere Light Rail route.

There was stronger public support to go through Manukau-Puhinui via Manukau Station Road (Central 5) rather than Ronwood Avenue (Central 3) as it provided a better connection with Manukau bus and train stations and maximised usage of existing infrastructure. Feedback noted that a rapid transit station here would be an accessible, flat, short walk to other stations, and the preference was that the rapid transit does not directly enter the bus station area as it would slow down services.

People who preferred the Ronwood Avenue option noted that the option would deliver a faster route between Botany and Puhinui and provide a better connection to the Manukau shopping areas and employment areas. It was recognised however that other transport infrastructure would be less accessible for all users, particularly the elderly or mobility impaired.

4.1.5 Long list preferred option(s)

The long list assessment included 10 route options for the project alignment. Following the MCAs, engagement and a long list to short list option workshop, six options were found to have adequate scores / benefits to progress to the short list:

- West segment: West 1, West 2
- Central segment: Central 3, Central 5, Central 6
- East segment: East 2

These options were confirmed in the Long List to Short List Option Workshop held on 31 August 2018. Attendees included Te Ākitai Waiohua, Auckland Transport, Waka Kotahi, Auckland Airport, Manawhenua (Ngāi Tai ki Tāmaki, Ngāti Maru, Ngāti Tamaoho, Ngāti Te Ata Waiohua, Ngāti Whanaunga, Te Patukirikiri), Auckland Council, Eke Panuku, The Southern Initiative, Te Tupu Ngātahi Supporting Growth, KiwiRail, and the Project Team.

To respond to the community feedback on Central options through Manukau, an additional Option Central 6 (via Manukau Station Road, Davies Avenue and Ronwood Avenue) was created and progressed to the short list assessment (see Figure 16). Central 6 combined the benefits of Central 3 and Central 5, providing access to the station as well as the Manukau Metropolitan Centre. Central 6 would also avoid the major intersection at Great South Road / Manukau Station Road.

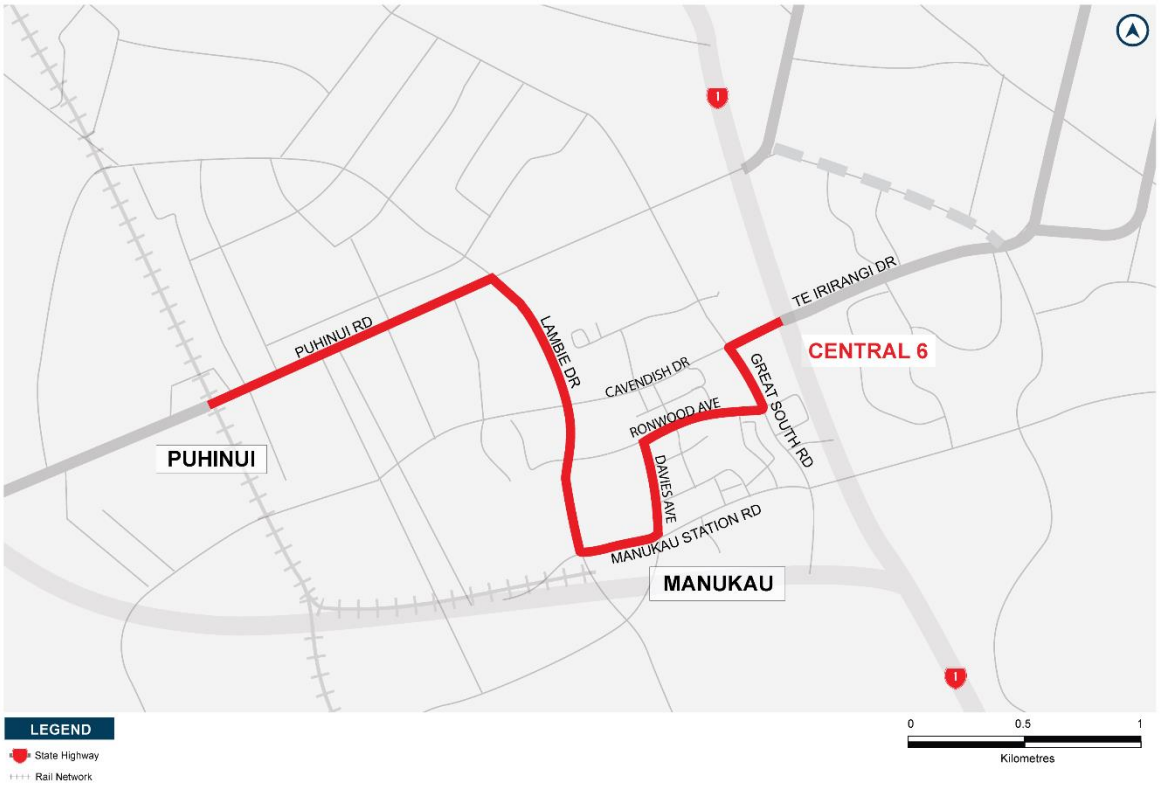

Figure 16: Option Central 6 (via Manukau Station Road, Davies Avenue, and Ronwood Avenue)

These six options, combining into six different route choices, are outlined below in Table 12 and illustrated in Figure 17. These made up the final short list of options to undergo another more comprehensive stage of assessment.

Table 12: Long list to short list preferred option combinations

No.	Combined route	West: Airport to Puhinui	Central: Puhinui to Manukau	East: Manukau to Botany
1	West 1-Central 3-East 2	West 1 – via SH20B	Central 3 – via Ronwood Avenue	East 2 – via Te Irirangi Drive
2	West 2-Central 3-East 2	West 2 – via SH20A, SH20	Central 3 – via Ronwood Avenue	East 2 – via Te Irirangi Drive
3	West 1-Central 5-East 2	West 1 – via SH20B	Central 5 – via Manukau Station Road	East 2 – via Te Irirangi Drive
4	West 2-Central 5-East 2	West 2 – via SH20A, SH20	Central 5 – via Manukau Station Road	East 2 – via Te Irirangi Drive
5	West 1-Central 6-East 2	West 1 – via SH20B	Central 6 – via Davies Avenue	East 2 – via Te Irirangi Drive
6	West 2-Central 6-East 2	West 2 – via SH20A, SH20	Central 6 – via Davies Avenue	East 2 – via Te Irirangi Drive

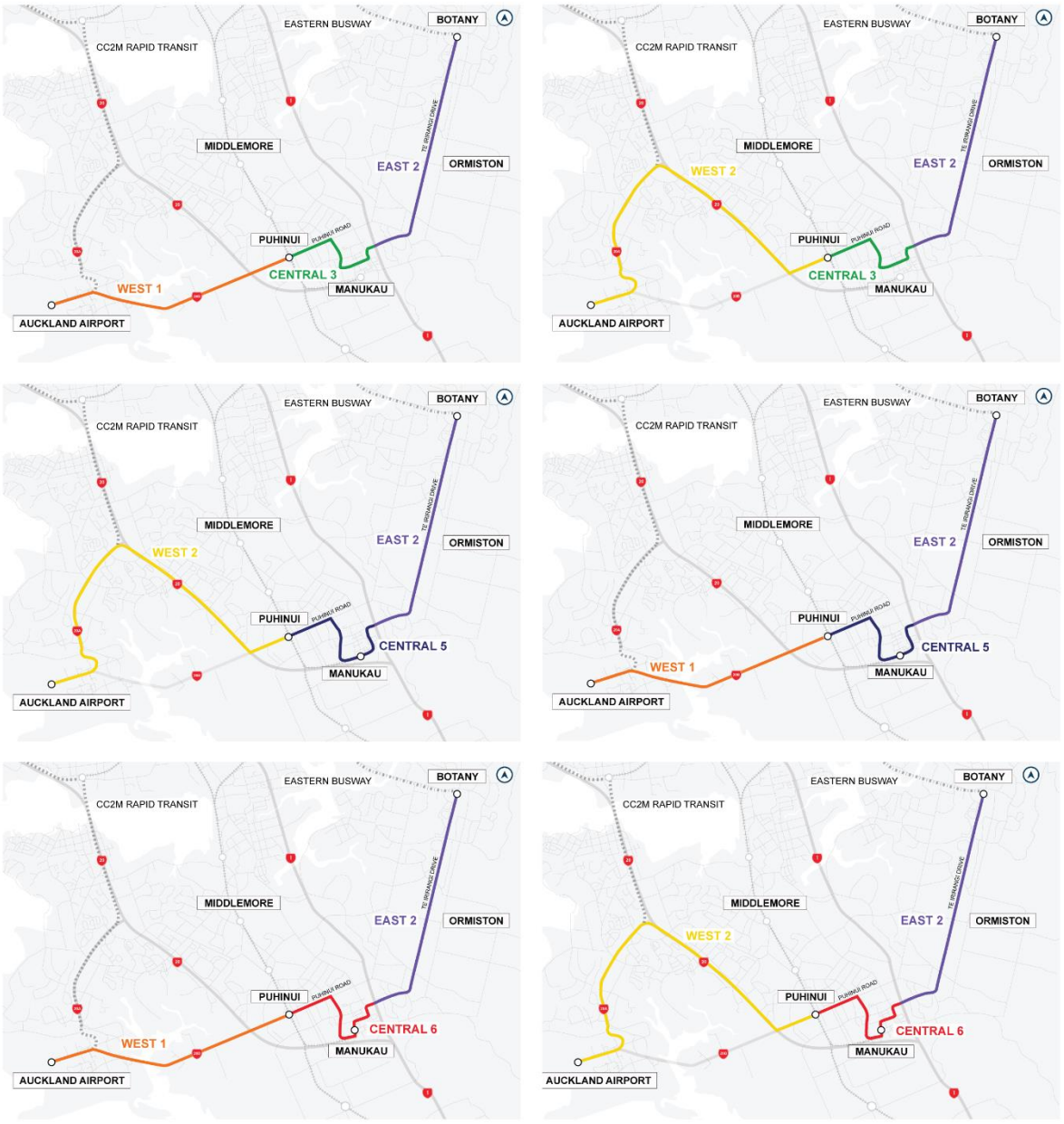

Figure 17: Long list to short list preferred option combinations

4.2 Short list assessment

4.2.1 Overview

Following the long list assessment, a short list of route options was confirmed. This set of options was assessed in detail to establish a preferred route for the Project. Figure 18 below illustrates short list options for each segment.

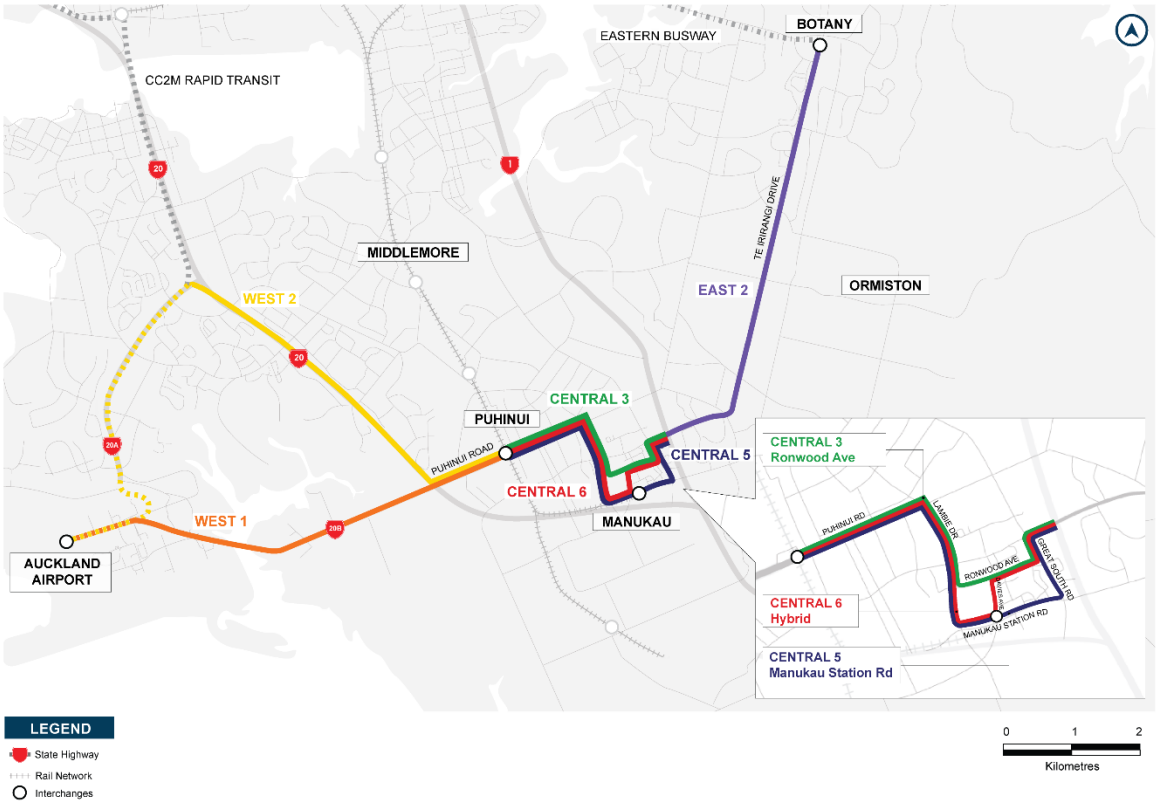

Figure 18: Short list route options assessed

The process steps involved in undertaking the short list assessment is detailed in Figure 19Figure below.

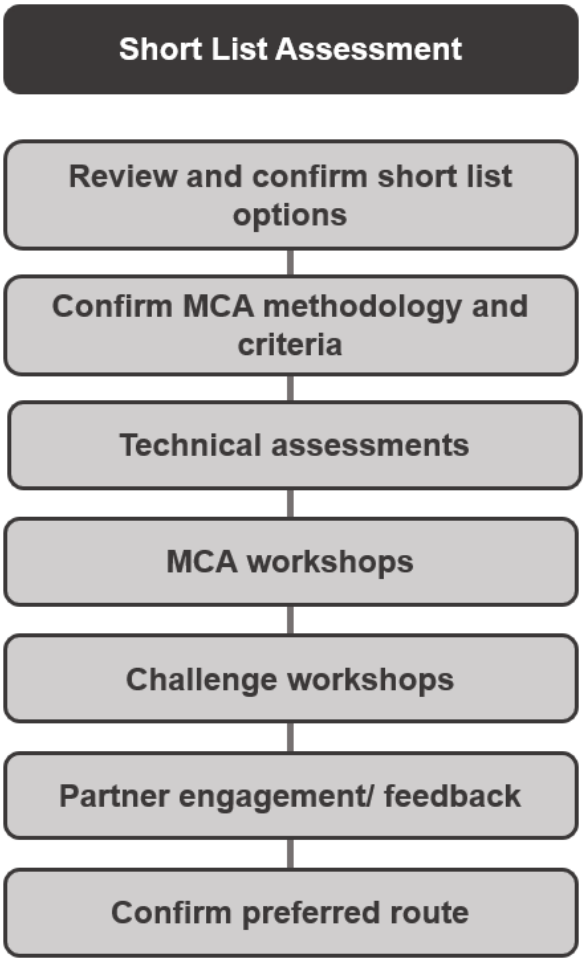

Figure 19: Short list assessment process

The following sections detail the options assessments for each segment.

4.2.2 Option assessment

4.2.2.1 West segment – Airport to Puhinui

The Project and the 20Connect state highway improvements study areas overlapped along SH20 and SH20B. The 20Connect project investigated improvements to state highways as a part of the SWGP.

Due to the overlapping geographic nature and shared aspirations of the two projects, it was decided that the options (and their cumulative effects) needed to be assessed holistically rather than in isolation from one another. As such, the extent of the RTC west of Puhinui Station was integrated with the 20Connect highway options short list assessment.

Combining the state highway options with the Project options (West 1 and West 2) as variants, six total options were created: HS1-West 1, HS1-West 2, HS2-West 1, HS2-West 2, HS3-West 1, and HS3-West 2. These short list options and their key attributes are as shown in Table 13 below.

Table 13: West segment short list options component summary

Components	HS1-West 1	HS1-West 2	HS2-West 1	HS2-West 2	HS3-West 1	HS3-West 2
RTC	**SH20B**	**SH20A and SH20**	**SH20B**	**SH20A and SH20**	**SH20B**	**SH20A and SH20**
SH20B widening	Offline	Offline	Online	Online	Online	Online
SH20B south-facing ramps onto SH20	Yes	Yes	No	No	No	No
SH20A south-facing ramps onto SH20	No	No	Yes	Yes	Yes	Yes
SH20 widening (Māngere Bridge to Interchange)	SH20A	SH20A	SH20B	SH20B	SH20B	SH20B
Pūkaki Creek Bridge lanes	4	4	4	4	2	2

While the environmental and engineering assessments were integrated for the two projects, the transport assessment of the RTC element was assessed independently.

The West short list assessment MCA involved the following technical assessments:

- RTC transport planning assessment – summary included in

- Table 14.
- Integrated environmental / planning and engineering assessments – summary included in Table 15.

The West segment short list options are shown in Figure 20 below.

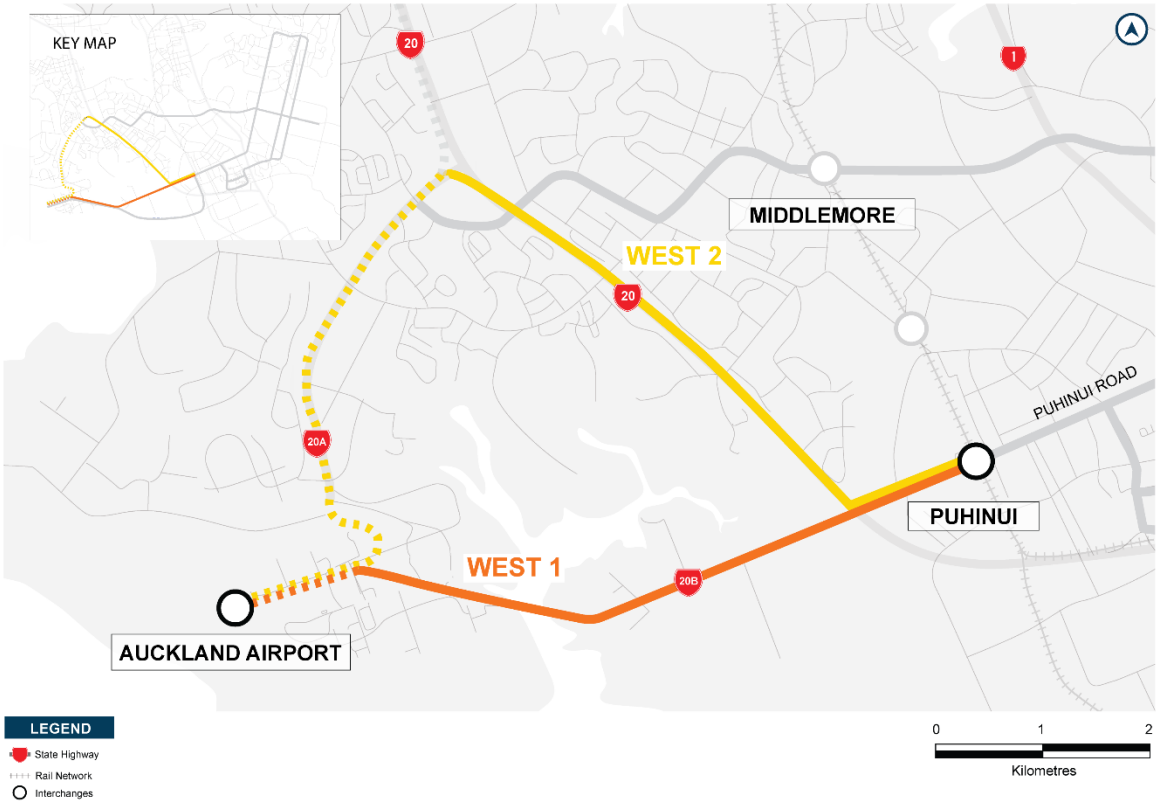

Figure 20: West segment short list options assessed

Table 14: West options transport assessment summary

West: Airport to Puhinui	
Transport Planning – Performance against Investment Objectives	
Investment Objective 1	*More equitable access and travel choice to jobs, key learning and social activities in the south and east of Auckland* **Population access to key destinations:** this metric was a key differentiator between Options West 1 and West 2. The net effects of improved access to key destinations from Option West 1 was considered greater than Option West 2 due to the significance of directness to the Airport, capturing significant parts of Manukau, Manurewa and East Tāmaki. **Job accessible from key locations:** although Option West 2 increased accessibility to a greater number of jobs from Botany to Ōtāhuhu, Māngere and Manurewa, Option West 1 provided better access to jobs within the Airport precinct. Given the study area for the Project, accessibility to employment within the Airport precinct was considered more important than other employment areas. Therefore, Option West 1 performed better. **Access to education and social opportunities:** as Option West 2 had greater coverage between the Airport and Puhinui, and there were several government offices and public services within the walking catchment of Māngere, Option West 2 performed better. **Access to resources and places of customary practice:** as Option West 2 provided access to several marae in Māngere and Option West 1 did not provide access to any marae or identified sites and places of value to Manawhenua, Option West 2 performed better. **Cost of travel in south and east Auckland:** Option West 1 lowered the generalised cost more than Option West 2.
Investment Objective 2	*Provide public transport for south and east Auckland that is easy to use, reliable, fast resilient and affordable* **Capacity and resilience of the option to meet forecast demand:** both options scored positively as high-quality BRT or LRT modes were assumed, which can achieve similar capacities that are appropriate to meet the anticipated demand on this corridor. **Travel time reliability, including separation of road space and vehicle interactions:** West 1 and West 2 both include full grade separation from SH20, and as such both scored positively. **Directness and ease of use:** both West options alignments (linking with Central and East options) removed the need for transfers for key journeys (City-Airport, Botany-Airport, Papakura-Airport, Botany-Manukau) between the Airport, Manukau and Botany, they both scored positively. **Travel time for key journeys:** Option West 1 provided better travel time savings to the key journeys identified, as well as journeys between a range of origins and destinations in South Auckland compared to Option West 2.

West: Airport to Puhinui	
Investment Objective 3	*Promote urban regeneration, improved built environment and economic opportunities* **Improved access to Local, Town and Metropolitan Centres:** whilst both options provided access to a similar area of neighbourhood, local and metropolitan centres, Option West 2 provided access to a much larger area of town centres due to the alignment via Māngere Town Centre. **Land development around stations:** for development opportunities of publicly owned land around stations, Option West 2 captured more Kāinga Ora sites within walking distance of the proposed stations, so scored higher than Option West 1.
Investment Objective 4	*Reduce the effects of the transport system on the environment and taonga* The criteria for IO4 are specifically associated with feedback from Manawhenua and is summarised in Section 4.2.3.2.
Investment Objective 5	*Improve health, safety and security of people* **Walking accessibility to PT stations:** Option West 1 scored higher as it would extend access to the RTN to a greater number of people than Option West 2. **Extent of local walking and cycling connections:** both options performed positively as they would both provide walking and cycling facilities and connections.

The Environmental and Planning and Engineering Feasibility assessment summaries are set out in the tables below. These assessed both the RTC options (West 1, West 2) and the highway options of the 20Connect Project (HS1, HS2, HS3).

Table 15: West options environmental and engineering assessment summaries (integrated assessment)

West: Airport to Puhinui	
Environmental and Planning Assessment	
Ecology	**Aquatic ecology:** all options will likely involve streamworks or works within wetland environments with the need for culvert extensions or bridge widening. There are no substantive differentiators and all options performed poorly. **Terrestrial ecology:** it was noted that banded rail and other coastal birds would likely be present within areas of the marine environment, particularly at Māngere Bridge. Other areas within the Project extent are also likely to support herpetofauna. Overall, there are no substantive differentiators and all options performed poorly. **Marine ecology**: each option requires one or more crossings of the CMA, many of which are identified as SEAs. However, the effects of the options on marine ecology are mitigable. There are no substantive differentiators and all options performed poorly.

West: Airport to Puhinui	
Coastal processes	**Construction effects on CMA:** All options impact the CMA with some form of infrastructure, construction effects considered to be adverse but manageable. **Geomorphology / sedimentation and tidal flows:** no substantial effects on geomorphology of the tidal inlets and tidal flows were anticipated over the operational life for any of the potential CMA crossings. There are no substantive differentiators and all options scored adversely. **Sea-level rise and coastal climate change:** it was considered that sea-level rise and climate change aspects could be managed via the design of the new bridges and culverts. There are no substantive differentiators and all options performed poorly.
Stormwater	**Stormwater quality:** there were little to no existing stormwater treatment at the time of assessment, and new treatment would be required to cater for new and existing impervious areas. There are no substantive differentiators and all options scored adversely. **Stormwater quantity:** each option required stormwater management within a Stormwater Management Area Flow control area. There were no substantive differentiators and all options scored adversely.
Landscape, visual and urban design	**Natural character and landscape:** the HS2 and HS3 options will result in greater effects on Ngā Kapua Kohu Ora which is subject to an Outstanding Natural Feature Overlay. West 1 options will result in changes to the Pūkaki Creek environment due to the additional bridge structure. Overall, there were no substantive differentiators and all options scored adversely. **Visual:** the loss of vegetation and removal of houses would increase the visibility of the motorway to receivers that may not currently have a visual effect. The HS2 and HS3 options may also have a potential effect on the Mount Māngere viewshaft (Viewshaft M4) in relation to the proposed south-facing ramps between SH20A and SH20. However, overall there were no substantive differentiators and all options scored adversely. **Urban design:** the offline SH20B motorway options (HS1 options) score more favourably than the online widening options (HS2 and HS3 options) which reduced the local road connections with the existing SH20B.
Social and community impact	**Accessibility:** the West 2 options (i.e. HS1-West 2, HS2-West 2, HS3-West 2) scored more favourably than the West 1 options as the inclusion of an RTC that provided direct connections to Māngere Town Centre would have more substantial benefits for the community. **Community:** the project impact on residential properties, parks and businesses could adversely alter the community's sense of place and lead to reduced functionality of community services. Overall, there were no substantive differentiators and all options scored adversely. **Health and safety:** there would be some impacts on health and safety as a result of construction (e.g. noise, dust, vibration, change to routes). There were no substantive differentiators and all options scored adversely.
Geology	**Geology:** this assessment considered the extent and degree of effects on nationally and regionally significant volcanic features. All the HS2 and HS3 options scored adversely due to the proposed widening to the west of SH20, toward the more significant volcanic features (eastern tuff ring) of Ngā Kapua Kohu Ora.

West: Airport to Puhinui	
Noise and vibration	**Operational noise and vibration:** option HS1-West 1 scored neutrally as it would result in most protected premises and facilities (**PPFs**) being either demolished or experience negligible effects. All other options scored adversely as they lead to PPFs next to SH20 being affected either from the removal of the existing bund (in part) and/or the demolition of existing houses which immediately abut SH20. **Construction noise and vibration:** some exceedance of construction noise criteria is anticipated, so all options scored adversely.
Archaeology and built heritage	**Archaeology and built heritage:** no differentiation was identified between the options. All options scored adversely as they would result in probable impact on archaeological sites – Papahinau and Ngā Kapua Kohu Ora.
Contaminated land	**Construction management (contaminated soils):** the West 2 options were likely to result in the demolition of residential properties along SH20, requiring the consideration of asbestos-containing material in residence construction and waste disposal to gardens. The West 2 options therefore scored worse than the West 1 options. **Construction management (groundwater):** no substantial differentiation between options, all scoring adversely. **Passive discharge:** the HS1 options required construction within quarry/landfill near Cavendish Drive which may create new pathways and worsen existing passive discharge arrangements in the area. The HS1 options therefore scored adversely while the rest of the options scored neutrally. **Potential for new or cross contamination:** contaminated land is likely to be disturbed across most of SH20. Construction activities in close proximity to the jet fuel pipeline and/or liquid fuel pipeline could potentially result in adverse environmental impacts. All options scored adversely. **Built environment risk:** no substantial differentiation between options, all scoring adversely. **Health and safety of construction workers:** HS1 options scored the worst due to the presence of the underground pipeline between Campana Road and Pūkaki Bridge which may be a source of deeper hydrocarbon contamination in these areas. The rest of the options scored adversely. **Acid sulphate soil:** acid soils may be present, particularly along the western end of the SH20B corridor. All options scored adversely.
Air quality	From an operational air quality or air quality construction perspective no options were differentiated having a similar scale of adverse impact.
Engineering Feasibility and Implementability Assessment	
Constructability: Option HS1-West 1 would require moderate works. The majority of road, RTC, and SUP construction would be offline in the SH20B corridor and partially within the designation, allowing for easier construction procedures with less disruption.	

West: Airport to Puhinui
The rest of the options would require major construction works. Options HS2-West 1 and HS3-West 1 would result in impacts on a great number of properties on SH20. The West 2 options had SUP and RTC designs which laid mostly outside of the designation, requiring large cuts and retaining walls. **Construction disruption:** Options HS1-West 1 and HS1-West 2 would result in construction disruption associated with works affecting bridges and construction of new underpasses as most of the construction is undertaken offline and within designation, allowing for a less stringent construction methodology. The remaining options was expected to have major construction disruption as most of the construction would be undertaken online. **Construction cost and risk:** Options HS2-West 1 and HS3-West 1 had slightly lower estimated construction costs than the remaining options, so performed better. **Safety in design and construction:** all options would result in health and safety design and construction risks, as a departure may be required for the proposed SH20/20B south facing ramp (HS1 options) and the proposed SH20A/20 ramps (HS2 and HS3 options). However, those Interchange ramps are ultimately likely to provide a safer transition between state highways. **Operation and maintenance:** all options would involve new pavement, stormwater, retaining walls and structures. Whilst the quantities between the options differ, they are all considered business as usual and therefore there are no substantive differentiators. **Property:** All options had a similar assessed scale of property impact and associated acquisition risk, no substantive differentiation between options. **Consentability:** all options would require highly complex approvals pathways to authorise the Project as the existing environment contains urban, coastal and cultural elements.

Following the transport assessment and the RTC elements of the environmental / planning and engineering assessments, it was noted that accessibility, travel time, and constructability matters were the key differentiators between Options West 1 and 2.

Option West 1 was identified as the preferred option for the following reasons:

- Routing via SH20B provides greater travel time savings for key journeys;
- SH20B opens up access (to the Airport, jobs, social and cultural activities) for significant parts of Manukau, Manurewa and East Tāmaki; and
- The alignment on SH20B is less complex from a constructability (and therefore construction cost / risk) perspective.

4.2.2.2 Central segment – Puhinui to Manukau

For the Central segment assessment, an additional Option Central 6 (using Manukau Station Road, Davies Avenue and Ronwood Avenue) was added as a hybrid of Options Central 3 and Central 5 after public consultation.

The purpose of this new option was to better understand the benefits of combining elements of Central 3 and Central 5 – connecting with bus and train stations and Manukau Central, and avoiding the Great South Road / Manukau Station Road intersection.

The Central segment options assessed are illustrated in Figure 21Figure below.

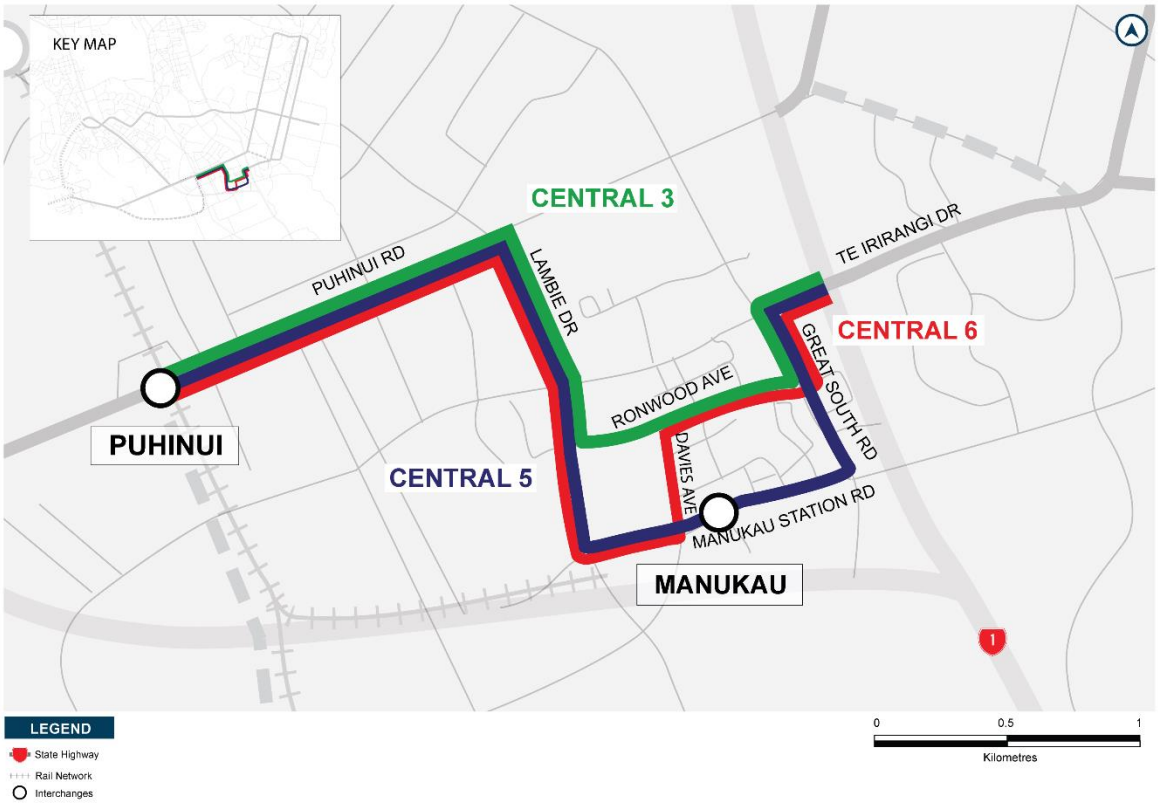

Figure 21: Central segment short list options assessed

The Central options had subtle differences to each other, so were assessed separately to the full corridor (considering only the effects of the Manukau alignment and making no assumptions about the alignment elsewhere along the corridor) to adequately capture key differentiators. The outcomes of the assessment are summarised in

Table 16 below. The detailed MCA scoring is included in **Appendix C**.

Table 16: Central options short list assessment summary

Central: Puhinui to Manukau	
Transport Planning – Performance against Investment Objectives	
Investment Objective 1	*More equitable access to jobs, key learning and social activities* **Population access to key destinations:** the fast, frequent services for all options would improve the 45-minute PT catchment to these centres. Options Central 5 and Central 6 performed the best as they both directly connected to Manukau Station, enabling convenient transfers to local buses and the train line. Option Central 3 performed slightly worse as it accessed Manukau via Ronwood Avenue, so transfers to the local buses and train line required an additional five-minute walk between Ronwood Avenue and Manukau Station. **Job accessible from key locations:** all options scored positively as they were all expected to considerably improve job accessibility. **Access to education and social opportunities:** all options scored positively as they were all expected to slightly improve walking accessibility to services. **Access to resources and places of customary practice:** no marae and sites and places of value to Manawhenua (from the AUP:OP) were identified within Manukau Central, so none of the options could be differentiated against this metric.
Investment Objective 2	*Provide public transport for south and east Auckland that is easy to use, reliable, fast resilient and affordable* **Capacity and resilience of the option to meet forecast demand:** Option Central 5 performed the worst as it passed through the major vehicle intersection of Great South Road with Manukau Station Road and Redoubt Road. Options Central 3 and Central 6 performed better as they used the less trafficked and less constrained Ronwood Avenue through Manukau. **Travel time reliability, including separation of road space and vehicle interactions:** all options were assumed to have mass rapid transit standards of priority and separation from traffic, therefore performing positively for travel time reliability. **Directness and ease of use:** all options performed positively as they removed the need to transfer at Manukau to access the Airport. **Travel time for key journeys:** this metric measured the travel time through Manukau for each option. Option Central 3 had the shortest travel time so performed the best, and Option Central 5 performed the worst due to additional delays caused by routing through major vehicle intersections.
Investment Objective 3	*Promote urban regeneration, improved built environment and economic opportunities* **Improved access to Local, Town and Metropolitan Centres:** Options Central 3 and Central 6 provided accessibility to Manukau Central and scored positively. Option Central 5 performed slightly worse as it did not provide a highly accessible and legible central stop in Manukau Central, with the main stop located on a more peripheral street. **Land development around stations:** with development opportunities of publicly owned land around stations, no substantial differentiation was identified between the options with regard to walking access to Kāinga Ora land. Option Central 3 had less direct access to the Eke Panuku development site to the south of Manukau Station Road as it did not have a Manukau Station stop. Therefore, Options Central 5 and 6 performed better.

Central: Puhinui to Manukau	
Investment Objective 4	*Local environment is protected and enhanced* The criteria for IO4 are specifically associated with feedback from Manawhenua and is summarised in Section 4.2.3.2.
Investment Objective 5	*Healthier and safer people* **Walking accessibility to PT stations:** all options were expected to improve the walking catchment of the frequent and rapid transit network, however there were negligible differences between their catchments, so all options scored positively. **Extent of local walking and cycling connections:** all three options provided considerable potential for walking and cycling improvements directly through changes to street corridors and indirectly through influencing future development patterns. All options scored positively.
Environmental and Planning Assessment	
Ecology	**Aquatic ecology:** all Central options would have minimal to no effect on aquatic ecology. **Terrestrial ecology:** all Central options would have minimal to no effect on terrestrial ecology. **Arboriculture:** the removal of a substantial amount of mature street trees would be required for all options, so they all scored adversely. In particular, the Norfolk Pines located at the eastern end of Manukau Station Road (Option Central 5) were considered to be an iconic symbol of the local area.
Stormwater	**Stormwater quality:** all options were likely to have an adverse effects on water quality due to limited opportunities to provide centralised devices. **Stormwater quantity:** all options performed very poorly as they had limited opportunities to provide for stormwater management devices due to the highly constrained environment. The very limited space along Ronwood Avenue to provide any peak flow attenuation may result in increased flooding of the immediate downstream receiving environment near Puhinui Stream.
Landscape, visual and urban design	**Natural character and landscape:** there were no AUP:OP scheduled places of natural heritage values within or close to the Central options. All options scored adversely due to the loss of mature trees along the corridors. **Visual:** all options scored adversely due to the visual effects related to corridor widening and removal of trees and landscaping, experienced by both users of the corridor and residential properties which overlook the corridor. **Urban design:** all options performed positively as they provided access to Manukau Central and its destinations, trip generators and employment opportunities. Option Central 5 performed the best as it had more major destinations along its alignment, including civic buildings, Manukau Police Station, Manukau District Court and Rainbows End.

Central: Puhinui to Manukau	
Social and community impact	**Accessibility:** all three options were considered to have a positive effect on accessibility as they would provide a missing public transport connection to and from Manukau Station. The options may result in some temporary adverse effects on access to community facilities / services and businesses during construction, however it was expected that these could be appropriately managed through Stakeholder and Communications Plans and Construction Management Plans. **Community:** all three options were within commercial and business areas, rather than residential areas. The most sensitive receiver was Hayman Park and the Manukau District Court for Option Central 5. During construction, there may be an impact on the ability for individuals to enjoy the amenity of the park and community facilities. Therefore, all options performed adversely. **Health and safety:** all options performed adversely as sensitive receivers along the alignments may experience adverse amenity (e.g. air quality, noise and vibration) impacts during construction. It was considered these impacts could be managed through Stakeholder and Communications Plans and Construction Management Plans.
Noise and vibration	**Operational noise and vibration:** Options Central 5 and Central 6 performed adversely as the nearest PPFs were MIT and the Manukau District Court. These buildings were located in the Aircraft Noise Notification Area (**ANNA**) and therefore no special design was required for sound insulation. The closest PPF for Option Central 3 was the apartment building on the corner of Ronwood Avenue and Osterley Way. Given the building's location within a Metropolitan Centre Zone and the Moderate Aircraft Noise Area (**MANA**) overlay, it was likely to have sound insulation. **Construction noise and vibration:** all options were considered to have construction noise and vibration effects. However, the effects would be temporary in nature and no businesses were identified to rely on outdoor space for sales.
Archaeology and built	**Archaeology and built heritage:** all options were considered to potentially have adverse effects if unrecorded archaeological material are encountered.
Contaminated land	**Waste management:** all options were considered to have adverse effects in relation to waste management. Historical depressions and gullies were present across all routes which had potential to have been in-filled with farm waste. **Health and safety during construction:** all options were considered to have adverse effects in relation to risk to construction works from soil or groundwater.
Engineering Feasibility and Implementability Assessment	
Constructability: all three options required major construction works but nothing unusual. Options would be straightforward to implement, with non-challenging construction methods and staging. Options Central 5 and Central 6 will require works on the bridge structure over the rail spur adjacent to the Manukau Station Road / Lambie Drive intersection. **Construction disruption:** Option Central 3 would have moderate construction disruption impacts as the route passes through primarily commercial areas with several available access points to be used as detour routes. Options Central 5 and Central 6 would have construction disruption impacts on the operation of the bus and train station. Option Central 5 would also limit access to Rainbow's End and Manukau Medical Centre during the construction period.	

Central: Puhinui to Manukau
Construction cost and risk: construction cost was yet to be confirmed. Whilst Option Central 3 would be lower in cost compared to Options Central 5 and Central 6 due to the construction footprint, in the scale of the whole project the difference is minor. **Safety in design and construction:** all three options have health and safety design risk but not considered unusual and can be managed. Options Central 5 and 6 would require KiwiRail protection / stand over when upgrading the bridge over the rail spur on Lambie Drive. **Operation and maintenance:** no major ongoing maintenance costs were expected for all three options. **Property:** Options Central 3 and 6 performed worst as they access into the Manukau Central area via the constrained corridors of Ronwood Avenue and Davies Avenue, and therefore have greater property impacts. **Consentability:** all options would require complex approvals pathways to authorise the Project but are considered to be manageable.

Overall, the three Central options scored similarly across many metrics. However, where there were score differentiations, Option Central 6 performed either the same or better than Options Central 3 and Central 5 for most of the Investment Objectives. Key differentiators included:

- Options Central 5 and Central 6 connected directly to Manukau Station, enabling direct transfers to local buses and the train line.
- Options Central 3 and Central 6 used the less trafficked and less constrained Ronwood Avenue, avoiding a major intersection with Great South Road, performing better than Option Central 5 in terms of resilience to meet demand. The slightly longer travel times with Option Central 6 due to its longer route was considered a reasonable trade-off against the benefits of providing a better-connected service through Manukau.
- Central 5 scored lower than the other two for access to centres as it did not provide a highly accessible and legible central stop in the town centre. Option Central 3 scored lower than the other two for land development opportunities due to its reduced access to the site south of Manukau Station Road between Davies Avenue and Lambie Drive intersections.

For the above reasons, Option Central 6 was selected as preferred.

It was noted that Option Central 6 performed poorly for stormwater quality, arboriculture, and property criteria. Opportunities to mitigate these impacts would be focused on as the preferred option is developed and refined.

4.2.2.3 East segment – Manukau to Botany

The preferred connection between Manukau and Botany using Option East 2 (Te Irirangi Drive) was already confirmed in the previous long list assessment, no additional assessment was undertaken to inform the preferred alignment.

4.2.3 Short list engagement

4.2.3.1 Internal feedback

A Project Risk Workshop was held on 5 November 2018, which exposed project risks associated with the options that provided for the RTN along the SH20/SH20A corridor. These risks included land take requirements, widening of over-bridges, and impacts on Ngā Kapua Kohuora. The identified project risks could potentially delay the project implementation programme greatly and result in reputational damage to the project investment and implementation partners.

This feedback influenced the optioneering for the West segment and the selection of West 1 (via SH20B) as the preferred option.

4.2.3.2 Partner feedback

During the short list assessment stage, Manawhenua were invited to provide Māori Values Assessments. Feedback was provided by Te Ākitai Waiohua on the West segment short list options. Locating the RTC on SH20B will impact on the Pūkaki corridor, which includes the former settlements at Papahinau and Mimiti Te Arero. However, providing the RTC on SH20 will impact on the former settlement Ngā Kapua Kohuora as well as potentially Te Ararata Creek and Te Hopua a Rangi. From the assessment and following discussions, Te Ākitai Waiohua did not oppose the RTC along the SH20B corridor.

To confirm the preferred options to progress further, a Short List to Preferred Option Workshop was held on 13 December 2018 with Te Ākitai Waiohua, Auckland Transport, Waka Kotahi, Auckland Airport, Manawhenua, Auckland Council, Eke Panuku, The Southern Initiative, Ministry of Housing and Urban Development, and the Project Team. The short list preferred option was endorsed by all attendees.

4.2.3.3 Manawhenua feedback

A hui was also held with representatives of the Southern Manawhenua Table on 12 December 2018 to review the short list options and identify a preferred option. Manawhenua highlighted the importance of exploring opportunities to deliver good outcomes for the community beyond infrastructure, and to include cultural practices throughout the development of the Project and not compromising wāhi tapu and wāhi taonga. There was an agreement that Te Irirangi Drive is the most appropriate route for the rapid transit corridor. For the West options, feedback was deferred to Te Ākitai Waiohua's Māori Values Assessment.

4.2.3.4 Stakeholder feedback

A Manukau City Centre Strategy Workshop was held on 28 February 2019 with Auckland Transport, Waka Kotahi, Auckland Council, Eke Panuku, Kāinga Ora, Ministry of Housing and Urban Development, Ministry of Education, Kiwibuild, and the Project Team. The workshop sought to agree a redevelopment sequence for the area. Discussions at the workshop provided consensus that Option Central 6 was the favoured rapid transit route through Manukau Central providing connection with Manukau bus and train stations.

4.2.3.5 Public feedback

A second round of online surveys were released from November to December 2019 which sought public feedback on the rapid transit preferred route (West 1-Central 6-East 2). Eight community drop-in sessions between 23 November to 7 December 2019 were also made available for the public to provide feedback in person.

63 submissions were made, with a majority (52 submitters) in support of the preferred rapid transit route. The breakdown of responses is illustrated in Figure 22Figure below.

Figure 22: Public engagement feedback

Feedback was also sought on additional comments or suggestions from the public. Whilst many responses included support for connecting rapid transit with the shopping areas and bus/train stations in Manukau, other submissions noted that the route through Manukau should be reviewed as it added additional travel time and was already well-serviced by bus/train services.

4.2.4 Short list preferred option

Following the short list MCAs and the consideration of partner and stakeholder feedback, the preferred Project route involved:

- East segment (Botany to Manukau) via Te Irirangi Drive (East 2);
- Central segment (Manukau to Puhinui) via Manukau Station Road, Davies Avenue and Ronwood Avenue (Central 6); and
- West segment (Puhinui to Airport) via SH20B (West 1).

This preferred route is illustrated in Figure 23Figure below.

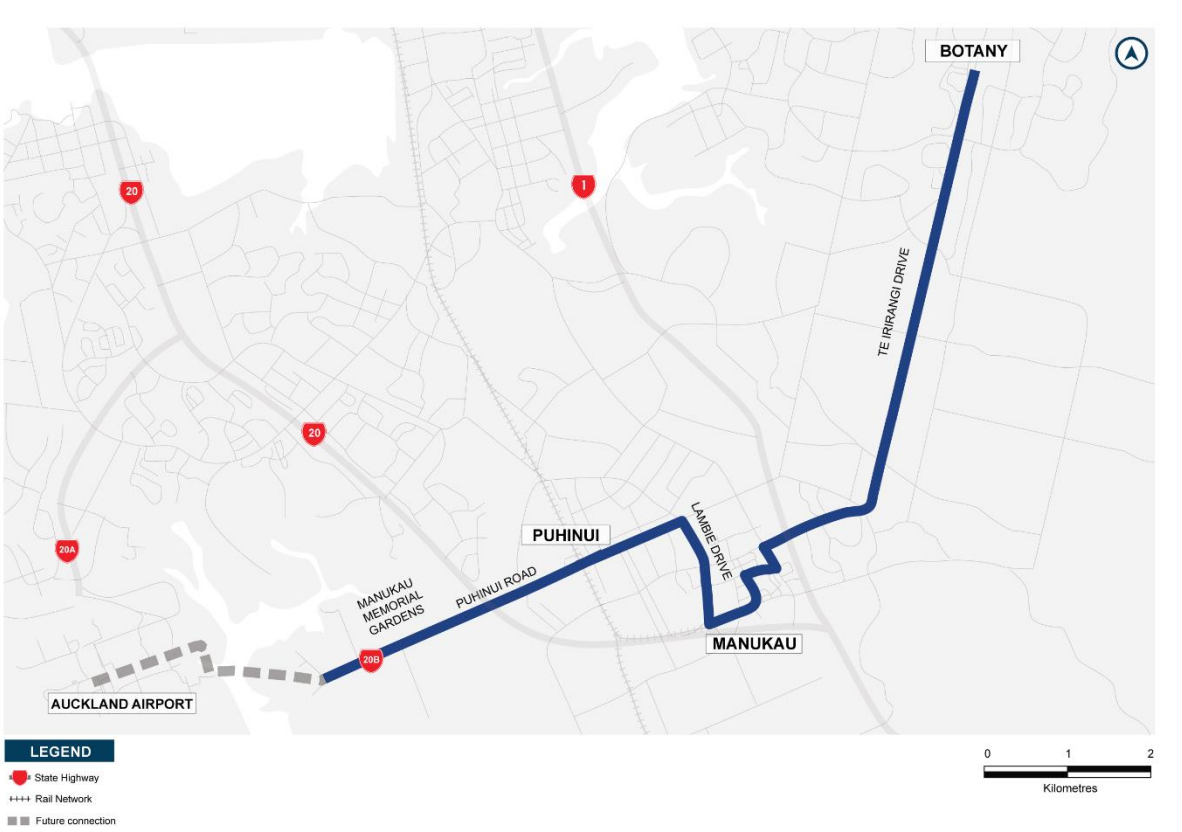

Figure 23: Preferred route from Botany to the Airport

A primary strength of the preferred option (**West 1**) is the direct link between the Airport and Puhinui Interchange, giving the shortest travel times for journeys between the Airport and east and south Auckland. These short travel times result in fast passenger trips, better regional network connectivity with greater catchment area, and lower operating and fleet costs. This route was strongly favoured by the public and has fewer environmental and cultural concerns than an alternative using SH20/SH20A.

The preferred option through Manukau was developed with an alignment along Lambie Drive / Manukau Station Road but continuing along Davies Avenue to Ronwood Avenue (**Central 6**). This option was developed with the aim of achieving good access to Manukau Central, despite being a slightly longer route, and serves both the rail and bus interchanges and the northern side of the metropolitan centre. It also avoids the congested and constrained intersection of Great South Road, Manukau Station Road and the adjacent SH1 Southern Motorway ramps. While it was noted that Option Central 6 performed poorly for criteria related to stormwater quality, arboriculture, and property criteria, opportunities to mitigate these impacts would be focused on as the option is refined.

Te Irirangi Drive as far as Botany (**East 2**) is the most direct, fastest and most reliable route and allows integration with the supporting bus, cycle and pedestrian networks. It also takes advantage of earlier planning for Te Irirangi Drive as a possible rapid transit route by using the wide median and reducing land requirements.

5 Puhinui Station rapid transit bridge

5.1 Overview

As part of an earlier stage of the SWGP known as the Short-Term Airport Access Improvements (**STAAI**)[12], the Puhinui Station was constructed. The station enabled the early implementation of a frequent bus service between Manukau and the Airport (AirportLink) which is now operative.

Optioneering was undertaken to determine the preferred long term RTC connection to Puhinui Station to provide for a high-quality bus and rail interchange.

Five options were developed and assessed through MCAs for transport, environmental and planning, and engineering feasibility. Programme Partner, Manawhenua, stakeholder, and internal engagement was also undertaken to inform option selection. The preferred option, comprising of two sub-variant options, was then progressed for further design refinement.

The process associated with the Puhinui Station rapid transit bridge assessment is included below:

[12] The Short Term Airport Access Improvements Project was part of the SWGP and included improvements to Puhinui Station, bus services from Manukau to the Airport, and SH20B roading improvements.

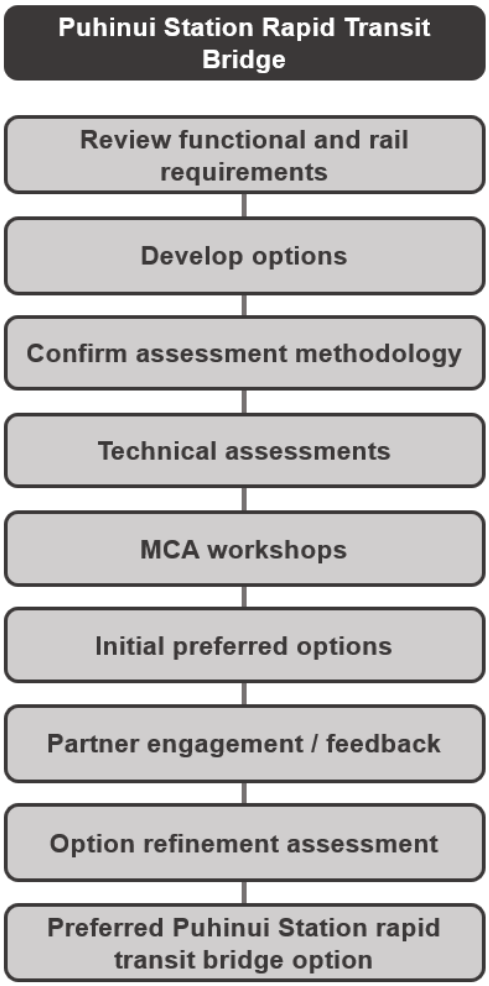

Figure 24: Optioneering process for Puhinui Station rapid transit bridge

5.2 Options development

When developing the options, the functional requirements were determined by Auckland Transport and backed by customer insights research. The options development then comprised different ways to meet specification based on the customer research, such as safety, directness, and confidence in transfers.

Consultation with KiwiRail was also undertaken prior to option development. It was likely that third, fourth and even fifth mains would eventually be added to the North Island Main Trunk (**NIMT**) rail line. Therefore, all options were developed to accommodate future additional rail lines and platforms.

Based on the above, five options were developed, outlined in Figure 25 and Table 17 below:

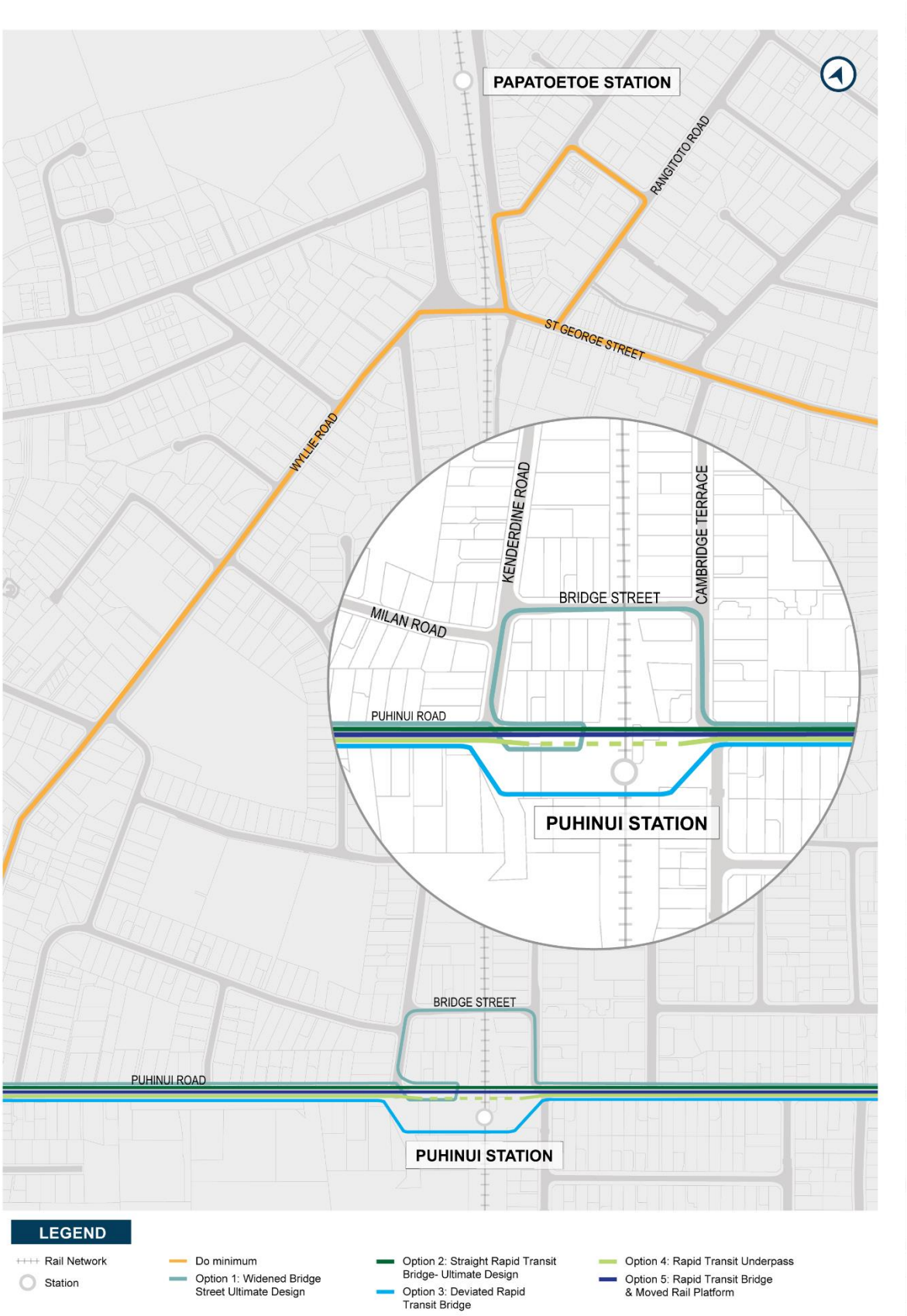

Figure 25: Puhinui Station Interchange Options, including Rapid Transit Bridge alignment

Table 17: Summary of options developed

Option	Name	Description
Do-Minimum	Do-Minimum	• The Do-Minimum scenario was included to be a reference against which all other options were assessed. It represented the minimum level of work required to maintain an existing level of service. • The Do-Minimum option maintained the status quo, but with a truncated 380 Airporter route service connecting Auckland Airport and Manukau via Papatoetoe Station (shown in orange in Figure 25).
Option 1	Widened Bridge Street Bridge	• This option provided a dedicated rapid transit corridor by widening the existing Bridge Street bridge. • The objective was to provide an option that did not require the construction of a new rapid transit bridge structure. • The rapid transit service would travel via Puhinui Road and Bridge Street and serve the bus stops in front of Puhinui Station.
Option 2	Straight Rapid Transit Bridge	• Option 2 included a dedicated rapid transit bridge to the south of Puhinui Road. • The rapid transit 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 objective was to provide the shortest and most direct rapid transit connection across the railway line.
Option 3	Deviated Rapid Transit Bridge	• Option 3 included a deviated dedicated rapid transit bridge to the south of Puhinui Road. • The rapid transit 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.
Option 4	Rapid Transit Underpass	• Option 4 included a deviated dedicated rapid transit underpass to the south of Puhinui Road. • The rapid transit would travel via a segregated rapid transit line on Puhinui Road, and serve new stops provided in the underpass. The underpass would be deviated to the south of the existing Puhinui Road alignment to minimise impact on the Hunua No.4 Watermain. • Additional station facilities such as ticketing and gate lines would need to be provided for this option given the multi-level layout of the Puhinui Station. • The objective was to minimise the visual impact of the rapid transit bridge and still provide the rapid transit connection across the railway line.
Option 5	Rapid Transit Bridge and Moved Rail Platforms	• Option 5 included a dedicated rapid transit bridge to the south of Puhinui Road. • The rapid transit 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 and enable a seamless transfer from the new rapid transit platforms to the concourse. • The objective was 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.

5.3 Assessment summary

The option assessment for the Puhinui Station rapid transit connection is summarised in Table 18.

The transport planning criteria assessed performance against Project Objectives specific to the STAAI project.

The detailed MCA scoring is included in **Appendix C**.

Table 18: Puhinui Station rapid transit bridge option assessment summary

Puhinui Station rapid transit bridge	
Transport Planning – Performance against Project Objectives	
Project Objective 1	*Provide more reliable and timely travel choices to and from Auckland Airport and surrounding areas* **Extent to which options contributes to reliable travel times to and from Auckland Airport:** more reliable and timely travel choices could be provided in all options. The routes are consistent across all options and do not affect station design or layout in the short-term.
Project Objective 2	*Improve people's access to employment, education and social opportunities* **Extent to which options improves people's access to employment, education and social opportunities:** access to employment, education and social opportunities would be improved in all options. However, Options 1 to 5 provide for high-quality interchanges at Puhinui Station, which would be more attractive for users compared to the do-minimum.
Project Objective 3	*Provide an enhanced and integrated bus / rail interchange at Puhinui that incorporates cultural values and reflects community identity* **Extent to which options could provide an enhanced and integrated bus / rail interchange at Puhinui that incorporates cultural values and reflects community identity:** the do-minimum option performed worst as the on-street stops and small-scale improvements would not result in an enhanced and integrated bus / rail interchange compared to Options 1 to 5.
Project Objective 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 limited improvements in the do-minimum were unlikely to lead to increased patronage and modal share due to low quality and perceived safety issues. Options 1 to 5 would contribute to increasing value from existing transport infrastructure (through increased public transport patronage and modal share) due to the upgraded interchange at Puhinui Station and public transport services that address reliability, quality, and safety issues.
Project Objective 5	*Be operational by end of 2020 / early 2021* This criterion was not relevant for selecting the long-term rapid transit bridge option.
Environmental and Planning Assessment	
Environmental	A qualitative assessment of key environmental risks was undertaken for each option. These included visual impact, noise, air quality (construction and operations), water quality, ecology, heritage, contaminated land on nearby receivers. Options 1 to 5 were all assumed to deliver similar levels of operational activity, and key differentiators are the spatial arrangement and operational design of each option (such as proximity to receivers and impact of traffic network). The following summarises key differentiators identified:

Puhinui Station rapid transit bridge	
	• Option 2 performed the best as the potential environmental effects of the physical works and RTN footprint were relatively constrained, reducing the exposure of receivers. • Option 3 performed worse as the deviated alignment would locate construction and operational effects closer to residential receivers to the south of the existing platform and at Puhinui Road properties. • Options 1, 4 and 5 performed the worst – Option 1 extended the physical works and RTN footprint, increasing exposure to a greater number of receivers; Option 4 involved an underpass component which creates CPTED and noise and vibration (tunnelling) effects that did not exist with other options; and the platform reconfiguration in Option 5 would move construction and operational effects and RTN drop-off closer to a higher number of residential receivers.
Urban design	• Options 3 and 5 performed best. Option 3 would present the Puhinui Station's face to the neighbourhood to the north. Option 5 had centralised platforms which provided better exit points for CPTED benefits. • Option 1 widened the existing Bridge Street bridge and road which would have negative impact due to the additional loss of residential properties required for widening. • Option 2 would have potential negative impacts on the Puhinui Station and the neighbouring properties to the north as it hid the station from the neighbourhood behind the bridge structure. • Option 4 would have poor CPTED visibility as the entrance is situated in the underpass.
Development potential	• All options performed well against this criterion which assessed the potential future transit-oriented development (**TOD**) / value capture opportunities.
RTN integration / futureproofing	The ability for the options to be futureproofed as an RTN for BRT or LRT was assessed: • Options 2, 3 and 5 performed the best as the position of the early deliverable concourse and station buildings in these options could be futureproofed to allow for BRT / LRT bridges in future. • Option 1 performed the worst as it cannot be futureproofed for LRT.
Customer experience	This criterion assessed the impact of station design on customer experience, including wayfinding, legibility, comfort and accessibility across different modes of arrival. Key differentiators included: • Option 1 performed the worst, with longer journey times for bus customers. Connectivity and access to the platform in the Puhinui Station is poor and this option does not provide an intuitive wayfinding route. • Option 2 would provide a good customer experience, with an elevated concourse that facilitates direct, intuitive wayfinding. Local station access would require vertical transport (lifts) to the concourse. This option would provide a legible connection as movement through the interchange would be linear. • Option 3 has more intuitive connection to the Puhinui Station for locals but has poorer legibility due to the switch-back movements required for all transfer passengers. • Option 4 would provide a good customer experience but with poorer visual connectivity than that offered by an elevated concourse (Options 2 and 3) given the subterranean environment. • Option 5 would provide similar customer experience to Option 2, given the position of the Puhinui Station closer to the platform centre.
Engineering Feasibility and Implementability Assessment	

Puhinui Station rapid transit bridge	
Cost	This criterion assessed a high level estimate of capital costs of physical works. • Option 4 had the highest capital cost and Option 5 the second highest due to property implications. • Option 2 had relatively lower long-term property costs due to directly avoided property impact and Option 3 had additional long-term property costs. • Option 1 had the lowest capital cost but high property costs.
Consentability	• Options 1, 4, and 5 performed the worst. Option 1 involved greater land requirements and property impacts; Option 4 involved additional consenting matters including greater potential construction effects and CPTED in the tunnel underpass; and Option 5 involved greater property impacts and altered site access. • Options 2 and 3 performed better for consentability as the land requirements were not as great as other options.
Operational and safety	**Traffic operational risks**: due to the similarity of the designs and the fully segregated rapid transit alignment in all options, there was no substantive differentiator for this criterion, with the exception that Option 1 would have higher operational risks due to the RTN alignment (centre-running BRT or LRT). **Bus operational risks:** *Refer to traffic operational criterion assessment above.* **Traffic including pedestrian and cycle safety risk**: while good pedestrian connectivity can be provided in all options, there are pedestrian and bus conflict points near the bus access points to Puhinui Station. Options 2, 3, 4, and 5 would allow for a clear separation between public transport and general traffic.
Operating cost / efficiency	This criterion assessed operational costs and efficiency including station maintenance and bus network operating costs. • Options 2, 3, and 5 performed the best as efficient and rapid transit connections across the railway line. • Option 4 performed similarly to Options 2, 3 and 5 as an efficient rapid transit connection, but had much higher station maintenance costs. • Option 1 also had higher operational cost in the long-term due to an additional 450m deviation around Bridge Street and internal circulation.
Property	• Option 2 performed best as it had the least potential property impact and acquisition risk. • Options 3 and 4 had greater potential property impact due to the land requirement and altered access along Puhinui Road. • Options 1 and 5 performed the worst as they involve the greatest property impacts. Option 5 involved land requirements either side of rail corridor (north of existing station and Bridge Street bridge.
Engineering feasibility	• Option 1 performed best due to its simple construction and station layout. This option would enable the construction for Bridge Street to be undertaken offline and would not impact on Hunua No.4 Watermain. • Options 2, 3 and 5 had more complex construction and station layouts (including deviated bridges / multiple bridges). The RTN bridge could be moved further south to accommodate required clearances to avoid the Hunua No.4 Watermain. • Option 4 performed the worst due to its complex construction and its proximity to the Hunua No.4 Watermain.

Following the MCA assessment, the initial preferred Puhinui Station connection was a rapid transit bridge – either a straight rapid transit bridge (Option 2) to the north of the concourse, or a deviated rapid transit bridge (Option 3) to the south of the concourse, as those options performed best.

Option 2 involved moderate potential urban design risks related to locating the bridge structure to the north of Puhinui Station, however had the lowest property impact compared to other options. Option 3 was more complex in constructability and had moderate potential operational and construction effects due to closer proximity to receivers, but also offered related urban design and CPTED benefits.

Both options involved the rapid transit service travelling via a segregated rapid transit line on Puhinui Road and serving new stops provided on the bridge.

Options 1, 4 and 5 were discounted for the below reasons:

Table 19: Puhinui Station connection discounted options

Option	Reasoning
Option 1 (widened Bridge Street bridge)	• **Potential adverse visual, urban design and construction effects on residential communities north of the bridge** • **Not suitable for potential LRT** • **High capital cost, including property cost** • **Would not result in public transport efficiency or a high-level of customer experience**
Option 4 (rapid transit underpass)	• Highest capital cost of all options • Environmental and engineering feasibility issues, in particular related to the complex rapid transit underpass construction and risks associated with the Hunua No.4 Watermain
Option 5 (rapid transit bridge and moved rail platforms)	• High construction cost as it requires moving the rail platforms north, widening of Bridge Street bridge, and the construction of a rapid transit bridge (much higher cost than the rapid transit bridge-only options) • Adverse property impacts due to moving of rail platforms

5.4 Engagement

As part of the options development process, KiwiRail provided the existing and future rail alignments. Future changes or additions to the rail alignment were space proofed in the development of the options as part of rail corridor futureproofing agreements with both KiwiRail and Auckland Transport.

Pre-Options Assessment Workshop meetings were held with Programme Partners and stakeholders on 29 June and 2 July 2018, and an Options Assessment Workshop was held with Programme Partners and stakeholders on 3 July 2018. The workshop assessed each of the options against the MCA criteria.

Engagement with Manawhenua partners was undertaken through hui held during the options assessment and refinement processes.

Following evaluation of the options through MCA workshops and engagement with Programme Partners, Options 2 and 3 were progressed to undergo a more refined assessment to determine the final preferred option.

5.5 Option refinement

Further refinement and assessment of the initial preferred Options 2 and 3 were undertaken to determine the final preferred Puhinui Station rapid transit bridge option.

As part of this, the two options were compared and workshopped with Auckland Transport stakeholders. A performance-based comparison was undertaken to assess the options.

The final preferred rapid transit bridge option was **Option 2 (straight rapid transit bridge)**, as it performed comparatively better than Option 3 against a range of considerations:

- **Phased development:** In Option 2, 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 Option 3.
- **Safety and community:** Option 2 performed better due to its 'open' entrance with views to and from neighbouring areas and pedestrian routes. The Customer Service Centre has 360˚ visibility over the entrance and public overbridge, which provides greater safety.
- **Clarity and ease of use:** Option 2 performed better 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.
- **Future-proofing:** Option 2 performed better as the alignment allows for maximum size and value of Auckland Transport-owned land, whereas Option 3 cuts Auckland Transport-owned land into smaller, less valuable parcels of land. Option 2 contains an area under the bridge which can be used for pickup / drop-off.

5.6 Preferred option

In summary, Option 2 (straight rapid transit bridge) was identified as the preferred Puhinui Station rapid transit connection option. This was decided following MCA assessments of five options, partner and stakeholder engagement, and an options refinement workshop to assess the initial preferred options against a range of qualitative considerations.

6 Confirmation of preferred mode

6.1 Overview

Following confirmation of the preferred Project route from Botany to the Airport, an iterative process of confirming the form, mode, vehicles and operational requirements of the Airport to Botany RTC was carried out. This included the identification of the preferred BRT system based on customer research, local and international BRT expertise, feedback from Project Partners, Manawhenua, internal and external stakeholders.

This assessment concluded that Airport to Botany should operate as a street-level dedicated BRT mode and corridor using special 'urban transit' vehicles. The proposed BRT mode was selected for the following reasons:

- Forecast demand;
- Mode capacity; and
- Service level (frequencies).

These interrelated factors are discussed in more detail below.

6.2 Demand, mode capacity and service levels

The appropriate mode options for Airport to Botany were assessed by comparing current estimates of model-predicted patronage with capacity and service levels (frequencies) afforded by a range of public transport mode options.

The projected 2048 demands of the Airport to Botany Rapid Transit system were estimated as 500 to 900 passengers per hour per direction in the interpeak and counterpeak, increasing to a peak loading of about 1,500 to 1,900 passengers per hour per direction at peak times.

Figure 26 below presents each mode assessed (bus, light rail, heavy rail) and their capacities at different service levels (frequencies), compared to the modelled peak demands of the Airport to Botany service in 2028, 2038 and 2048.

The green bars indicate the "desirable" headways (every 3-5 minutes), blue headways are at a level that would result in poor reliability with an at-grade system, while yellow headways present low service levels that would result in long passenger wait times. The vertical red lines indicate forecast demands by decade.

Where the red demand bar intersects with the green part of the bar for a given mode, that mode should provide sufficient capacity, operating at ideal service levels. The modes that would be over or under-utilised if they were selected for the Airport to Botany service have been greyed out.

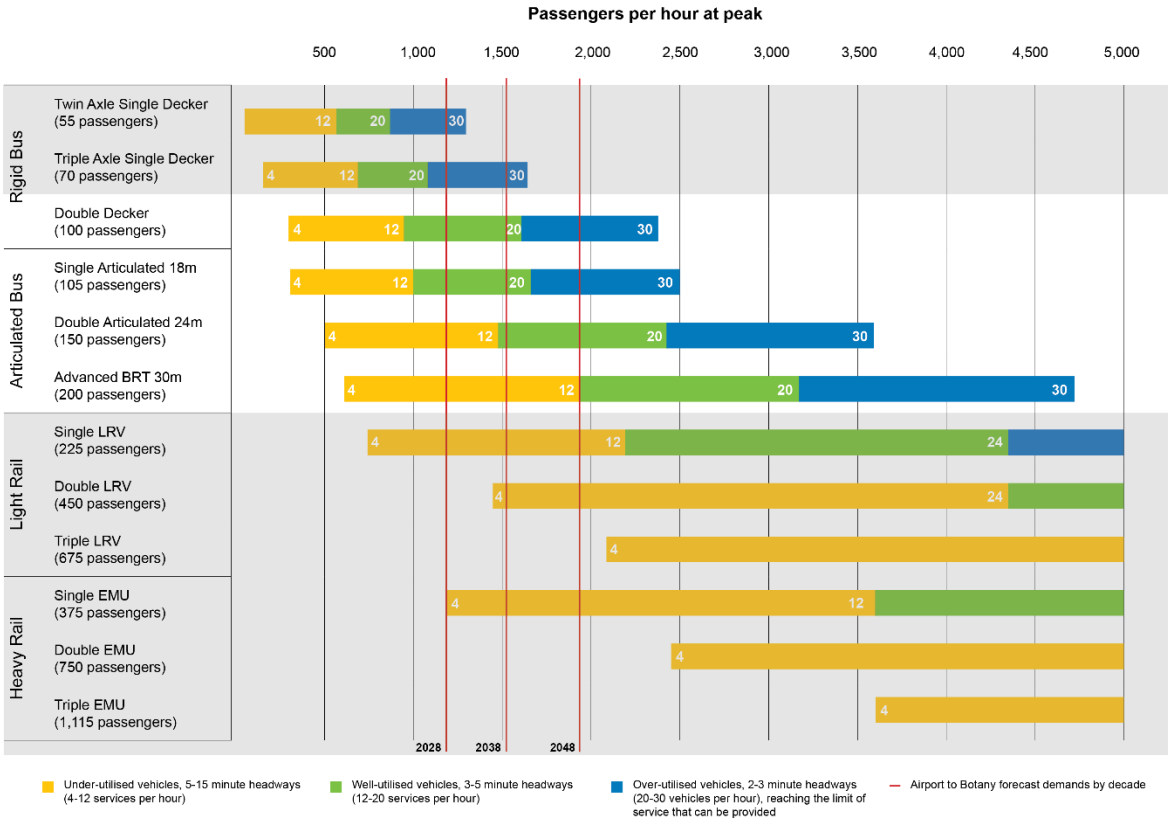

Figure 26: Airport to Botany Rapid Transit peak demand by decade vs. mode capacity and service levels of each mode assessed

Note: This forecast demand has been reviewed in the NoR stage, and the recommendations for BRT as the preferred mode remains.

6.3 Preferred mode recommendation – BRT

Based on forecast demands, high-capacity BRT was identified as the most appropriate mode for the Airport to Botany route. Double-articulated buses in dedicated lanes can achieve fast, frequent, reliable services with emissions-free, comfortable and safe vehicles, as is required to meet the investment objectives for the Project.

BRT can deliver the required capacity for 2048 peak at turn-up-and-go frequencies, with flexibility if higher or lower demands eventuate. On the other hand, light and heavy rail over-cater for demand, and would require additional investment.

7 Bus Rapid Transit corridor placement

Following on from the confirmation of the preferred alignment, the location of the BRT corridor within the Airport to Botany cross section was assessed to ensure the BRT responds and integrates with the surrounding environment. The corridor placement assessment occurred in two parts:

1. Urban section (from Botany Town Centre to SH20/20B Interchange)
2. SH20B section (between the Airport boundary (Orrs Road) and SH20/20B Interchange)

7.1 Botany Town Centre to SH20/20B Interchange

7.1.1 Overview

This section outlines the BRT corridor placement assessment for the urban section of the Project between Botany and the SH20/20B Interchange. Refer Section 7.2 for the assessment for the remainder of the alignment along SH20B.

While the preferred default placement of the BRT corridor in the cross section is central-running, three other potential options were identified. For the sections in the alignment where a deviation from the generally preferred central-running placement may be appropriate, an MCA was applied assess the alternative options. The process associated with the BRT corridor placement assessment is outlined in Figure 27 below:

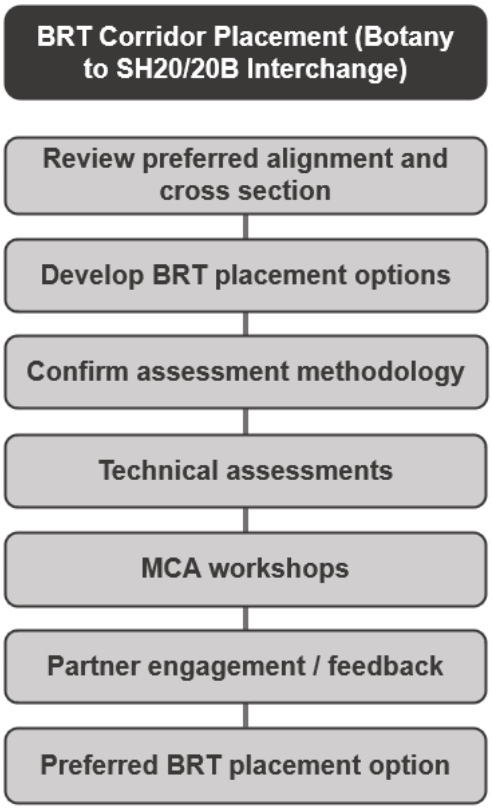

Figure 27: BRT corridor placement options assessment process

7.1.2 Options development

Four potential BRT corridor placement options where identified, outlined below:

Option A-side running BRT: This option involves the BRT predominantly operating along the western and northern side of the Airport to Botany route. Figure 28 provides a visual representation for context only.

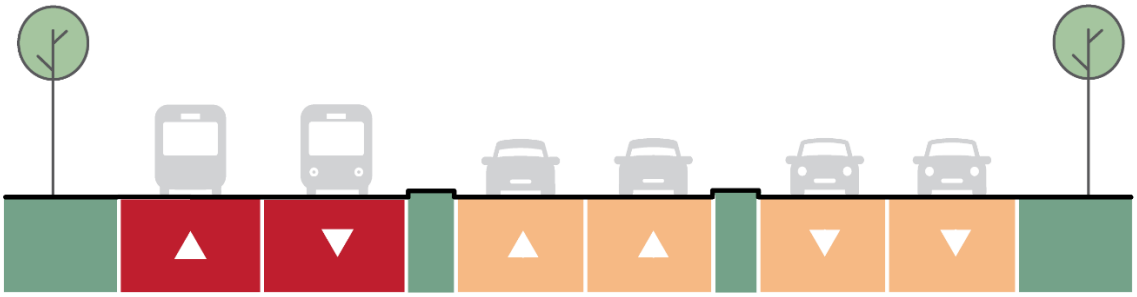

Figure 28: A-side running RTC

Option Central-running BRT: This option involves the BRT operating in the centre of the alignment, with general traffic on either side. For context only, Figure 29 illustrates this option.

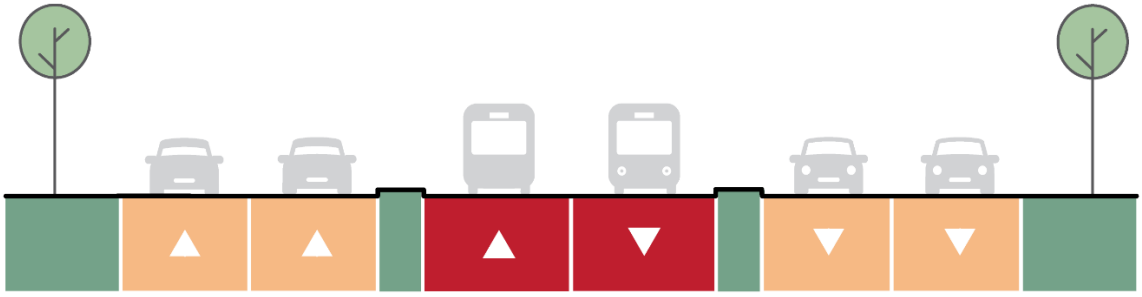

Figure 29: Central-running RTC

Option B-side running BRT: This option involves the BRT predominantly operating on the eastern or southern side of the preferred route. For context only, Figure 30 illustrates this option.

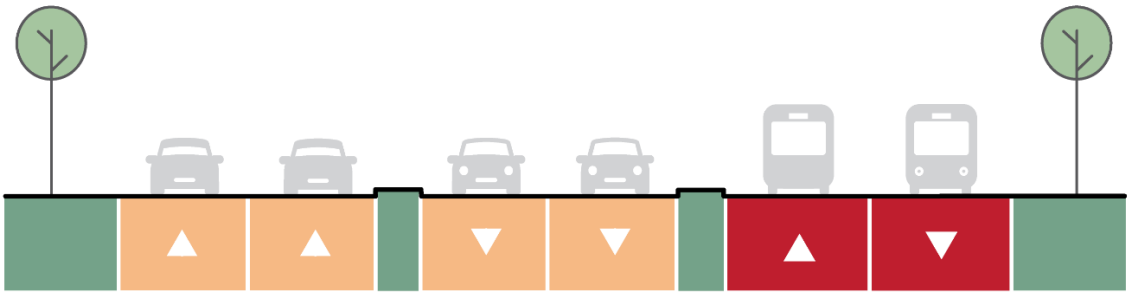

Figure 30: B-side running RTC

Option Split-side running BRT: This option involves a BRT split with east/northbound services running on one side of the corridor and the west/southbound services running the other side. For context only, Figure 31 illustrates this option.

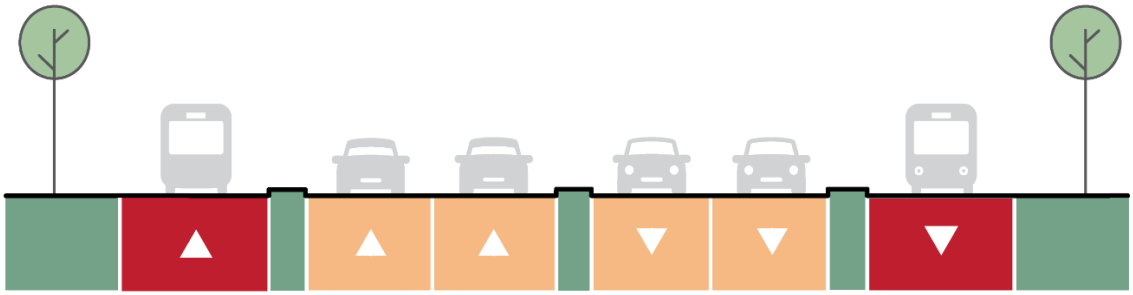

Figure 31: Split-side running RTC

Following an initial assessment of the above options, it was determined that the split-side running placement option offers no advantages over the other options for any section along the alignment for the below reasons:

- The split side-running option conflicts the most with land uses and property accesses on both sides of the road, even where these only located on one side of the corridor.
- At intersections, the split-side running option means that the BRT movements conflict with all left and right turns, such that it is less efficient at standard four-way intersections while also offering no potential advantages at other intersection configurations.

As such, the split-side running placement option was excluded from further assessment.

7.1.3 Key considerations

There are various factors to consider when determining the best placement option for a BRT, including:

- **Spacing and frequency of access points**: in environments with frequent accesses and side streets, a side-running or split-side running BRT will result in more conflict points.
- **Adjacent land uses**: land uses with frequent access points, such as residential areas or local centres, will generate more traffic and introduce more conflict points than a large school, which may have just one or two access points. Additionally, if adjacent land uses are likely to change in the short to medium term, the expected land uses should also be considered.
- **Layout of signalised intersections**: the volume and type of general traffic turning movements that are permitted should be considered.
- **Demand for particular intersection movements**: where there is a particularly dominant demand for one movement, such as motorway on- or off-ramps, A-side running BRT can avoid these key conflict points.
- **Crossing environments and distances for active modes**: the potential disadvantage of providing a side-running BRT is that one side of the catchment will have to cross the full street corridor to access the stations.

Table 20 summarises the four placement options and key interactions between the BRT and the surrounding environment, based on the above considerations.

Table 20: BRT corridor placement options summary

Placement option	Interaction with driveway and street accesses	Interaction with left turn movements	Interaction with right turn movements	Crossing environment and distances for active modes
A-side running	**Conflicts**	**Conflicts**	**Conflicts**	**Close and easy access from the north/west but further from south/east**
Central-running	Conflicts (only for right turn movements)	None	Conflicts	Medium for both sides
B-side running	Conflicts	Conflicts	Conflicts	Close and easy access from the south/east but further from north/west

7.1.4 General preference of central-running

For most sections of the Airport to Botany alignment, the preferred default BRT corridor placement between Botany and the SH20/20B Interchange is the central-running option, as this enables the following design features:

- **Easy street-entry from driveways and side streets**: access from driveways and side streets operates as it would in a typical street. All other options would require vehicle access points to cross the BRT (potentially with two opposing directions of travel) before merging into general traffic lanes.
- **Left-in, left-out for driveways and small side streets**: driveways and smaller side streets can operate as uncontrolled left-in left-out intersections, without the need for signals to control either the general traffic lanes or the RTC lanes.
- **Fewer conflicts with vehicle movements**: for most intersections, the central alignment enables the BRT to proceed with the main through-traffic movements and can be phased without conflicting with left turn movements or parallel pedestrian phases. The only conflict is with right turn movements, which need to be signalised to cross general traffic lanes in any case.

It is recognised that this preferred placement option may not be best suited along the full length of the corridor. Sections at typical intersections or sections that have different land use or property access conditions on one side of the road may better suit an alternative BRT corridor placement.

7.1.5 Assumptions

The assumptions that applied to the options assessment are as follows:

- Bus priority lanes as part of the STAAI will be removed and replaced with the BRT corridor.
- The final BRT will be a 24 hours per day 7 days a week bus-only running way.
- Protected walking and cycling facilities will be provided along the corridor.
- Existing roundabouts will be converted into signalised intersections.
- All existing signalised intersections will be retained and the BRT will be controlled by phases at all signalised intersections.

- Service roads are removed and replaced with left turn lanes at intersections, and where two right turn lanes exist, one will be removed.
- The parking lane along the western side of Davies Ave will be removed.
- At the southern end of Davies Avenue (between Putney Way and Manukau Station Road), general traffic lanes will be removed. The BRT and buses egressing from the Manukau bus station will be diverted to the Manukau Station Road / Davies Avenue intersection. The signals at Putney Way/ Davies Ave intersection will be removed.

7.1.6 Assessment summary

For the purpose of this assessment, the alignment was divided into nine sections (Figure 32). Based on the existing street environment, the sections which would be best suited to the default central-running BRT did not undergo further assessment. For the sections where a deviation from the preferred central-running placement may be appropriate, an MCA was applied.

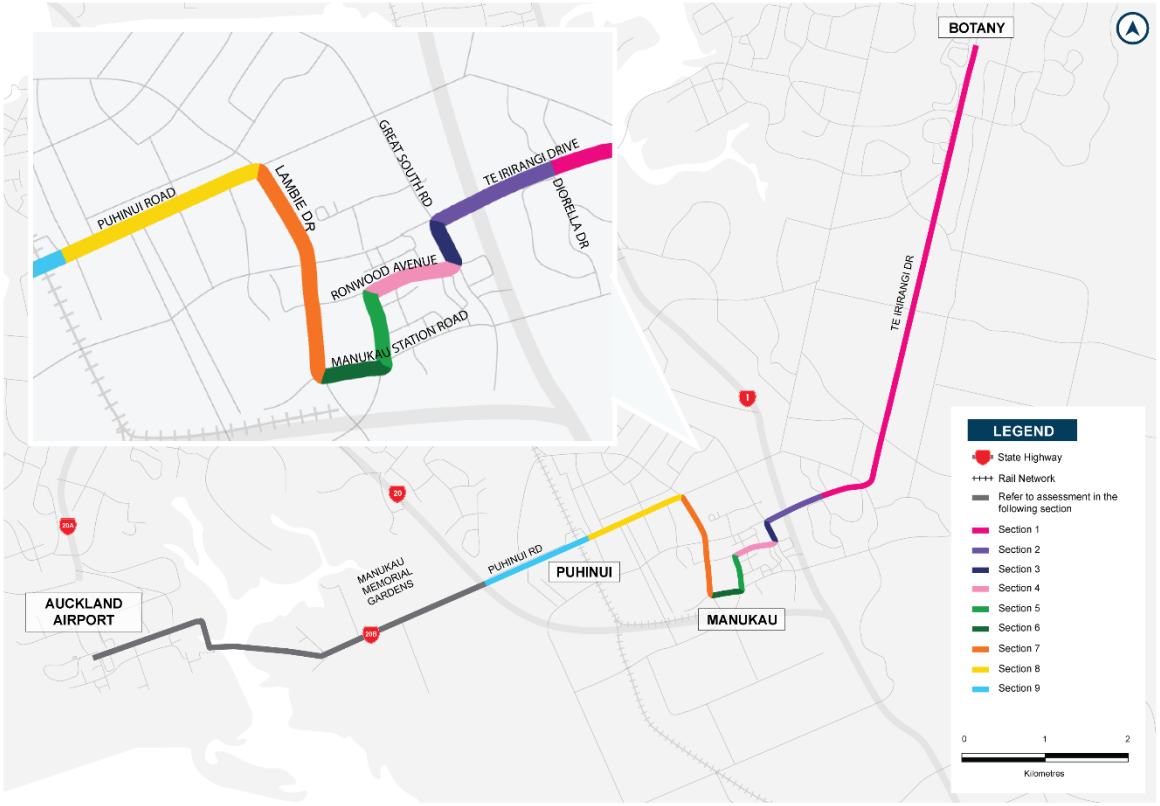

Figure 32: Nine assessment sections (between Botany and SH20/20B interchange)

The MCA methodology is detailed in Section 3, and the assessment outcomes are summarised below:

Section 1: Te Irirangi Drive – between Botany Town Centre and Diorella Drive

The default preferred option of **central-running** is preferred as the street environment comprises direct and non-direct access to neighbouring properties, and already provides limited right turn movements. No further optioneering was undertaken.

Section 2: Te Irirangi Drive – between Diorella Drive and Great South Road

This section of Te Irirangi Drive interacts with two motorway ramps on the north connecting SH1 with Te Irirangi Drive, requiring an MCA to determine the most appropriate BRT corridor placement. Section 2 consists of a raised median throughout, except at major intersections.

Figure 33: Section 2: Te Irirangi Drive – Placement Considerations

The BRT corridor placement assessment summary for Section 2 is set out in the table below.

Table 21: Section 2 assessment summary

Criteria	Assessment summary
Public transport cost / Time of travel / Travel time reliability	• A-side running (north) conflicted with high volumes of vehicles using the motorway ramps, affecting travel times. The likely requirement for signalising these movements would introduce additional variability to the Airport to Botany service. • Central-running BRT conflicted with the right-in and right-out movements at the motorway ramps, also slightly affecting travel times and reliability. • B-side running (south) would not conflict with motorway traffic movements. However, as Sections 1 and 3 had been determined as central-running preferred, there would be additional travel time of transitioning from centre to B-side and back to centre again.
Constructability / Construction disruption / Cost and risk / Safety in design	• The constructability, cost and risk were the same for all options. • The existing bridge structure over SH1 was not adequate to accommodate a BRT, therefore a new or widened structure is required for all options. • Construction of the BRT to the A-side (north) and Central would result in disruption to the north-facing motorway ramps, whereas construction of the RTC to the B-side (south) would result in access disruption to nine residential properties to the southwest and the left-in movement to Countdown. However, this was not a sufficient differentiator to affect the scoring.
Operation and maintenance	• The provision of a new or widened bridge structure for the BRT would require a similar level of maintenance requirements across all three options.

Central or B-side running performed best for this section. However, as Sections 1 and 3 on either side of this section were identified as central-running preferred, progressing with B-side running would require designing two deviations (central to south to central again). Therefore, **central-running** is preferred for this section.

Section 3: Great South Road – between Te Irirangi Drive and Ronwood Avenue

The default preferred option of **central-running** is preferred here as the street environment comprises direct access to neighbouring properties and already provides limited right turn movements. No further optioneering was undertaken.

Section 4: Ronwood Avenue – between Great South Road and Davies Avenue

The default preferred option of **central-running** is preferred here as the street environment comprises direct access to neighbouring properties and already provides limited right turn movements. No further optioneering was undertaken.

Section 5: Davies Avenue

This Davies Avenue section between Ronwood Avenue and Manukau Station Road required further assessment on BRT corridor placement due to its unique street environment. It fronts the linear Hayman Park to the west and a series of office blocks and surface carparks on the east. Right turn movements are allowed. This section consists of a flushed median with a single traffic lane in either direction. On the southwestern corner is the Manukau Train Station and on the south-eastern corner is the Manukau Bus Station.

Figure 34: Section 5: Davies Ave – Placement Considerations

The BRT corridor placement assessment summary for Section 5 is set out in the table below.

Table 22: Section 5 assessment summary

Criteria	Assessment summary
Public transport cost / Time of travel / Travel time reliability	• A-side running (west) performed well for travel times and travel time reliability as it would be located on the park edge without a need to stop other than at pedestrian crossings. However, as the BRT would be centre-running in Section 4 (Ronwood Avenue), the travel time and reliability were contingent on the design of the Davies/ Ronwood intersection and signal phasing to retain priority for the BRT transitioning from the centre of Ronwood Avenue to the west of Davies Avenue. • Central-running conflicted with half the traffic movements on or off Davies Avenue, including right-in right-out traffic on Putney Way. This would slightly affect travel times and reliability.

Criteria	Assessment summary
	• B-side running (east) would require several signalised intersections that conflict with all traffic movements on Davies Avenue, including for property access. This would affect travel times and introduce additional unreliability.
Constructability / Construction disruption / Cost and risk / Safety in design	• A-side (west) scored positively as the construction methodology was straightforward and could be undertaken in the existing parking lane to the west of Davies Avenue, allowing likely retention of existing carriageways. There would be no disruption to existing accesses. • Central would involve shifting existing traffic to complete the works. Right-turn accesses would be restricted from two side roads and one property. • B-side (east) would also require shifting of existing traffic to complete the works. All movements from two side roads and one property access would be impeded.
Operation and maintenance	• All options required additional infrastructure of similar area, therefore had similar maintenance requirements.

A-side performed best as it would lead to the least access disruption and travel time variability, therefore was selected as the preferred option. However, this assumes that the transition from central-running on Ronwood Avenue to A-side (west) on Davies Avenue can be designed to retain priority for the BRT. **A-side (west) running** is preferred for this Section.

Section 6: Manukau Station Road – between Davies Avenue and Lambie Drive

This section of Manukau Station Road between Davies Avenue and Lambie Drive required further assessment on BRT placement. The section comprises a wide raised median along its entire length. There is an uncontrolled, all-movement access to the MIT campus to the north, and a second left-in left-out access to a carpark on the northern edge. To the south, at the time of assessment, the land to the south was expected to be developed by MIT to the edge of the existing road reserve, and it was assumed that one or more additional vehicle accessways on Manukau Station Road would be included as part of the development. This MIT site has now been developed and includes two vehicle accessways into the site from Manukau Station Road.

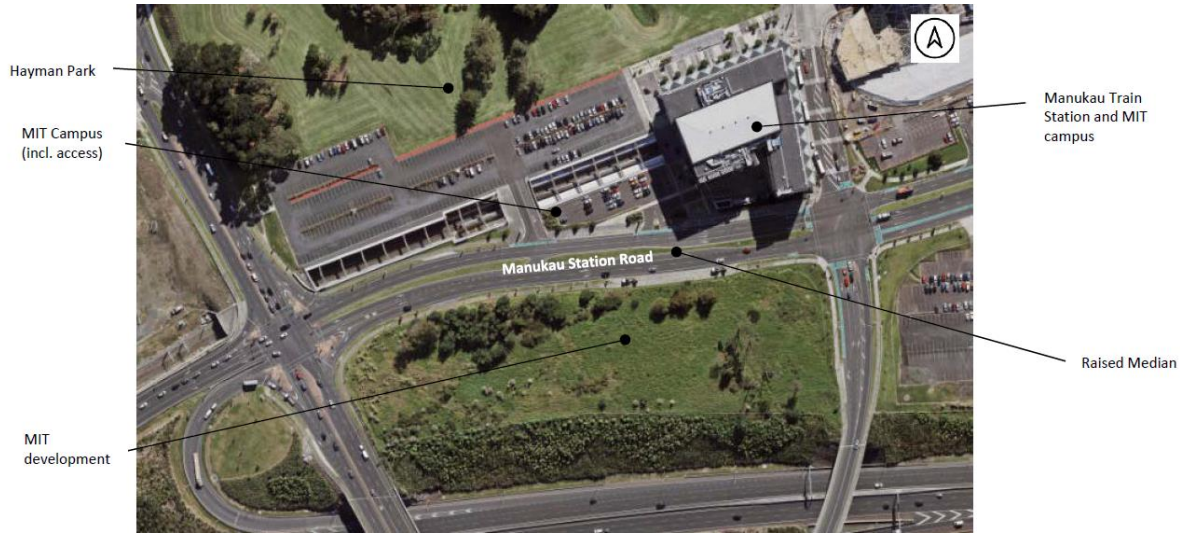

Figure 35: Section 6: Manukau Station Road – Placement Considerations

The BRT corridor placement assessment summary for Section 6 is set out in the table below.

Table 23: Section 6 assessment summary

Criteria	Assessment summary
Public transport cost / **Time of travel /** **Travel time reliability**	• A-side (north) running enabled the BRT to turn in and out of Davies Avenue without any conflict with traffic movements. However, there would still be conflict with pedestrian phases at the intersection and with the two property accesses to the MIT site on the north, increasing travel time and unreliability. • Central-running conflicted with approximately half of the traffic and pedestrian movements at the intersections at either end, and one of the intermediate property accesses. It was assumed that the existing all-movement access would be signalised, and the other existing or new accesses would be left-in left-out only. • B-side (south) running increased the probability of red signals by conflicting with a higher proportion of traffic and pedestrian movements at the intersections with Lambie Drive and Davies Avenue, performing slightly worse than the other two options for travel time and reliability. It would also conflict with the property accesses to the MIT development on the south.
Constructability / Construction disruption / Cost and risk / Safety in design	• All options would have a similar construction methodology for staging of the works and have a similar level of disruption. • A-side (north) would have some safety in design issues due to works adjacent to the rail trench.
Operation and maintenance	• All options required additional infrastructure of similar area, therefore had similar maintenance requirements.

Overall, Central and A-side (north) scored similarly, but **central-running** scored higher on safety in design and operation and maintenance and was selected as the preferred option. Central-running is also consistent with the majority of the corridor.

Section 7: Lambie Drive – between Manukau Station Road and Puhinui Road

The Lambie Drive section required further assessment due to its unique street environment fronting Hayman Park along the eastern edge for much of its length. The existing layout of this section comprises of a raised grass median with some breaks to allow right-turn movements. For most of the rest of the route, commercial businesses line the roadside, except towards the north where the area transitions to residential.

Figure 36: Section 7: Lambie Drive – Placement Considerations

The BRT corridor placement assessment summary for Section 7 is set out in the table below.

Table 24: Section 7 assessment summary

Criteria	Assessment summary
Public transport cost / Time of travel / Travel time reliability	• A-side (east) running provided a direct route along the Hayman Park edge without conflict with traffic movements or property access and would afford a less-conflicted connection to Manukau Station Road. However, there would be conflict on the northern section related to property accesses, and at the two main intersections at Ronwood Avenue and Cavendish Drive, both of which had primary demand flows to the western leg. • Central-running performed better than the other two options as it avoided direct conflicts with property accesses along both sides of this section which could operate as left-in left-out. It was noted that this section currently features eight points, in addition to the main intersections, where traffic can cross the median to turn right. This scoring assumed that these would be converted to left-in left-out only, or signalised to allow the BRT to retain priority. • B-side (west) running did not perform well as continuous retail and commercial land use and property accesses are located on the eastern side. As there were limited opportunities to close or realign these accesses, their crossing with the BRT corridor would need to be either signalised (increasing travel time variability) or operate uncontrolled (requiring slower speeds to minimise the chance of collision).
Constructability / Construction disruption / Cost and risk / Safety in design	• All options were deemed to have a low to moderate scale of works for the majority of these criteria. • A-Side (east) and B-Side (west) were considered to have high construction risk, red signals and unplanned stops from interaction with local property accesses and the RTC, and a potentially greater number of conflicting movements at the adjacent intersections. Central scored 2, as the conflicts with side streets and property accesses are minimised (subject to redesign of existing uncontrolled right turns), allowing for the full potential of the RTC priority lanes to be realised by reducing the potential for red signals and delays.
Operation and maintenance	• All options required additional infrastructure of similar area, therefore similar maintenance requirements.

Overall, central scored higher than both A-side and B-side options here, therefore **central-running** is the preferred placement for Lambie Drive.

Section 8: Puhinui Road – between Lambie Drive and Cambridge Terrace

The default preferred option of **central-running** is preferred here as the street environment provides direct access to residential properties on both sides, and a central-running BRT would provide easy street-entry from driveways with fewer conflicts with vehicle movements. No further optioneering was undertaken.

Section 9: Puhinui Road – between Kenderdine Road and SH20/20B Interchange

The default preferred option of **central-running** is preferred here as the street environment provides direct access to residential properties on both sides, and a central-running BRT would provide easy street-entry from driveways with fewer conflicts with vehicle movements. No further optioneering was undertaken.

7.1.7 Partner and internal engagement

As part of the BRT corridor placement assessment, an Auckland Transport RTC Placement Workshop was held in January 2020 which confirmed the placement of the BRT corridor placement between Botany Town Centre and the SH20/20B Interchange.

7.1.8 Preferred option(s)

The preferred BRT corridor placement options are detailed in Table 25 below. A central-running BRT corridor is preferred for most of the Project, with the only deviation being the Davies Avenue section where the alignment runs alongside Hayman Park.

Table 25: Preferred BRT corridor placement

Airport to Botany Section	Preferred BRT Corridor Placement
Section 1: Te Irirangi Drive – Botany Town Centre to Diorella Drive	**Central-running BRT**
Section 2: Te Irirangi Drive - Diorella Drive to Great South Road	Central-running BRT
Section 3: Great South Road	Central-running BRT
Section 4: Ronwood Avenue	Central-running BRT
Section 5: Davies Avenue	A-side Running BRT (Hayman Park side)
Section 6: Manukau Station Road – Davies Avenue to Lambie Drive	Central-running BRT
Section 7: Lambie Drive – Manukau Station Road to Puhinui Road	Central-running BRT
Section 8: Puhinui Road – Lambie Drive to Cambridge Terrace	Central-running BRT
Section 9: Puhinui Road – Kenderdine Road to SH20 Interchange	Central-running BRT

7.2 SH20/20B Interchange to Orrs Road

7.2.1 Overview

The placement of the BRT corridor and the associated corridor widening for the SH20B section (between the SH20/20B Interchange and Auckland Airport designation boundary at Orrs Road) of the Airport to Botany and 20Connect projects were assessed together. The process followed is outlined below in Figure 37.

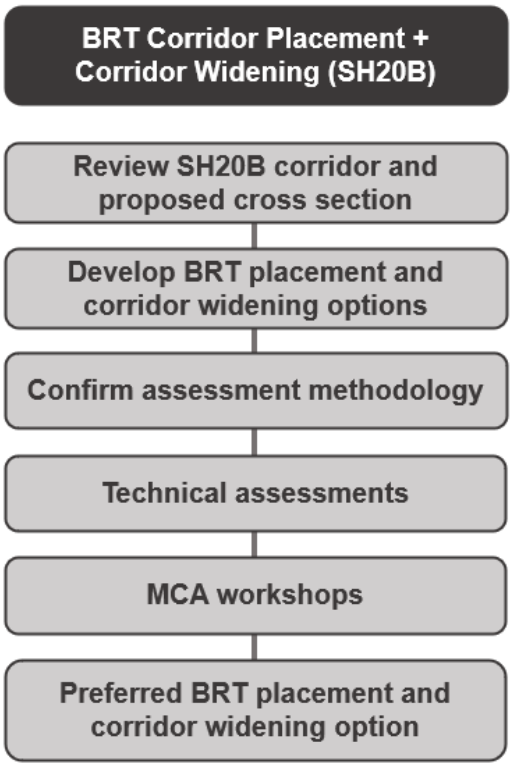

Figure 37: SH20B BRT corridor placement and side of road widening process

7.2.2 Option development

For the purpose of this assessment, the SH20B corridor has been split into the following four sections as follows and shown on Figure 38:

- **Section 1:** SH20/20B Interchange to Manukau Memorial Gardens Intersection (including the SH20/20B Interchange)
- **Section 2:** Manukau Memorial Gardens (**MMG**) to Waokauri Creek (including the MMG intersection)
- **Section 3:** Waokauri Creek
- **Section 4:** Waokauri Creek to Orrs Road (including the Campana Road intersection)

Figure 38: SH20B BRT placement / side of road widening assessment segments

The options (representing potential BRT corridor configurations/scenarios) assessed at each section of the corridor are as follows:

- **Option A:** BRT corridor in median (widening applied symmetrically)

Figure 39: Option A

- **Option B:** BRT corridor in median (all widening applied on northern side);

Figure 40: Option B

- **Option C:** BRT corridor in median (all widening applied on southern side);

Figure 41: Option C

- **Option D:** BRT corridor on northern side of SH20B (SH20B remains largely unchanged);

Figure 42: Option D

- **Option E:** BRT corridor on southern side of SH20B (SH20B remains largely unchanged)

Figure 43: Option E

Table 26: BRT corridor placement and side of road widening options assessed

	A – RTC in median (widening symmetrical)	B – RTC in median (widening on northern side)	C – RTC in median (widening on southern side)	D – RTC on northern side of SH20B	E – RTC on southern side of SH20B
Section 1	Option 1A	Option 1B	Option 1C	Option 1D	Option 1E
Section 2	Option 2A	Option 2B	Option 2C	Option 2D	Option 2E
Section 3	Option 3A (online widening of existing alignment)	Option 3B (offline replacement on northern side)	Option 3C (offline replacement on southern side)		
Section 4	Option 4A	Option 4B	Option 4C	Option 4D	Option 4E

7.2.3 Assumptions

The following assumptions relevant to the BRT have been made when assessing the options:

- The proposed STAAI Project, the Auckland Airport Park and Ride South and the realignment of Prices Road are treated as the 'existing environment' (i.e. operational in the road environment).
- The preferred location of the BRT corridor on Puhinui Road (east of the SH20/20B Interchange) is central-running.
- No stations are required on the BRT corridor between SH20/20B Interchange and Orrs Road.

- The existing Jetfuel lines can be retained if located under the service road on the northern edge. Relocation is required if they are located under the SH20B carriageway or BRT corridor.
- Any stormwater edge details that are impacted will be replaced on a like-for-like basis.

7.2.4 Assessment summary

The tables below summarises the assessment outcomes for each section in the SH20B area. The MCA methodology has been detailed in Section 3.

Section 1: SH20/20B Interchange to Manukau Memorial Gardens (including the SH20/20B Interchange)

Table 27: Section 1 assessment summary

Criteria	Assessment Summary
Highways	• No option scored adversely as they all provided a compliant cross section for most of the section. • Option 1C (BRT in median; all widening on southern side) was slightly preferred as it allowed the BRT to continue in the median without requiring a full rebuild of the existing SH20/20B Interchange, whilst enabling retention of the existing SUP.
Traffic/ intersection performance	• Options that included a central-running BRT (1A, 1B, and 1C) were preferred as they would allow more of the BRT vehicles to clear both sides of the intersection without stopping. • Options 1D and 1E were feasible but resulted in higher delays for the BRT, more complicated signal phasing and longer queues on the ramps. • *Note: As a part of the initial traffic / intersection performance analysis, several enhancement options to the SH20/20B Interchange were assessed. Based on the assessment, a grade separated south-bound ramp at the SH20/20B Interchange was adopted as a key design feature and applied to all the options tested. This is set out in* Table 31 *below.*
Structures	• As all options implemented a southbound ramp at the SH20/20B Interchange, there were no substantive differentiators from a structures perspective.
Geotechnical	• Ground conditions across Section 1 comprised of embankment fill of variable nature supporting the existing carriageway and infilling a historic gully adjacent to the Manukau Memorial Gardens. • As all proposed options would likely encroach into the gullies and this assessment had excluded earthworks considerations, geotechnical effects were considered neutral.
Stormwater	• The corridor between SH20/20B Interchange to MMG included two watersheds which both discharged to Stormwater Management Areas: Flow (**SMAF**) and therefore required attenuation and treatment prior to discharge. • The STAAI project's treatment device and attenuation swale would likely require upsizing, relocation and/or revision for all options. There were no substantive differentiators across the options.
Utilities	• Options 1A, 1B and 1D all impacted the SUP on the northern side under which utilities were located. Options 1A, 1C and 1E required diverting of utilities on the southern side. • Option 1A therefore performed the worst.

Criteria	Assessment Summary
Environmental/ planning	• **Social impact**: Options 1A, 1B and 1D all shared the adverse effects of encroaching north into the MMG site requiring the relocation of graves. • **Contaminated land**: as cemeteries would be an activity listed on the Hazardous Activities and Industries List (**HAIL**), Options 1A, 1B and 1D all performed adversely as they would be likely to encounter contamination risk. • **Ecology**: There were no substantive differentiators for terrestrial ecological effects as construction effects had been excluded from this assessment. • **Landscape visual**: the removal/ partial removal of vegetation for Options 1A, 1B and 1D would greatly diminish the amenity values and visual screening of the state highway within the cemetery. • **Consentability**: Options 1A, 1B and 1D which encroached into MMG would present great consentabilty risk, particularly when a viable option that avoids these effects was available to the south.
Property	• Options 1A, 1B and 1D which encroached into MMG performed adversely due to difficulties in acquiring land from cemeteries. Although more favourable, Options 1C and 1E presented medium risk due to the requirement of land from major land holdings. • While Options 1C and 1E had higher upfront costs due to the future development potential of the sites requiring acquisition, the long-term costs for Options 1A, 1B and 1D may be much greater due to increased fees and possibility of exchange land.
Construction disruption	• Option 1A scored high risk as the online widening works on both sides of the carriageway would require greater temporary traffic management (**TTM**). • Options 1C, 1D and 1E scored medium risk as they all limited widening works to one side of the carriageway and had some aspects of offline construction. • Option 1B scored low risk as the southbound ramp situated north of the existing carriageway would have the least construction disruption.
Cost	• The cost of the civil works for each option will be reasonably similar.

Based on the above assessment, Option 1C was the preferred option, which is **central-running BRT, with all widening applied on the southern side**. Options 1D and 1E showed reduced traffic performance at the SH20/20B Interchange, and options 1A, 1B and 1D would generate major adverse effects on Manukau Memorial Gardens.

Section 2: Manukau Memorial Gardens to Waokauri Creek (including the MMG intersection)

Table 28: Section 2 assessment summary

Criteria	Assessment Summary
Highways	• **All options provided a fully compliant cross section within Section 2 and had no substantive differentiators.**
Traffic/ intersection performance	• Generally, intersection performance at MMG was acceptable for all options with overall level of service (LOS) of B/C, due to low flows accessing MMG in the peak hour. This was based on the assumption of the BRT not switching position within the intersection.
Structures	• As no structures were proposed to be modified or installed under the proposed options, there were no substantive differentiators from a structures perspective.

Highways	• **All options provided a fully compliant cross section within Section 2 and had no substantive differentiators.**
Geotechnical	• Ground conditions in Section 2 comprised embankment fill supporting the existing carriageway. There were no preferred option from a geotechnical perspective as all options would likely encounter similar geotechnical risks.
Stormwater	• As noted in the assumptions, stormwater assets from the STAAI project which are impacted would be replaced on a like-for-like basis. • Options 2A, 2B and 2D would require the removal of the swale constructed as part of the STAAI project. No reasonable substitution existed without purchasing additional land, so these options scored adversely stormwater quantity. • Options 2C and 2E performed better as the swale may be retained. It was estimated that the swale would have sufficient treatment and attenuation capacity to accommodate the increased catchment area.
Utilities	• Options 2A, 2C and 2E would require re-diversion of the utilities placed under the SUP, scoring adversely. • Options 2B and 2D would allow the existing SUP and utilities to be retained.
Environmental/ planning	• Section 2 presented limited environmental effects due to its size, nature and ownership. • **Social impact**: all options performed well except the ones that proposed central-running BRT (Options 2A, 2B and 2C) which were less favourable for accessibility. • **Contaminated land**: there were no substantive differentiators. • **Ecology**: there were not considered to be any substantive differentiators. • **Landscape visual**: Option 2A was considered to minimise visual effects on both MMG to the north and the private residences to the south, while other options would result in greater effects on one of these properties. • **Consentability**: overall there were no substantive differentiators within Section 2.
Property	• Option 2D would require further land acquisition from MMG and scored the worst out of all options for property effects due to difficulty of acquisition. • For property cost, although Options 2C and 2E impacted four private properties and had higher costs than Options 2A and 2B, if temporary occupation was required (for construction purposes) then the risk and cost would elevate and Options 2C and 2E would likely be preferred.
Construction disruption	• Option 2A scored adversely as it required online widening works on both sides of the carriageway as well as a full rebuild of the MMG intersection. This would require additional temporary traffic management (TTM) and, due to the sensitivity of the land use on the northern side, result in major disruption. • The remaining options all had less disruption effects and therefore, likely fewer TTM phases compared to Option 2A.
Cost	• The cost of the civil works for each option would be reasonably similar.

Overall, based on the above assessment, Option 2E was the preferred option which is **B-side (south) running BRT on the southern side of SH20B, with all widening applied on the southern side**. Options 2A, 2B and 2D present stormwater issues and require subsequent land acquisition to resolve these issues. There is also high construction disruption for Option 2A and increased property risk with Option 2D.

Section 3: Waokauri Creek

Table 29: Section 3 assessment summary

Criteria	Assessment Summary
Highways	• **The intention of Section 3 was to assess the footprints of the bridge structures required to accommodate three varying alignments.** • **All Section 3 options provided a compliant cross section with relevant design standards and had no substantive differentiators.**
Traffic/ intersection performance	• For Section 3 there were no intersections affected and consequently no substantive differentiators from a traffic performance perspective.
Structures	• Option 3A (online widening of existing alignment) performed adversely as it would require a staged construction sequence to demolish existing structural elements while maintaining road access during construction. • Options 3B and 3C (offline replacement on northern and southern sides respectively) were preferred form a structures perspective due to the ease of offline replacement.
Geotechnical	• Ground conditions across Section 3 comprised embankment fill supporting the existing carriageway, infilling historic gullies and forming the existing bridge abutments. • There was no preferred option from a geotechnical perspective as all options would likely encounter similar geotechnical risks. • For Section 3 specifically liquefaction risk and pavement sub soil risk would need to be assessed in later stages to better understand earthwork requirements.
Stormwater	• As noted in the assumptions, stormwater assets from the STAAI project which are impacted would be replaced on a like-for-like basis. • A like-for-like replacement was possible for all Section 3 options, and therefore no substantive differentiators existed for stormwater reticulation, quality and quantity.
Utilities	• Option 3A would require diversion of all the utilities on both sides of the bridge, so scored worst. • Option 3C involved the demolition of the SUP and underlying utilities, which would be diverted to the proposed new SUP. • Option 3B was the most preferred option as it would have the least effect on the existing utility services located under the SUP on the southside.
Environmental/ planning	• All three Section 3 options required the crossing of the main tributary of Waokauri Creek. • **Ecology**: Option 3B performed worst for marine ecology due to further encroachment into the CMA (to the north), and had greatest loss of coastal riparian vegetation. The other options encroached these habitats to a lesser extent. • **Contaminated land**: Option 3C performed worst as it may affect the south-eastern corner of the Prices Road/SH20B intersection which was potentially contaminated. • **Landscape visual**: Option 3B performed worst due to the further encroachment into the CMA (to the north). • **Social impact**: there were no substantive differentiators across the options. • **Consentability**: the CMA in Options 3A and 3B was identified as SEA-M2 as well as being within the Manawhenua Management Precinct. For this reason, coupled with the

Highways	• **The intention of Section 3 was to assess the footprints of the bridge structures required to accommodate three varying alignments.** • **All Section 3 options provided a compliant cross section with relevant design standards and had no substantive differentiators.**
	non-complying activity status of construction of structures within the CMA, Option 3B performed the worst.
Property	• All options required tidal land from the Manukau Harbour and various private properties. Option 3C was the preferred option from a property effects perspective as it did not contain a requirement for land subject to the Reserves Act and had comparatively fewer private property requirements. • Option 3A was half the estimated cost of the others and preferred for property cost.
Construction disruption	• Option 3A performed worst as it would be very disruptive for all modes of transport within Section 3, with a high number of TTM shifts required. • Options 3B and 3C performed better as general traffic and 'T3' lanes could be kept operational for the most part on the existing Waokauri Creek bridge and it did not impact the early works SUP on the southern side.
Cost	• The cost of the civil works for each option would be reasonably similar and most of the cost difference was likely to come from constructability issues such as TTM. Due to the complexity of constructing Option 3A, the other two options would be much cheaper.

In summary, Option 3C is preferred which provides a **new bridge at Waokauri Creek on the south side of the existing alignment**. This is primarily based on the construction disruption and cost that would result from Option 3A, and Option 3B resulting in more adverse environmental and planning effects. The location of the BRT in Section 3 will be determined by the adjacent sections.

Section 4: Waokauri Creek to Orrs Road (including the Campana Road intersection)

Table 30: Section 4 assessment summary

Criteria	Assessment Summary
Highways	• **All options Section 4 options provided a fully compliant cross section with relevant design standards and had no substantive differentiators.**
Traffic/ intersection performance	• Modelling showed that the intersection had poor service levels (LOS E/F) for all options. • Performance for Option 4D (BRT on northern side) performed best due to less conflicts between vehicles accessing the development to the north and the BRT.
Structures	• As no structures were proposed to be modified or installed under the proposed options, there was no substantive differentiator from a structures perspective.
Geotechnical	• Ground conditions across Section 4 comprised embankment fill of variable nature supporting the existing carriageway and infilling historic gullies. • Options widening to the north (4A, 4B and 4D) performed worse as they interacted with an earth structure that supported a jet fuel line, so may require an engineered solution. • Options 4C and 4E performed better as they widen to the south and avoid filling adjacent to the jet fuel line.

Highways	• **All options Section 4 options provided a fully compliant cross section with relevant design standards and had no substantive differentiators.**
Stormwater	• No substantive differentiators are identified between the options.
Utilities	• Options 4A, 4B and 4D scored adversely as they would require the realignment of the jet fuel lines located under trafficable lanes. As these lines are considered strategic New Zealand assets, relocation of the lines is considered a substantive differentiator. • Options 4A, 4C and 4E would affect the SUP on the southern side and require the relocation of underlying utilities.
Environmental/ planning	• **Social impact**: the options with the BRT located on one side (Options 4D and 4E) as opposed to centre-running scored more preferably when considering accessibility and health and safety. • **Contaminated land**: all options required construction over the existing fuel pipeline which was likely to be a source of soil contamination. • **Ecology**: there were not considered to be any substantive differentiators. • **Landscape visual**: some visual effects would be created on residential properties and some loss of vegetation would occur. However there were no substantive differentiators. • **Consentability**: there were no substantive differentiators between the options.
Property	• Options 4A, 4C and 4E required land acquisition from two Auckland Airport titles which contained encumbrances so performed adversely. Options 4B and 4D would avoid the Auckland Airport land and instead require private property acquisition. • For property cost, all options were similar.
Construction disruption	• Option 4A required online widening works on both sides of the carriageway as well as full rebuild of the Campana Road intersection. This would require additional TTM and greater disruption to traffic. • Options 4B and 4C were moderately disruptive, as the addition of a central-running BRT would result in relatively extensive pavement shape correction and required partial rebuild of the Campana Road intersection. • Options 4D and 4E performed best as they provided the opportunity to retain the existing crown position with no pavement shape correction required.
Cost	• The cost of the civil works for each option would be reasonably similar, however Options 4D and 4E performed best as they had the lowest estimated costs.

Based on the assessment, Options 4D and 4E which place the RTC on the northern and southern sides respectively are reasonable evenly matched. Whilst Option 4E results in reduction in performance of the Campana Road intersection, Option 4D requires realignment of the jet fuel lines which is also considered a major issue. Options 4A, 4B and 4C were discounted due to poor intersection performance, substantive impacts on utilities, and high construction disruption effects.

On further assessment, selection of Option 4D would require the selection of Option 2D (BRT on northern side), which would result in major property and stormwater impacts. In addition, adopting Options 2D/4D (BRT transition to north side) would result in a great impact on the performance of the MMG intersection compared to Options 2E/4E (BRT transition to south side). Therefore, Option 4E is preferred, which is **B-side (south) running BRT to the south of SH20B, with all widening on the southern side.**

7.2.5 SH20/20B enhancement options assessment

As a part of the initial traffic / intersection performance analysis for Section 1, a number of enhancement options to the SH20/20B Interchange were identified and assessed. These would provide benefits regardless of the BRT corridor placement within the corridor and are therefore not considered substantive differentiators for that assessment. The analysis is detailed in Table 31 below:

Table 31: Section 1 traffic/intersection performance – Interchange options assessment

<table>
<tr><th>Interchange Option</th><th>Assessment</th></tr>
<tr><td>Grade separation of the BRT over the Interchange</td><td>A grade separated BRT crossing was investigated but was discounted due to several adverse property impacts. There would be increased property acquisitions on Puhinui Road. A long length of structure would be required to provide a crossing – with a 5% longitudinal gradient, the BRT corridor would have to start climbing from as far back as Wyllie Road, further adding to the property impacts.

It was therefore concluded that grade separating the BRT, whilst providing full priority for buses, was not the most appropriate option due to the excessive land take and cost.</td></tr>
<tr><td>At grade modifications to the Interchange</td><td>In order to accommodate the BRT through the SH20/20B Interchange at-grade whilst remaining central-running, a general traffic lane would need to be removed. Options of removing an east or westbound lane were tested in conjunction with reallocation of movements between the remaining lanes.

Modelling showed that the Level of Service at the SH20/20B Interchange was very poor (LOS F) for all the tested options. For the 2048 design year delays at the intersection were forecast to be excessive at around 10 – 15 minutes for eastbound traffic on SH20B.

These delays would form very large queues in the peak hours and would severely limit access to and from the airport from the south, as well as causing dangerously long queues from SH20B onto SH20 in both directions.</td></tr>
<tr><td>Grade separation of General Traffic</td><td>Based on the results above, it was considered that grade separation would greatly improve intersection performance and several options were considered as summarised below.

<table>
<tr><th>Grade Separated Traffic Movement</th><th>Pros</th><th>Cons</th><th>Comment</th></tr>
<tr><td>SH20B / Puhinui Road east-west through movement</td><td>Removes a major movement from the intersection</td><td>Gives priority to general traffic rather than to PT; contravenes the project objectives</td><td>Not preferred</td></tr>
<tr><td>SH20 southbound to SH20B westbound</td><td>Removes a major turning movement from the intersection</td><td>North facing ramps discounted at longlist stage</td><td>Not preferred</td></tr>
<tr><td>SH20 northbound to Puhinui Road eastbound</td><td>Removes a major turning movement from the intersection</td><td>Low flows through the intersection don’t justify expense of this ramp</td><td>Not preferred</td></tr>
<tr><td>SH20B eastbound to SH20 northbound</td><td>Major flow through the intersection</td><td>North facing ramps discounted at longlist stage</td><td>Not preferred</td></tr>
<tr><td>SH20B eastbound to SH20 southbound</td><td>Removes a major turning movement from the intersection</td><td>Requires amendment of the braided ramp arrangement</td><td>Preferred Option</td></tr>
</table>
</td></tr>
</table>

Grade separation of the BRT over the Interchange	**A grade separated BRT crossing was investigated but was discounted due to several adverse property impacts. There would be increased property acquisitions on Puhinui Road. A long length of structure would be required to provide a crossing – with a 5% longitudinal gradient, the BRT corridor would have to start climbing from as far back as Wyllie Road, further adding to the property impacts.** **It was therefore concluded that grade separating the BRT, whilst providing full priority for buses, was not the most appropriate option due to the excessive land take and cost.**

	In line with Project Objectives of providing airport access		

The greatest traffic conflicts occur between the southbound movement from SH20B to SH20 and the through flows along SH20B. An option was tested to grade separate this movement.

The proposed ramp will remove major conflicting traffic volumes at the Interchange, allowing better accommodation of the BRT, improving operational efficiency and improving intersection performance (level of service) from LOS F to LOS D.

Transport modelling of the proposed southbound ramp shows much improved intersection performance, travel times and reliability for bus, freight and car journeys accessing the airport precinct to from the south and east.

The outcome of this assessment concluded that a **grade separated SH20B eastbound to SH20 southbound ramp** was adopted as a key design feature at the Interchange and applied to all of the BRT options tested.

7.2.5.1 Partner engagement

A hui was undertaken with Te Ākitai Waiohua on 22 May 2020 prior to assessment to identify the options and assessment approach.

7.2.5.2 Manawhenua engagement

As part of the regular hui with the Auckland Transport Southern Table, hui where undertaken with Manawhenua presenting the options, assessment outcomes and proposed recommendation. They were the following:

- Auckland Transport Southern Table Hui 25 June 2020 – Technical specialist assessment outcome run through (online due to Covid restrictions).
- Auckland Transport Southern Table Hui 30 July 2020 – Additional (in person) technical specialist assessment outcome run through (considered appropriate to ensure assessment outcomes were communicated effectively to Kaitiaki).

Manawhenua were generally supportive of the assessment approach and the preferred side of road widening. No direct feedback on this assessment was provided.

7.2.6 Preferred option(s)

Based on the above assessment, the preferred BRT corridor placement and associated corridor widening for the SH20B section is shown in Table 32 and Figure 44. As noted above in Section 8.5.2.5, the preferred option includes a southbound ramp between SH20B and SH20.

Table 32: Preferred BRT corridor placement and side of road widening for SH20B

Section	Preferred BRT Corridor Placement	Preferred Side of Road Widening
Section 1: SH20/20B Interchange to Manukau Memorial Gardens Intersection	**Central-running BRT**	**All widening applied on the southern side**
Section 2: Manukau Memorial Gardens to Waokauri Creek	South-side running BRT on the southern side of SH20B	All widening applied on the southern side
Section 3: Waokauri Creek	South-side running BRT on the southern side of SH20B	New bridge at Waokauri Creek on the southern side of the existing alignment
Section 4: Waokauri Creek to Orrs Road	South-side running BRT on the southern side of SH20B	All widening applied on the southern side

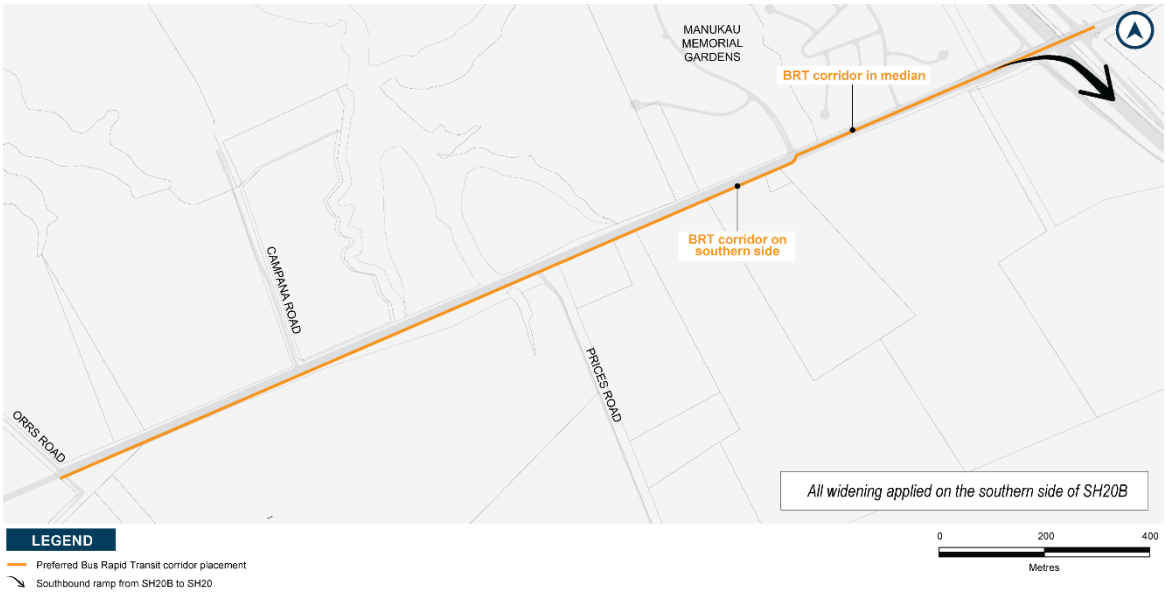

Figure 44: Preferred BRT placement and side of road widening option (SH20B)

8 Station locations

8.1 Overview

In conjunction with BRT corridor placement and side of road widening assessment, the Project Team investigated the preferred locations of Airport to Botany stations along the identified alignment.

Determined to have primarily 'patronage service' focus[13] (direct, frequent, and attract higher numbers of users), the strategic function of Airport to Botany as an RTN service is to:

- Provide direct connections for high demand areas and
- focus on speed, directness, and reliability over local access and coverage.

The location of stations is a critical component for the accessibility and usefulness of a rapid transit line, particularly for 'closed' corridors operated by a single service pattern such as Airport to Botany.

As such, the assessment and selection of station locations were based on a three-level priority: major destinations, transit Interchanges, and local coverage, in order of hierarchy. This is described in more detail in the following sections.

Using this criteria, the long list station location options were assessed. A list of 'definite' stations was selected which identified which stations met either of the first two priorities. Following this, additional 'local coverage' stations were considered to form the final preferred list of station locations. This process is illustrated in Figure 45 below.

[13] Defined in the Auckland Transport's Regional Public Transport Plan (RPTP)

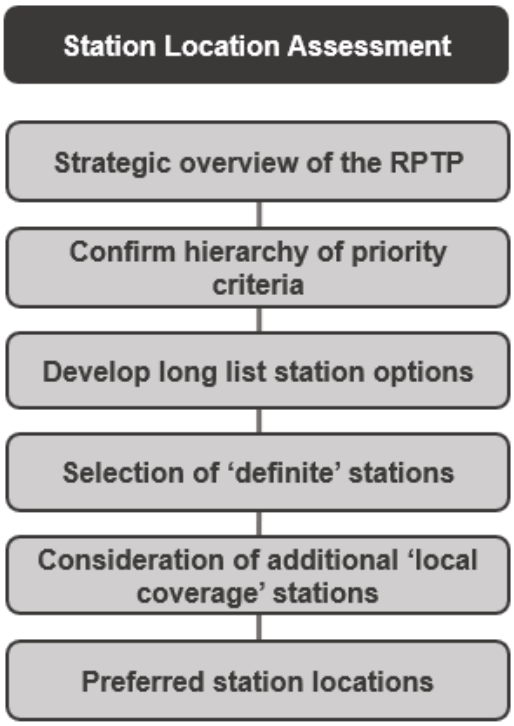

Figure 45: Station location options assessment process

8.2 Assessment framework

Station locations were assessed and selected based on a three-level priority which relate back to Investment Objectives (IO):

1. **Major demand destinations** – the first priority was to locate stops at high demand destinations, including employment areas, tertiary education centres, major shopping areas, and centres of unique demand such as Auckland Airport. The metropolitan centres of Manukau and Botany incorporate several of these major demand drivers in a single location and are also important Interchange points, making them very high priority destinations.

   This priority criterion relates to IO1 and IO2, improving equitable access and providing direct connections to major destinations.

2. **Interchange points and transfer nodes** – the second priority for station location was to enable the Airport to Botany rapid transit line to function as part of a connected public transport network, by locating stations at places where it:

- Connected with other rapid transit lines, including the rail network at Puhinui Station, the rail, bus and coach network at Manukau Station, the future Eastern Busway at Botany, and the future City Centre to Māngere Light Rail.
- Was intersected by frequent and local bus routes, providing a local grid of connecitng bus services. This typically meant locating stops at main roads and cross streets where buses run.
- Connected to major pedestrian pathways, cycle links or local roads.

This criterion improves the catchment of public transport journeys using the FTN, by increasing its connectivity to first and last kilometre trips. It relates to IO1, IO2, and IO3; improving equitable

access, providing direct connections to major destinations, and enabling the efficient movement of people and goods.

3. **Additional residential land local coverage** – the third priority for station locations was for additional intermediate stops to provide coverage to other areas, where appropriate. These locations were typically local residential areas, which could be served with 'infill' stops between major destinations and modes.

   This criterion relates to IO1, IO2, IO3, and IO5; improving equitable access, providing direct connections to major destinations, enabling the efficient movement of people and goods, and safe and secure transport facilities.

8.3 Assessment summary

The long list of potential station locations for Airport to Botany was developed based on locations that met as least one of the criteria outlined above. This produced 21 potential station locations (Figure 46).

Figure 46: Long list of station options

Based on the 21 long list options, station locations which met either of the first two priorities (major demand generators or important transit Interchanges) were automatically progressed into the set of preferred station locations, as they supported the strategic purpose of rapid transit. The 2013 Census employment and population numbers within 1km walking distance from each station was also considered.

A more detailed analysis was undertaken for lower priority stations which served only local coverage without an Interchange or major demand centre function, to determine which ones should be included in the preferred station list. Under the third priority (local coverage), a trade-off between speed and coverage arises. It was recognised that the more stations were included in the RTC, the slower travel times will be and the greater the operating and capital costs would be. Due to the delays and travel time variability introduced by each additional stop, the coverage-only stops which did not meet the following conditions were discarded for the Airport to Botany rapid transit corridor:

If they serviced (current or future) dense residential areas, especially apartments and clusters of terraced housing directly accessible to the rapid transit line.

If they covered residential areas that were otherwise not serviced by the public transport network.

If they provided coverage of lesser demand destinations, such as smaller town and local centres, shopping strips, schools and community facilities that were otherwise not served by the public transport network.

Following this test, only the following station options remained for further assessment:

- **New Industrial Estate (Prices Road) and Memorial Gardens**: these sites represented a special case, due to the unique land use of the Manukau Memorial Gardens as well as plans to develop an industrial-commercial precinct to the south of SH20B, and Auckland Airport's plans to construct a Park-and-Ride lot adjacent to Prices Road. However, it was concluded that based on existing and planned low-density land uses in the area, the catchment would be better served by a local bus service. It was noted that a station on SH20B near Prices Road intersection or Memorial Gardens may be justified in the future if land use plans in the area change.
- **Puhinui road at Lambie Drive**: due to the coverage gap that would exist if this station was excluded from the Airport to Botany route (nearly 3km between Puhinui and Manukau Stations), and the geographic value of having a station positioned on a corner of the route, this station location was preferred as part of the preferred list.
- **Accent Drive**: a coverage gap would exist if this station was excluded from the Airport to Botany route (the distance between the Ormiston and Smales stations would be 2.5km). This station will also serve the additional objective of providing an Interchange. Following consultation with Auckland Transport, it was agreed that this station should be included in the preferred list.

The table below summarises the long list options and provides a brief summary of the reason for inclusion or exclusion of each option from the preferred stations list.

Table 33: Long list of station locations

	Section	Location	Priority 1	Priority 2	Priority 3	Reason for inclusion/exclusion
1	Airport	Passenger terminal	Yes	Yes	No	**Progressed to preferred list**: Major destination and transit Interchange; critical priority
2	Airport	The Quad Business Park (Airport Precinct)	Yes	TBC	No	**Progressed to preferred list**: Major destination; major priority

	Section	Location	Priority 1	Priority 2	Priority 3	Reason for inclusion/exclusion
3	SH20B	New Industrial Estate – Prices Road	No	No	Yes	Rapid transit station not justified due to low-density land uses – discarded
4	SH20B	Memorial Gardens	No	No	Yes	Rapid transit station not justified due to low-density land uses – discarded
5	Puhinui	Puhinui Rail Station	No	Yes	Yes	**Progressed to preferred list**: Major transit Interchange with the rail network; critical priority
6	Puhinui	Suburban Puhinui at Grayson Ave	No	No	Yes	Coverage-only station already serviced by the public transport network – discarded
7	Puhinui	Puhinui Road / Lambie Drive	No	Limited	Yes	**Progressed to preferred list**: Provides local coverage and fills coverage gap between stations. Minor priority
8	Manukau	Lambie Drive at Cavendish Drive	No	No	Yes	Coverage-only station already serviced by the public transport network – discarded
9	Manukau	Manukau Station	Yes	Yes	Yes	**Progressed to preferred list**: High priority destination and transit Interchange with connections to Manukau train and bus stations. High employment area. Critical priority
10	Manukau	Ronwood Avenue	Yes	No	Yes	**Progressed to preferred list**: Major destination, high employment area. Close proximity to Manukau Station, but is suitably located due to intensity of demand across Manukau central. Major priority
11a	Manukau	AUT	Yes	No	No	Discarded because of design difficulties. Consolidated with Boundary Road station to form Diorella Drive station
11b	Manukau	Diorella Drive	Limited	Limited	Yes	**Progressed to preferred list**: Provides access to AUT south campus and Manukau Sports Bowl. Major priority
12	Te Irirangi	Boundary Road	No	Limited	Yes	Discarded because of design difficulties. Consolidated with AUT station to form Diorella Drive station
13	Te Irirangi	Dawson Road	No	Yes	Yes	**Progressed to preferred list**: Transit Interchange opportunity with Route 325, increasing feeder bus catchment towards Ōtara. Large residential catchment. Major priority

	Section	Location	Priority 1	Priority 2	Priority 3	Reason for inclusion/exclusion
14	Te Irirangi	Belinda Ave	No	No	Yes	Coverage-only station already serviced by the public transport network – discarded
15	Te Irirangi	Ormiston Road	No	Yes	Yes	**Progressed to preferred list**: Important Interchange opportunity for services connecting to Ormiston Town Centre and Ōtara. Major priority
16	Te Irirangi	Bishop Dunn Place	No	No	Yes	Coverage-only station already serviced by the public transport network. Already an existing targeted school bus service – discarded
17	Te Irirangi	Accent Drive	No	Limited	Yes	**Progressed to preferred list**: Convenient access to industrial areas. Fills coverage gap between stations. Minor priority
18	Te Irirangi	East Tāmaki Drive	No	No	Yes	Coverage-only station already serviced by the public transport network – discarded
19	Te Irirangi	Smales Road	No	Yes	Yes	**Progressed to preferred list**: transit Interchange, area of high employment. Major priority
20	Botany	Botany Metropolitan Centre	Yes	Yes	Yes	**Progressed to preferred list**: Major destination and transit Interchange. Area of unique demand and future Interchange with Eastern busway and local bus routes. Critical priority
21	Botany	North of Botany terminus	No	Limited	Yes	Less logical location to provide Interchange function between BRT and local bus services – discarded

Note: greyed cells are the stations which are not within the scope of this Project.

8.4 Internal partner engagement

Two Auckland Transport Project Control Group (**PCG**) workshops were held with the Project Team on 5 September 2019 and 22 April 2020 to confirm the indicative stations. The Auckland Transport PCG team endorsed the preferred stations.

8.5 Public engagement

As part the feedback forms send out between November and December 2019, public feedback was sought on the Airport to Botany preferred alignment. The preferred station locations were included in the public engagement collateral.

Overall, there was strong public support for the preferred route and form for the preferred option.

8.6 Preferred station locations

Based on the assessment, 12 station locations were selected for the rapid transit corridor. Table 34 and Figure 47 below provide the full list of the transit stations and their indicative classifications, including functions and priority levels.

Table 34: Airport to Botany preferred station locations

	Section	Location	Priority 1	Priority 2	Priority 3	Spacing from previous	Indicative priority
1	Airport	Passenger terminal	Yes	Yes	No	-	Critical
2	Airport	The Quad Business Park (Airport Precinct)	Yes	TBC	No	1,000 m	Major
3	Puhinui	Puhinui Rail Station	No	Yes	Yes	6,100 m	Critical
4	Puhinui	Puhinui Road / Lambie Drive	No	Limited	Yes	1,400 m	Minor
5	Manukau	Manukau Station	Yes	Yes	Yes	1,750 m	Critical
6	Manukau	Ronwood Avenue	Yes	No	Yes	500 m	Major
7	Manukau	Diorella Drive	Limited	Limited	Yes	1,300 m	Minor
8	Te Irirangi	Dawson Road	No	Yes	Yes	1,300 m	Major
9	Te Irirangi	Ormiston Road	No	Yes	Yes	1,600 m	Major
10	Te Irirangi	Accent Drive	No	Limited	Yes	1,100 m	Minor
11	Te Irirangi	Smales Road	No	Yes	Yes	1,400 m	Major
12	Botany	Botany Metropolitan Centre	Yes	Yes	Yes	1,200 m	Critical

Note: greyed cells are the stations which are not within the scope of this Project.

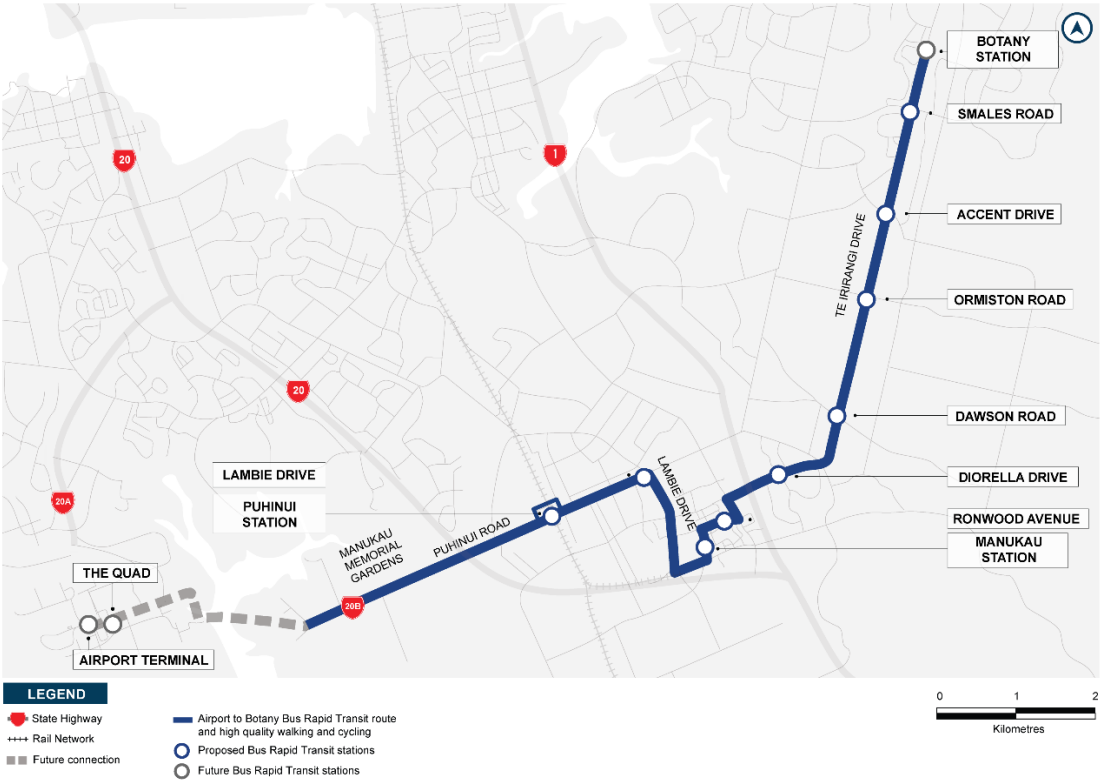

Figure 47: Preferred stations

9 Side of road widening

Following the conclusion of the preferred route for the Airport to Botany alignment, further optioneering was required to determine which side of the road corridor should be widened to accommodate the Airport to Botany cross section in the cases where the desired cross section does not fit within existing road reserve.

The Project Team undertook the side of road widening assessment in two parts within the wider optioneering workstream:

- Urban section (Botany Town Centre to SH20/20B Interchange); and
- SH20B section.

As the side of road widening assessment for the SH20B portion of the Project has already been outlined in Section 7.2 above, this section will outline the optioneering process for the urban section between Botany and the SH20/20B Interchange.

The process associated with the side of road widening assessment is included below:

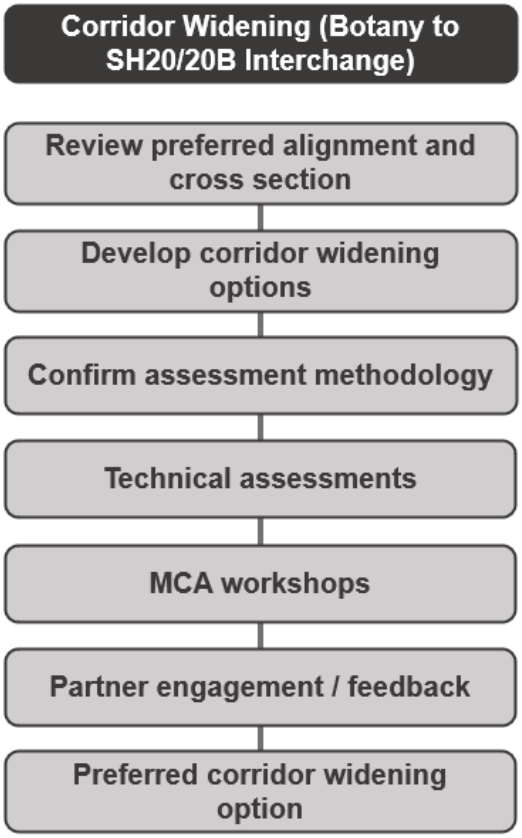

Figure 48: Side of road widening assessment process between Botany and SH20/20B Interchange

9.1 Option development

This side of road widening optioneering extent for the urban section extends from Botany Town Centre to the SH20/20B Interchange.

The three generic side of road widening options assessed are as follows:

- **Option A (A-side widening)**: requires encroachment into property solely on the A side of the preferred alignment, which is generally the northern and western sides of the alignment
- **Option B (B-side widening)**: requires encroachment into property solely on the B side of the preferred alignment, which is generally the eastern and southern sides of the alignment
- **Option C (A-side and B-side widening)**: This option involves property encroachment on both sides of the corridor.

The side of road widening assessment extent and widening options are depicted in Figure 49 below.

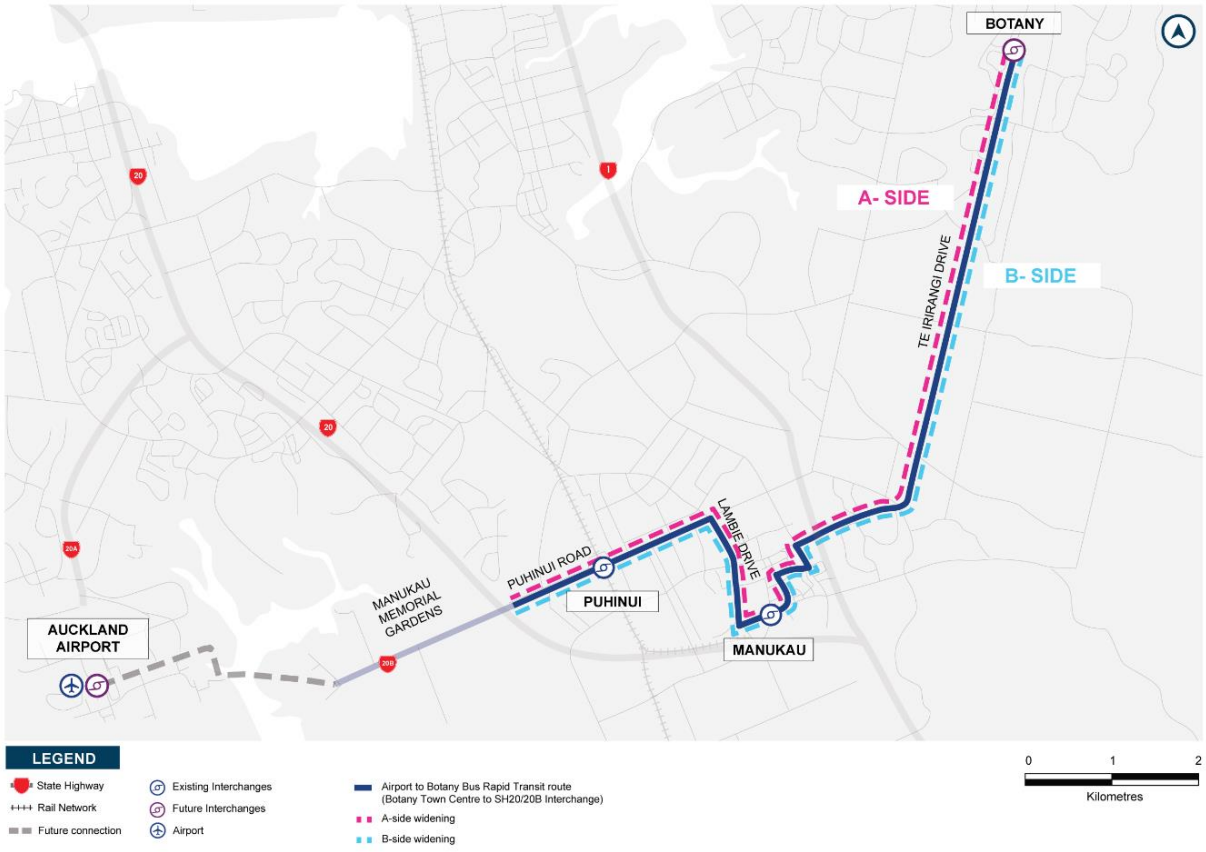

Figure 49: Airport to Botany side of road widening options (A-side, B-side) for the urban section

To assess the three options at an appropriate level of detail, the alignment was split into 14 sections (Figure 50 and Table 35).

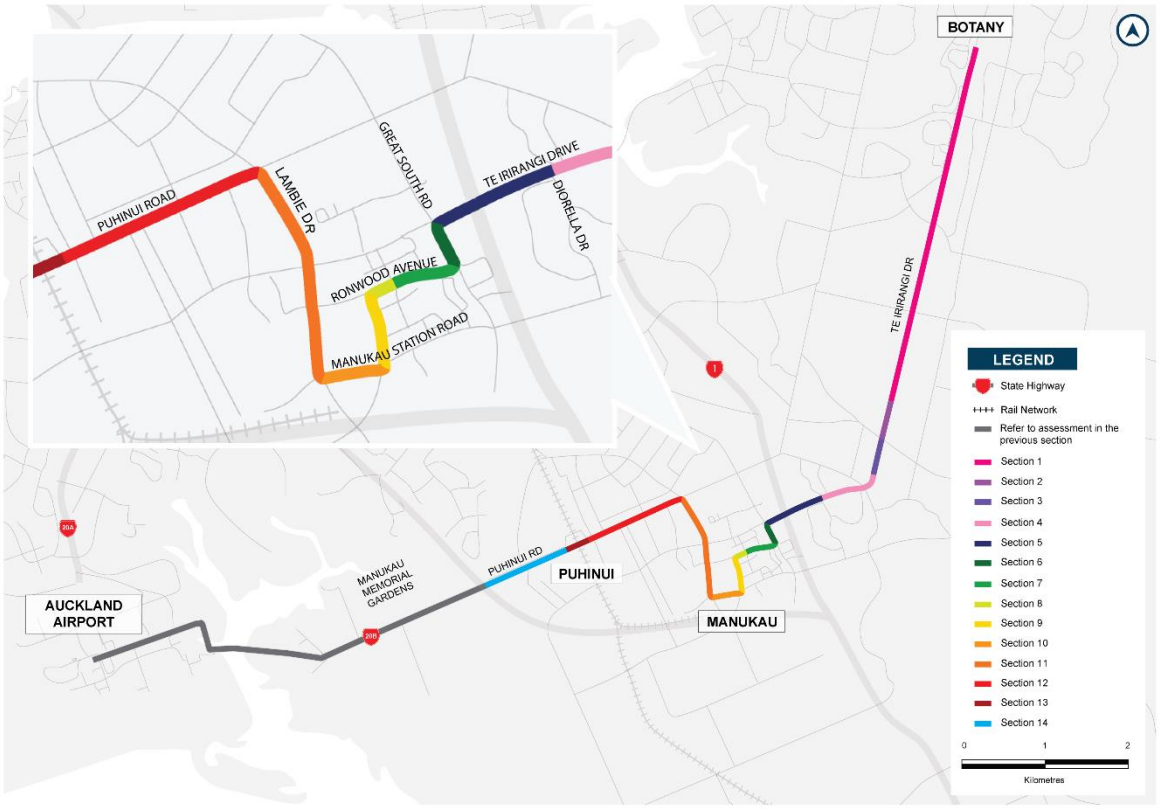

Figure 50: 14 assessment sections for side of road widening in the urban section (Botany to SH20/20B interchange)

It was determined for each section whether a further MCA would be required to assess the preferred side to widen the corridor to. Table 35 sets out the general context of each section and whether an MCA was required. Where MCAs were not undertaken, it was generally for the following reasons:

- **Engineering and civil design**: where civil design requires road widening to occur on a given side (or both sides) of the road, such as on the approach to some intersections. An MCA may also be deemed unnecessary if there are fatal flaws in one of more of the widening options considered.
- **Level of property impact**: the extent of property impact determines whether an MCA will be applied to determine the best side to widen the corridor.

Table 35: Sections for the corridor widening assessment

Section	Section extent	Surrounding land use	Property impact	MCA required?
1	Te Irirangi Drive – Botany Town Centre to Penion Drive	Predominantly residential	Property impact associated with widening at the approaches to the intersections of Haven Drive, Bishop Dunn Place and Ormiston Road	Widening is required on both sides of the road at the approaches of Haven Drive, Bishop Dunn Place and Ormiston Road intersections. Therefore, no MCA was undertaken
2	Te Irirangi Drive – Penion Drive to Dawson Road	Mixture of commercial and residential	Property impact associated with widening	Yes

Section	Section extent	Surrounding land use	Property impact	MCA required?
			of the intersection with Dawson Road.	
3	Te Irirangi Drive – Dawson Road to 41 Dissmeyer Drive	Predominantly residential	Property impact associated with widening at the approaches to the Dawson Road intersection	Widening is required on both sides of the road at the approaches to the Dawson Road intersection. Therefore, no MCA was undertaken
4	Te Irirangi Drive – 41 Dissmeyer Drive to Diorella Drive	Predominantly residential	Property impact associated with the area near Diorella Drive	Yes
5	Te Irirangi Drive – Diorella Drive to Great South Road	Mixture of residential, commercial and recreational	Property impact along the entirety of the section. Existing SH1 overbridge widening required	Yes
6	Great South Road – Te Irirangi Drive to Ronwood Avenue	Mixture of commercial and industrial	Property impact along the entirety of the section	Yes
7	Ronwood Avenue – Great South Road to Sharkey Street	Commercial	Property impact associated with widening at the approaches to the Great South Road intersection	Widening must occur on both sides of the road at the approaches to the Great South Road intersection. Therefore, no MCA was undertaken
8	Ronwood Avenue – Sharkey Street to Davies Avenue	Commercial	Property impact along the entirety of the section	Yes
9	Davies Avenue	Mixture of commercial and recreational	No property impact as the cross section could be accommodated within the existing road corridor	The RTC cross section could be accommodated within the existing road corridor so no widening MCA was undertaken
10	Manukau Station Road – Davies Avenue to Lambie Drive	Predominantly recreational	Property impact along the entirety of the section	Yes
11	Lambie Drive – Manukau Station Road to Puhinui Road	Mixture of commercial and industrial	Property impact associated with widening at the approaches to the Ronwood Avenue and Puhinui Road intersection	Widening must occur on both sides of the road at the approaches to the Ronwood Avenue and Puhinui Road intersection. Therefore, no MCA was undertaken
12	Puhinui Road – Lambie Drive to Cambridge Terrace	Mixture of primarily residential	Property impact along the entirety of the section	Yes

Section	Section extent	Surrounding land use	Property impact	MCA required?
13	BRT Bridge (Cambridge Terrace to Kenderdine Road)	Residential and commercial	Property impact along the entirety of the section	Road corridor widening must occur on both sides of the road to accommodate the BRT bridge. Therefore, no MCA was undertaken
14	Puhinui Road – Kenderdine Road to SH20/20B Interchange	Residential and commercial	Property impact along the entirety of the section	Yes

9.2 Assessment summary

The following Table 36 provides an outline of the MCA assessment:

Table 36: Side of road widening assessment summary

Criteria		Assessment Summary
Engineering	Traffic management during construction	• All options performed adversely for traffic management during construction, some requiring more complex traffic management than others. • Traffic management along Great South Road (Section 6) is particularly critical due to its road status and high volume of traffic. Staged construction will be important to ensure the traffic is managed sufficiently and detours may also be required.
	Pavements / structures	• The interface between new/existing pavement and/or structures is anticipated to have adverse effects for most options. • In particular, Section 5 (Te Irirangi Drive from Great South Road to Diorella Drive) is expected to have adverse effects for all widening options due to the complexity of widening in the vicinity of the existing SH1 overbridge. • Overall, from a pavement perspective better uniformity is achieved by having a wider construction area (i.e. when widening to one side only).
	Impact on utilities	• All widening options for Section 6 (Great South Road) are expected to have a major impact on utilities due to the large high voltage underground cables on either side of the road requiring protection or relocation. • Widening on both sides for Sections 13 and 14 (from the BRT bridge to the SH20/20B interchange) will also require the relocation of most existing utilities, scoring adversely. • Most of the remaining options are expected to only have minor impacts on existing utilities and only protection and minor relocations is expected to be required.
Property		• All options would require different levels of acquisitions, scoring adversely. Eleven options would require many partial or full property acquisitions. In particular: • All options in Section 6 (Great South Road) scored adversely as large commercial properties will be greatly impacted, and Transpower's Wiri substation will also require partial acquisition for B-Side and both-side widening options.

Criteria		Assessment Summary
		• The A-Side widening option for Section 10 (Manukau Station Road) scored adversely because of the property impacts to the existing railway line and carparking at MIT. The relocation of carparking is anticipated to have large financial implications. • The both-side widening option for Section 12 (Puhinui Road between Lambie Drive and Cambridge Terrace) scored adversely as it would require numerous commercial acquisitions and a high number of residential acquisitions.
Planning	Consentability	• Generally, options that would impact designated land or the national grid corridor overlay and require approval from third parties performed the poorest. A-side widening for Section 5 would require permission from the Minister for Tertiary Education, Skills and Employment for widening impacting the AUT designation, and Sections 4, 5 and 6 impact the National Grid Corridor Overlay, requiring permission from Transpower. • There are also three service stations which will be impacted by the corridor widening: Z located in Section 2 (impacted by A-side widening); Caltex in Section 6 (impacted by B-side widening); and Mobil in Section 14 (impacted by B-side widening). Ground fuel tanks are likely at these sites and a consent under the 'National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health' is likely to be required.
	Third Party Consenting	• All options were considered to generate third party consent implications in some form. Typical third-party consent implications include new potential bulk and location non-compliances because of reduced site areas and reconfigured site boundaries and removal of landscaping, vehicle access / carparking and loading areas that are likely required by underlying resource consents. • The options which impact commercial property are more likely to trigger third part consent requirements compared to residential property, so have scored more poorly.
Landscape, Visual and Urban Design	Urban Design	• A-Side widening option for Section 5 (Te Irirangi Drive from Diorella Drive to Great South Road) would require the reduction of two open spaces on the AUT site, performing adversely. • All options for Sections 6, 7 (excluding B-side widening), and 10 would have no discernible change to urban design.
	Visual	• Similar to urban design, all options for Sections 6, 8 and 10 had neutral scores as they will result in only minor losses of young trees and shrubs to the southern boundary. • Six of the options performed the worst due to the loss of mature tree(s) or a notable tree, as well the removal of private garden boundaries.
Social Impact	Accessibility	• All options for Sections 6, 8 and 10 were scored neutrally as the corridor widening would not change the accessibility of sites or properties in the surrounding area (including the new MIT trade training school and Manukau train station for Section 10). • The remaining options performed adversely for accessibility relating to the direct property impacts and potential uncertainty for owners on the property acquisition process and their adaptability to change.
	Community	• All options for Sections 2, 4, 6, 8 (excluding B-side widening) and 10 would have no discernible change for community groups and activities as a result of widening. • The remaining options scored adversely, largely due to the potential loss of community caused by residential property acquisitions.

Criteria	Assessment Summary
Stormwater	• The sections assessed are urban and heavily developed with the proposed corridor widening options typically occurring within existing impervious surface areas. Thus, all options scored adversely due to the increase in impervious surface area. • Section 5 to 12 have the most AUP:OP restrictions and stormwater features, and therefore are the most challenging sections from a stormwater mitigation perspective. • Additional stormwater treatment will be required for Sections 3 to 9 due to their location within the SMAF2.
Contaminated Land	• Where an option was scored adversely, there is likely to be asbestos and lead contamination within the vicinity which may result in increased soil disposal costs and health and safety considerations during construction. • The options that have scored the poorest for this criterion have petrol stations that would be impacted by road corridor widening (Z located in Section 2 (impacted by A-side widening); Caltex in Section 6 (impacted by B-side widening); and Mobil in Section 14 (impacted by B-side widening)). • All options for Section 10 (Manukau Station Road) are expected to have neutral impacts because bulk earthworks were completed for the Manukau Train Station, and it is considered unlikely contaminated soils will be encountered in this area.
Noise and Vibration	• The options that brought the road closer to potentially sensitive receptors scored worst: • Kingdom Hall of Jehovah's Witnesses (Section 2 and 14, B-Side and both-side widening) • Educational facilities (AUT Campus for Section 5 B-Side and both-side widening, and Puhinui School for Section 12, B-Side and both-side widening). • Construction noise and vibration effects are likely to have an adverse impact on sensitive receptors along most of the corridor.

9.3 Internal engagement

Internal Auckland Transport subject matter expert (**SME**) engagement was undertaken through several MCA workshops being involved in each stage of the side of road widening process. The details of each workshop are set out in Table 37 below:

Table 37: Internal engagement workshops as part of the side of road widening assessment

Workshop / Meeting	Date	Attendees	Commentary / Outcome
MCA Methodology	17/01/2020	Project Team	Discussed and confirmed developed options and assessment methodology and associated programme to deliver workstream.
MCA Workshop	04/02/2020	Project Team SME's	Pre scored criteria (by technical specialists) discussed and respectively challenged, identify emerging preferred options.

Workshop / Meeting	Date	Attendees	Commentary / Outcome
Preferred Option	21/02/2020	Project Team Specific SME's	Present emerging prefer option with discussion surrounding constrained options, further assessment to be undertaken to support preferred option.
Challenge Workshop	06/03/2020	Project Team Specific SME's	Present further assessment of specific sections of the alignment and confirm preferred option to present to Manawhenua for review.

9.4 Manawhenua engagement

As part of the regular hui with Te Ākitai and the Auckland Transport Southern Table, three hui where undertaken with Manawhenua presenting the options, assessment outcomes and proposed recommendation. They were the following:

- Te Ākitai Southern Gateway Programme Hui 22 May 2020 – Identifying the options and assessment approach.
- Auckland Transport Southern Table Hui 25 June 2020 – Technical specialist assessment outcome run through (online due to Covid restrictions).
- Auckland Transport Southern Table Hui 30 July 2020 – Additional (in person) technical specialist assessment outcome run through (considered appropriate to ensure assessment outcomes were communicated effectively to Kaitiaki).

Kaitiaki where generally supportive of the assessment approach and the preferred side of road widening. No direct feedback on this assessment was provided.

9.5 Preferred option(s)

After considering the performance of all options against the MCA criteria, SME and Manawhenua feedback, the following options were preferred for each section:

Table 38: Preferred side of road widening options for the urban section

Section	Preferred Side of Road Widening	Reasoning
Section 2: Te Irirangi Drive – Penion Drive to Dawson Road	B-side widening	This option did not score adversely for any MCA criteria and had the greatest amount of neutral or minor effects of all three options.
Section 4: Te Irirangi Drive – 41 Dissmeyer Drive to Diorella Drive	A-side widening	This option did not score significant adverse for any MCA criteria and had the greatest amount of neutral or minor effects of all three options. A key differentiator is the property criteria: A-side would require 18 full and 12 partial residential acquisitions, whereas B-side would require 18 full and 21 partial residential acquisitions, along with 1 partial acquisition of Auckland Council land.

Section	Preferred Side of Road Widening	Reasoning
Section 5: Te Irirangi Drive – Diorella Drive to Great South Road	B-side widening	B-side widening would require 2 partial commercial property acquisitions and 15 full and 3 partial residential acquisitions, however it would avoid any impacts on the AUT buildings and the Manukau Velodrome. Therefore, B-side widening scored more positively.
Section 6: Great South Road (Te Irirangi Drive to Ronwood Avenue)	A-side widening	This option scored the least number of significant adverse impacts and had the greatest amount of neutral or minor effects of all three options. A-side widening also avoids acquisition of Transpower's Wiri Substation, whereas the other two options would require partial or full acquisition.
Section 8: Ronwood Avenue (Sharkey Street to Davies Avenue)	A-side widening	This option would have no significant adverse effects. The other two options would result in significant adverse property effects that would add significant cost, time and risk. Specifically, A-Side Widening will have a substantial impact on a large commercial property that is multi tenanted. However, B-side widening would also have significant adverse impacts as it would require the relocation of an external stairwell of the Auckland Transport Ronwood Avenue carparking building. The common area of a residential apartment building will also be impacted and require redesign.
Section 10: Manukau Station Road – Davies Avenue to Lambie Drive	B-side widening	This option would have no significant adverse effects and had the greatest number of neutral or minor effects of all three options. The other two options would impact the railway lines and MIT carparking. Substantial mitigation costs would be required to relocate carparking.
Section 12: Puhinui Road – Lambie Drive to Cambridge Terrace	A-side widening	This option would have no significant adverse effects and the greatest number of minor effects of all three options. A key differentiator is that A-side widening would not impact the designation at Puhinui School.
Section 14: Puhinui Road – Kenderdine Road to SH20 Interchange	B-side widening	This option scored no significant adverse effects. The other two options would result in significant adverse property effects. A-side widening will require 35 full and 30 partial residential acquisitions, along with a large industrial building. Both-side widening would also have a significant property impact as it will involve the greatest number of affected properties.

10 Walking and cycling

High quality walking and cycling was confirmed as a part of the Airport to Botany corridor in the initial option generation across all segments. Alignment options that traversed the local road network from Botany Town Centre to the SH20/20B Interchange will include walking and cycling facilities on both sides of the BRT corridor.

10.1.1 Puhinui Station section

An exception to this is the pedestrian and cyclist bypass at Puhinui Station. This is because the BRT ramp structure which connects to Puhinui Station will be implemented with a 5% grade ramp for BRT vehicles, but pedestrians and cyclists require a desired longitudinal grade of 3%. In addition, creating a cycling facility along the BRT ramp means what cyclists must cross Puhinui Road to reach the base of the ramp, disrupting continuity of flow for cyclists. As a result, alternative routes for pedestrians and cyclists through the Puhinui Station area was investigated.

As pedestrians travelling the through route can use the Puhinui Interchange facilities to do so, the assessment primarily focused on facilities for cyclists. Four options were assessed:

Table 39: Puhinui cycling facilities options

Option	Description
Option 1	**Cyclists use separated cycle facilities along the existing Kenderdine Road, Bridge Street and Cambridge Terrace Roads to bypass the Interchange**
Option 2	Cyclists bypass the Interchange via a separate ramp structure to the BRT ramp structure
Option 3	Cyclists bypass the interchange by running a cycleway on the BRT ramp structure
Option 4	Cyclists utilise the facilities at Puhinui Station. this will require cyclists getting off their bike to use lifts/ stairs

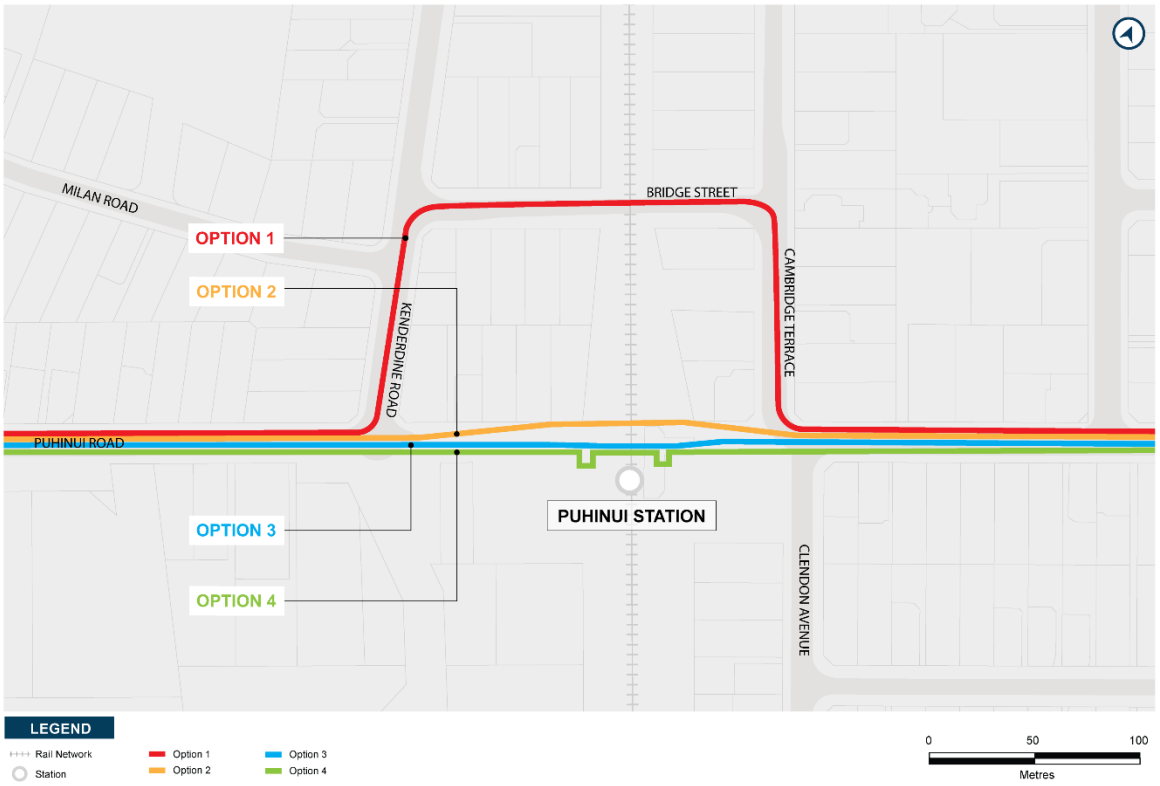

Figure 51: Puhinui cycling facilities options

The below table summarises the comparison assessment of the options:

Table 40: Assessment summary for Puhinui Station cycling options

Option	Positives	Negatives
Option 1	• **Consistent with the rest of the Airport to Botany corridor** • **There is sufficient space to provide protected facilities (with the exception of the Bridge Street bridge)** • **The Bridge Street bridge is anticipated to be widened when the third and fourth mainline tracks are being placed in the rail corridor – provides opportunity to widen the bridge to accommodate cycling facilities** • **Mostly an unimpeded facility with priority given to cyclists**	• **Longest route of all the options (425m)** • **Current bridge structure on Bridge Street not wide enough to accommodate separated cycling facilities** • **Option with highest interaction with side streets and driveways; safety concern**
Option 2	• Unimpeded separate facility for cyclists • Lowest number of interactions with side streets and driveways	• A new separate structure required • Second longest route if ramped (400m). providing a compliant gradient would result in the bridge being longer than the BRT bridge, creating poor visual outcomes

Option 1	• **Consistent with the rest of the Airport to Botany corridor** • **There is sufficient space to provide protected facilities (with the exception of the Bridge Street bridge)** • **The Bridge Street bridge is anticipated to be widened when the third and fourth mainline tracks are being placed in the rail corridor – provides opportunity to widen the bridge to accommodate cycling facilities** • **Mostly an unimpeded facility with priority given to cyclists**	• **Longest route of all the options (425m)** • **Current bridge structure on Bridge Street not wide enough to accommodate separated cycling facilities** • **Option with highest interaction with side streets and driveways; safety concern**
		• Requires cyclists to cross to the other side of Puhinui Road to access the bridge, disrupting cycle movement
Option 3	• Direct connection by bike to the Airport to Botany route	• Constrained gradient of 5%, therefore won't be suitable for all ages and abilities • Cyclists must cross to the middle of the road to access the cycleway
Option 4	• Cheapest option as it uses the facilities already provided	• Most inconvenient option due to wait times • Cyclists must get off their bikes to get over the interchange • Cyclists must mix with pedestrians wishing to access the BRT and railway • Pedestrian space and access will be affected by people with bicycles moving through station areas

Based on the assessment, Option 1 (separate cycling facilities along Kenderdine Road, Bridge Street, and Cambridge Terrace) was selected as the preferred option as it provides a solution consistent with the remainder of the Project, avoids the need for cyclists to cross the BRT, and provides acceptable cyclist grades.

10.2 SH20B section

10.2.1 Overview

For the SH20B corridor, a shared use path (**SUP**) was proposed connecting from the SH20/20B Interchange to the Auckland Airport Boundary (Orrs Road). Optioneering was undertaken to determine the most appropriate walking and cycling alignment integrating the proposed BRT.

Figure 52 below illustrates the process undertaken to assess the walking and cycling options for the SH20B section.

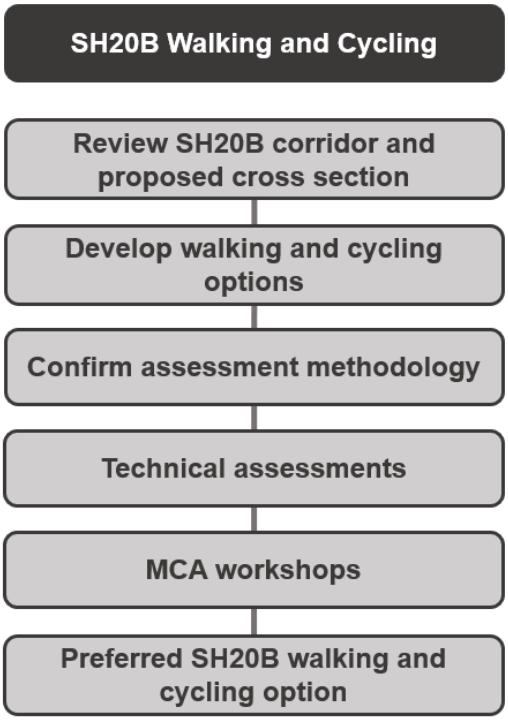

Figure 52: Walking and cycling assessment process for the SH20B section

For the purpose of assessing the walking and cycling facility along the SH20B section, the SH20B corridor was split into three sections:

- Section 1: SH20/20B Interchange to Manukau Memorial Gardens (including the Interchange)
- Section 2: Manukau Memorial Gardens to Campana Road (including the MMG intersection)
- Section 3: Campana Road to Orrs Road (including Campana Road intersection)

Figure 53: SH20B walking and cycling assessment sections

The table below shows all options assessed:

Table 41: Walking and cycling options assessed

	Option A	Option B	Option C	Option D
Section 1	Option 1A – SUP on northern side (retention of existing)	Option 1B – SUP on southern side + northern side (retention of existing)		
Section 2	Option 2A – SUP on northern side (northern side of service road _ demolition of existing SUP bridge)	Option 2B – SUP on northern side (southern side of service road + retention of existing SUP bridge)	Option 2C – SUP on southern side (demolition of existing SUP bridge)	
Section 3	Option 3A – SUP on northern side (northern side of service road)	Option 3B – SUP on northern side (southern side of service road)	Option 3C – SUP on southern side (south of BRT)	Option 3D – SUP on southern side (retention of existing)

10.2.2 Assessment methodology

The MCA criteria and scoring scale used for this assessment is outlined in Section 3.

10.2.3 Assessment summary

Section 1: SH20/20B Interchange to Manukau Memorial Gardens

Options assessed:

- Option 1A – SUP on northern side (retention of existing)
- Option 1B – SUP on southern side + northern side (retention of existing)

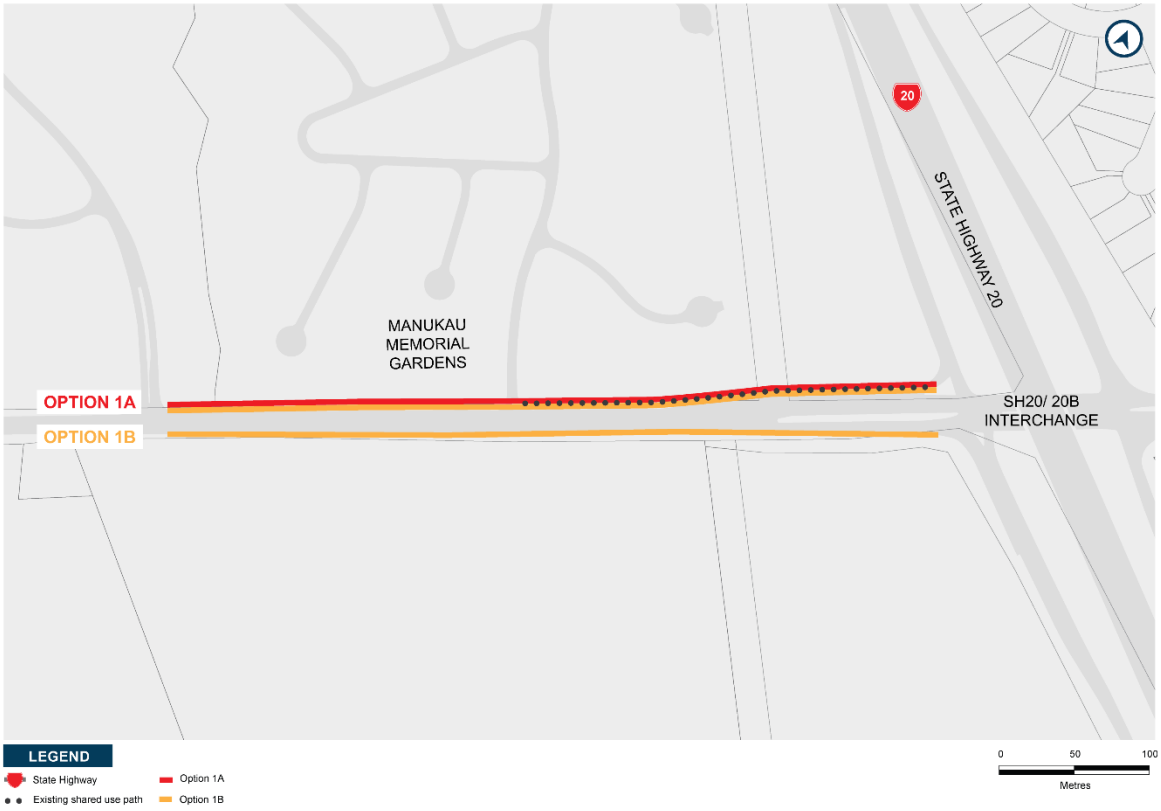

Figure 54: Section 1 assessment options

Table 42: Section 1 assessment summary

Criteria	Assessment Summary
Highways	**Both options provided SUPs with the same width compliant with design standards.** **Option 1B would provide a safer outcome, allowing on-road cyclists travelling westbound through the SH20/20B Interchange to leave the carriageway and use the SUP to avoid conflict with the general traffic. Option 1B would also provide an improved user experience, avoiding the need to cross Puhinui Road/SH20B at multiple locations when travelling to/from the Airport. Therefore, Option 1B performed better.**
Traffic/ intersection performance	A north-south active mode connection would be needed to the east of the SH20B and SH20 southbound off ramp intersection for both options. Following SIDRA modelling, Option 1B performed worse as it degraded intersection performance slightly compared to Option 1A due to the provision for more active mode movements.
Structures	As no structures were proposed to be modified or installed under the proposed options, there were no substantive differentiators.

Highways	**Both options provided SUPs with the same width compliant with design standards.** **Option 1B would provide a safer outcome, allowing on-road cyclists travelling westbound through the SH20/20B Interchange to leave the carriageway and use the SUP to avoid conflict with the general traffic. Option 1B would also provide an improved user experience, avoiding the need to cross Puhinui Road/SH20B at multiple locations when travelling to/from the Airport. Therefore, Option 1B performed better.**
Geotechnical	There were no substantive geotechnical differentiators between the options.
Stormwater	The addition of a SUP did not have an impact on stormwater quality and no treatment would be required for the SUP runoff. There were no substantive differentiators between the options in terms of stormwater quality or quantity/attenuation.
Utilities	Both options would allow the utilities under the existing SUP on the northern side to be retained so both performed well.
Environmental/ planning	Given Option 1A involved the retention of the existing SUP on the northern side of SH20B and is a 'do-nothing' option, it would not result in any additional environmental effects. As Option 1B involved the retention of the existing SUP on the northern side and a new SUP on the southern side of SH20B, assessments focused on the new southern side SUP. **Ecology**: Option 1B performed worse as the inclusion of the southern side SUP may require modification of the cross culvert which may have effects on its freshwater habitat. **Landscape visual**: Option 1B performed same as 1A; while it increased the overall width of the corridor there was increased connectivity, natural character, and planting opportunity. **Social impact:** Option 1B performed same as 1A; there would be an increase in continuous access, connectivity and reduced complexity of crossing Puhinui Interchange. **Contaminated land**: Option 1B performed same as 1A. **Consentability**: Option 1B performed same as 1A as the positive effects generated from the inclusion of the additional SUP potentially outweigh any additional adverse effects.
Property	Option 1B performed worse as it required additional land acquisition for the SUP from land holdings to the south. Option 1A would have no additional property effect or cost.
Construction disruption	Option 1B would result in works constructed offline with minimal additional disruption to general traffic beyond the RTC works, and Option 1A would require no additional works, so both options scored the same
Cost	Option 1B would result in additional costs so performed worse. However, these additional costs were not considered significant given the overall cost of the SH20B corridor works.

Although the above assessment indicated a preference of Option 1A, based on the improved safety of the SUP users through the SH20/SH20B Interchange and the added convenience of avoiding multiple crossings of SH20B, **Option 1B was the preferred option**. This retains the existing SUP on the northern side and also adds a new SUP on the southern side.

Section 2: Manukau Memorial Gardens to Campana Road

Options assessed:

- Option 2A – SUP on northern side (northern side of service road + demolition of existing SUP bridge)
- Option 2B – SUP on northern side (southern side of service road + retention of existing SUP bridge)
- Option 2C – SUP on southern side (demolition of existing SUP bridge)

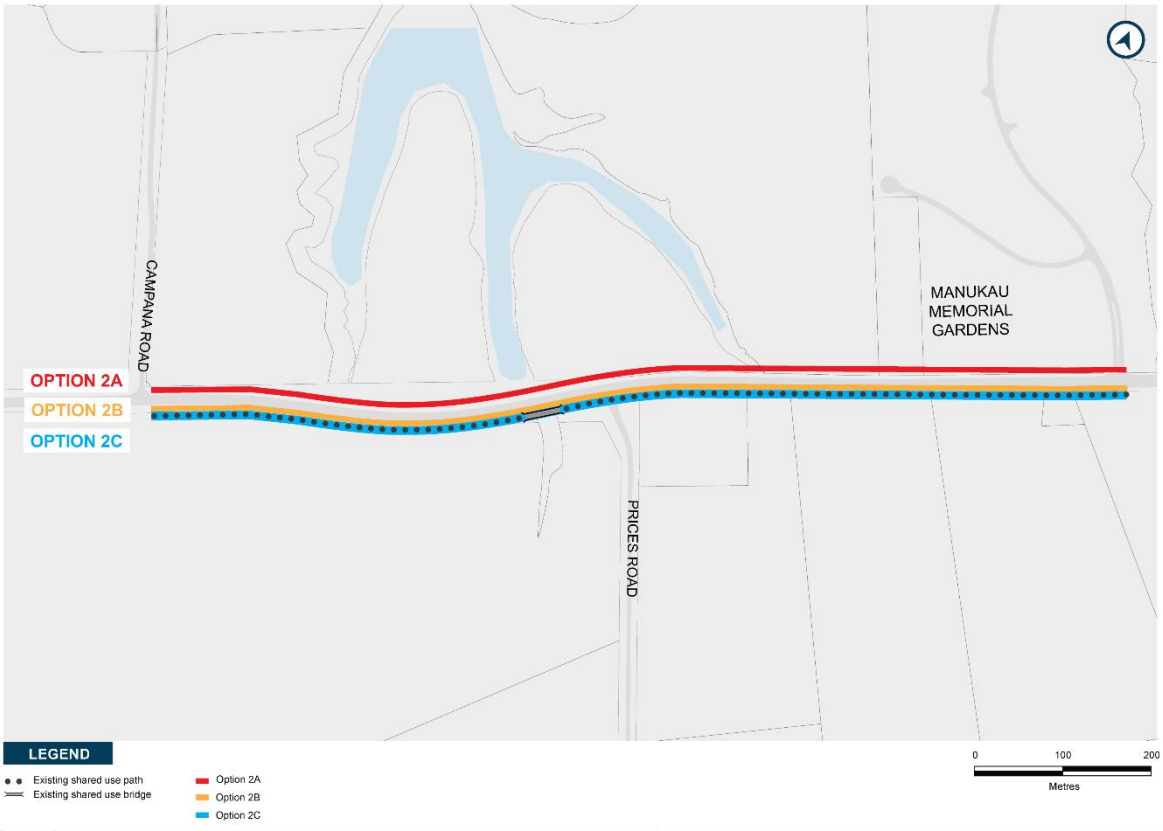

Figure 55: Section 2 assessment options

Table 43: Section 2 assessment summary

Criteria	Assessment Summary
Highways	**All options provided SUPs with the same width compliant with design standards.** **Option 2A and 2B would result in the SUP running adjacent to the service road and live traffic. Option 2C would result in a slightly safer outcome with the SUP being fully segregated from live traffic.**
Traffic/ intersection performance	A north-south active mode connection across SH20B was required to provide access to MMG. SIDRA modelling was undertaken to investigate whether crossing the east side or west side of the intersection was more efficient, and minimal difference was found. All three options had the same traffic performance regardless of whether it was located to the north or south of the highway.
Structures	There were no substantive differentiators between the options.
Geotechnical	There was no preferred option as all options would likely encounter similar geotechnical risks and would require further investigation.
Stormwater	There were no substantive differentiators between the options in terms of stormwater quality or quantity/attenuation.
Utilities	All options have similar overall impact on utilities.
Environmental/ planning	**Ecology**: Option 2A and 2C involved additional potential construction effects at Waokauri Creek East and West. Option 2B was preferred as it retained the existing SUP bridge and had no further effect on marine ecology. There were no substantive differentiators among the options regarding terrestrial ecology. **Landscape visual**: Option 2C was scored low risk for all landscape and visual effects, as it avoids further encroachment into MMG and retains amenity planting along the boundary.

Highways	**All options provided SUPs with the same width compliant with design standards.** **Option 2A and 2B would result in the SUP running adjacent to the service road and live traffic. Option 2C would result in a slightly safer outcome with the SUP being fully segregated from live traffic.**
	Option 2C also provided better urban design outcomes than the other two options due to the more direct alignment and a reduction in CPTED issues. **Social impact**: there were no substantive differentiators for accessibility and community or health and safety. **Contaminated land**: there were no substantive differentiators in terms of contaminated land. **Consentability**: none of the options presented any significant planning issues, however given the social, landscape, visual and urban design benefits of Option 2C, it was considered the preferred option.
Property	Options 2A and 2B were considered high risk from a property perspective as they required further land acquisition from Memorial Gardens. Option 2C was considered medium risk as it impacted four private properties.
Construction disruption	All options would result in works constructed offline with minimal additional disruption to general traffic beyond BRT works. As Option 2C may require the existing SUP bridge to be demolished prior to construction of the new SUP crossing at Waokauri Creek, active mode access could be interrupted.
Cost	Option 2C would be the most expensive, with the additional width on the new road/BRT bridge in addition to the demolition of the existing SUP bridge.

Based on the above assessment, **Option 2C is the preferred option** which demolishes the existing SUP and replaces it with an SUP along the southern side of the BRT. This option was selected as it provides the greatest safety, accessibility, landscape visual and urban design outcomes. Further, Options 2A and 2B have significant property risks related to land acquisition from MMG.

Section 3: Campana Road to Orrs Road

Options assessed:

- Option 3A – SUP on northern side (northern side of service road)
- Option 3B – SUP on northern side (southern side of service road)
- Option 3C – SUP on southern side (southern side of RTC)
- Option 3D – SUP on southern side (retention of existing)

Figure 56: Section 3 assessment options

Table 44: Section 3 assessment summary

Criteria	Assessment Summary
Highways	All options provided SUPs with the same width, compliant with design standards. Options 3A and 3B would result in the SUP running adjacent to the service road and live traffic, whilst Options 3C and 3D would result in a slightly safer outcome as the SUP would be fully segregated.
Traffic/ intersection performance	A north-south crossing for active modes was required near the park and ride to provide safe access across SH20B. There were no substantive differentiators between locating the SUP on the north or south.
Structures	As no structures were proposed to be modified or installed under the proposed alignment options, there were no differentiators from a structures perspective.
Geotechnical	There was no preferred option from a geotechnical perspective as all options would likely encounter similar geotechnical risks. This was due to the relatively consistent nature of the expected geology across all the proposed options and the exclusion of earthworks considerations from the MCA.
Stormwater	There were no substantive differentiators between the options in terms of stormwater quality or quantity/attenuation.
Utilities	Option 3D would allow the utilities under the existing SUP on the southern side to be retained. All other options would require relocation of those utilities.
Environmental/ planning	**Ecology**: there were no substantive differentiators for ecology and coastal processes. **Landscape visual**: Options 3A and 3C performed better than Options 3B and 3D. 3B and 3D placed the SUP between roading infrastructure and restrict planting opportunities. For Option 3D, this would diminish the user experience and pot safety and CPTED concerns.

Criteria	Assessment Summary
	Social impact: Option 3D performed worst due to the SUP location restricting north-south accessibility as a result of its location between the RTC and roading elements. **Contaminated land**: no differentiators between the options. All options included additional agricultural areas where potentially contaminating activities are and have historically been undertaken. **Consentability**: none of the options presented major planning issues. However, given the social, landscape, visual and urban design adverse effects of Options 3B and 3D, Options 3A and 3C were preferred.
Property	Options 3C and 3D performed worse as they required additional land from Auckland Airport, for which the titles contained complex encumbrances. No differentiation across options for property acquisition cost.
Construction disruption	All options would result in works constructed offline with minimal disruption to general traffic beyond the BRT works.
Cost	Option 3D would be cheapest as it required the least amount of new SUP works and utility relocation.

Based on the above assessment, **Option 3C is the preferred option** which demolishes the existing SUP and replaces it with an SUP along the southern side of the BRT. Although the options were fairly balanced in assessment outcomes, Option 3C was the preferred option due to accessibility of the SUP and the land uses further west at Auckland Airport.

10.2.4 Preferred option(s)

The preferred options for walking and cycling facilities along the SH20B section are as follows:

- Option 1B between SH20/20B Interchange and Manukau Memorial Gardens, which is the retention of the existing SUP on the northern side of the corridor and construction of a new additional SUP on the southern side.
- Option 2C between Manukau Memorial Gardens and Campana Road, which demolishes the existing SUP bridge and replaces it with an SUP along the southern side of the BRT.
- Option 3C between Campana Road and Orrs Road, which demolishes the existing SUP and replaces it with a SUP along the southern side of the BRT.

11 Route and design refinement

11.1 Overview

The route and design refinement process involved numerous steps to robustly identify and test alternative options. An overview of the process is provided in Figure 57 and described in detail Sections 13.3 to Section 13.5.

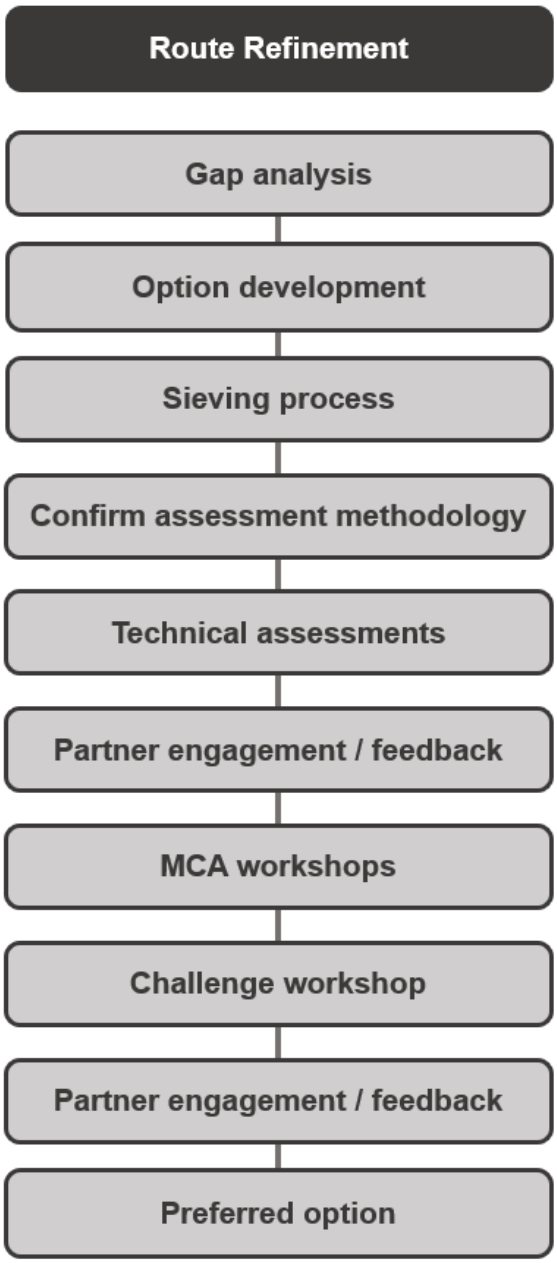

Figure 57: Route and design refinement options assessment process

11.2 Gap analysis

At the outset of the Notice of Requirement (NoR) phase, a gap analysis was undertaken of the optioneering process undertaken to date. The purpose of this exercise was to consider the requirements under s171(1)(b) of the Resource Management Act 1991, and to determine whether any elements of the preferred Project should be subject to further optioneering.

Generally, further optioneering was deemed necessary where the gap analysis determined that:

a) New information had emerged – for example, changes to the strategic context, land use, growth projections that has the potential to influence the recommended option; and/or

b) The options assessment undertaken to date had not sufficiently considered alternatives proportional to the scale of potential effects.

The gap analysis included the following:

Review of the previous phase optioneering recommendations, specifically including all optioneering workstreams including:

- Rapid Transit Route Selection (Section 4)
- Puhinui Station Bus Rapid Transit Bridge (Section 5)
- Preferred Mode (Section 6)
- Bus Rapid Transit Corridor Placement (Section 7)
- Station Location assessment (Section 8)
- Side of Road Widening (Section 9)
- Walking and Cycling (Section 10)

It was concluded that the following sections of the Project (shown in Figure 58) were to be investigated for route and design refinement:

- The alignment through Manukau Central between Lambie Drive and the Great South Road / Te Irirangi Drive Intersection.
- Side of road widening along Puhinui Road between the Puhinui Station and the Lambie Drive / Puhinui Road intersection
- Walking and cycling provision traversing and connecting to Puhinui Station.

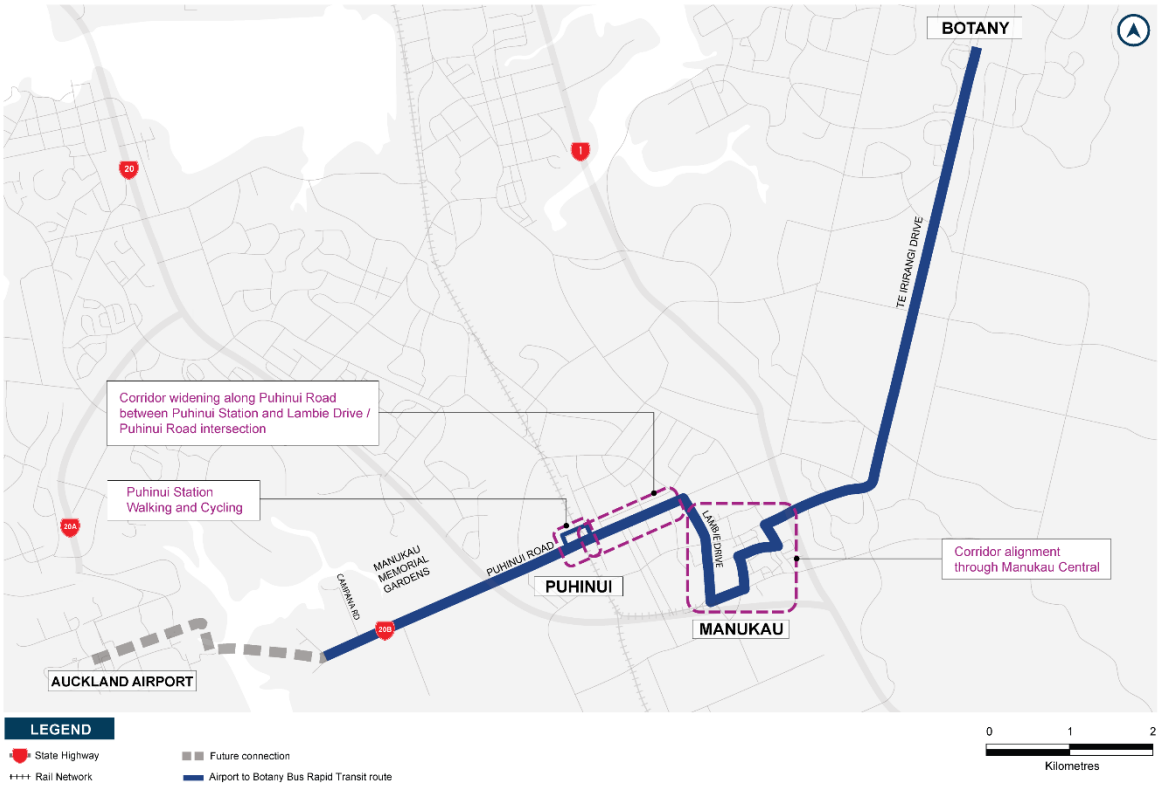

Figure 58: Gap analysis outputs - areas requiring further assessment

The gap analysis and further optioneering outcomes are detailed in the following sections.

11.3 Route refinement - Manukau Central alignment

11.3.1 Gap analysis

From engagement with key stakeholders and two Manukau Central site visits (undertaken by the Project Team) in February / March 2022, it was acknowledged that the Project has a key role in improving the accessibility of Manukau Central. Therefore, the Project Team tested additional alignment options for the Central segment to capture potential additional benefits.

It was understood that delivering the Airport to Botany cross section through the constrained environment of Manukau Central will result in business disruption and commercial property impact regardless of the alignment. However, when considering the long-term operation of the BRT, it was deemed appropriate to consider further alternatives within Manukau Central.

Figure 59 below shows all Central segment options tested in the route long list and short list optioneering.

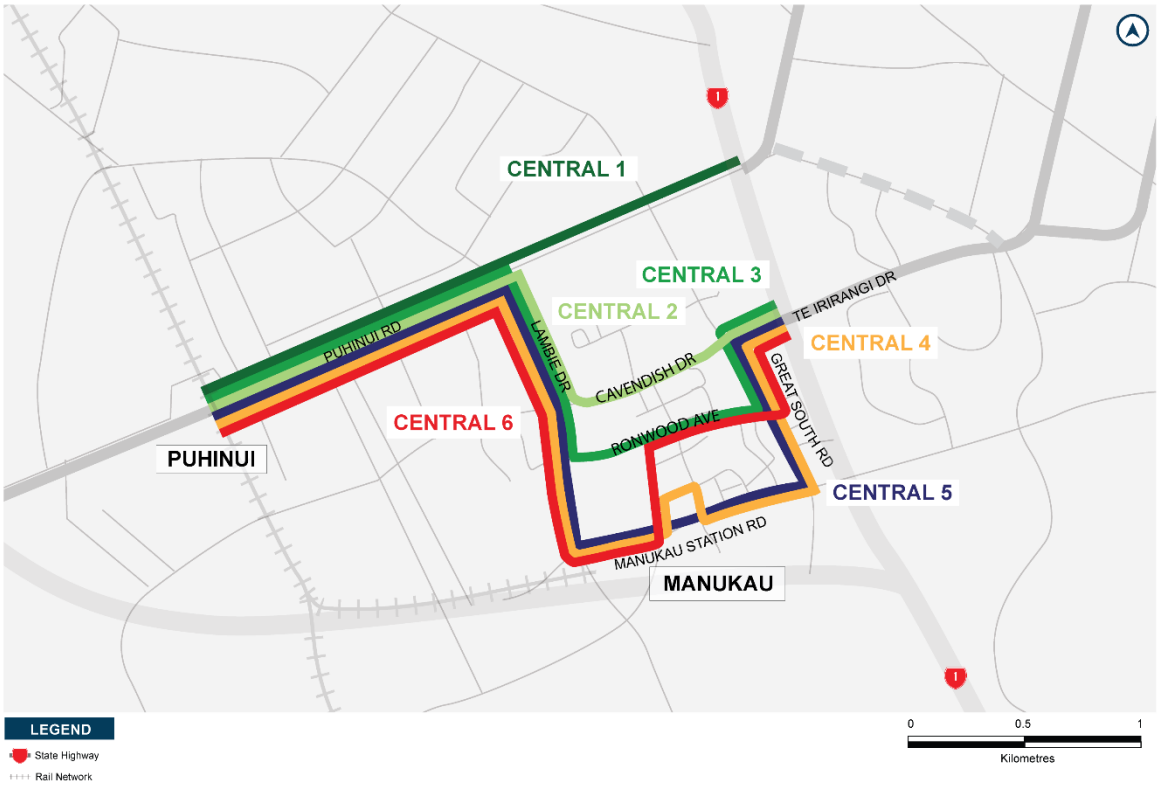

Figure 59: Central segment options assessed

Two alignment variants were identified to be assessed, involving the following key elements:

- **Using Cavendish Drive / Sharkey Street** - From the Te Irirangi Drive / Great South Road / Cavendish Drive intersection, turning down Sharkey Street to connect to Ronwood Avenue.
- **Turnaround Facility at Davies Avenue Station** - Reduce the length of the alignment by implementing a turnaround area on Davies Avenue in the vicinity of the Airport to Botany Manukau Station.

11.3.2 Option development

Using the alignment variants, the following alternative options were developed:

- **Option Central 7** – Combining elements of Options Central 3 and Central 2, using Sharkey Street and Cavendish Drive.
- **Option Central 8** – Same alignment as Central 7 but uses the option Central 6 connection to Manukau train and bus station and loop around Hayman Park (Manukau Station Road / Lambie Drive).
- **Option Central 9** – Option Central 3 with Davies Avenue spur with a turnaround in the vicinity of the Manukau train and bus station.

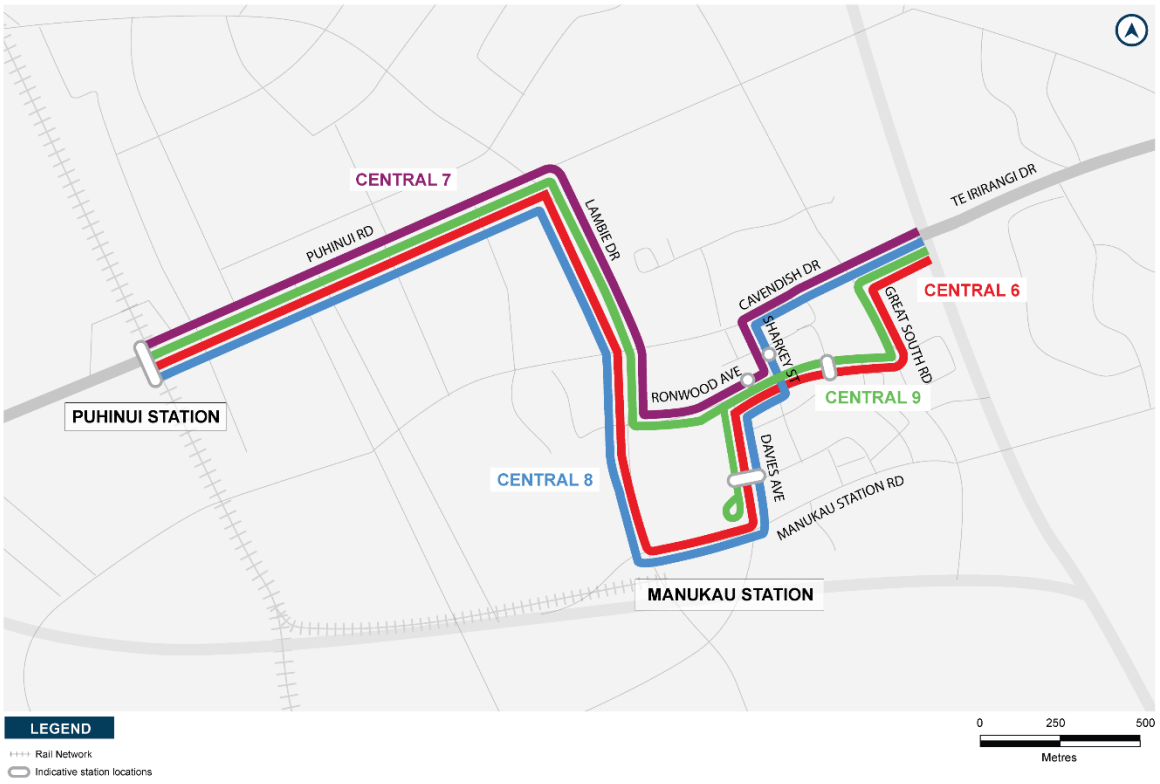

Figure 60: Options Central 7, 8, 9, and the original preferred Central 6

11.3.3 Option assessment

11.3.3.1 Sieving process

To initially test the viability of the identified options, a sieving process was undertaken by the Project Team. The sieve utilised a pros and cons assessment across multiple criteria, including:

- Transport (including operational considerations) elements;
- Urban design;
- Social and community impact;
- Environmental (ecological and arboricultural) effects; and
- Property and construction impacts.

The Project Team and technical specialists assessed the options and undertook a sieving assessment workshop on 12 April 2022 exploring the merits of the three additional options.

Utilising the Cavendish Drive / Sharkey Street alignment (Central 8) and use of the BRT turnaround (Central 9) demonstrated positive attributes against a range of criteria.

Option Central 7 performed poorly against key Investment Objectives and was discounted, primarily due to not directly connecting to the Manukau train and bus stations resulting in an approximately 300 m walk to interchange.

Following the assessments, an additional hybrid option (Central 10) was formed, combining the Cavendish Drive / Sharkey Street alignment with the Davies Avenue turnaround. This option was assessed along with Central 8 and 9 in an MCA process.

The variant options, as well as the initial preferred Central 6, are shown in Figure 61 below, including their respective proposed station locations.

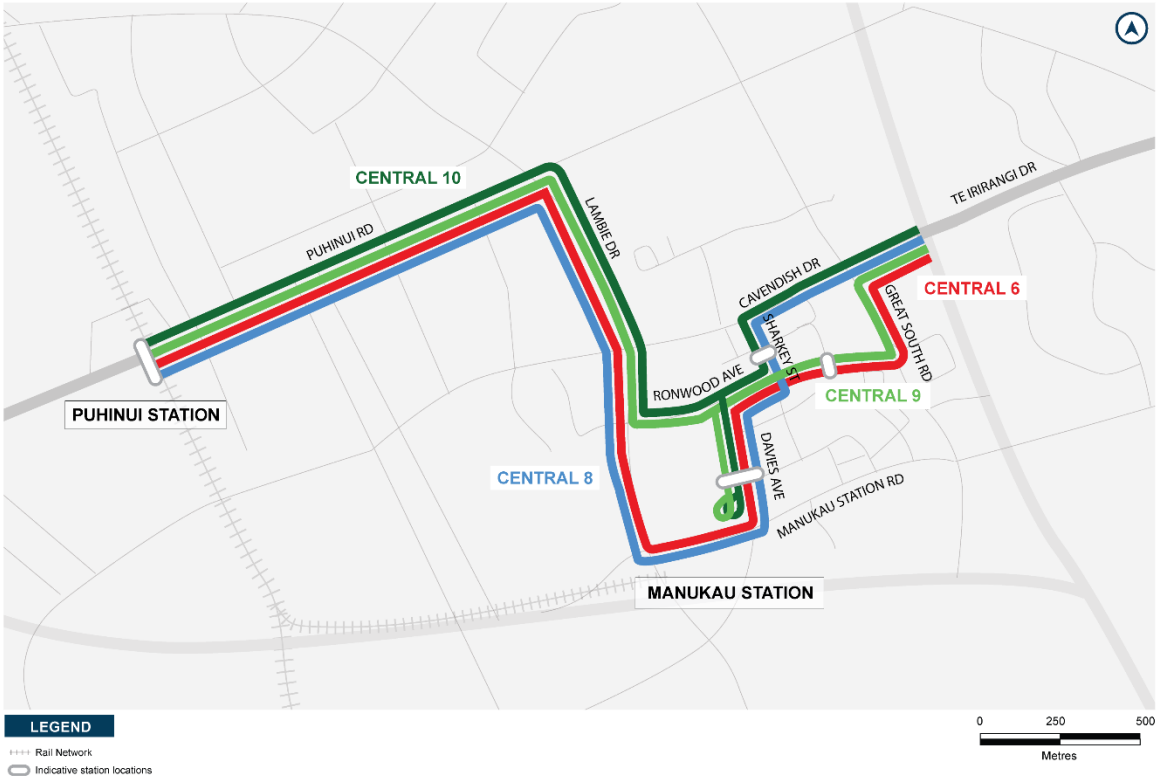

Figure 61: Options Central 8, 9, 10, and the preferred Central 6

11.3.3.2 Assessment summary

Options Central 8, Central 9 and Central 10 were assessed through an MCA. The MCA compared the variant options (Central 8, 9 and 10) against the initial preferred option (Central 6) to indicate a preference, rather than individually scoring each option.

The MCA assessment results are summarised in Table 45 below. Being a hybrid of both Central 8 and Central 9, Central 10 is included in the summary where the benefit of combining these options was identified.

Table 45: Manukau Central route selection assessment summary

Central: Puhinui to Manukau	
Transport Planning – Performance against Investment Objectives	
Investment Objective 1	***More equitable access to job, learning and social activities*** • The Sharkey Street station (Central 8 and 10) was approximately 150m longer walk to Manukau Central (via Amersham Way / Osterley Way) than the Ronwood Avenue station (Central 6 and 9), resulting in reduced access to Manukau Central and its commercial and civic land uses (including businesses on Bakerfield Place and Gladding Place).
Investment Objective 2	***Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable*** **In-bus experience** • Central 8 was broadly similar to Central 6 but was preferred due to the travel time saving of being a slightly shorter route (approx. 150m) and avoiding a major signalised intersection between Great South Road and Ronwood Avenue. • Central 9 was a shorter route than Central 6 (approx. 300m shorter) and avoided the major SH20 / Lambie Drive motorway intersection, which would need to balance BRT priority against motorway queues and lead to additional delays. However, the benefits of Central 9 having a shorter route would be offset by user perceptions of a less direct route due to the turnaround. **Transfer / access to stations** • The Central 9 and Central 10 station on Davies Avenue were likely to be further away from the Manukau Train Station (relative to the Central 6 and Central 8 station on Davies Avenue) due to the turnaround. • Due to the more legible, useable Davies Avenue station configuration and a more functional interface between the BRT and Manukau bus and rail stations, Central 6 was preferred over Central 9.
Investment Objective 3	***Promote urban regeneration improved bult environment and economic opportunities*** • Central 8 would impact on property access on Cavendish Drive and Sharkey Street, whereas Central 6 would impact on access from Great South Road and Ronwood Avenue. While there are major traffic generators on the south side of Cavendish Drive (Pak'n'Save), Central 6 would impact on main vehicle access points to Manukau Central and Ronwood Avenue. Therefore, there was a slight preference to Central 8. • Central 9 performed better than Central 6 as it avoided impacts on major traffic generators (including large format retail) at the southern end of Lambie Drive and on Manukau Station Road.
Investment Objective 4	***Reduce the effects of the transport system on the environment and taonga*** • Walking and cycling facilities provided along the Airport to Botany route (including Sharkey Street) would integrate with other programmes (such as Eke Panuku Streetscape, Walking and Cycling improvements and Manukau Cycling Network Single Stage Business Case). • No substantive differentiation was identified between the option variants and Central 6.
Investment Objective 5	***Healthier and safer people*** • The walking distance between the Manukau bus station and the Central 9 Davies Avenue station would be greater and the legibility of this station would be worse than Central 6.

Transport Planning – Performance against Investment Objectives .	
	• For the options with the turning head on Davies Avenue, pedestrian accessibility and access to Hayman Park would be negatively affected by the fenced, operational turning head required between the park and Manukau Central. Therefore, there is slight preference for the Central 6 alignment than Central 9.
Planning and Environmental Assessment	
Landscape, Visual and Urban Design	**Natural character and Landscapes** • All options would result in loss of street trees on Ronwood Avenue and Davies Avenue. • Compared with Central 6, Central 8 retained mature street trees on the eastern end of Ronwood Avenue but required tree removal on Sharkey Street. This results in a slight preference for Central 8. • No substantive differentiation between Central 9 and Central 6 as the impacts were similar. **Visual Amenity** • All options resulted in increased width of road corridor, making Ronwood Avenue and Davies Avenue more transport orientated. • No substantive differentiation between Central 8 and Central 6 as the impacts were similar. • Central 9 increased bus movements and the transport dominance of Davies Avenue. The bus turnaround facility would have a visual impact on surrounding receivers including MIT. There was therefore a preference for Central 6. **Urban design** • Central 8 stations provided good access to Manukau Central and future development areas (within the Metropolitan Centre Zone). The Central 6 Ronwood Avenue station (compared to the Central 8 Sharkey Street station) was slightly better located to capture these opportunities. • Increased bus movements on Davies Avenue with the Central 9 turnaround facility would result in segregation between Hayman Park from Manukau Central. Having a more transit orientated Davies Avenue did not align with Eke Panuku's vision for Manukau Central. • Compared with Central 8 and 9, Central 6 was preferred.
Social and Community Impact	**Accessibility** • The station on Sharkey Street (Central 8) instead of Ronwood Avenue (Central 6 and 9) reduced connectivity to Manukau Central. • No differentiation between Central 6 and Central 9 as they had the same station locations. These options had strong connections to Manukau Central with the route down Ronwood Avenue and Great South Road and a station near high destination activity (Westfield) and areas identified for future development. **Community** • Compared to Central 6, the Sharkey / Cavendish route (Option 8) reduced BRT access to the main Manukau Central retail area (Westfield) and areas of future potential development along Ronwood Avenue between Sharkey Street and Great South Road. • No differentiations between Central 6 and Central 9 as they have the same station locations. **Health and safety** • The turnaround facility (Central 9) had potential negative impacts on health and wellbeing due to increased severance to Hayman Park.

Transport Planning – Performance against Investment Objectives .

Environmental

Stormwater

- All options (including Central 6) had similar potential stormwater quality and quantity effects.
- Central 8 and Central 10 would have linear treatment (swales and treepits) along Cavendish Drive and Sharkey Street.
- From a stormwater perspective there was a preference for both Central 9 and Central 6 due to treatment being achieved via a new community device in Hayman Park.

Arboriculture

- Central 8 would have less arboricultural impacts than Central 6 as it retained the existing more mature central median and berm planted street trees growing along the eastern portion of Ronwood Avenue. The Mexican Fan Palms growing on Sharkey Street were of low arboricultural value when compared to the trees east of the Sharkey Street roundabout.
- Central 9 performed the most adversely, as the central median and berm trees on the western end of Ronwood Avenue would require removal, and the additional turnaround along Davies Road would affect street trees growing adjacent to and within Hayman Park

Archaeology / Contaminated Land / Ecology

- No differentiation between the proposed options and Central 6 for archaeology, contaminated land and ecology.

Engineering Feasibility Assessment

Constructability

- The proposed variant options (Central 8, Central 9 and Central 10) would be straightforward to implement from a constructability perspective. Local network utilities would likely require relocation or protection. There was no substantive differentiation from Central 6.
- Central 9 avoided the need to widen over the top of the Manukau spur line rail box. The structural integrity of the rail box and the ability to accommodate additional loading associated with the widened corridor would need to be considered in detailed design. Therefore, Central 9 was preferable to Central 6 from a pavement perspective.

Construction disruption

- Central 8 would require construction along Cavendish Drive (heavily trafficked; 31,000 vehicles per day) and would require works at two major intersections. This option was comparable to Central 6 with high traffic volumes on Great South Road (29,000 vpd) and worked on three signalised intersections.
- Construction disruption to traffic was considered similar between Central 8 and Central 6. Both Great South Road and Cavendish Drive were identified as freight routes (Level 1B) and cycle routes (Regional and Major respectively), with Great South Road and Ronwood Avenue also being identified as a Frequent Transit Network route.
- Central 9 had much less disruption to general traffic and active modes, as it avoided the Lambie Drive and Manukau Station corridor which were considered as freight, over dimension and regional cycle routes. Central 9 would also avoid construction at the busy intersection with the SH20 motorway ramps, and avoid construction disruption to students and commuters travelling from Manukau Station to Manukau Central, MIT, and the Manukau bus stations.

Construction cost and risk

- Construction cost and risk was considered similar for Central 8 and Central 6, with construction occurring at major intersections.

Transport Planning – Performance against Investment Objectives .

- Central 9 was preferred over Central 6 as it would be approximately 620m shorter than Central 6, and required approximately 4,000m^2 less private land to be acquired, including less land from Hayman Park.

Safety in design and construction

- No substantive differentiators between Central 6 and 8 as this criterion mostly related to construction works in a major urban area and the associated risks to motorists, pedestrians, and cyclists.
- Central 9 was preferred over Central 6 as it would take place on lower volume roads compared to Central 6 with less complex traffic management. Construction in high pedestrian areas near Manukau Station and MIT buildings would be avoided, and construction over the rail box on Lambie Drive would not be required, reducing the risk of working near rail lines, overhead electrical cables, and working at height.

Operation and maintenance

- No substantive differentiator between the variant options and Central 6.

Property

- Central 10 was preferred as it was the shorted route that avoided acquisition along Great South Road, Manukau Station Road, and Lambie Drive (section south of Ronwood Avenue).

Consentability

- No substantive differentiator between Central 6 and Central 8.
- The Central 9 turnaround and its associated function would likely result in strong sustained resistance from the Auckland Council family (and the surrounding community) due to the creation of a perceived barrier between Hayman Park and Manukau Central. A consenting risk and associated preference for Central 6 over Central 9.

11.3.4 Partner and internal engagement

Manawhenua, Eke Panuku and internal Auckland Transport SME's were briefed on the Manukau Central alignment optioneering. Feedback supported the retention of Central 6 as the preferred alignment. Eke Panuku did not support the turnaround options (Central 9 and 10), noting:

- Installing a turnaround facility (as a part of the BRT) along Davies Ave would further disconnect Hayman Park and Manukau Central by creating a fenced barrier within the vicinity of the turnaround facility.
- The turnaround would reduce the amount of useable park land on the valuable eastern edge of Hayman Park.
- Hayman Park was an important green space within Manukau Central and its connection with the centre was vitally important, any changes to the form and function of Davies Ave should look to allow for this connection.

For these reasons this option did not align with future regeneration plans for Manukau (Transform Manukau).

Manawhenua also acknowledged the turnaround variants options misalignment with the strategic outcomes of Transform Manukau.

11.3.5 Assessment outcome

As outlined, through the assessment process and feedback from project partners, the preferred option for the Central Manukau section remained Central 6. Table 46 outlines why each option variant was discounted:

Table 46: Manukau Central alignment discounted options

Option	Reason for discounting
Option Central 7	Poor performance against key Investment Objective criteria, particularly Investment Objective 1, as it did not directly connect to the Manukau train and bus station resulting in an approximately 300m walk to interchange.
Option Central 8	While slightly shorter than the preferred option (Central 6), the Central 8 alignment and the proposed Sharkey Street station did not proceed as preferred for the following reasons: • The location of the Sharkey Street station provided limited access to Manukau Central (including the Great South Road precinct / Bakersfield Place) compared to the Ronwood Avenue station; and • Central 6 and Central 9 were comparable on numerous assessed criteria, noting accessibility and construction disruption are similar for either corridor.
Option Central 9	While Central 9 would have BRT travel time efficiencies and cost savings due to its shorter route (not traversing around Hayman Park), it did not proceed as preferred for the following reasons: • The Central 9 station on Davies Avenue was less legible and more confusing than the Central 6 one, as buses running in both directions would stop at the same platform; • The turnaround would be perceived by users as 'doubling back' and being indirect; and • The fenced turnaround area and increased frequency of buses would make Davies Avenue a more transport oriented environment, increasing the disconnection between Hayman Park and Manukau Central.
Option Central 10	As Central 10 combined the variants of Central 8 and 9, the proposed alignment would not provide additional benefits by merging these options. For this reason, Central 10 was discounted.

11.4 Route refinement - Puhinui Station walking and cycling

11.4.1 Gap analysis

For the section of the active mode corridor that traversed the North Island Main Trunk (**NIMT**) and Puhinui Station, the Project Team identified a number of further additional options to explore.

A brief alignment assessment had been undertaken as part of preliminary design (Section 10.1.1). To enhance the process undertaken to date on the Puhinui walking and cycling optioneering, a further MCA was considered appropriate to determine the preferred walking and cycling alignment through Puhinui Station.

11.4.2 Option development

An analysis of the previous assessment of the Puhinui Station BRT bridge, the existing form and function of the Puhinui Station, and the surrounding infrastructure and land use identified the following options for further assessment:

Option WC1 - Kenderdine Road / Bridge Street / Cambridge Terrace

This option utilised the existing road corridor to provide walking and cycling facilities for the Airport to Botany route. The at-grade facility (moving west to east) connected Puhinui Road with Kenderdine Road, Bridge Street, Cambridge Terrace, then reconnected back with the Airport to Botany alignment on Puhinui Road.

Figure 62: Option WC1

Option WC2A – Puhinui Road Spiral Ramps

This option utilised spiral ramps and a bridge approximately 190m in length, clipped onto the side of the BRT bridge, to traverse the NIMT for walking and cycling. The west side ramp would be situated on 213 Puhinui Road, 107, 109A and 111 Kenderdine Road, and the east side ramp situated on 6 and 8 Cambridge Terrace and a section on the rail corridor.

Figure 63: Option WC2A

Option WC2B – Puhinui Station Spiral Ramps

This option utilised spiral ramps and a connecting bridge to traverse the NIMT for walking and cycling. The west side ramp would be situated on 205A, 205B, and 203 Puhinui Road, and the east side ramp situated on 6 and 8 Cambridge Terrace and a section on the rail corridor.

Figure 64: Option WC2B

Option WC2C - Puhinui Station Spiral Ramps

This option utilises spiral ramps and a connecting bridge to traverse the NIMT for walking and cycling. The west side ramp is situated on 205 and 203 Puhinui Road, and the east side ramp is situated on 6 and 8 Cambridge Terrace and a section on the rail corridor.

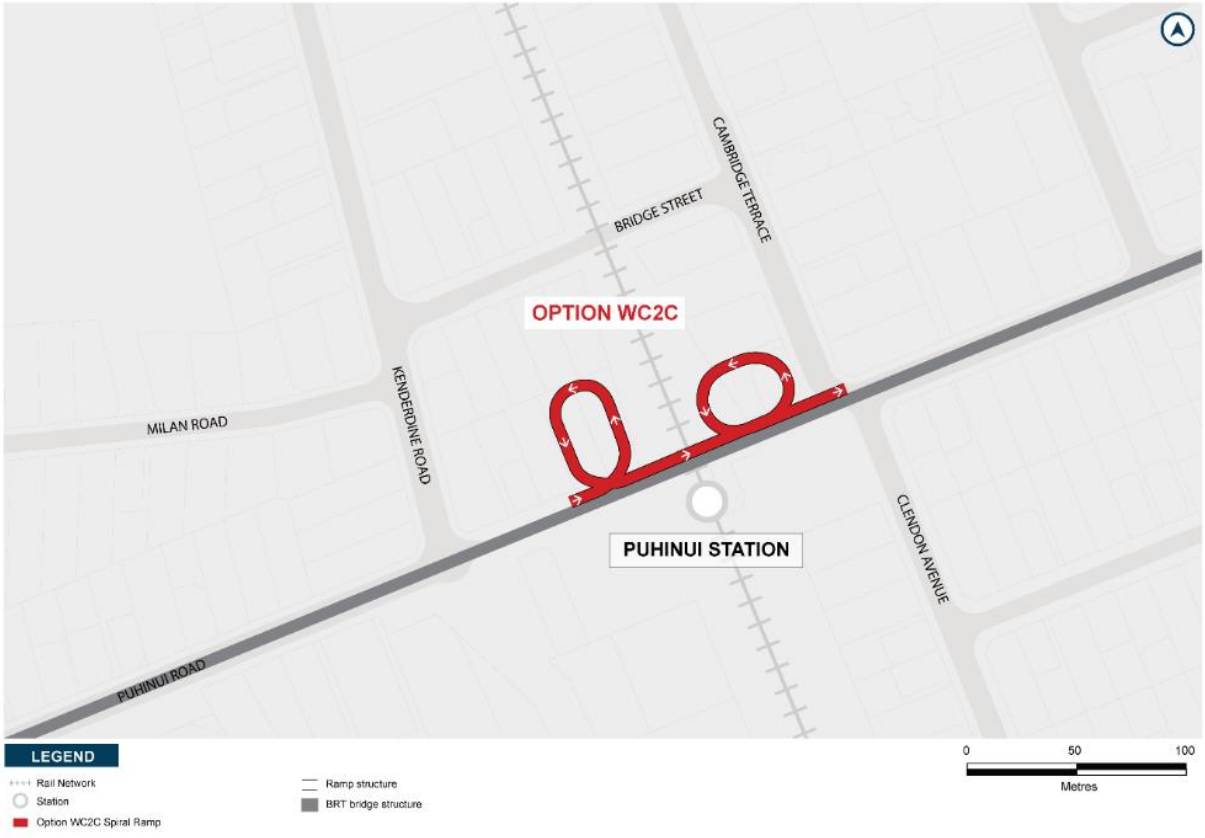

Figure 65: Option WC2C

Option WC3 - BRT Bridge

This option integrated active modes provision on the proposed BRT bridge interchanging with Puhinui Station. The active modes were proposed to be situated on its northern side. The proposed cross section linked the proposed cycle corridor via signals at the start of each ramp.

Figure 66: Option WC3

Option WC4 - Longitudinal Ramp

This option used a new ramp structure to cross the rail line directly north of the Puhinui Station building and the proposed BRT bridge. The walking and cycling corridor from Puhinui Road would connect directly into the base of the structure on each side of the rail line.

Figure 67: Option WC4

11.4.3 Option assessment

11.4.3.1 Sieving process

The options were put though a sieving process which discounted the less viable options. Transport, engineering and urban design specialists inputted to the process identifying two of the spiral ramp options (WC2A and WC2B) to be discounted. Table 47 below provides a summary of reasoning.

Table 47: Puhinui walking and cycling discounted options

Option	Reasoning
Option WC2A	This option was discounted due to the visual impact of the large ramp structure (offset from the BRT bridge and Puhinui Station) on the surrounding residential environment, and the scale of property impact on properties on the corner of Puhinui Road / Kenderdine Road and the eastern side of Puhinui Station.
Option WC2B	This option was discounted as it was considered to be similar in design to Option WC2C, and only one of the two options needed to be tested. Option WC2C was progressed due to its more compact design (for the eastern ramp) within the NIMT / Puhinui Station footprint.

The assessment concluded that due to the scale of property impact and perceived visual impact on the surrounding residential environment, **WC2A and WC2B were discounted**. The remaining Option WC2C will be referred to as WC2 for simplicity in the following sections.

11.4.4 Assessment summary

The Puhinui Station walking and cycling alignment was assessed using an MCA, utilising the methodology detailed in Section 3. The MCA was conducted over two workshops (alongside the other route and design refinement assessment areas). The MCA output is summarised in the Table 48 below. Refer **Appendix C** for detailed scoring.

Table 48: Puhinui Station walking and cycling assessment summary

Puhinui Station Walking and Cycling Alignment	
Performance against Investment Objectives (Investment Objectives 2, 3 and 4 not considered to differentiate between options and were not scored for this assessment)	
To provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland • WC1 was a long route (approx. 850m from Raymond Avenue to Wallace Street). It had the least gradient for cyclists and pedestrians and scored positively, however perceived indirectness as route goes around side streets. • The ramp options (WC2 and WC4) were similar in length with a marginally steeper gradient. Both options would be perceived to be indirect, with WC4 performing the worst due to the zigzag route. • WC3 provided the most direct east-west link, would be attractive for cyclists (bypassing the Puhinui Station area) and scored most positively for this criterion. It was potentially not attractive for pedestrians due to longer length. Cyclists would need to cross to the centre of the road to access the BRT bridge cycling corridor. ***To improve health, safety, and security of people*** • WC1 would need to cross intersections and driveway crossings, increasing risk of conflict between vulnerable users and vehicles. • Both WC2 and WC3 scored positively as grade separating the active modes avoided driveway crossings and intersections, reducing risk of conflict. Due the length of the BRT bridge, WC3 had potentially worse personal safety and security issues for pedestrians. • Due to the sharp corners and poor visibility caused by high barriers, WC4 would create an unsafe walking and cycling environment. With two-way cyclist movement, there would a high safety risk. WC4 performed the worst out of all options.	
Environmental and Planning	
Landscape Visual and Urban Design	***Visual and Landscape*** • The on-road option (WC1) has limited impact to vegetation and no scheduled trees or natural features affected, with limited impact on adjacent properties as works largely located within road reserve. • WC2 and WC4 have similar visual and landscape effects. Both require removal of houses and impact on gardens with the visual impact of 9m high ramps. Privacy issue with people on the ramps looking into adjacent properties.

Puhinui Station Walking and Cycling Alignment	
	• WC3 will increase the width of BRT bridge. The bridge approaches and associated walls will move closer to retained residential properties, exacerbating the dominance of the structure in the context of the surrounding residential environment. ***Urban Design*** • WC1 lacks the direct east west cyclist access along the corridor but provides good local road connections into the surrounding community. Both smaller ramp options provide worse east - west accessibility along the corridor and CPTED issues with using the ramps structures. • WC3 provides convenient east-west movements for pedestrians and cyclists. A very long bridge with observation only being from buses creates a CPTED issue.
Social	***Accessibility*** • WC1 provides strong connections into the local community via the existing local road network and opportunities for further connections. Less convenient for cyclists wanting to cross the corridor quickly without connecting to the local network. • WC2 and WC4 connects into the local community on either side of the bridge enabling local network connection and development as the area intensifies over time. Direct route across the rail corridor for quicker connections. Increases the 'island' impact for remaining properties - which are likely to be redeveloped. • Active modes on the BRT bridge (WC3) provides limited accessibility for local community as connections are over apart at each end of the BRT bridge structure. The surrounding residential community has limited access to the facility. ***Community*** • By providing active modes via Bridge Street (WC1), stronger pedestrian and cycling connections between residential communities either side of the NIMT is achieved. This will improve transport choice for future communities as the area intensifies. • Size and scale of the proposed structures (WC2 and WC4), along with the BRT structure could be quite imposing within a residential context negatively affecting amenity values. • WC3 increases severance between the residential communities on the east and west of the NIMT as connections to the BRT bridge are a long way apart (at each end of the BRT bridge structure). • WC4 connects into the local community on either side of the bridge enabling local network connection and development as the area intensifies over time. Less impact on existing residential property within the 'island' of properties compared to the spiral ramps, and smaller footprint. ***Health and Safety*** • WC1 improves safety for active modes to and from local businesses and community facilities. Potentially not as effective at connecting the local community to where they want to go (i.e. local connections to local shops, schools). • WC2 and WC4 provide increased access to transport choice, limited benefit for this criterion. • WC3 reduces access to transport choice as limited to those at either end of the BRT bridge. Could increase perceptions of being unsafe from feeling 'trapped' on the BRT structure with no alternatives.

Puhinui Station Walking and Cycling Alignment	
Environmental	***Stormwater*** • WC1 utilises the existing road corridor for active mode corridor with minor widening, potential additional increase in flow if more impervious area is added. • WC2 and WC4 involve a small increase in imperviousness area in front of the Puhinui Station. Flood plain also exists on the eastern side of the NIMT, not considered to be an issue. • Flood plain exists on the western side of Puhinui Station which may be in the way of the bridge abutment structure. Increasing the width of the BRT bridge to accommodate WC 3 will likely result in flood storage loss and therefore mitigation would be required. ***Arboriculture*** • Protected vegetation removal on eastern side of bridge for widening required for WC1 so scored negatively. Very few street trees in this section of the proposed works area. No public vegetation removal would be required as part of WC2 and WC4. • Some vegetation removal necessitated by widening the bridge to enable WC 3. This proposal will involve the removal of newly planted trees and vegetation within the bounds of the new station as well as on Puhinui Road. ***Noise and vibration*** • Walking and cycling activities are inaudible next to busy roads and do not generate high noise levels. On that basis the on-road option (WC1) scores neutral, WC2 and WC4 create new ramp structures close to dwellings so scored negatively. By integrating into the ramp structure WC3 has the potential to mitigate any additional noise with elevated edge barrier. • Construction noise scores negatively across all options due to the location and proximity to adjacent dwellings and sensitive receivers. ***Archaeology, Contaminated Land and Ecology*** • Largely no differentiation between options scores for Archaeology, Contaminated Land and Ecology criteria, all scoring minor adverse effect.
Engineering Feasibility	
• All options involved a moderate scale of construction works resulting in bridging the NIMT and had a similar scale of impact from a constructability perspective. The WC3 alignment would integrate with the existing BRT bridge, so would not increase construction complexity. • WC2, WC3, and WC4 would likely impact the same properties as the proposed BRT bridge so is not considered to add additional construction disruption. WC1 will impact sections of Kenderdine Road, Bridge Street and Cambridge Terrace and result in additional disruption during construction. Users of these roads will also be impacted by additional traffic management through this corridor during the works. Overall impacts from WC1 are considered minor. • All options are comparable from a construction cost and risk perspective. Widening to provide for active modes (WC1) and provide for a ramp structure (WC2 and WC4) are considered manageable and straightforward to deliver. WC3 would require added width on the BRT bridge, this design change for delivery is not significant. • From a safety in design perspective, all options require works over the active rail line would require consideration during construction and is reflected in the scores. WC 2, WC3, and WC4 can integrate these works with the proposed BRT bridge so this risk could be managed in conjunction with these works. • The main outlier is WC1, traffic management would be required for construction activities on the local roads making deliver more complex but manageable. Traffic volumes are relatively low and it is considered that these risks can be managed through standard practice (preparation of a Traffic Management Plan).	

Puhinui Station Walking and Cycling Alignment

- Nothing unusual is being proposed for any of these options. Negligible / minor level of maintenance and operation costs and all options scored neutrally on this criterion.

Property

- The ramp options (WC2, WC3, and WC4) would necessitate a series of partial and / or full acquisitions of properties to establish the facilities, these would have a moderate acquisition risk. WC 1 would require the frontage of numerous properties and is considered less complex than providing for the ramp structures.

Consentability

- Minor consenting issues associated with WC 1, 2 and 4. Adding active modes to the BRT bridge would increase the size and dominance of the structure. This will exacerbate its visual impact and potential for community opposition.

11.4.5 Partner and internal engagement

The route and design refinement engagement summarised the Puhinui Station walking and cycling alignment optioneering with Manawhenua, Eke Panuku and internal Auckland Transport SME's. All stakeholders supported WC1 as the preferred option, as WC1 improved walking and cycling connectivity for the surrounding community (not just providing a broader east-west movement,) and linked to Papatoetoe Town Centre (via Cambridge Terrace).

11.4.6 Assessment Outcome

From the resulting assessment and associated engagement, it was concluded WC1 was the preferred for the following reasons:

- WC1 would improve active modes connectivity with adjacent land use (surrounding Puhinui Station) and provide opportunity for a future connection to Papatoetoe Town Centre via Cambridge Terrace;
- The alignment would provide improved transport choice for future communities as the area intensified around Puhinui Station; and
- Balanced against the other option alignments, WC1 would be straightforward to deliver from an engineering feasibility perspective.

11.5 Route refinement - Puhinui Road widening

11.5.1 Gap analysis

The initial preferred option for the segment of the alignment east of Puhinui Station to the Lambie Drive intersection was to widen on the northern side.

Reviewing the assessment undertaken for side of road widening (Section 9), an opportunity was identified to improve the alignment. By widening on the southern side and then transitioning to widening on the northern side, benefits of the previously assessed A-side and B-side options could be combined. This would avoid impacts on:

- Puhinui School (located at 116 Puhinui Road) and;
- The Ranfurly Road Shops and Puhinui Road Medical Centre

This potential variant was considered to have merit and was progressed to be developed as an option variant in the Airport to Botany route refinement.

11.5.2 Option development

The southside variant partially combines A-side (northern side) and B-side (southern side) widening options, widening onto the properties on the southern side of Puhinui Road eastbound from the Puhinui Station to Puhinui School, then returning to widening on the northern side until the Lambie Drive intersection (see Figure 68 below).

Figure 68: Southside variant option (initial preferred option was widening on the northern side entirely)

This option straightens the Puhinui Station BRT bridge, widening onto properties with less development potential (single house zoned under the AUP:OP). As noted above, the option avoids Puhinui School and the Ranfurly Road shops and Puhinui medical centre located adjacent to the Ranfurly Road intersection.

11.5.3 Option assessment

The Southside variant was tested using an MCA, with the methodology detailed in Section 3. The MCA compared the variant option against the initial preferred option (northern side widening) to indicate a preference of options, rather than individually scoring each option. The MCA was undertaken over two workshops with the other route refinement assessments, and assessment outcomes are summarised in Table 49 below.

Table 49: Southside variant assessment summary

Side of Road Widening – Puhinui Station to Lambie Drive	
Environmental and Planning Assessment	
Landscape Visual and Urban	• Compared to the northside option (initial preferred option,) the impact on properties, removal of houses and potential tree loss were very similar. • The southside variant option would avoid Puhinui School and local shops opposite Ranfurly Road on Puhinui Road. It would also straighten the Puhinui Station BRT bridge.

Side of Road Widening – Puhinui Station to Lambie Drive	
	• The southside variant option would create an island of residential land sandwiched between road and industrial land between Plunket Avenue and Grayson Avenue, which is under the HANA overlay.
Social	• The southside variant option would retain major community facilities including Puhinui Medical Centre and Ranfurly Road local shops, the only existing businesses (within the Neighbourhood Centre Zone) along this section of Puhinui Road. • As the southside variant option would widen to the south, the surrounding area would be more likely to develop over time into commercial uses due to its proximity to the HANA. This would help to retain a stronger connection of the northern side of Puhinui Road to Papatoetoe.
Environmental	**Stormwater** • There would be an overall increase in area of high contaminant generating area (from additional bus lanes and traffic lanes) that would require treatment for both options. • The widened portion of the existing road corridor would be over existing residential area (both north and south of Puhinui Road), which would already have some impervious area. The net increase in imperviousness, and runoff quantity, was expected to be manageable within the road corridor. No substantive differentiators between the southside variant option and the initial preferred for noise and vibration, arboricultural and contaminated land criteria.
Engineering Feasibility and Implementability Assessment	
Engineering feasibility • No substantive differentiators between the initial preferred option and the southside variant for the majority of engineering feasibility criteria. • The southside variant would provide a straight alignment for the eastern side of the BRT bridge, avoiding the need for a horizontal curve on the ramp structure (which was previously proposed for the northside widening). This resulted in a simpler design and associated construction beneficial from an engineering and bridge design perspective. **Property** • Both options would have a similar impact on property. A primary differentiator was that the southside variant would not impact the Ranfurly Road local shops and neighbouring medical centre, avoiding a more complex commercial acquisition. **Consentability** • A minor consenting risk was associated with both options due to the scale of widening, but considered to be manageable.	

11.5.4 Partner and Internal Engagement

The southside variant widening option was discussed with internal and external stakeholders along with the other variant options. No direct comments were provided from any key stakeholders regarding the southside variant option.

11.5.5 Assessment outcome

Based on the assessments and associated engagement, the Project Team concluded that the proposed Southside variant option would provide additional benefits for the Project as:

- Widening to the south (between Puhinui Station and Puhinui School) would avoid the Ranfurly Road shops and Puhinui Medical Centre, both considered important social facilities for the surrounding community;
- The eastern portion of the BRT bridge would be straightened, avoiding the need for a horizontal curve on the ramp structure (which was previously proposed for northside widening); and
- The southside variant would widen to the south of the Puhinui Road corridor onto single house zoned land with less development potential. This would allow for the northern side of the corridor to be more comprehensively developed.

For these reasons, the southside variant was integrated into the Airport to Botany preferred option.

12 Approach to stormwater infrastructure

The type and location of stormwater infrastructure was based on a stormwater philosophy that was developed for the Project in partnership with Manawhenua. Refer to Section 6.4 of the AEE.

13 Summary of recommended Project

The preferred route as indicated by outputs of the long list and short list assessments involves an alignment via SH20B between the Airport and Puhinui, through Manukau Metropolitan Centre and the Manukau bus and rail Interchange using (west to east) Lambie Drive, Manukau Station Road, Davies Avenue and Ronwood Avenue, and using Te Irirangi Drive through to Botany.

Between the Airport to Puhinui segment, the short list assessment indicated a strong preference for Option West 1 (via SH20B). The primary differentiator of routing via SH20B was the more direct link between Puhinui and the Airport, reducing travel times, improving network connectivity with greater catchment area, and lowering operating and fleet costs.

For the alignment through Manukau, Option Central 6 was developed as a hybrid of the short-listed Options Central 3 and Central 5 with the aim of combining the primary benefits of the two initial option, both serving the Manukau Station and the Metropolitan Centre and avoiding the congested and constrained intersection of Great South Road, Manukau Station Road and the adjacent SH1 Southern Motorway ramps. Option Central 6 emerged as the preferred; the slightly longer route and slower travel time through Manukau with option Central 6 is considered to be a reasonable trade-off compared to the benefits of providing a more connected service through Manukau.

Between Manukau and Botany, Option East 2 routing through Te Irirangi Drive was the preferred. The primary differentiator for this option was the utilisation of the existing public transport reservation in the road median, resulting in fewer direct property impacts.

The preferred BRT corridor placement is primarily the default centre-running position for the entire Airport to Botany alignment, with the exception of Davies Avenue and the SH20B section between Manukau Memorial Gardens and Orrs Road, due to access and coastal environment factors.

A list of 12 station locations were recommended as preferred options based on the three-level priority criteria, including: Auckland Airport, The Quad Business Park, Puhinui Station, Lambie Drive, Manukau Station, Ronwood Avenue, Diorella Drive, Dawson Road, Ormiston Road, Accent Drive, Smales Road, and Botany Town Centre

The corridor widening options assessment responded to the receiving environment and recommended a combination of single side and both side widening options which minimised impact on key land uses.

As outlined, following the gap analysis, route refinement assessment process and feedback from Project Partners, the preferred Airport to Botany route remains unchanged. However, for the section of Puhinui Road between Puhinui School and Puhinui Station, it was recommended to widen the corridor onto the south side due to the lower development potential of housing (single house zoned under the AUP:OP), avoidance of local shops and medical centre located adjacent to the Ranfurly Road intersection, and avoidance of Puhinui School.

The recommended alignment is shown in Figure 69 below.

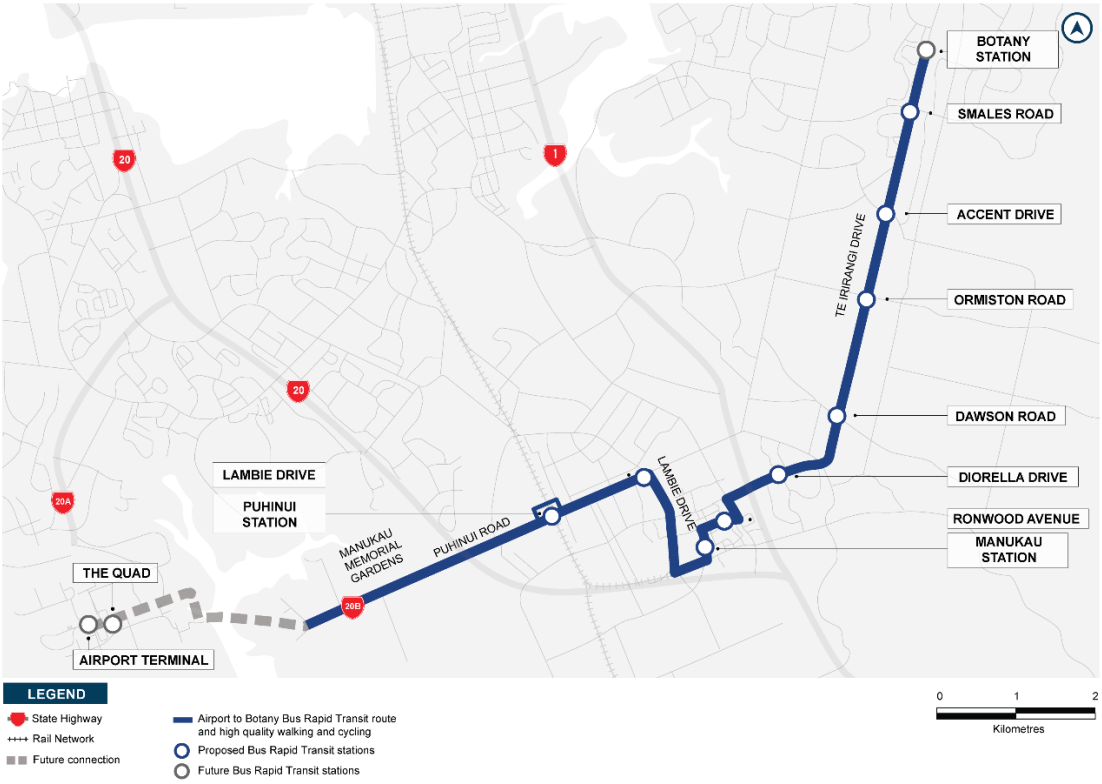

Figure 69: Recommended Project

14 Alternative statutory methods

In accordance with Section 171(1)(b) of the RMA, an evaluation of alternative methods was undertaken for Project. As part of the consideration of alternatives, the options for statutory approval that enable route protection and future implementation were considered in light of a number of contextual elements including project urgency / timing and risk complexity.

As part of the consideration of alternatives, the options for statutory approval that enable route protection and future implementation were considered in light of contextual elements including project strategic importance, project urgency / timing and project complexity risk profile.

A range of RMA approval options were considered including:

a) NoR(s);
b) Alterations to designations;
c) Resource consents; and
d) Plan changes (including the streamlined planning process).

Table 50 below summarises the strengths, weaknesses and suitability of each RMA approval option for the Project.

Table 50: Summary of possible RMA approval and consenting methods

Method	Summary of strengths and weaknesses within the Project context
Notices of requirements/ designations	An NoR(s) to designate land for a public work under the RMA provides a strong level of route protection. An NoR has interim route protection effect as soon as the notice is lodged with Council which ensures the corridors will be protected from incompatible development from that date. If confirmed, the designation is included in the relevant district plan and provides certainty and visibility to the public about the intended land use, enabling informed development decisions. A designation maximises flexibility for future implementation, and also provides authorisation to undertake and maintain the works. It negates the need for additional land use consents to implement works authorised under the district plan provisions of the Auckland Unitary Plan (Operative in Part) (**AUP:OP**).
Alterations to designations	As SH1, SH20 and SH20B are the only transport corridors within the Project that have existing transport designations, there are limited opportunities to rely on this method for the entire Project corridor. Lodging an NoR(s) for the alteration of an existing designation has the same strengths and potential risks as identified for a new designation. It also provides for an efficient use of an existing corridor reducing private property impacts. An alteration to an existing designation for the recommended Airport to Botany corridor is available for SH20 (existing Waka Kotahi designation).
Resource consents	A resource consent grants approval to use resources such as the land, water, air and coastal environment. A resource consent, if granted, is not shown in a district plan and does not provide a method to protect the land not already under the ownership of a requiring authority. However, it can be advantageous to also seek resource consents (particularly for construction activities) under the RMA alongside other route protection methods in instances where projects are likely to proceed to construction once route protection is secured. Resource consents for regional matters will be sought at a later stage.

Method	Summary of strengths and weaknesses within the Project context
Plan changes	This method would provide for the Project through plan changes, or by participation in processes initiated by Council. Securing the network through new plan changes is not considered an appropriate method because the land surrounding the Project corridor are largely already urbanised and developed. Opportunities would be limited to the FUZ land in the vicinity of SH20B. The level of route protection provided by this opportunity is not as strong as that provided by designations which protects the corridor from incompatible development.

Designations were considered to be the most logical and effective method to protect a route in an evolving environment for the following reasons:

- A designation provides certainty to all parties including the community and affected landowners;
- It is a well-recognised and understood tool for route protection which also enables land acquisition processes through the link to the Public Works Act 1981;
- Maximises flexibility for future implementation;
- Negates the need for additional land use consents to implement works authorised under the district plan (s9(3) of the RMA); and
- Will continually provide for future operation and maintenance requirements.

NoR(s) were identified as the recommended route protection method, with Auckland Transport as the requiring authority leading the approvals application process. Waka Kotahi will seek alteration to the Waka Kotahi designation to support the Project.

15 Conclusion

This report has considered alternatives and identified the preferred alignments, corridor widening, RTC placement and station locations for route protection for the Airport to Botany Bus Rapid Transit project. The recommended alignment comprises five Notices of Requirements as follows:

- NoR 1;
- NoR 2;
- NoR 3;
- NoR 4a; and
- NoR 4b.

Te Tupu Ngātahi Supporting Growth, on behalf of Auckland Transport and Waka Kotahi, adopted a systematic approach to considering alternative routes and statutory methods for undertaking the Project. The MCA framework adopted to consider alternative options incorporated Part 2 RMA elements as well as matters appropriate to Auckland Transport and Waka Kotahi's statutory functions.

The consideration of alternatives methodology adopted meets the statutory requirements set out in section 171(1)(b) if the RMA.

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Appendix A

Alternatives optioneering timeline

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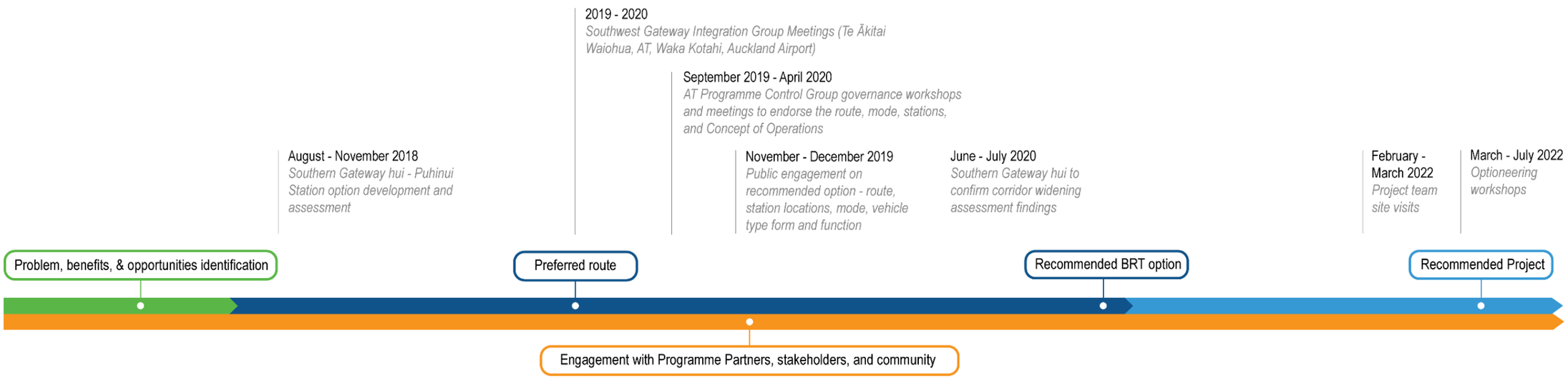
Airport to Botany Bus Rapid Transit Alternatives Optioneering Timeline



Problem definition

February & November - December
Customer insight surveys - To develop the investment logic map

June
Problem definition workshop

July
Southern Gateway hui - Problem definition workshop

Development of recommended BRT option

Generation of initial options

July
Options assessment workshop for Puhinui Station rapid transit bridge

August
Southern Gateway hui - Long list options assessment review

August
Long list to short list workshop

November
Public engagement on route options from Puhinui to Airport and through Manukau

December
Short list to preferred option workshop

Southern Gateway hui Short list to preferred options

February
Manukau City Centre strategy workshop

May
Manawhenua site visit for emerging preferred option

January
AT and Waka Kotahi RTC corridor placement and side of road widening assessments

April
Confirming the recommended alignment, mode and station locations
PCG workshop September 2019
PCG meeting

May
Te Ākitai Waiohua hui to confirm corridor widening assessment findings

Route and design refinement

February
AT Board approved the SSBC

May
Waka Kotahi I&D Committee and Waka Kotahi Board endorsed the SSBC

Gap analysis
NoR stage

June & August
Te Tupu Ngātahi Southern hui - Route refinement updates

July
Manukau Central Workshop
Kāinga Ora, Eke Panuku

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Appendix B

MCA scoring approach

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1 Appendix B: MCA scoring approach

1.1 MCA criteria measures

1.1.1 Transport assessment criteria

Investment Objective	Transport KPI	Measure
IO 1: To provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	Population accessible to key employment precincts	Population within 45-minute PT trip from: Airport, Manukau, Botany
	Jobs accessible to key residential locations	Jobs within 45-minute PT trip from: Ormiston, Ōtara, Botany, Manukau Papakura
	Access to education and healthcare	Tertiary institutes, hospitals, government offices within walking distance of MRT route
	Access to places of customary practice	Marae and sites and places of value to Manawhenua within walking distance of MRT route
	Cost of travel in south and east Auckland	Generalised cost (incorporates cost and time) of PT travel in south and east Auckland
IO 2: To provide public transport to south and east Auckland that is easy to use, reliable, fast, resilient and affordable	Capacity and resilience of the option to meet demand	Assessment of demand and capacity of MRT option
	Travel time reliability, including separation of road space	Assessment of vehicle travel time reliability for key journeys
	Directness and ease of use	Transfers for key journeys: City-Airport, Botany-Airport, Papakura-Airport, Botany-Manukau
	Travel time for key journeys	PT travel time for key journeys (as above)
IO 3: To promote urban regeneration, improved built environment, and economic opportunities	Improved access to Local, Town, and Metropolitan Centres	Local, Town and Metropolitan Centres within walking distance of MRT
	Land development around stations	Extent of Housing NZ (Kāinga Ora) and Eke Panuku land within 1km of stations
IO 4: To reduce the effects of the transport system on the environment and taonga	Air emissions from transportation	Particulate and carbon dioxide emissions from vehicles in Auckland region
	Water quality effects of transport system	Quantity and quality of stormwater around the transport system

Investment Objective	Transport KPI	Measure
	Effects on places of heritage	Effects on sites/buildings/places of heritage value, and sites and places of archaeological significance
	Māori communities and wellbeing[14]	Effect on relationship with ancestral lands, water, sites, waahi tapu, and other taonga
	Te Taiao (air, land, water, taonga)	Effects on air, land, water and other resources including on Mātauranga Māori
	Effects on culture and traditions	Relationship with culture, traditions, ancestral lands, water, sites, waahi tapu, and other taonga
		Recognition of sites of significance
IO 5: To improve health, safety, and security of people	Walking accessibility to PT stations (Improved access to the RTN/FTN)	Population within 500m walk of frequent PT stops or 1km walk to RTN stations
		Additional distance walked due to mode shift

1.1.2 Environmental assessment criteria

Environmental Criteria		Measure
Ecology	Aquatic ecology	Extent, nature and degree of effects on freshwater aquatic ecology, in particular on significant habitats of indigenous fauna and vegetation, and opportunities for ecological restoration and enhancement
	Terrestrial ecology	Extent, nature and degree of effects on terrestrial ecology, in particular on significant habitats of indigenous fauna and vegetation, and opportunities for ecological restoration and enhancement
	Marine ecology	Extent, nature and degree of effects on marine ecology, in particular on significant habitats of indigenous fauna and vegetation, and opportunities for ecological restoration and enhancement
	Arboriculture	Extent and effects of tree removal or alteration on arboricultural values
Coastal processes	Construction effects on Coastal Marine Areas (CMA)	Extent of temporary effects on coastal physical processes
	Geomorphology / sedimentation and tidal flows	Extent of permanent effects on coastal physical processes, including effects of geomorphology, exacerbating sedimentation and changes in tidal and storm-tide flows in the upper creeks
	Sea-level rise and coastal climate change	Extent of increasing impacts on coastal physical processes from sea-level rise and climate change, including vulnerability of the works (present and proposed) and opportunities to improve resilience
Stormwater	Stormwater quality	Impact of operational stormwater discharges on flooding within the catchment, including vulnerability to impacts of climate change such as increased storm events, and opportunities to increase resilience

[14] Note that at the time of issue, Manawhenua had not validated these scores

Environmental Criteria		Measure
	Stormwater quantity	Impact of operational stormwater discharges on flooding within the catchment, including vulnerability to impacts of climate change such as increased storm events, and opportunities to increase resilience
Landscape, visual and urban design	Natural character and landscape	Extent, nature and degree of effects on natural character, features, and landscape
	Visual	Extent, nature and degree of effects on visual amenity
	Urban design	Extent and degree of effects on urban design, including open space
Social/ community impact	Accessibility	Extent and degree of effects on the community concerning accessibility to/from facilities, services, properties and businesses
	Community	Extent and degree of change to groups and activities, including sense of community and to known aspirations and plans
	Health and safety	Extent and degree of effects on human health and safety
Geology	Geology	Preservation of nationally and regionally significant volcanic features
Noise and vibration	Operational noise and vibration	Impact of operational noise and vibration on sensitive receivers. Ability to mitigate adverse impact
	Construction noise and vibration	Impact of construction noise and vibration on sensitive receivers. Ability to mitigate adverse impact
Archaeology and built heritage	Archaeology and built heritage	Extent of effects on sites and places of archaeological value and on heritage buildings and places
Contaminated land	Contaminated land – waste management	Potential for works to expose materials containing hazardous substances which may require additional management considerations
	Construction management (contaminated soils)	Potential to encounter and ability to manage the effects of contaminated soils on human health and the environment
	Construction management (groundwater)	Potential to encounter and ability to manage the effects of groundwater on human health and the environment
	Passive discharge	Potential to influence ongoing passive discharge of contaminants from soil or groundwater to groundwater or surface water
	Potential for new or cross contamination	Potential for the works to mobilise or place contamination within the project area
	Built environment risk	Risk to concrete and plastic below ground from aggressive ground conditions such as solvents and acid conditions
	Health and safety of construction workers	Risk to construction workers from soil or groundwater

Environmental Criteria		Measure
	Acid sulphate soil	Risk to the environment from the discharge of acid generating soils
Air quality	Operational air quality	Extent and degree of effects on human health arising from operational air pollution
	Construction air quality	Extent and degree of effects on human health arising from discharges to air from construction activities

1.1.3 Engineering feasibility and implementability assessment criteria

Engineering Feasibility and Implementability Criteria	Measure
Constructability	The level of complexity of implementing the solution, with consideration of construction methodology and staging, and constraints
Construction disruption	Impacts of construction on people and businesses
Construction cost and risk	Estimated construction costs, including complexity and risk in construction
Safety in design and construction	General assessment of hazards and level of complexity in risk management during construction
Operation and maintenance	Assessment of maintenance and operational implications over the projected life
Property	The extent of impacts on properties; primarily the necessary acquisition of properties
Consentability	Level of complexity of gaining approvals and the level of compliance with regulatory plans

1.2 MCA criteria for optioneering assessments

		Long list	Short list (West)	Short list (Central)	Puhinui Station rapid transit bridge	Rapid transit corridor placement (Botany to SH20/20B)	Side of road widening (Botany to SH20/20B)	Rapid transit corridor placement and side of road widening (SH20B)	Walking and cycling (SH20B)	Route refinement – Puhinui Station Walking and Cycling
Transport assessment										
IO1: Provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	Population accessible to key employment precincts	✓	✓	✓						✓
	Jobs accessible to key residential locations	✓	✓	✓						
	Access to education and healthcare	✓	✓	✓						
	Access to places of customary practice	✓	✓	✓						
	Cost of travel in south and east Auckland		✓	✓		✓				
IO2: Provide public transport for south and east Auckland that is easy to use, reliable, fast, resilient and affordable	Capacity and resilience of the option to meet demand		✓	✓						✓
	Travel time reliability, including separation of road space		✓	✓		✓		✓	✓	
	Ability for high priority trips to have reliable journeys		✓							
	Directness and ease of use	✓	✓	✓						
	Travel time for key journeys	✓	✓	✓						

		Long list	Short list (West)	Short list (Central)	Puhinui Station rapid transit bridge	Rapid transit corridor placement (Botany to SH20/20B)	Side of road widening (Botany to SH20/20B)	Rapid transit corridor placement and side of road widening (SH20B)	Walking and cycling (SH20B)	Route refinement – Puhinui Station Walking and Cycling
IO3: Promote urban regeneration, improved built environment, and economic opportunities	Population accessible to key employment precincts	✓	✓	✓						✓
	Jobs accessible to key residential locations	✓	✓	✓						
	Improved access to Local, Town, and Metropolitan Centres	✓	✓	✓						
	Potential for land development around stations	✓	✓	✓						
IO4: Reduce the effects of the transport system on the environment and taonga	Air emissions from transportation		✓	✓						✓
	Water quality effects of transport system		✓	✓						
	Effects on places of heritage	✓	✓	✓						
	Māori communities and wellbeing	✓	✓	✓						
	Te Taiao (air, land, water)	✓	✓	✓						
	Effects on culture and traditions	✓	✓	✓						
	Opportunities to recognize sites of significance	✓								
IO5: Improve health, safety	Air emissions from transportation		✓							✓

		Long list	Short list (West)	Short list (Central)	Puhinui Station rapid transit bridge	Rapid transit corridor placement (Botany to SH20/20B)	Side of road widening (Botany to SH20/20B)	Rapid transit corridor placement and side of road widening (SH20B)	Walking and cycling (SH20B)	Route refinement – Puhinui Station Walking and Cycling
and security of people	Walking accessibility to PT stations		✓	✓						
	Improved access to the RTN/FTN	✓								
	Extent of local walking and cycling connections		✓	✓						
	Amenity function of activity areas and town centres		✓							
	Safe walking and cycling connections		✓							
Environmental / planning assessment										
Ecology (including arboriculture)		✓	✓	✓	✓			✓	✓	✓
Coastal processes			✓							
Stormwater		✓	✓	✓	✓		✓			✓
Landscape, visual and urban design		✓	✓	✓	✓		✓	✓	✓	✓
Social and community impact		✓	✓	✓			✓	✓	✓	✓
Noise and vibration		✓	✓	✓	✓		✓			✓
Archaeology and built heritage		✓	✓	✓	✓					✓
Contaminated land		✓	✓	✓	✓		✓	✓	✓	✓

	Long list	Short list (West)	Short list (Central)	Puhinui Station rapid transit bridge	Rapid transit corridor placement (Botany to SH20/20B)	Side of road widening (Botany to SH20/20B)	Rapid transit corridor placement and side of road widening (SH20B)	Walking and cycling (SH20B)	Route refinement – Puhinui Station Walking and Cycling
Air quality	✓	✓		✓					
Engineering feasibility assessment									
Constructability	✓	✓	✓	✓	✓	✓*	✓*	✓*	✓
Construction disruption	✓	✓	✓		✓	✓	✓	✓	✓
Construction cost and risk	✓	✓	✓	✓	✓		✓	✓	✓
Safety in design and construction	✓	✓	✓	✓	✓				✓
Operation and maintenance	✓	✓	✓	✓	✓				✓
Property	✓	✓	✓	✓		✓	✓	✓	✓
Consentability	✓	✓	✓	✓		✓	✓	✓	✓

* Represents four criteria assessed (highways, structures, geotechnical, and utilities)

1.3 Scoring methodology

A seven-point scale (-3 to 3) was used to assess the transport planning criteria and the environmental / planning criteria (Table 51). Each option was compared against a do-minimum or base case option, representing the minimum expected level of interventions based on the previous short-term recommendations of the study area. Negative scores indicated worse performance than the base case, whilst positive scores indicated better performance and a score of zero represented similar performance to the base case option.

Table 51: Scoring scale for transport planning criteria and environmental / planning criteria

Measure	Scoring
Unmitigable adverse effects	-3
Significant adverse effects	-2
Minor/moderate adverse effects	-1
Neutral effects	0
Minor positive effects	1
Moderate positive effects	2
Significant positive effects	3

For engineering feasibility and implementation assessments, a different rating scale of a five-point scale with no negative values (1 to 5) was used. Unlike the other metrics, the feasibility was not measured against a do-minimum approach. A descriptive rating for each criterion was specified against the five-point scale for clarity and transparency; the descriptions of the scores are set out in Table 52.

Table 52: Engineering feasibility and implementability rating scale

Measure	Scoring
Highly specialised work with significant physical constraints; significant health and safety design and construction risks; significant maintenance, operation, and construction costs; significant construction impact on people and businesses; impacts significant land holdings (100+ parcels)	1
Resources to carry out the work are scarce; high level of health and safety design and construction risks; high maintenance, construction, and operation costs; high impact of construction on people and businesses; impacts large amount of residential and business properties (40-100 parcels)	2
Major construction works but not unusual; moderate level of health and safety design and construction risks; moderate maintenance, construction, and operation costs; moderate impact of construction on people and businesses; impacts a moderate number of residential and business properties (10-40 parcels)	3
Moderate works; low to moderate level of health and safety design and construction risks; moderate maintenance, construction, and operation costs; minor impact of construction on people and businesses; minimal land requirement (<10 parcels)	4
Straightforward and minor works; low level of health and safety design and construction risks; negligible/ minimal maintenance, construction, and operation costs; negligible impact of construction on people and businesses; no land requirement	5

The majority of the MCA assessments utilised a consistent scoring approach against the groups of criteria detailed above, the exceptions are:

Puhinui Station rapid transit bridge

The assessment for the Puhinui Station Interchange and the associated rapid transit bridge were scored based on performance against a three-point scale of High, Medium or Low, as set out in Table 53. This relates to associated benefits of each criterion (i.e. 'high' scoring refers to high positive impacts).

Table 53: Scoring scale for the Puhinui Station rapid transit bridge

Measure	Scoring
High	High
Medium	Medium
Low	Low

SH20B section: BRT placement / side of road widening / walking and cycling assessments

The assessments within the SH20B section of the alignment were undertaken in tandem with the 20Connect project and adopted a different scoring scale. These included the BRT corridor placement, side of road widening, and walking and cycling assessments along SH20B. The scale scored the criteria based on the perceived risk associated with each option, from low, medium to high (Table 54 below).

Table 54: Risk-based scoring scale for the BRT corridor placement assessment and walking and cycling assessment for the SH20B corridor

Measure	Scoring
None or very minor issues	Low risk
A few issues or an issue with moderate difficulty	Medium risk
Fatal flaw; significant difficulties	High risk

Route and design refinement assessments

To test the merits of the identified option variants, a performance-based comparison was used. This involved the technical specialists comparing (in the context of the criteria) the option variants against the preferred option (from the previous assessment) to indicate a preference.

No MCA was undertaken for the Puhinui Station walking and cycling alignment options, as a full MCA had already been carried out on this set of options prior to route refinement. The assessment utilised transport, environmental/ planning, and engineering feasibility assessment criteria. The engineering criteria were scored using the same seven-point scale as was used for the transport and environmental criteria to provide a greater level of comparison between criteria.

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Appendix C
MCA scoring outputs

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2 Appendix C: MCA scoring outputs

2.1 Long list assessment

	KPI / Measure	West Segment – Airport to Puhinui			Central Segment – Puhinui to Manukau			East Segment – Manukau to Botany[15]			Alternative
		West 1 (via SH20B)	West 2 (via SH20A)	West 6 (Heavy Rail to Puhinui)	Central 1 (Bypass Manukau via Puhinui Road)	Central 3 (via Ronwood Ave)	Central 5 (via Manukau Station Road)	East 1 (via Chapel Road)	East 2 (via Te Irirangi Drive)	East 3 (via Preston Road, Harris Road)	Alt 1 (Airport to Ormiston via Māngere, Middlemore, Otara)
Transport Planning Assessment											
IO 1: Provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	Population accessible to key employment precincts	3	1	0	2	3	3	2	3(2)	2	-2
	Jobs accessible to key residential locations	2	2	2	2	2	2	1	2	3(2)	0
	Access to education and healthcare	1	2	3	1	1	1	1	1	1	2
	Access to places of customary practice[16]	0	1	0	0	0	0	0	0	0	2
	Peak travel time reliability	2	2	3	0	2	2	0	2	0	-1
IO 2: Provide public transport for south and east of Auckland that is easy to use, reliable, fast, resilient and affordable	Directness of key journeys	2	2	0	2	2	2	2	2	2	0
	Travel time for key journeys	3	1	2	2	3	3	3(2)	3(2)	3(2)	-2
IO 3: Promote urban regeneration, improved built environment, and economic opportunities	Population accessible to key employment precincts	3	1	0	2	3	3	2	3(2)	2	-2
	Jobs accessible to key residential locations	2	2	2	2	2	2	1	2	3(2)	0
	Improved access to Auckland Unitary Plan ‘centres’	2	3	2	0	2	2	1(0)	2(0)	1(-1)	1
	Potential for land development	0	1	0	0	0	0	0	0	1	3
IO 4: Reduces the effects of the transport system on the environment and the taonga	Extent of effects on places of heritage	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1
	Effect on Māori communities and wellbeing	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1
	Te Taiao (air, land, water)	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1
	Effects on culture and traditions	1	1	1	1	1	1	1	1	1	1

[15] The transport planning metrics for the East segment were dependent on whether Manukau was bypassed in the Central segment B (i,e, Option Central 1) or if it was connected (i.e. Option Central 3 or Central 5). The main score shown assumes Manukau is connected to in the Central segment B, whilst a secondary score is shown in brackets if this score differs by assuming Manukau is bypassed.

[16] Assessed by Aurecon

	KPI / Measure	West Segment – Airport to Puhinui			Central Segment – Puhinui to Manukau			East Segment – Manukau to Botany[15]			Alternative
		West 1 (via SH20B)	West 2 (via SH20A)	West 6 (Heavy Rail to Puhinui)	Central 1 (Bypass Manukau via Puhinui Road)	Central 3 (via Ronwood Ave)	Central 5 (via Manukau Station Road)	East 1 (via Chapel Road)	East 2 (via Te Irirangi Drive)	East 3 (via Preston Road, Harris Road)	Alt 1 (Airport to Ormiston via Māngere, Middlemore, Otara)
	Opportunities to recognise sites of significance	1	1	1	0	0	0	0	0	0	0
IO 5: To improve health, safety, and security of people	Improved access to the RTN/FTN	1	2	1	2	1	1	2	1	3	2
Environmental and Planning Assessment											
	Aquatic ecology	-1	-1	0	-1	0	-1	-1	-1	-1	-1
	Terrestrial ecology	-1	-1	-1	0	0	0	-1	-1	-1	-1
	Marine ecology	-1	0	-1	0	0	0	0	0	0	-1
	Arboriculture	-1	-2	-1	-2	-2	-2	-2	-2	-1	-2
	Stormwater quality	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	Stormwater quantity	-1	-1	-1	-2	-2	-2	-1	-1	-1	-2
	Natural character and landscape	-1	-1	-1	0	0	0	0	0	0	0
	Visual	-1	-2	-1	-2	-1	-1	-2	-2	-2	-2
	Proximity to key destinations and trip generators	0	2	0	1	2	3	2	2	1	2
	Opportunities for further developments	1	2	0	0	3	3	1	1	1	2
	Ability to accommodate suitable cross-section	0	-1	0	-1	0	0	-1	0	-1	-1
	Accessibility	1	1	1	1	1	1	1	1	1	1
	Community	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
	Health and safety	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	Operational noise and vibration	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1
	Construction noise and vibration	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1
	Archaeology and built heritage	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1
	Contaminated land	-1	-1	-3	-1	-1	-2	-1	-1	-2	-1
	Operational air quality	0	0	0	0	0	0	0	0	-1	0
	Construction air quality	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1
Engineering Feasibility / Implementability Assessment											

	KPI / Measure	West Segment – Airport to Puhinui			Central Segment – Puhinui to Manukau			East Segment – Manukau to Botany[15]			Alternative
		West 1 (via SH20B)	West 2 (via SH20A)	West 6 (Heavy Rail to Puhinui)	Central 1 (Bypass Manukau via Puhinui Road)	Central 3 (via Ronwood Ave)	Central 5 (via Manukau Station Road)	East 1 (via Chapel Road)	East 2 (via Te Irirangi Drive)	East 3 (via Preston Road, Harris Road)	Alt 1 (Airport to Ormiston via Māngere, Middlemore, Otara)
	Constructability	3	2	2	3	3	3	3	3	3	3
	Construction disruption	3	2	1	3	3	3	3	4	2	3
	Construction cost and risk	3	2	1	3	3	3	3	3	3	2
	Safety in design and construction	3	2	2	3	3	3	3	3	3	3
	Operation and maintenance	4	2	2	4	4	4	4	4	4	4
	Consentability	2	2	1	2	2	2	2	2	2	2

2.2 Short list assessment (West Segment options)

2.2.1 Transport Planning assessment

Investment Objective	KPI	Measure	West Segment – Airport to Puhinui	
			West 1	West 2
Transport Planning Assessment				
IO1: Provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	Population accessible to key employment precincts	Population within 45-minute PT trip from: Airport, Manukau, Botany	3	1
	Jobs accessible to key residential locations	Jobs within 45-minute PT trip from: Ormiston, Otara, Botany, Manukau Papakura	3	2
	Access to education and healthcare	Tertiary institutes, hospitals, government offices within walking distance of MRT route	1	2
	Access to places of customary practice	Marae and sites and places of value to Manawhenua within walking distance of MRT route	0	1
	Cost of travel in south and east Auckland	Generalised cost (incorporates cost and time) of PT travel in south and east Auckland	2	1
IO2: Provide public transport for south and east of Auckland that is easy to use, reliable, fast, resilient and affordable	Capacity and resilience of the option to meet demand	Assessment of demand and capacity of MRT option	2	2
	Travel time reliability, including separation of road space	Assessment of vehicle travel time reliability for key journeys	3	3
	Directness and ease of use	Transfers for key journeys: City-Airport, Botany-Airport, Papakura-Airport, Botany-Manukau	2	2

Investment Objective	KPI	Measure	West Segment – Airport to Puhinui	
			West 1	West 2
	Travel time for key journeys	PT travel time for key journeys (as above)	3	1
IO3: To promote urban regeneration, improved built environment, and economic opportunities	Population accessible to key destinations	Population within 45-minute PT trip from: Airport, Manukau, Botany	3	1
	Jobs accessible from key locations	Jobs within 45-minute PT trip from: Ormiston, Otara, Botany, Manukau, Papakura	3	2
	Improved access to Local, Town, and Metropolitan Centres	Local, Town and Metropolitan Centres within walking distance of MRT	2	3
	Land development around stations	Extent of Housing NZ (Kāinga Ora) and Eke Panuku land within 1km of stations	1	2
IO4: To reduce the effects of the transport system on the environment and taonga	Air emissions from transportation	Particulate and carbon dioxide emissions from vehicles in Auckland region	-1	-1
	Water quality effects of transport system	Quantity and quality of stormwater around the transport system	-1	-1
	Effects on places of heritage	Effects on sites/buildings/places of heritage value, and sites and places of archaeological significance	-2	-2
	Māori communities and wellbeing[17]	Effect on relationship with ancestral lands, water, sites, waahi tapu, and other taonga	-2	-2
	Te Taiao (air, land, water, taonga)	Effects on air, land, water and other resources including on Mātauranga Māori	-2	-2
	Effects on culture and traditions	Relationship with culture, traditions, ancestral lands, water, sites, waahi tapu, and other taonga	-2	-2
		Recognition of sites of significance	1	1
IO5: To improve health, safety, and security of people	Walking accessibility to PT stations	Population within 500m walk of frequent PT stops or 1km walk to RTN stations	1	2
		Additional distance walked due to mode shift	2	2
	Extent of local walking and cycling connections	Technical assessment of walking and cycling links	2	2

[17] Note that at the time of issue, Manawhenua had not validated these scores

2.2.2 Environmental and engineering feasibility assessments

Criteria	Measure	Segment A – Airport to Puhinui					
		HS1-A1	HS1-A2	HS2-A1	HS2-A2	HS3-A1	HS3-A2
Environmental and Planning Assessment							
Ecology	Aquatic ecology	-1	-1	-1	-1	-1	-1
	Terrestrial ecology	-1	-1	-1	-1	-1	-1
	Marine ecology	-1	-1	-1	-1	-1	-1
	Arboriculture	The arboriculture measure was not scored in detail for the short list assessment, due to the initial screening indicating that there would be no differentiation between the options.					
Coastal processes	Construction effects on Coastal Marine Areas (CMA)	-2	-2	-2	-2	-2	-2
	Geomorphology / sedimentation and tidal flows	-1	-1	-1	-1	-1	-1
	Sea-level rise and coastal climate change	-1	-1	-1	-1	-1	-1
Stormwater	Stormwater quality	-1	-1	-1	-1	-1	-1
	Stormwater quantity	-1	-1	-1	-1	-1	-1
Landscape, visual and urban design	Natural character and landscape	-2	-2	-2	-2	-2	-2
	Visual	-1	-1	-1	-1	-1	-1
	Extent, nature and degree of effects on urban design, including open space	2	2	1	1	1	1
Social / community impact	Accessibility	2	3	2	3	2	3
	Community	-2	-2	-2	-2	-2	-2
	Health and safety	-1	-1	-1	-1	-1	-1
Noise and vibration	Operational noise and vibration	0	-1	-1	-1	-1	-1
	Construction noise and vibration	-1	-1	-1	-1	-1	-1
Archaeology and built heritage	Archaeology and built heritage	-2	-2	-2	-2	-2	-2
Contaminated land	Construction management (contaminated soils)	-2	-3	-1	-2	-1	-2
	Construction management (groundwater)	-1	-1	-1	-1	-1	-1
	Passive discharge	-1	-1	0	0	0	0
	Potential for new or cross contamination	-2	-2	-2	-2	-2	-2
	Built environment risk	-1	-1	-1	-1	-1	-1
	Health and safety of construction workers	-2	-2	-1	-1	-1	-1
	Acid sulphate soil	-3	-3	-3	-3	-3	-3

Criteria	Measure	Segment A – Airport to Puhinui					
		HS1-A1	HS1-A2	HS2-A1	HS2-A2	HS3-A1	HS3-A2
Air quality	Operational air quality	0	0	0	0	0	0
	Construction air quality	-1	-1	-1	-1	-1	-1
Engineering Feasibility / Implementability Assessment							
Constructability		4	2	2	2	2	2
Construction disruption		3	3	2	2	2	2
Construction cost and risk		2	2	3	2	3	2
Safety in design and construction		3	3	3	3	3	3
Operation and maintenance		3	3	3	3	3	3
Property		2	2	2	2	2	2
Consentability		2	2	2	2	2	2

2.3 Short list assessment (Central Segment options)

Investment Objective	KPI / Criteria	Measure	Central Segment – Puhinui to Manukau		
			Central 3 (via Ronwood)	Central 5 (via Manukau Station Road)	Central 6 (Hybrid)
Transport Planning Assessment					
IO1: To provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	Population accessible to key employment precincts	Population within 45-minute PT trip from: Airport, Manukau, Botany	2	3	3
	Jobs accessible to key residential locations	Jobs within 45-minute PT trip from: Ormiston, Otara, Botany, Manukau Papakura	2	2	2
	Access to education and healthcare	Tertiary institutes, hospitals, government offices within walking distance of MRT route	1	1	1
	Access to places of customary practice	Marae and sites and places of value to Manawhenua within walking distance of MRT route	0	0	0
	Cost of travel in south and east Auckland	Generalised cost (incorporates cost and time) of PT travel in south and east Auckland	Not formally assessed due to no models for Manukau, however there would be negligible difference between the options		
IO2: To provide public transport for south and east of Auckland that is easy to use, reliable, fast, resilient and affordable	Capacity and resilience of the option to meet demand	Assessment of demand and capacity of MRT option	2	1	2
	Travel time reliability, including separation of road space	Assessment of vehicle travel time reliability for key journeys	2	2	2
	Directness and ease of use	Transfers for key journeys: City-Airport, Botany-Airport, Papakura-Airport, Botany-Manukau	2	2	2
	Travel time for key journeys	PT travel time for key journeys (as above)	3	1	2
IO3: To promote urban regeneration, improved built environment, and economic opportunities	Population accessible to key destinations	Population within 45-minute PT trip from: Airport, Manukau, Botany	2	3	3
	Jobs accessible from key locations	Jobs within 45-minute PT trip from: Ormiston, Otara, Botany, Manukau, Papakura	2	2	2
	Improved access to Local, Town, and Metropolitan Centres	Local, Town and Metropolitan Centres within walking distance of MRT	3	2	3
	Land development around stations	Extent of Housing NZ (Kāinga Ora) and Eke Panuku land within 1km of stations	0	1	1
IO4: To reduce the effects of the transport system on the environment and taonga	Air emissions from transportation	Particulate and carbon dioxide emissions from vehicles in Auckland region	Not formally assessed due to no models for Manukau, however there would be negligible differences between the options		
	Water quality effects of transport system	Quantity and quality of stormwater around the transport system	-1	-1	-1
	Effects on places of heritage	Effects on sites/buildings/places of heritage value, and sites and places of archaeological significance	-1	-1	-1
	Māori communities and wellbeing[18]	Effect on relationship with ancestral lands, water, sites, waahi tapu, and other taonga	-1	-1	-1
	Te Taiao (air, land, water, taonga)	Effects on air, land, water and other resources including on Mātauranga Māori	-1	-1	-1

[18] Note that at the time of issue, Manawhenua had not validated these scores

Investment Objective	KPI / Criteria	Measure	Central Segment – Puhinui to Manukau		
			Central 3 (via Ronwood)	Central 5 (via Manukau Station Road)	Central 6 (Hybrid)
	Effects on culture and traditions	Relationship with culture, traditions, ancestral lands, water, sites, waahi tapu, and other taonga	0	0	0
		Recognition of sites of significance	0	0	0
IO5: To improve health, safety, and security of people	Air emissions from transportation	Particulate and carbon dioxide emissions from vehicles in Auckland region	Not formally assessed due to no models for Manukau, however there would be negligible differences between the options		
	Walking accessibility to PT stations	Population within 500m walk of frequent PT stops or 1km walk to RTN stations	1	1	1
		Additional distance walked due to mode shift	Not formally assessed due to no models for Manukau, however there would be negligible differences between the options		
	Extent of local walking and cycling connections	Technical assessment of walking and cycling links	2	2	2
Environmental and Planning Assessment					
	Ecology	Aquatic ecology	0	0	0
		Terrestrial ecology	0	0	0
		Marine ecology	Not assessed because the information required to differentiate between options is unavailable		
		Arboriculture	-2	-2	-2
	Stormwater	Stormwater quality	-1	-1	-1
		Stormwater quantity	-3	-2	-3
	Landscape, visual and urban design	Natural character and landscape	-1	-1	-1
		Visual	-1	-1	-1
		Urban design	1	2	1
	Social / community impact	Accessibility	1	1	1
		Community	-1	-1	-1
		Health and safety	-1	-1	-1
	Noise and vibration	Operational noise and vibration	0	-1	-1
		Construction noise and vibration	-1	-1	-1
	Archaeology and built heritage	Archaeology and built heritage	-1	-1	-1
	Contaminated land	Waste management	-1	-1	-1
		Health and safety during construction works	-1	-1	-1
	Air quality	Operational air quality	Not assessed because the information required to differentiate between options is unavailable		

Investment Objective	KPI / Criteria	Measure	Central Segment – Puhinui to Manukau		
			Central 3 (via Ronwood)	Central 5 (via Manukau Station Road)	Central 6 (Hybrid)
		Construction air quality	Not assessed because the information required to differentiate between options is unavailable		
Engineering Feasibility and Implementability Assessment					
	Constructability		3	3	3
	Construction disruption		3	2	2
	Construction cost and risk		3	3	3
	Safety in design and construction		3	3	3
	Operation and maintenance		3	3	3
	Property		1	3	1
	Consentability		3	3	3

2.4 Puhinui Station Rapid Transit bridge assessment

Criteria	Do-Minimum	Option 1	Option 2	Option 3	Option 4	Option 5
Transport Planning Assessment						
Project Objective 1: Provide more reliable and timely travel choices to and from the Airport and surrounding areas						
Project Objective 2: Improve 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						
Project Objective 4: Integrate with and get increased value from existing and planned transport investments						
Project Objective 5: Be operational by end of 2020/early 2021						
Environmental and Planning Assessment						
Environmental	N/A					
Urban design	N/A					
Development potential	N/A					

Criteria	Do-Minimum	Option 1	Option 2	Option 3	Option 4	Option 5
RTN integration / future proofing	N/A					
Customer experience	N/A					
Engineering Feasibility and Implementability Assessment						
Capital cost	N/A					
Consenting	N/A					
Operational safety	N/A					
Operating cost / efficiency	N/A					
Property	N/A					
Engineering feasibility	N/A					

2.5 BRT Corridor placement assessment

2.5.1 Botany Town Centre to SH20/20B Interchange

Criteria	Section 2: Te Irirangi Drive – Diorella Drive to Great South Road			Section 5: Davies Avenue			Section 6: Manukau Station Road – Davies Avenue to Lambie Drive			Section 7: Lambie Drive – Manukau Station Road to Puhinui Road		
	A-side (north)	Central	B-side (south)	A-side (north)	Central	B-side (south)	A-side (north)	Central	B-side (south)	A-side (north)	Central	B-side (south)
Transport Planning Assessment												
Public transport, cost, and time of travel	1	2	2	2	1	0	1	1	0	1	2	1
Public transport travel time reliability	-1	2	2	2	1	0	1	1	0	1	2	1
Engineering Feasibility and Implementability Assessment												
Constructability	3	3	3	5	4	4	4	4	4	4	4	4
Construction disruption	3	3	3	5	4	3	4	4	4	4	4	4
Construction cost and risk	2	2	2	4	4	4	4	4	4	4	4	4
Safety in design	3	3	3	4	4	4	3	4	4	4	4	4
Operation and maintenance	3	3	3	5	4	3	3	4	3	3	4	3

2.6 SH20/20B Interchange to Orrs Road (BRT corridor placement and road widening)

Criteria		Section 1: SH20/20B interchange to Manukau Memorial Gardens					Section 2: Manukau Memorial Gardens to Waokauri Creek					Section 3: Waokauri Creek			Section 4: Waokauri Creek to Orrs Road				
		1A	1B	1C	1D	1E	2A	2B	2C	2D	2E	3A	3B	3C	4A	4B	4C	4D	4E
Highways																			
Traffic / intersection performance																			
Structures																			
Geotechnical																			
Stormwater quality																			
Stormwater quantity																			
Utilities																			
Property effect																			
Property cost																			
Construction disruption																			
Cost																			
Environmental and Planning	Ecology – aquatic																		
	Ecology – terrestrial																		
	Ecology – marine																		
	Coastal – construction effects on CMA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				N/A	N/A	N/A	N/A	N/A
	Coastal – geomorphology, sedimentation, tidal flows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				N/A	N/A	N/A	N/A	N/A
	Coastal – sea-level rise and coastal climate change	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				N/A	N/A	N/A	N/A	N/A
	Natural character and landscape																		
	Visual																		
	Urban design																		
	Social – accessibility																		
	Social - community																		
	Social – health and safety																		
	Contamination management – soil																		
	Contamination management – groundwater																		

Criteria		Section 1: SH20/20B interchange to Manukau Memorial Gardens					Section 2: Manukau Memorial Gardens to Waokauri Creek					Section 3: Waokauri Creek			Section 4: Waokauri Creek to Orrs Road				
		1A	1B	1C	1D	1E	2A	2B	2C	2D	2E	3A	3B	3C	4A	4B	4C	4D	4E
	Consentability																		

2.7 Road widening assessment

2.7.1 Botany Town Centre to SH20/20B Interchange

Criteria	Section 1			Section 3			Section 5			Section 7			Section 9			Section 10			Section 11			Section 13		
	A	B	Both	A	B	Both	A	B	Both	A	B	Both	A	B	Both	A	B	Both	A	B	Both	A	B	Both
Property	-3	-2	-3	-1	-2	-3	-3	-1	-2	-3	-3	-2	-3	-3	-3	-2	-2	-1	-2	-3	-1	-3	-1	-2
Consentability	-1	-2	-2	-1	-2	-2	-1	-1	-1	-1	-2	-2	-1	-3	-3	-3	-2	-3	-1	-1	-1	-2	-1	-2
Third party consents	-2	-2	-2	-1	-1	-1	-3	-2	-3	-1	-1	-2	-2	-2	-3	-2	-2	-3	-1	-1	-1	-2	-1	-2
Visual amenity	-1	-1	-2	-1	-1	-2	0	0	0	-1	-1	-1	-1	-2	0	-2	-2	-2	-1	-1	-1	-1	-1	-2
Urban design	-1	-2	-2	-1	-1	-2	0	0	0	0	-1	0	0	0	0	-3	-2	-1	-1	-1	-2	-1	-1	-1
Accessibility	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1
Community	-2	-2	-1	-2	-2	-1	0	0	0	0	-1	0	0	0	0	-1	-2	-2	0	0	0	0	0	0
Stormwater	-2	-1	-2	-2	-1	-2	-1	-1	-1	-1	-2	-2	-2	-1	-2	-1	-1	-1	-1	-2	-2	-1	-1	-1
Contamination management	-1	-2	-2	-1	-1	-1	0	0	0	-1	-1	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1
Traffic management	-1	-1	-2	-1	-1	-2	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-1	-2	-1	-1	-2	-1	-1	-2
Pavements / structures	-1	-1	-2	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	-1	-2	-3	-3	-3	-1	-2	-2	-2	-1	-1
Utilities	-1	-1	-3	-1	-1	-3	-1	-1	-1	-2	-1	-2	-3	-3	-3	-1	-1	-2	-1	-1	-2	-1	-1	-1
Noise and vibration	-1	-2	-2	-1	-2	-2	0	-1	-1	0	0	0	-1	0	-1	-1	-2	-2	-1	-1	-2	-1	-2	-2

2.8 SH20B walking and cycling assessment

Criteria		Section 1: SH20/20B interchange to Manukau Memorial Gardens		Section 2: Manukau Memorial Gardens to Campana Road			Section 3: Campana Road to Orrs Road			
		1A	1B	2A	2B	2C	3A	3B	3C	3D
Highways (design standards)										
Traffic / intersection performance										
Structures										
Geotechnical										
Stormwater quality										
Stormwater quantity										
Utilities										
Property effect										
Property cost										
Construction disruption										
Cost										
Environmental and Planning	Ecology – aquatic									
	Ecology – terrestrial									
	Ecology – marine									
	Natural character and landscape									
	Coastal – construction effects on CMA	N/A	N/A				N/A	N/A	N/A	N/A
	Geomorphology, sedimentation, tidal flows	N/A	N/A				N/A	N/A	N/A	N/A
	Sea-level rise and coastal climate change	N/A	N/A				N/A	N/A	N/A	N/A
	Visual									
	Urban design									
	Social – accessibility									
	Social - community									
	Social – health and safety									
	Contamination management – soil									
	Contamination management – groundwater									
	Consentability									

2.9 Puhinui Station walking and cycling – route refinement assessment

KPI / Measure	WC1	WC2	WC3	WC4
Transport Planning Assessment				
IO 1: Provide more equitable access and travel choices to jobs, learning, cultural and social activities in the south and east of Auckland	2	2	3	1
IO 5: To improve health, safety, and security of people	2	3	3	2
Environmental and Planning Assessment				
Arboriculture	-1	0	-2	0
Stormwater	-1	-1	-2	-1
Landscape	0	-1	0	-1
Visual	0	-2	-1	-2
Urban design	1	-2	-1	-2
Accessibility	1	1	-1	1
Community	1	-1	-2	-1
Health and safety	1	0	-1	0
Construction noise and vibration	-2	-2	-2	-2
Operational noise and vibration	0	-1	1	-1
Archaeology	-1	-1	-1	-1
Contaminated land	-1	-1	-1	-1
Engineering Feasibility and Implementability Assessment				
Constructability	-1	-1	-1	-1
Construction disruption	-1	0	0	0
Construction cost and risk	-1	-1	-1	-1
Safety in design and construction	-1	0	0	0
Operation and maintenance	0	0	0	0
Consentability	-1	-1	-2	-1
Property	-1	-2	-2	-2

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Appendix B

Relevant statutory planning documents

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

APPENDIX B: Assessment against relevant statutory documents

On 18 August 2022, Auckland Council notified:

- Plan Change 78 – Intensification;
- Plan Change 79 – Amendments to the transport provisions; and
- Plan Change 80 – Regional Policy Statement Well-functioning urban environment, resilience to the effects of climate change and qualifying matters.

Pursuant to Section 171(1)(a)(iv) of the RMA, Plan Change 78, Plan Change 79 and Plan Change 80 have been considered in the table below. Where objectives and policies have been added or amended by Plan Change 78, 79 and 80, provision references have been highlighted in the table in blue.

How Plan Change 78 zoning has informed the future environment is considered in the Section 7.5 of this AEE

Theme: Urban growth and development capacity		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**NPS:UD** Objectives 1 and 6 Policy 1(c), 1(e), 1(f) Policy 3, Policy 6 **AUP:OP [RPS]** B2.2.1(1A), B2.2.1(1), B2.2.2(5)(c), B2.4.1(1), B2.4.1(6), B2.4.2(6), B2.5.1(2), B2.5.2(2), B3.2.1(5), B3.3.1(1)(c), B3.3.2(3), B3.3.2(4)(b), B3.3.2(5)(a)	**Summary of Objectives and Policies** • The National Policy Statement on Urban Development (**NPS:UD**)[23] seeks to ensure urban environments are well-functioning and enable all people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety. Within the NPS:UD, Auckland is recognised as a Tier 1 urban environment and therefore is subject to a greater policy direction in terms of intensification and density of urban form. The NPS:UD directs that urban development is integrated with infrastructure planning and funding decisions and is strategic over the medium to long term.[24] • The objectives and policies of the AUP:OP seek to provide sufficient feasible development capacity for housing with set dwelling targets over the next 30 years.[25] In order to reach these targets adequate infrastructure must be existing or provided prior to or with development.[26] • Provisions in Chapter E27 – Transport seek to ensure that land use and all modes of transport are integrated in a manner that realises the benefits of an integrated network and manages the adverse effects of traffic generation.[27]

[23] NPS:UD Objective 1
[24] NPS:UD Objective 6
[25] AUP:OP [RPS] B2.4.1(6)
[26] AUP:OP [RPS] B2.2.1(1), B2.2.2(5)(c), B2.4.2(6), B3.2.1(5), B3.3.1(1)(c), B3.3.2(3), B3.3.2(4)(b), B3.3.2(5)(a)
[27] AUP:OP [DP] E27.2(1), E27.2(2), E27.2(5), E27.2(6)

	AUP:OP [DP] E27.2(1), E27.2(2), E27.2(5), E27.2(5A), E27.2(6) **NoRs 1 and 2 only: Flat Bush Precinct [DP]** I412.2.1(5) **NoR 2 only: Florence Carter Avenue Precinct [DP]** I443.2(6) **NoRs 4a / 4b only: Puhinui Precinct [DP]** I432.2(7) - (11) I432.3(9)(a), I432.3(c)	• Flat Bush Precinct[28] (relevant to NoRs 1 and 2) and Florence Carter Avenue Precinct[29] (NoR 3) provisions seek to provide safe, efficient, well connected and integrated transport systems. • Puhinui Precinct (relevant to NoRs 4a and 4b)[30] provisions seek to provide gateway connections to Auckland Airport, providing connectivity and accessibility for all transport modes whilst recognising and providing for the cultural significance of the area to Manawhenua. The assessment against the objectives and policies of the Puhinui Precinct is addressed together in the Manawhenua theme below. **Assessment** • The objectives and policies emphasise the importance of providing short, medium and long term residential and business capacity. This includes long-term strategic planning for urban development and generally indicates that ad hoc or out of sequence urban expansion is less desirable than that which is planned and integrated. The Project is consistent with these objectives and policies by providing for the necessary transport infrastructure to support the zoning of land and the eventual establishment of the necessary development capacity. • Proposed designations for the Project will ensure that the necessary transport infrastructure is planned and integrated (and identified in the AUP:OP) to meet the feasible development capacity targets over the next 30 years. • The Project will protect the land for the construction of a BRT corridor and high quality walking and cycling facilities, traversing primarily developed urban land. The NPS:UD enables higher density dwellings within a walkable catchment of BRT stations. It is anticipated that zoning within these walkable catchments will enable, at a minimum, buildings of six storeys. • Beyond walkable catchments and within residentially zoned areas, the MDRS will provide three dwellings up to three storeys in height (subject to meeting the relevant development standards) per site. • The Project will respond to the accessibility, reliability, and travel choice issues present in public transport services and bus infrastructure connecting southern and eastern suburbs of Auckland and encourage mode shift towards public and active transport. • Where necessary, Auckland Transport and Waka Kotahi will work with landowners and developers under the process in section 176(1)(b) of the RMA to enable earthworks and development within the proposed designations and alteration to Designation 6717 – provided those works will not prevent or hinder the work authorised by the Auckland Transport designations and NZ Transport Agency alteration to Designation 6717.

[28] AUP:OP [DP] I412.2.1(5)
[29] AUP:OP [DP] I443.2(6)
[30] AUP:OP [DP] I432.2.7(7)-(11), I432.3(9)(a), I432.3(9)(c)

		• The NPS:UD and AUP:OP recognise the benefits of urban development where they contribute to people's social, economic, cultural and environmental wellbeing. Of particular relevance to the Project, where good accessibility is provided for all people between housing, jobs, community services, natural spaces, and open spaces, including by way of public or active transport. The Project will ensure land is protected to contribute to the accessible, high quality, effective, efficient and safe transport routes (including public and active transport modes) that support the movement of people, goods and services for the Airport, Puhinui, Manukau and Botany areas. **Conclusion** It is considered that the Project contributes to the achievement of these objectives and policies by designating a BRT corridor and high quality walking and cycling facilities which will positively contribute to a well-functioning urban environment.
Theme: Enabling Infrastructure, including within an overlay		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**AUP:OP [RPS]** B3.2.1(1), B3.2.1(2), B3.2.1(3), B3.2.1(4), B3.2.1(8), B3.2.2(1), B3.2.2(3), B3.2.2(6), B3.2.2(7), B3.2.2(8), B3.2.2(9), B3.3.1(1), B3.3.2(1), B3.3.2(3) **AUP:OP [DP]** D9.2(1), D9.3(8) D13.3(2), D17.3(24), D17.3(25), D17.3(26), E17.2(1), E17.2(3), E17.3(1)	**Summary of Objectives and Polices** • Objectives and policies in Chapter B3 of the AUP:OP[31] recognise the importance of infrastructure in realising Auckland's full economic potential. This includes integrating the provision of infrastructure with urban growth, avoiding incompatible land uses and increasing resilience. The provisions recognise the importance of the transport network in the movement of people, goods and services, urban form, enabling growth, and providing choices. • Objectives and policies in Chapter E26 of the AUP:OP[32] identify that infrastructure is critical to the social, economic, and cultural well-being of people and communities and the quality of the environment. The development, operation, use, repair, maintenance, upgrading and removal of infrastructure is anticipated, and the benefits infrastructure can have, as well as a range of adverse effects, are acknowledged within the objectives and policies. • The policies of Chapter B3[33] seek to enable the development and operation of infrastructure, even in sensitive areas that are scheduled in the AUP:OP in relation to historic heritage, provided adverse effects are avoided where practicable and an operational and functional need to locate in sensitive areas is demonstrated. • While the objectives and policies of the AUP:OP generally seek to recognise the benefits, functional and operational needs and value of investment in infrastructure and enable the safe, efficient and secure provision of infrastructure

[31] AUP:OP [RPS] B3.2.1(1), (2), (4), B3.2.2(1), B3.3.1(1), B3.3.2(1), B3.3.2(1), (3)

[32] AUP:OP [DP] E26.2.1(1), (2), (4), (9), E26.2.2(1), (2), (4), (14), (15)

[33] AUP:OP [RPS] B3.2.1(3), (8), B3.2.2(3), (6), (7), (8), (9)

	E26.2.1(1), E26.2.1(2), E26.2.1(4), E26.2.1(9), E26.2.2(1), E26.2.2 (2), E26.2.2 (4), E26.2.2(14), E26.2.2(15) E27.2(1), E27.2(2), E27.2(5) **NoRs 1 and 2 only: Flat Bush Precinct [DP]** I412.2.1(2), I1412.2.1(5) I412.2.2(1), I412.3.1(2), I412.3.2(2) **NoR 2 only: Florence Carter Avenue Precinct [DP]** I443.2(4), I443.2(6) **NoR 3 only: Manukau Precinct [DP]** I425.2(1), I425.3(1) **NoRs 4a and 4b only: Puhinui Precinct [DP]** I432.2(1), I432.2(6)-(11), I432.3(5)-(9)	where appropriate[34], the objectives and policies also anticipate that there may be some adverse effects as a result of the provision of such infrastructure. However, the objectives and policies recognise that in some instances such adverse effects may be appropriate given the necessity of, and essential services provided by, infrastructure.[35] • Flat Bush and Florence Carter Avenue Precincts[36] include provisions for a safe, efficient, well connected and integrated transport system that provides a choice of travel modes. • Puhinui Precinct [37] recognises that the existing road network is reaching capacity and that substantial transport infrastructure investment is required to support the full development of the precinct. A focus of the objectives and policies is therefore on the provision, staging and coordination of transport infrastructure. **Assessment** <u>Land use and transport integration</u> • The Project is consistent with the infrastructure objectives and policies by providing for a wide range of transport benefits for the community both individually and as part of improving the wider integrated regional network. • The Project will provide better access to jobs and education for southern and eastern Auckland and increase labour and customer catchments for businesses. • The Project will enable a significant increase in public transport usage in the area, increasing the public transport mode share and decreasing travel by light vehicles. This includes improving integration with existing and future public transport networks. • The Project will improve safety when compared to the existing environment. This is through the overall mode shift, and the provision of dedicated walking and cycling facilities along the entire Project corridor. • The Project will benefit future communities by enabling opportunities for development, particularly around the proposed BRT stations. • NoR 3 will not detract from the objectives and policies of the Manukau Precinct and will positively contribute by enabling a range of transport modes for the community and users of the square. • NoRs 4a and 4b will enable the provision of infrastructure to support land use development in an integrated manner as required by the Puhinui Precinct. <u>Adverse effects are avoided, remedied or mitigated</u>

[34] AUP:OP [RPS] B3.2.1(2), (3), (4), (6), B3.2.2(1), (2), (3); AUP:OP [DP] E26(1), (2), (3), (4), E26.2.2(1), (2), E27.2(1), (2)

[35] AUP:OP [RPS] B3.2.2(6); AUP:OP [DP] E26.2.2(2), (4), (15)

[36] AUP:OP [DP] I412.2.1(2), (5), I412.2.2(1), I412.2.1(2), I412.3.2(2), I443.2(4), (6)

[37] AUP:OP [DP] I432.2(1), I432.2(7) - (11), I432.3(6) - (9)

		• The Project has sought to avoid adverse effects on overlays within the Project area as far as practicable and this is demonstrated through the options assessment process. • Removal of the two notable trees within NoR 3 is necessary to accommodate the BRT and high quality walking and cycling facilitates within the road network. Alternative methods that could result in retaining the two notable trees (potentially relocation) will be considered as a matter in the Tree Management Plan (**TMP**) which is a condition on the proposed designation. If this is not practicable, appropriate mitigation to address the loss of values associated with the notable trees will be determined through the TMP. • The proposed designations and alteration to Designation 6717 will provide sufficient width to respond to the surrounding land use and potential effects such as removal of street trees and trees in open spaces. This will be supported by a Management Plan framework which identifies key environmental outcomes and design principles that direct further design and assessment. **Conclusion** The Project contributes to the achievement of these objectives and policies by designating a BRT corridor and high quality walking and cycling facilities. Within sensitive areas that are scheduled in the AUP:OP there is an operational need to locate the BRT and high quality walking and cycling facilities in the existing road corridor and the adverse effects on notable trees cannot be practicably avoided.
Theme: National Grid		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All – but specifically NOR 2	**NPS:ET** Objective, Policies 1, 10 **AUP:OP [RPS]** B3.2.1(7), B3.2.2(7) **AUP:OP [DP]** D26.2(1), D26.3(1)	**Summary of Objectives and Policies** • The relevant objectives and policies of the NPS for Electricity Transmission (**NPS:ET**)[38] and the AUP:OP RPS[39] seek to enable and provide for the National Grid, recognising the national significance of the electricity transmission network and to manage the adverse effects of other activities on the network to ensure its operation is not compromised. • The objectives and policies of Chapter B3 of the AUP:OP RPS[40] also encourage co-location of infrastructure where safe to do so and operational and technical requirements are satisfied.

[38] NPS:ET Objective, Policies 1, 10
[39] AUP:OP [RPS] B3.2.1(7)
[40] AUP:OP [RPS] B3.2.2(7)

	E26.2.1(7)	• Specific AUP:OP objectives and policies[41] aim to ensure the efficient development, operation, maintenance, upgrading and removal of the National Grid is not compromised by subdivision, use and development by ensuring operational and technical requirements and standards are satisfied. **Assessment** • The National Grid Overlay is traverses Te Irirangi Drive (NoR 1) and Great South Road (NoR 2). • Engagement has been undertaken with Transpower on potential impacts of the Project on their infrastructure. Feedback from Transpower has been incorporated into the concept design and associated designation boundaries. The proposed designation boundary for NoR 1 takes into account the location of two Transpower towers. One tower is located within the road reserve (adjacent to 35 Dissmeyer Drive). The second tower is partially within the road reserve and Rongomai Park. The proposed designation boundary provides sufficient width to avoid both towers. • At detailed design, and through the implementation of the NUMP which is a condition of the proposed designations, ongoing engagement will be undertaken with Transpower. Any potential adverse effects on the National Grid can be managed appropriately. **Conclusion** The BRT and high quality walking and cycling facilities contribute to the achievement of these objectives and policies by recognising the national significance of electricity transmission and by appropriately managing any potential adverse effects to ensure its operation is not compromised.
Manawhenua		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**AUP:OP [RPS]** B4.2.1(2), B6.2.1(1), B6.2.1(2), B6.3.1(1), B6.3.1(2), B6.3.1(3), B6.3.2(1), B6.3.2(2)(d), B6.3.2(3), B6.3.2(4), B6.3.2(6), B6.5.1(1), B6.5.1(3), B6.5.1(5), B6.5.2(1), B6.5.2(4),	**<u>Kaitiakitanga</u>** **Summary of Objectives and Policies** • The RPS[42] requires recognition of and provision for the principles of Te Tiriti o Waitangi, in particular through Manawhenua participation in resource management processes. **Assessment** • The recognition of Te Tiriti o Waitangi underpins the partnership between Manawhenua, Auckland Transport and Waka Kotahi and this has been a key objective for the NoR phase of the Project.

[41] AUP:OP [DP] D26.2(1), D26.3(1), E26.1(7)

[42] AUP:OP [RPS] AUP:OP [RPS] B6.2.1(2), B6.2.2(1), B6.3.1(1), B6.3.2(4)

	B6.5.2(5), B6.5.2(6), B6.5.2(9), B7.4.1(6) **AUP:OP [DP]** E12.3(1), E12.3(2)(c),E12.3(4) **NoRs 4a / 4b only: Puhinui Precinct Plan** I432.2(2), I432.2(4)-(7), I432.3(2)-(4), I432.3(9) I432 (Sub-precincts A and B) Objectives (3), (4) I432 (Sub-precincts A and B) Policies (1), (4)	• Manawhenua have been actively involved throughout the development of the Project. This has included through the alternatives assessment and identification of the preferred options. • The partnership with Manawhenua has involved the identification of opportunities to acknowledge and respond to the cultural landscape along the Project corridor and restore and enhance the natural and cultural landscapes. • To ensure Manawhenua are involved as partners in all phases of the Project, the proposed designation and proposed alteration to Designation 6717 conditions set out the involvement for Manawhenua in the future design and implementation of the Project. **<u>Māori values</u>** **Summary of Objectives and Policies** • The principles of the Te Tiriti o Waitangi are also recognised and provided for in the sustainable management of natural and physical resources, wāhi tapu and other taonga. Sites and places of significance to Manawhenua are recognised and provided for in the objectives and policies of the AUP:OP.[43] • The Puhinui Precinct[44] also contains objectives and policies requiring the identification, recognition and protection and enhancement of Manawhenua cultural, spiritual and historical values and integration of these values into developments. **Assessment** • The partnership approach undertaken with Manawhenua, means that Manawhenua values are embedded in the NoR phase of the Project which gives effect to the provisions of the AUP:OP. Having involved Manawhenua in the development of the Project corridor has enabled the incorporation of Māori worldviews in the Project decision-making undertaken to date. With respect to future involvement, Manawhenua will be invited as partners in the preparation of management plans and future detailed design through conditions on the proposed designations and alteration to Designation 6717. • The Project has also recognised Manawhenua cultural values, particularly with regards to the mauri of, and the relationships of Manawhenua with natural and physical resources including freshwater, land, air and coastal resources. Significant adverse effects on these values are required to be avoided, with adverse effects avoided, remedied or mitigated as appropriate.
Theme: Ecological values		

[43] AUP:OP [RPS] B4.2.1(2), B6.2.1(1), B6.3.1(2), (3), B6.3.2(1), (2)(d), (3), (6), B6.5.1(1), (3), (5), B6.5.2(1), (4), (5), (6), (9), B7.4.1(6)
[44] AUP:OP [DP] I432.2(2), I432.2(4) – (7), I432.3(2) – (4), I432.3(9), I432 (A and B) Objectives 3 and 4, I432 (A and B) Policies 1 and 4

Applicable NoR(s)	Relevant objectives and policies	Summary of objectives and policies and assessment
All	**NPS:FM** Objective 1, Policies 6, 7, 8, 9 **AUP:OP [RPS]** B7.2.1(2), B7.3.1(3), B7.3.2(1), B7.3.2(4), B7.3.2(5), B7.3.2(6), B7.4.1(4), B7.4.1 (5), B7.4.2(1)(a), B7.4.2(1)(d), B7.4.2(7)(b), B7.4.2(9), B7.5.1(2), B7.5.2(1)(f) **AUP:OP [DP]** D9.2(1), D9.3(1), D9.3(2), D9.3(6), D9.3(8) E12.2(1), E12.3(1),E12.3(2)(c) E15.2(1), E15.2(2), E15.3(2), E15.3(3), E15.3(4)(b), E15.3(7)	**Summary of Objectives and Policies** • The NPS for Freshwater Management (**NPS:FM**)[45] objective and policies seek to ensure that natural and physical resources are managed in a way that prioritises first, the health and well-being of water bodies and freshwater ecosystems followed by the health needs of people and then the ability of people and communities to provide for their social, economic, and cultural well-being. • The relevant AUP:OP[46] objectives and policies seek to protect and enhance ecological values across terrestrial, freshwater and coastal environments. • The primary method the AUP:OP uses to protect biodiversity is the identification of Significant Ecological Areas (**SEAs**). These areas receive the highest level of protection. Biodiversity values outside SEAs need to be considered and effects on them addressed. • Significant adverse effects on biodiversity are to be avoided as far as practicable, and where avoidance is not practicable to be minimised. Other adverse effects on biodiversity and ecosystems should be avoided, remedied or mitigated. The provisions recognise that avoidance of areas with biodiversity values is not always practicable for infrastructure. Where biodiversity is affected, measures to protect and restore biodiversity through legal protection and active management should be considered. • The permanent loss and significant modification or diversion of lakes, rivers, streams (excluding ephemeral streams), and wetlands are to be avoided unless, amongst other matters, it is necessary to provide for infrastructure and no practicable alternative exists. The objectives and policies seek to manage subdivision, use, development, including discharges and activities in the beds of lakes, rivers, streams, and in wetlands, to limit the establishment of structures within the beds of lakes, rivers and streams and in wetlands to those that have a functional need or operational requirement to be located there. • While the objectives and policies of the AUP:OP generally seek to recognise the benefits, functional and operational needs and value of investment in infrastructure and to enable the safe, efficient and secure provision of infrastructure where appropriate, the objectives and policies also anticipate that there may be some adverse effects as a result of the provision of such infrastructure.[47] The objectives and policies recognise that in some instances such adverse effects may be appropriate given the necessity of, and essential services provided by, infrastructure. **Assessment**

[45] NPS:FM Objective 1, Policies 6, 7, 8, 9

[46] AUP:OP [RPS] B7.2.1(2), B7.3.1(3), B7.3.2(1), B7.3.2(4) - (6), B7.4.1(4), (5), B7.4.2(1)(a), (1)(d), (7)(b), (9); AUP:OP [DP] D9.2(1), D9.3(1), (2), (6), E12.2(1), E12.3(1), (2), E15.2(1), (2), E15.3(2), (3), (4)(b)

[47] AUP:OP [DP] D9.3(2), (8), E15.3(7)

		Although resource consents are not being sought for the Project at this time, ecological effects arising in respect of activities that require consents have been considered to inform alternatives assessment, concept design and the proposed designation and alteration footprints.
Themes: Climate change and natural hazards		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**NPS:UD** Objective 8, Policies 1(e), 1(f) and 6(e) **AUP:OP [RPS]** B2.2.1(1)(h), B2.3.1(1)(f), B2.3.2(1)(g), B10.2.1(2), B10.2.1(3), B10.2.1(5), B10.2.1(6), B10.2.2(7), B10.2.2(8), B10.2.2(12), B10.2.2(13)(c), B10.2.2(13)(d) **AUP:OP [DP]** E12.2(1), E12.3(5), (6). E36.2(1)-(5), E36.3(21), E36.3(23)-(28), E36.3(35)	**Summary of Objectives and Policies** • The objectives and policies of the NPS:UD[48] seek to reduce greenhouse gas emissions and enhance resilience to current and future effects of climate change. • The objectives and policies of Chapter B2 of the AUP:OP seek to enable a quality built environment and well functioning urban environments while improving resilience to the effects of climate change[49] • The objectives and policies of Chapter B10 of the AUP:OP[50] recognise the importance of integrating the provision of resilient transport networks and infrastructure within urban growth areas and avoiding effects in areas subject to natural hazards and risk and adapting to the effects of climate change. • Specific AUP:OP objectives and policies[51] reinforce the unique requirements of infrastructure and that it can have an operational or functional need to locate within a natural hazard area. Where infrastructure is required to locate within a hazard area significant adverse effect on people and property are sought to be first avoided, and otherwise mitigated to the extent practicable **Assessment** Particular regard has been given to these objectives and policies. The Project will deliver better accessibility and mode choice by providing a fast, high capacity, reliable and frequent BRT corridor, and high quality walking and cycling facilities, therefore reducing the reliance on low occupancy vehicles. A number of design measures to provide resilience to flooding, inundation and climate change have been adopted across the Project. The flooding assessment has made recommendations which are to be implemented at detailed design so that: • There is no increase in flood levels for existing authorised habitable floors that are already subject to flooding; and

[48] NPS:UD Objective 8 and Policies 1(e)(f) and 6(e)
[49] B2.2.1 (1)(h), B2.3.1(1)(f), B2.3.2(1)(g)
[50] B10.2.1(2), (3), (5), (6), B10.2.2(7), (8), (12), (13)(c), (13)(d)
[51] B2.3.1(1)(f), E12.2(1), E12.3(5), (6), E36.2(1) - (5), E36.3(21), (23) - (28), (35)

		• There are no new flood prone areas created. There is sufficient space within the proposed designations for stormwater and flood mitigation. The proposed designations provide for street tree planting which improve urban tree canopy cover that, when delivered, will contribute to reducing urban heating resulting from the effects of climate change in the future. **Conclusion** The Project is consistent with these objectives and policies by supporting a reduction in greenhouse gas emissions through modal choice, contribute to reducing urban heat island effects. The Project will generally avoid or mitigate potential adverse effects on people and property in areas subject to flooding.
Theme: Urban form and quality design		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**NPS:UD** Objective 4, Policy 1(c) **AUP:OP [RPS]** B2.2.1(1)(c), B2.2.1(d), B2.2.1(e), B2.3.1(1)(d), B2.3.1(3), B2.3.2(1)(d), B2.3.2(2)(b), B2.3.2(4) **AUP:OP [DP]** E12.2(1), E12.3(2), E12.3(3) E17.2(1), E17.2(2), E17.2(3), E17.3(1), E17.3(4)	**Summary of Objectives and Policies** • The objectives and policies[52] seek to create and protect urban environments that are both functional and enjoyable for people, by balancing the place and movement function of transport networks and achieving high levels of amenity and safety for users. • The NPS:UD[53] acknowledges that the urban environment, including amenity values will develop and change over time in response to the diverse and changing needs of people, communities and future generations. • To achieve balance between place and movement, the objectives and policies recognise a necessary mode shift,[54] minimising private vehicle travel in favour of public transport, walking and cycling. • Manukau Precinct[55] seeks to maintain the amenity and function of Manukau Square, while Manukau 2 Precinct seeks to ensure and develop, a range of activities at 640 Great South Road. Both precincts are within NoR 3. **Assessment** • The BRT corridor and high quality walking and cycling facilities integrate with key centres and neighbourhoods to support intensification and compact urban form.

[52] AUP:OP [RPS] B2.2.1(1)(e), B2.3.1(3), B2.3.2(1)(d), (4); AUP:OP [DP] E12.2(1), E12.3(2), (3), E17.2(1), (2), (3), E17.3(1), (4), E24.2(1), (2), E24.3(1), (2), E25.2(1), (2), E25.3(2), (5)

[53] NPS:UD Objective 4, Policy 1(c)

[54] AUP:OP [RPS] B2.2.1(1)(c), B2.3.2(2)(b)

[55] AUP:OP [DP] I425.2(1), I425.3(1)

	E24.2(1), E24.2(2), E24.3(1), E24.3(1A), E24.3(2) E25.2(1), E25.2(2), E25.3(2), E25.3(5) **NoR 3 only: Manukau Precincts [DP]** I425.2(1), I425.3(1)	• A ULDMP is proposed as a condition of the proposed designations. The ULDMP will integrate the BRT corridor with the surrounding landscape and urban context and ensure that the Project contributes to a quality urban environment and manages potential adverse landscape and visual effects. • Amenity of the Project during construction will be managed appropriately through engagement with residents, the community and stakeholders, and through the construction noise and vibration, and construction management plans proposed as conditions of the designations. **Conclusion** • The Project contributes to well-functioning urban environment through the provision of a BRT corridor and high quality walking and cycling facilities. • The Project will manage adverse effects on amenity during construction and sets outcomes and further opportunities through the UDLMP to integrate permanent works into the surrounding landscape and urban context.
Theme: Historic Heritage		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**AUP:OP [RPS]** B3.2.1(1), B3.2.1(2), B3.2.1(3), B3.2.2(1), B3.3.1(1), B3.3.2(1), B3.2.1(3) B5.2.1(1), B5.2.2(6), B3.2.1(7), B5.3.1(2), B5.3.2(4)(c), B5.3.2(4)(d) **AUP:OP [DP]** E26.2.1(9), E26.2.2(4), E26.2.2 (6)	**Summary of Objectives and Policies** • The RPS[56] recognises the importance of heritage to the identity of Auckland, and the importance of active stewardship to protect it from inappropriate subdivision use and development. The provisions seek to avoid significant adverse effects on scheduled historic heritage, where practicable, and to encourage new development to have due regard to significant historic heritage. • The policies of Chapter B3[57] and E26[58] seek to enable the development, operation and maintenance of infrastructure, even in sensitive areas that are scheduled in the AUP:OP in relation to historic heritage, provided adverse effects are avoided or managed where practicable and an operational and functional need to locate in sensitive areas arises. • While the objectives and policies of the AUP:OP generally seek to recognise the benefits, functional and operational needs and value of investment in infrastructure and enable the safe, efficient and secure provision of infrastructure where appropriate, the objectives and policies also anticipate that there may be some adverse effects as a result of

[56] AUP:OP [RPS] B5.2.1(1), B5.2.2(6), (7), B5.3.1(2), B5.3.2(4)(c), (4)(d)
[57] AUP:OP [RPS] B3.2.1(1), (2), (3), B3.2.2(1), B3.3.1(1), B3.3.2(1), (3)
[58] AUP:OP [DP] E26.2.1(9), E26.2.2(4), (6)

		the provision of such infrastructure. However, the objectives and policies recognise that in some instances such adverse effects may be appropriate given the necessity of, and essential services provided by, infrastructure. **Assessment** • There are no significant adverse effects to built heritage places as a result of the Project. Adverse effects are anticipated as a result of the likely removal of an unscheduled former Gardeners Cottage. This cottage is associated with Cambria House (a scheduled historic heritage extent of place and building). • A HHMP is condition on the proposed designations and will be prepared at detailed design before construction commences. As part of the HHMP, further research and survey of the Project area, and specific sites, will be undertaken to support a precautionary HNZPTA authority for the Project footprint. • Any adverse effects to potential previously unrecorded archaeological deposits that are exposed during the works will be mitigated under the provisions of a precautionary HNZPTA authority, and the means of mitigation detailed in an Archaeological Management Plan prepared for the HNZPTA authority application. An authority under the HNZPTA will be sought at a later date prior to construction of the Project. **Conclusion** The Project is consistent with the objectives and policies as the BRT corridor and high quality walking and cycling facilities do not impact on scheduled historic heritage. The importance of historic heritage is recognised through the implementation of the HHMP, specific mitigation measures, and providing a precautionary approach to the potential of identifying previously unrecorded sites during construction.
Theme: Open Space		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**AUP:OP [DP]** E16.2(1), E16.2 (2), E16.3(2), E16.3 (3) H7.2(2), H7.4.2(2), H7.5(1), H7.6.2(2),	**Summary of Objectives and Policies** • The general objectives and policies of open space zones in the AUP:OP[59] seek to enable infrastructure while avoiding, remedying or mitigating adverse effects on residents, communities and the environment. • Objectives and policies in Chapter E16 of the AUP:OP[60] seek to protect the cultural, amenity, landscape and ecological values of trees in open space zones and increase the quality and extent of tree cover in open space zones.

[59] AUP:OP [DP] H7.2(2), H7.4.2(2), H7.5(1) H7.6.2(2), H7.6.3(4), H7.8.2(1), H7.8.3(2)
[60] AUP:OP [DP] E16.2(1), (2), E16.3(2), (3)

	H7.6.3(4), H7.8.2(1), H7.8.3(2)	**Assessment** • NoRs 1 – 3 include potential works in open space zones. This includes informal recreation zones, sports and recreation zones, conservation zones and community zones. • Potential construction effects on amenity values of open space zones can be managed through engagement with residents, the community and stakeholders through an SCEMP, a CNVMP, a CTMP and CEMP to minimise potential effects. A ULDMP is recommended as a condition of the proposed designations which will require all areas be reinstated at the completion of the construction period. • The Project will provide high quality walking and cycling facilities which will improve connectivity to open space areas, reserves and recreation facilities by active modes. • Within the open space zones, the effects of tree loss can be mitigated by comprehensive replanting. Replacement planting will be determined through a planting plan for the Project under the ULDMP which is a condition on the proposed designation. • Where possible, existing stormwater ponds are proposed to be upgraded to increase the capacity of the ponds. Indigenous vegetation will be re-instated with enhancement opportunities identified through the UDLMP where practicable. • In addition, a TMP will be developed prior to construction to identify the existing trees protected under the District Plan, confirm the construction methods and impacts on each tree and detail methods for all work within the rootzone of trees that are to be retained. **Conclusion** The Project is consistent with the objectives and policies by providing for infrastructure while avoiding, remedying or mitigating adverse effects on residents, communities, trees and the environment.
Theme: Residential		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**AUP:OP [DP]** H4.2(1), H4.2 (2), H4.2(4), H4.3(1), H4.3(2), H4.3(9)	**Summary of Objectives and Policies** • The objectives and policies of residential zones[61] adjacent to the Project seek to ensure land is efficiently used to provide higher density urban living, increase housing capacity and improve choice and access to public transport.

[61] AUP:OP [DP] H4.2(1), (2), H4.3(1), (2), H5.2(1), H5.3(1), H6.2(1), H6.3(1)

	H5.2 (A1), H5.2(1), H5.2(4), H5.2(8), H5.3 (C1), H5.3(1), H5.3(8) H6.2 (A1), H6.2(1), H6.2 (8), H6.2(4), H6.3(C1), H6.3(1), H6.3(9)	• Specific objectives and policies[62] also seek to recognise the functional and operational requirements for development, in particular that non-residential activities provide for communities' social, economic and cultural well-being while avoiding, remedying or mitigating adverse effects on residential amenity. **Assessment** • The Project will support higher density residential development through designating for a rapid transit service. • The BRT and high quality walking and cycling facilities will improve connections to the surrounding residential communities, supporting the movement of people goods and services. • A ULDMP is a condition of the proposed designations. The ULDMP will integrate the permanent works of the Project into the surrounding landscape and urban context and ensure potential adverse landscape and visual effects are managed. • It is acknowledged that within NoR 3, the proposed BRT bridge structure will have low-moderate to high visual amenity impact on residents dependent on their viewing point (i.e. residential viewing audiences set back from the road corridor will only have an apparent view of the profile of the bridge while viewing audiences on the northern side, directly adjoining Puhinui Road will have the greatest effects due to their proximity and the size and scale of the bridge). In the context of the future environment, development is likely to respond to the proposed BRT bridge structure, given all of Puhinui Road is located within a walkable catchment of a rapid transit stop (Puhinui Station). • Amenity of the corridors during construction will be managed appropriately through engagement with residents, the community and stakeholders (through the SCEMP), and through the construction noise and vibration, and construction management plans (in particular the CTMP) proposed as conditions of the designations. **Conclusion** It is considered that the Project contributes to the achievement of these objectives and policies by providing a BRT corridor and high quality walking and cycling facilities while avoiding, remedying or mitigating adverse effects on residential amenity during construction.
Theme: Business		
Applicable NoR(s)	**Relevant objectives and policies**	**Summary of objectives and policies and assessment**
All	**AUP:OP [DP]**	**Summary of Objectives and Policies**

[62] AUP:OP [DP] H4.2(4), H4.2(9), H5.2(4), H5.3(8), H6.2(4), H6.3(9)

	H9.2(3), H9.2(5), H9.3(2), H9.3(3), H9.3(12) H11.2(2), H11.2(3), H11.2(8), H11.3(3), H11.3(12), H11.3(20) H12.2(2), H12.2(3), H12.2(12), H12.3(3), H12.3(12) H13.2(2), H13.2(3), H13.2(9), H13.3(3), H13.3(12), H13.3(20), H13.3(21) H14.2(2), H14.2(3), H14.2(8), H14.3(3), H14.3(12), H14.3(21) H17.2(3), H17.2(4), H17.3(4)	• The relevant objectives and policies for all centre zones and the Business – Mixed Use Zone in the AUP:OP[63] seek that development positively contributes towards planned future form and quality, creating a sense of place particularly with regard to streets. This includes providing pedestrian amenity, movement, safety and convenience for people of all ages and abilities. • The objectives and policies of the Business – Metropolitan Centre Zone[64] seek to reinforce and encourage the development of centres for commercial, community and civic activities and provide for residential intensification. • The objectives and policies of the relevant business zones[65] also seek to recognise the functional and operational requirements of activities and development while avoiding, remedying or mitigating adverse effects on amenity values and the natural environment of adjacent public open spaces and residential areas. **Assessment** • The BRT and high quality walking and cycling facilities will positively contribute towards the planned future form and quality of all business zones adjoining the Project corridor. The Project will create a sense of place particularly for streets by providing improved pedestrian amenity, movement, safety and convenience for people of all ages and abilities. The Project will support growth, encourage mode shift and improve access to major employment centres (i.e. Auckland Airport). • The Project will reduce light vehicle movement, thereby reducing congestion on the State Highway, creating capacity for freight. • A ULDMP is proposed as a condition of the proposed designations. The ULDMP will integrate the permanent works of each transport corridor into the surrounding landscape and urban context and ensure potential adverse landscape and visual effects are managed. • Business disruption during construction will be managed appropriately through early engagement with businesses through the DRMP and through the construction management plans (in particular the CTMP) which are conditions proposed on the designations. **Conclusion** It is considered that the Project is consistent with the relevant objectives and policies of the business zones. The Project will contribute towards the planned future form and quality of centre and business zones, particularly Manukau Central.

[63] AUP:OP [DP] H9.2(3), H9.3(3), H11.2(2), (3), (8), H11.3(3), H12.2(2), H12.3(3), H13.2(2), (3), (9), H13.3(3), (20), (21), H14.2(2), (3), (8), H14.3(3), (21), H17.2(3), (4), H17.3(4)

[64] AUP:OP [DP] H9.2(5), H9.3(2)

[65] AUP:OP [DP] H9.3(12), H11.3(12), H12.3(12), H13.3(12), H14.3(12)