TE TUPU NGĀTAHI
SUPPORTING GROWTH

VOLUME 4

Airport to Botany - Assessment of Transport Effects

December 2022

Version 1

WAKA KOTAHI NZ TRANSPORT AGENCY

New Zealand Government

Document Status

Responsibility	Name
Author	Ana Lee
Reviewer	Ida Dowling
Approver	Andrew Murray

Revision Status

Version	Date	Reason for Issue
1.0	9 December 2022	Final for lodgement

Table of Contents

Table of Figures

Table of Tables

Appendices

Appendix A: Station capacity and access

Appendix C: Roads and Streets Framework

Glossary of Acronyms / Terms

Acronym/Term	Description
AADT	Annual average daily traffic
AEE	Assessment of Effects on the Environment report
AFC	Auckland Forecasting Centre
ATAP	Auckland Transport Alignment Project
AUP:OP	Auckland Unitary Plan: Operative in Part
BRT	Bus Rapid Transit
CAS	Crash Analysis Systems
CCTM	City Centre to Māngere
CTMP	Construction Traffic Management Plan
CVA	Cultural Values Assessments
DSI	Death or Serious Injuries
HCV	Heavy commercial vehicles
LoS	Level of Service
MDRS	Medium Density Residential Standards
MSM	Regional Multi-modal Model
N/A	Not Applicable
NIMT	North Island Main Trunk railway
NoR	Notice of Requirement
NoR 1	Notice of Requirement 1: Airport to Botany Bus Rapid Transit (Botany Town Centre, in the vicinity of Leixlep Lane 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:UD	National Policy Statement for Urban Development 2020
Programme partners	Te Ākitai Waiohua, Auckland Airport, Auckland Transport and Waka Kotahi
PT	Public transport
RSAF	Roads and Streets Framework
RCA	Road Controlling Authority
RMA	Resource Management Act 1991
RP	Regional Plan
RPS	Regional Policy Statement

Acronym/Term	Description
RTN	Rapid Transit Network
SAMM	Strategic Active Mode (walk/cycling) Model
SEA	Significant Ecological Area
SH1	State Highway 1
SH20	State Highway 20
SH20B	State Highway 20B
SSTMP	Site-Specific Traffic Management Plans
SWGP	Southwest Gateway Programme
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth
TDM	Transport Design Manual
TOD	Transit-oriented development
VKT	Vehicles Kilometres Travelled
Waka Kotahi	Waka Kotahi NZ Transport Agency

Executive summary

Overview

This Assessment of Transport Effects (**Report**) has been prepared to inform the Assessment of Effects on the Environment (**AEE**) for five Notices of Requirement (**NoRs**) being sought by Waka Kotahi New Zealand Transport Agency (**Waka Kotahi**) and Auckland Transport (**Auckland Transport**) for the Airport to Botany Bus Rapid Transit Project (**the Project**) under the Resource Management Act 1991 (**RMA**). Specifically, this report considers the actual and potential effects associated with the construction, operation, and maintenance of the Project on the existing and likely future environment as it relates to transport effects, and where appropriate recommends measures that may be implemented to avoid, remedy and/or mitigate effects.

The Project is proposed to be an 18 km fast, high capacity, reliable, and frequent Bus Rapid Transit (**BRT**) connection with twelve stations, connecting Auckland Airport and its employment areas with major urban centres including Manukau and Botany and will be part of Auckland's wider Rapid Transit Network (**RTN**).

As set out in the AEE, this Report specifically relates to a portion of the broader Project (approximately 14.9 km) which extends from the Botany Town Centre in the vicinity of Leixlep Lane to Orrs Road in the Puhinui peninsula, off SH20B. The Project primarily involves the upgrade and widening of existing transport corridors to provide for a separated BRT corridor and high-quality walking and cycling facilities and included nine of the twelve proposed BRT stations.

The Project comprises five NoRs as shown below.

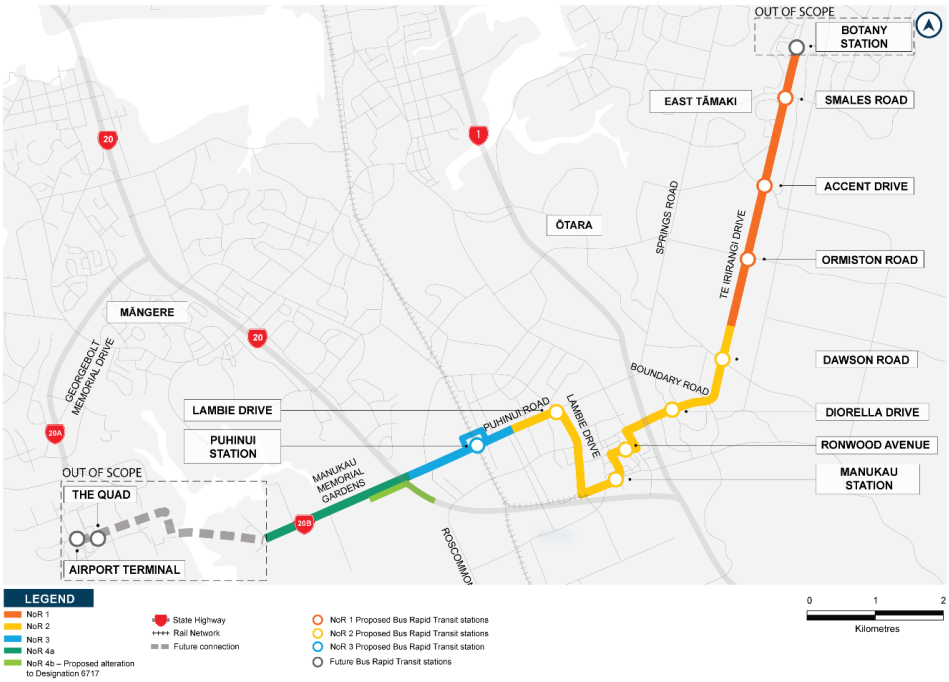


Figure 1: Overview of the Project and NoR extents

Methodology

Approach to assessment of operational transport effects

Potential operational transport effects are assessed using:

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

In respect to individual NoRs, a separate assessment has been undertaken for each key element of the transport system, including effects on safety, different modes, and property access. The assessment criteria and methodology are summarised in Table 1 below.

Table 1: Summary of assessment methodology

Network Component	Information Source	Assessment Method
Safety	Crash Analysis (**CAS**) Database Project design drawings, modelled network-reduction in total vehicle travel	Assessment to determine alignment with Vision Zero and Road to Zero standards, design compliance with Transport Design Manual and network-wide estimate in reduced crashes from less vehicle travel.
Public Transport	Transport Model tools (MSM, BRT corridor model) SGA Remix File[1]	Quantification of expected change in accessibility, mode share and public transport travel, including on other parts of the public transport network.
Walking and Cycling	Walking and Cycling Network Plans Proposed Cross Sections Model forecasts of change in active model travel from Project	Assessment to determine alignment with walking and cycling strategic documents and design compliance with Transport Design Manual. Estimation of uplift in walk and cycle travel, including potential associated reductions in vehicle travel.
General Traffic	Transport Model tools: MSM (changes in overall demand), Airport to Botany Traffic Model (changes in traffic flows and network performance) and SIDRA (changes in intersection efficiency at key locations) Project design drawings	Assessment using key model outputs including traffic volumes, levels of service for corridor midblock performance and intersection performance. Assessment of surrounding network connections
Property access	Engineering Standards Project design drawings	Assessment identifying where there is a potential effect on access in the existing environment
Parking	Engineering Standards and existing on-street parking provisions	Assessment identifying where there is a potential effect on both off-street / private and on-street parking in the existing environment
Freight	Auckland Strategic Freight Network Plan, traffic models	Assessment to determine alignment with the Auckland Strategic Freight Plan and to identify any potential effect on the freight movements

[1] SGA Remix file provided by Auckland Transport, June 2022, showing draft bus network plan to be implemented by 2038

Network Component	Information Source	Assessment Method
Note: A Road Safety Audit and Safe System assessment will be completed as part of the implementation business case / detailed design stage, prior to implementation, and have not been undertaken during this route protection phase.		

Further to the general traffic network component, a range of different transport modelling tools have been used to undertake quantitative assessments of the transport system throughout the transport network analysis process. The impacts of the Project on the future transport environment are assessed using forecasting transport models, owned by the Auckland Forecasting Centre (**AFC**). The models include:

- The regional multi-modal model (**MSM**);
- A traffic assignment model (Airport to Botany Traffic Model);
- A strategic active mode (walk/cycling) model (**SAMM**);
- Intersection models (SIDRA) at key locations; and
- A more detailed AIMSUN operational model of the BRT corridor.

The main assessment of transport effects is based on a 2038 forecast year horizon. This aligns with the available regional models and the likely horizon for implementation of the full BRT corridor.

Approach to assessment of construction effects

Based on the indicative construction methodology, an assessment of construction effects has been completed for the Project sufficient to support each NoR. This assessment considers:

- An overview of key considerations including speed management, potential impacts to pedestrians and cyclists and property access;
- Identification of any works that should not occur at the same time; and
- An assessment of potential conflict areas with vulnerable road users that will need specific mitigation.

The impact of any temporary traffic management measures implemented to undertake the Projects will be re-assessed in the future, prior to construction, when a greater level of detail is available in terms of the specific construction methodology and traffic environment.

NoR 1: Te Irirangi Drive section

Road environment overview

In this section it is proposed that the function of Te Irirangi Drive, an existing urban four-lane arterial corridor, will change to incorporate components for the BRT corridor and active modes. The proposed cross-section will be generally consistent through this section, with the two-way BRT corridor replacing the existing central solid median (approximately 10 m wide) and walking and cycling facilities established along both sides of the corridor. It is noted that an existing footpath is already provided along the length of the corridor on both sides. Te Irirangi Drive will continue to provide two vehicle lanes in either direction. All signalised intersections along this section will be retained and upgraded to include priority for BRT services and, four BRT stations.

In this regard, there are, in general, minimal impacts to the existing road reserve, given that the rapid transit corridor (two-way) will essentially replace the existing solid median.

The typical cross section for this section is shown in Figure 2.

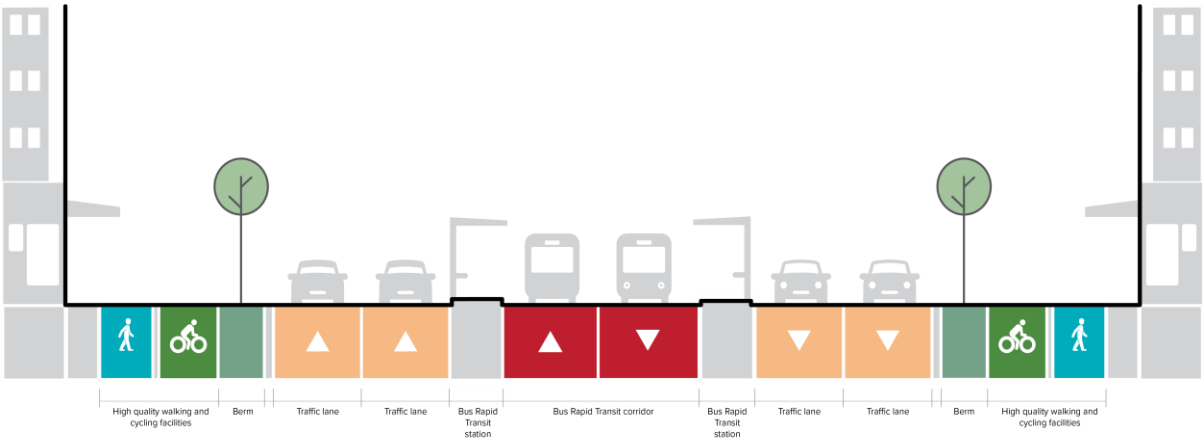


Figure 2: NoR 1 Typical cross section

Overall conclusion

Table 2 below summarises the operational transport effects for NoR 1.

Table 2: Summary of operational transport effects - NoR 1

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • Improved walking and cycling facilities along Te Irirangi Drive (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved walking and cycling crossing facilities (crossing Te Irirangi Drive), resulting in a safer environment for all road users; and • Consequential reductions in the risk of Death or Serious Injuries (**DSIs**).
Public Transport	In summary, the effects of the Project on public transport are: • 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.
Walking and Cycling	In summary, the effects of the Project on walking and cycling include: • Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along corridors along Te Irirangi Drive; • Improved integration with the future walking and cycling network, resulting in improved north-south walking, and cycling connectivity; • Environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips;

Operational Transport Effects	
	• Supporting growth surrounding Te Irirangi Drive, particularly around proposed BRT stations; and • Improved safety and access to employment and social amenities.
General Traffic	In summary, the effects of the Project on general transport are: • Minimal operational impacts along the corridor and intersection capacity because of the Project corridor; • Improved driver safety with the removal of all give-way controlled slip lanes at the intersections along the NoR 1 corridor. Fully signalised intersections will control vehicle and pedestrian movements, further reducing potential conflict with pedestrians and cyclists; and • The provision of NoR 1 supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and reduced Vehicles Kilometres Travelled (**VKT**) via private vehicle.
Access and Parking	In summary, the effects of the Project on access and parking include: • Minimal operational impacts on existing access provisions and on-street / off-street parking along Te Irirangi Drive; and • All existing access points are to be maintained (excluding for sites that are fully within the proposed designation boundary) with minor reforming and regrading proposed.
Freight	In summary, the effects of the Project on freight are minimal: • Te Irirangi Drive will continue to support the overall freight connections in this area. The Project will also result in improved journey times and reliability for existing and future freight.

NoR 2: Manukau section

Road environment overview

In this section it is proposed that the form and function of the various corridors (Te Irirangi Drive, Great South Road, Ronwood Avenue, Davies Avenue, Manukau Station Road, Lambie Drive and Puhinui Road) within NoR 2 will change to include a centre-running BRT corridor (two-way) and five BRT stations. It is proposed to either utilise the existing central median width and / or widen the existing road reserve to include a central BRT corridor. The Project also provides improved walking and cycling facilities along its length on both sides of the road. Intersections within NoR 2 will be upgraded to accommodate the BRT corridor.

The proposed cross-section varies along the corridor, based on the existing road reserve width, number of lanes and surrounding land use activities. A typical cross section is shown in Figure 3.

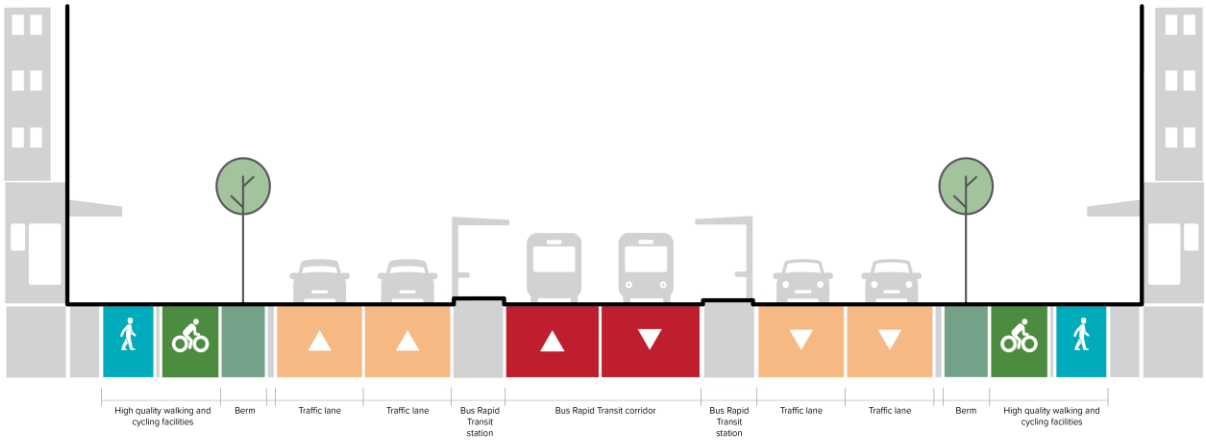


Figure 3: NoR 2 Typical cross section

Overall conclusion

Table 3 summarises the operational transport effects for NoR 2.

Table 3: Summary of operational transport effects - NoR 2

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • Improved walking and cycling facilities along corridors within NoR 2 (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved walking and cycling crossing facilities, resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.
Public Transport	In summary, the effects of the Project on public transport are: • Significantly better quality, frequency, and reliability of public transport services (BRT services); • Good integration with the future public transport network and significantly improved connectivity and improved access to employment and social amenities; and • Better and safer access provisions for pedestrians, cyclists, and mobility impaired passengers.
Walking and Cycling	In summary, the effects of the Project on walking and cycling include: • Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along corridors within NoR 2; • Improved integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity; • Environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; • Supporting growth within and surrounding Manukau Central and around proposed BRT stations; and • Improve safety and access to employment and social amenities.

Operational Transport Effects	
General Traffic	In summary, the effects of the Project on general transport include: • Minimal operational impacts along the corridor and intersection capacity because of the Project; • Improved driver safety with the removal of all give-way controlled slip lanes at the intersections along the NoR 2 corridor. Intersections will be upgraded to provide fully signalised vehicle and pedestrian movements, further reducing potential conflict with pedestrians and cyclists; • The provision of NoR 2 supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and less VKT via private vehicle; and • The modelling indicates that Manukau Station Road (outside the corridor) will have a relatively substantial increase in AADT, with the increase in eastbound traffic flows noticeably greater than the increase in westbound traffic flows. This road is a major bus route that connects the Manukau Bus Station with eastern and southern Auckland (providing access for seven bus routes). Manukau Station Road currently provides an eastbound bus lane between Osterley Way and Leyton Way and in this regard, the delay experienced for eastbound buses will likely be minimal. The increase in westbound traffic flows is not as significant, and it is therefore not considered necessary to provide additional priority / dedicated facilities for buses for the anticipated change in flows. Overall, there are considered to be no significant adverse effects / delay for buses travelling to and from Manukau Bus Station via Manukau Station Road and Great South Road.
Access and Parking	• The overarching design philosophy for the Project has been to maintain existing access points (excluding sites that are fully within the proposed designation boundary) with minor reforming and regrading proposed; • Where right turn access is removed at certain properties because of the centre running BRT corridor, access will be provided via alternative routes. An assessment of alternative travel routes indicated that the additional travel distance is generally less than 2.5 km for all affected properties, which translates to approximately 3-4 minutes of additional travel time (maximum). Overall, the alternative route travel distances are considered within acceptable range from a traffic perspective; • The Project removes a number of on-street and off-street parking spaces within NoR 2. However, the BRT corridor provides a desirable alternative to car use and supports mode share; • The increased use of public transport is likely to lead to less demand for on-street and off-street parking within commercial / retail areas, with adequate parking facilities such as paid car park buildings available within proximity if necessary; and • Where land within the proposed designation is not required for permanent works, there is potential for it to be returned to landowners, therefore some off-street parking spaces may be able to be reinstated.
Freight	In summary, the effects of the Project on freight are: • Te Irirangi Drive, Lambie Road and Great South Road will continue to serve their respective freight roles in the long term; • The improved corridor capacity because of the Project (mode shift away from private travel to public transport) will result in improved journey times and reliability for existing and future freight; and

Operational Transport Effects	
	• The proposed Project footprint provides sufficient space to enable resilient and reliable freight movements on a long-term basis.

NoR 3: Puhinui Road section

Road environment overview

The Project proposes that the form and function of Puhinui Road within NoR 3 will change to include a centre-running BRT corridor (two-way) and walking and cycling facilities on both sides of the corridor. The proposed cross-section will be generally consistent along the length of the section, with one general traffic lane in each direction, a central two-way rapid transit corridor and dedicated and separated walking and cycling paths on both sides of the road.

This road does not currently provide a central median; therefore, the Project proposes to generally widen the existing road reserve to the southern side of Puhinui Road. One BRT station is provided within the NoR 3 section which integrates with the existing Puhinui Station.

The typical cross sections are shown in Figure 4 and Figure 5.

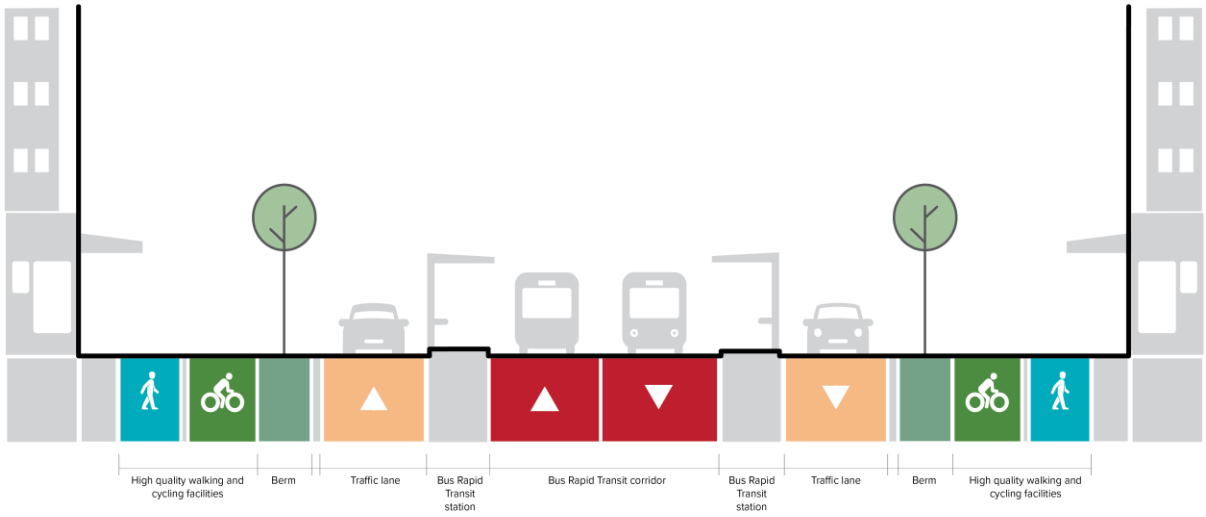


Figure 4: NoR 3 Typical cross section (with a BRT station)

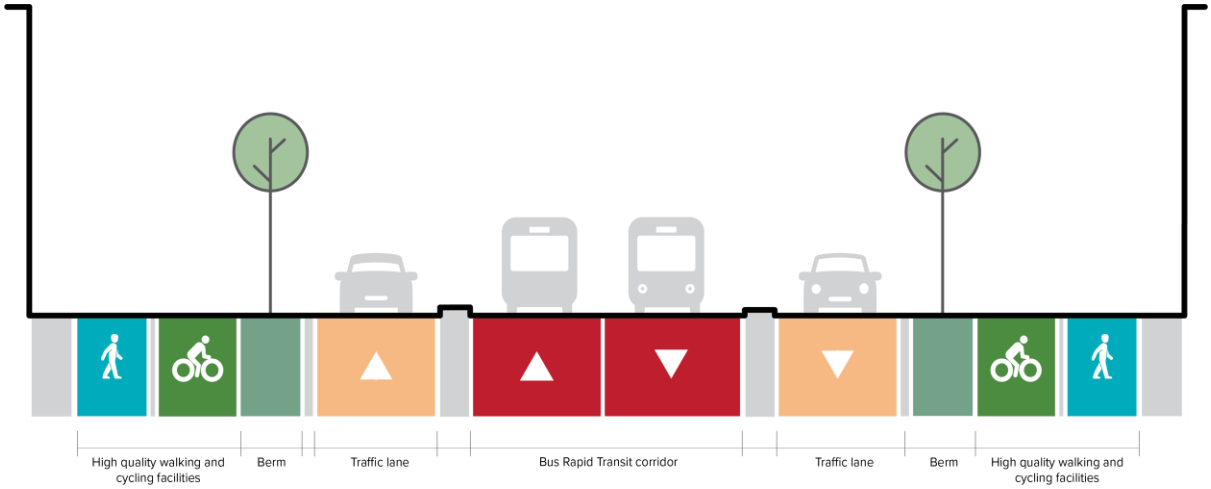


Figure 5: NoR 3 Typical cross section (without BRT station)

Overall conclusion

Table 4 summarises the operational transport effects for NoR 3.

Table 4: Summary of operational transport effects - NoR 3

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • Improved walking and cycling facilities along Puhinui Road (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved walking and cycling crossing facilities (crossing Puhinui Road), resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.
Public Transport	In summary, the effects of the Project on public transport are: • Significantly better quality, frequency, and reliability of public transport services (BRT services); • Good integration with the future public transport network and significantly improved connectivity and improved access to employment and social amenities; and • Better and safer access provisions for pedestrians, cyclists, and mobility impaired passengers.
Walking and Cycling	In summary, the effects of the Project on walking and cycling include: • Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along Puhinui Road; • Improved integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity; • Environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; • Supporting growth within and surrounding Puhinui Road, particularly around the proposed BRT station; and • Improve safety and access to employment and social amenities.

Operational Transport Effects	
General Traffic	In summary, the effects of the Project on general transport include: • Minimal operational impacts along the corridor and intersection capacity because of the Project; and • The provision of NoR 3 supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and less VKT via private vehicle.
Access and Parking	• The overarching design philosophy for the Project has been to maintain existing access points where practicable (excluding sites that are fully within the proposed designation boundary) with minor reforming and regrading proposed; • Where right turn access is removed because of the centre running BRT, access will be provided via alternative routes. An assessment of alternative travel routes indicates that the additional travel distance is generally less than 2.5 km for all affected properties, which translates to approximately 3-4 minutes of additional travel time (maximum). Overall, the alternative route travel distances are considered within acceptable range from a traffic perspective; and • The Project removes a minimal number of on-street and off-street parking spaces within NoR 3. The increased use of public transport is likely to lead to less demand for on-street and off-street parking.
Freight	In summary, the effects of the Project on freight are: • The improved corridor capacity because of the Project will result in improved journey times and reliability for existing and future freight; and • The corridor will be able to accommodate freight movements along the mid-block and through the intersections, therefore supporting the efficient movement of freight.

NoRs 4a and 4b: State Highway 20B section

Road environment overview

The NoR 4a section extends between the SH20/20B interchange to Orrs Road, while NoR 4b runs for approximately 700-800 m between the SH20/20B interchange to the Manukau Memorial Gardens intersection. NoR 4b is a proposed alteration to existing Designation 6717.

In this section, it is proposed that the function of SH20B will change from the existing four lanes (two general traffic and two bus / transit lanes) in a rural context to a four-lane urban arterial corridor, with a new BRT corridor and walking and cycling facilities.

The function of NoR 4a and 4b is consistent, however the cross-section differs in terms of the location of the BRT corridor and active mode elements in relation to the State Highway elements.

As shown in Figure 6, for NoR 4a, both the BRT corridor and the walking and cycling facilities run along the southern side of SH20B, with no changes to the footprint of the existing four traffic lanes. For NoR 4b, the BRT corridor is proposed to run down the centre of the existing road carriageway separating the directional traffic lanes, and walking and cycling facilities will be provided along both sides of the, as shown in Figure 7.

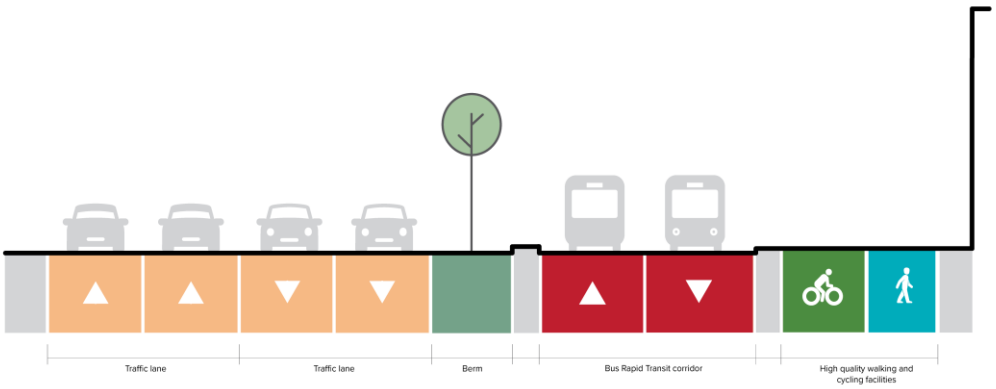


Figure 6: NoR 4a Typical cross section

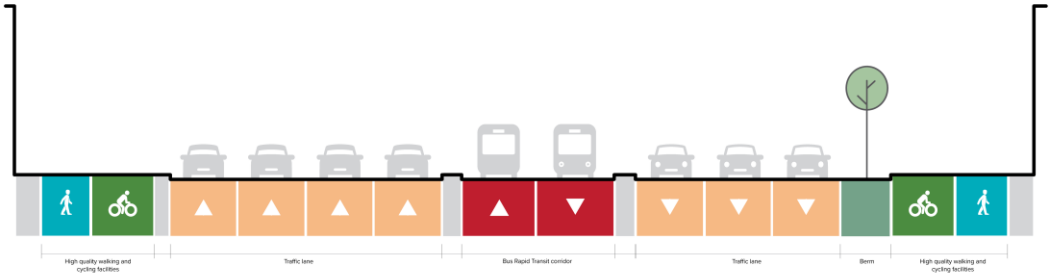


Figure 7: NoR 4b Typical cross section

Overall conclusion

Table 5 summarises the operational transport effects for NoR 4a / 4b.

Table 5: Summary of operational transport effects - NoRs 4a and 4b

Operational transport effects	
Safety	In summary, the effects of the Project on safety are: • Improved walking and cycling facilities along SH20B (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved walking and cycling crossing facilities (crossing SH20B), resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.
Public Transport	In summary, the effects of the Project on public transport are: • Significantly better quality, frequency, and reliability of public transport services (BRT services);

Operational transport effects	
	• 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.
Walking and Cycling	In summary, the effects of the Project on walking and cycling include: • Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along corridors along SH20B; • Improved integration with the future walking and cycling network, resulting in improved north-south walking, and cycling connectivity; • Environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; and • Supporting growth surrounding SH20B and improved safety and access to employment and social amenities.
General Traffic	In summary, the effects of the Project on general transport include: • Manageable operational impacts along the corridor and intersection capacity because of the Project; and • The provision of NoRs 4a and 4b support wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and less VKT via private vehicle.
Access and Parking	In summary, the effects of the Project on access and parking include: • Negligible operational impacts on existing access provisions and on-street / off-street parking along SH20B; and • All existing access points are to be maintained, with minor reforming and regrading proposed.
Freight	In summary, the effects of the Project on freight are: • Upgrades to SH20B and the separate BRT corridor maximise the corridor's productivity and provide reliable travel for the most critical users, which include freight and high occupancy vehicles; and • The proposed footprint provides sufficient space to enable resilient and reliable freight movements.

1 Introduction

1.1 Purpose and scope of this Report

This Assessment of Transport Effects (**Report**) has been prepared to inform the Assessment of Effects on the Environment (**AEE**) for five Notices of Requirement (**NoRs**) being sought by Waka Kotahi New Zealand Transport Agency (**Waka Kotahi**) and Auckland Transport (**Auckland Transport**) for the Airport to Botany project (**the Project**) under the Resource Management Act 1991 (**RMA**). Specifically, this Report considers the actual and potential effects associated with the construction, operation, and maintenance of the Project on the existing and likely future environment as it relates to transport effects, and where appropriate recommends measures that may be implemented to avoid, remedy and/or mitigate effects.

Auckland's southern and eastern areas (east Auckland, south from Manurewa and south to Manukau) contain a significant population of 360,000 people and include two of the seven metropolitan centres in Auckland, a substantial growth area at Ormiston and two of Auckland's largest employment areas in the Airport precinct and East Tāmaki. Of importance is also the proposed growth further to the south of the Auckland region. When combined with the wider south – Drury, Paerata and Pukekohe – the southern area of Auckland alone is forecasted to accommodate an additional 114,800 people between 2016 and 2038, giving a forecast total population of 334,900 people by 2038. Between 2013 and 2018, Manukau grew the most of all areas in Auckland, and is anticipated to continue to be an area of significant population and employment growth. Access to jobs for the people living in southern Auckland is heavily dependent on access to the Manukau Central, the Airport area and East Tāmaki – none of which can be accessed easily with the existing public transport network.

The Airport to Botany Project will provide route protection for a BRT corridor, which includes walking and cycling facilities needed to support existing demand and expected growth in south and east Auckland.

This Report should be read alongside the AEE, which contains further details on the history and context of the Project. The AEE also contains a detailed description of works to be authorised for each NoR, likely staging and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this Report and have been considered as part of this assessment of transport effects. As such, they are not repeated here, unless a description of an activity is necessary to understand the potential effects, then it has been included in this Report for clarity.

1.2 Report structure

To provide a clear assessment of each NoR, this Report follows the general structure set out in the AEE. That is, each notice has been separated out into its own section, and each section contains an assessment of the actual and potential effects for the specific NoR. Where appropriate, measures to avoid, remedy or mitigate effects are recommended. However, because some transport effects span across multiple NoRs, this Report includes an assessment of the full corridor to capture the effects of the Project at a network level. This full-corridor assessment is presented in Section 5.5 while the effects assessment of each NoR is presented in subsequent Sections 7 - 10.

Each section is arranged in geographical order starting from the northernmost point of the proposed NoR to the southernmost point. Table 6 provides an overview of the Report structure and where the assessment of effects for each NoR can be found in this Report.

Table 6: Report structure

Sections	Section number
Description of the Project	2
Overview of the methodology used to undertake the assessment and identification of the assessment criteria and any relevant standards or guidelines	4
Assessment of general transport matters for all Airport to Botany Bus Rapid Transit NoRs	5
Assessment of specific transport matters for Airport to Botany Bus Rapid Transit NoR 1	7
Assessment of specific transport matters for Airport to Botany Bus Rapid Transit NoR 2	8
Assessment of specific transport matters for Airport to Botany Bus Rapid Transit NoR 3	9
Assessment of specific transport matters for Airport to Botany Bus Rapid Transit NoRs 4a and 4b	10
Overall conclusion of the level of potential adverse transport effects of the Airport to Botany Bus Rapid Transit Project	11

2 Project description

The Airport to Botany Project is proposed to be an 18 km fast, high capacity, reliable, and frequent Bus Rapid Transit (**BRT**) connection with twelve stations, connecting Auckland Airport and its employment areas with major urban centres including Manukau and Botany and will be part of Auckland's wider Rapid Transit Network (**RTN**).

As set out in the AEE, this Report specifically relates to a portion of the broader Project (approximately 14.9 km) which extends from the Botany Town Centre in the vicinity of Leixlep Lane to Orrs Road in the Puhinui peninsula, off SH20B. The Project primarily involves the upgrade and widening of existing transport corridors to provide for a separated BRT corridor and high-quality walking and cycling facilities.

Nine BRT stations are proposed as part of the Project. These stations will facilitate off-board ticketing and level boarding and 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

As part of the Project, SH20B is proposed to be widened to provide eastbound 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 BRT corridor.

Section 5 provides an overview of the entire project length. Specific descriptions of each NoR are also discussed in detail in their respective sections.

3 Project inter-dependency

The Airport to Botany Project has been developed to be fully integrated with related projects at each end of the corridor, namely the Eastern Busway station design at Botany Town Centre (to the north of NoR 1) and the BRT corridor planned within the Auckland International Airport Limited (**AIAL**) precinct connecting the BRT at Orrs Road (west of NoR 4a) into the airport terminals.

The Eastern Busway Project is being progressed, including design and consenting for the Botany Station, and is expected to be operational before the Airport to Botany Project is implemented. Similarly, AIAL are progressing planning, design and consenting for the busway extending along SH20B from Orrs Road into the Airport Precinct. The Airport to Botany Project is expected to be implemented after (or concurrently with), the AIAL project.

The AEE (and identified positive effects) has been based on the assumption that the Airport to Botany Project is implemented into an environment that already includes those related projects. If the Project was to be prioritised ahead of those related projects, it is possible that the benefit to the users of the BRT may not be fully realised. Given the understanding of where these adjacent works are at in their approval stages, it is considered that the risk of this scenario is low.

4 Assessment methodology

4.1 Preparation for this Report

Work undertaken for this Report commenced in January 2022. The preparation for this work has included:

- Review of the construction method statement and previous SSBC documentation;
- Site visits with Project Team (23/03/2022);
- Weekly meetings with Project Team; and
- Workshops with other relevant technical specialists.

4.2 Assumptions and limitations

Given the long-term nature of the designations being sought by the NoRs, this assessment does not assess the interim staging of individual projects. Instead, it places a greater focus on the 'full build out' of the project to support future communities and assesses the transport effects of this project on that likely future environment. The business case suggested a staged implementation approach with the full scheme operational by 2035 (noting this date is uncertain as funding for this full scheme has not yet been committed).

The assessment is targeted at long-term route protection, rather than imminent implementation, as such the following stages would need to be undertaken prior to implementation:

- Business case for implementation, including any concept design review / update to contemporary information or standards;
- Updated transport modelling;
- Detailed design;
- Consent applications;
- Construction planning and approvals; and
- Construction.

Given the above, this NoR is based on only concept-level design and relies on conditions and future management plans to confirm design detail and address local effects. As such, the NoR:

- Makes greater use of generic cross-sections and design standards;
- Focuses more on desired outcomes and full-build footprints;
- Takes a longer-term view, with its inherent uncertainties; and
- Assumes more use of recommended management plans and planning processes rather than specific design details to manage potential effects.

The methodology for the operational and construction transport effects is applicable for each NoR specified within this document. Any nuances between the NoRs are specified where appropriate within each assessment.

The Assessment of Transport Effects has two elements:

- Assessment of operational effects on the transport system; and
- Assessment of construction effects on the transport system.

4.3 Existing and likely future environment

A key element of the assessment is the definition of the 'existing / likely future environment', against which the effects are assessed. This is a complex issue as the proposed BRT is planned to support medium-longer-term urban re-development and transformation of travel choices. As such, the future environment will differ from the existing environment, and the source of some potential effects (such as people and vehicle movement) is generally from that urban development itself, rather than from the planned infrastructure.

To isolate the effects of the planned works, the 'Existing Environment' includes the likely future urban development but does not include the planned projects for which designations are sought. The effect of the Project is then assessed using the same land use assumptions. Given the long-term perspective of the assessment, the analysis is based on the estimated 'full build out' given current zoning and including the future urban area. This is based on demand forecasting estimates provided by Auckland Council.[2]

It is arguable that the Project would itself induce some change in that urban development, or conversely, the planned urban development may be less likely to emerge without the Project. It would become highly speculative to estimate where the planned growth could instead go without this Project in place. Given that land use planning decisions are subject to separate processes (via Auckland Council), this approach is considered suitable for this AEE.

4.4 Approach to assessment of operational transport effects

Potential operational transport effects are assessed using:

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

In respect to individual NoRs, a separate assessment has been undertaken for each key element of the transport system, including effects on safety, different modes, and property access. This section will outline the methodology adopted for these assessments.

4.4.1 Transport modelling

Throughout the transport network analysis process, a range of different transport modelling tools have been used to undertake quantitative assessments of the transport system. These tools inform decisions about planning the transport network, corridors, and intersections. These, or similar, tools were used in the SSBC to develop the recommended Project, with further refinement of the project design and the tools undertaken for this AEE. Where appropriate, results from both the SSBC and the more refined AEE analysis are used in this assessment.

The impacts of the Projects on the future transport environment are assessed using forecasting transport models, owned by the AFC. The models include:

- The regional multi-modal model (**MSM**). This model creates estimates of car, truck, and PT movements at a regional level, based on land use, network, and policy inputs. This model is the

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

primary tool to estimate future PT usage. Generally, this model is run using regional assumptions as per recent ATAP planning, with project-specific inputs in the study area;
- A traffic assignment model (Airport to Botany Traffic Model), that uses the traffic demands from MSM on a more detailed representation of the road and street network. This model is the main tool used to estimate potential changes in traffic flows and road network performance because of the Project;
- A strategic active mode (walk/cycling) model (**SAMM**). This tool gives strategic-level estimates of walking and cycling demands, including those expected to be induced because of the Project;
- Intersection models (SIDRA) at key locations. These models were used to check concept designs and report the expected intersection performance at key locations. SIDRA models use expected traffic flows at key locations from the Airport to Botany Traffic Model; and
- A more detailed AIMSUN operational model of the BRT corridor was also used during project refinement. That model also uses traffic flows through and across the BRT corridor from the Airport to Botany Traffic Model but simulates the detailed traffic signal interaction and bus movements in more detail. That tool was used to inform specific detailed parts of the project design and potential BRT operation but was not used extensively in this assessment.

The assessment of operational effects is informed by modelled estimates of travel and network performance for a future full-build-out scenario. Each of the models used (except the small, localised SIDRA models), have been subject to independent peer review.

The main assessment of transport effects are based on a 2038 forecast year horizon. This aligns with the available regional models and the likely horizon for implementation of the full BRT. Longer-term forecasts (2048) were prepared for specific assessments such as operational traffic noise but are not reported extensively here.

A key input to the models are regional land use forecasts, which influence the future quantum and location of travel. Regionally agreed land use forecasts are prepared by Auckland Council via the AFC, with the most recent available forecasts (at the time of this assessment), referred to as Scenario I11.6. Those forecasts are based on regional population forecasts from Statistics NZ, with spatial allocation to individual spatial areas based on the AFCS land use model and known detail around specific land use planning processes.

Land use forecasts have inherent uncertainty, in terms of the specific rate of new growth in specific areas. Currently, there is additional uncertainty around the likely outcomes and rate and location of higher-density development sought through central Government policies such as the National Policy Statement on Urban Development (**NPS:UD**). A key intent of those policies is to enable higher density development, especially around high-quality public transport systems. The specific planning response to those 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. Generally, it is considered that this BRT Project is not inconsistent with such policy direction, regarding supporting higher density urban development via more sustainable travel modes. Given this context, the use of those available I11.6 forecasts is considered acceptable for this assessment.

The potential for the Project to generate diversion of traffic to other routes or corridors was primarily assessed via the traffic models, albeit augmented by local knowledge of the area and data on existing behaviour and network issues. Although the transport models include detailed assessment of three weekday peak periods (morning and evening commuter peaks plus the interpeak), the assessment

has focussed on predicted change in daily[3] flow to better reflect sustained change, rather than impacts that could be more fleeting during peak periods. Daily flows can be a useful measure of a range of traffic effects, including noise, amenity, safety, and likely congestion. The assessment of effect on potential network delay did consider each peak period.

For traffic modelling analysis at key intersections, level of service (**LOS**) metrics were used to quantify the potential change in system efficiency (for vehicles) because of the Project. LOS is a qualitative measure used to explain the quality of motor vehicle traffic service. LOS is used to analyse roads and intersections by categorising traffic flow and assigning quality levels to traffic based on a performance measure ranging from A to F. These are summarised as follows:

- **LOS A: free flow**. Traffic flows at or above the posted speed limit and motorists have complete mobility between lanes.
- **LOS B: reasonably free flow**. LOS A speeds are maintained, manoeuvrability within the traffic stream is slightly restricted.
- **LOS C: stable flow, at or near free flow**. Ability to manoeuvre through lanes is noticeably restricted and lane changes require more driver awareness.
- **LOS D: approaching unstable flow**. Speeds slightly decrease as traffic volume slightly increase. Freedom to manoeuvre within the traffic stream is much more limited and driver comfort levels decrease.
- **LOS E: unstable flow, operating at capacity**. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to manoeuvre in the traffic stream and speeds rarely reach the posted limit.
- **LOS F: forced or breakdown flow**. Every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Travel time cannot be predicted, with generally more demand than capacity

Given the focus on provision of high quality and attractive bus and active mode travel in this corridor, the assessment did not define minimum LOS standards to be met at intersections. Rather, the LOS measures were generally used to easily identify the likely performance of key intersections, and more importantly the potential change because of the Project.[4]

4.4.2 Transport guidance and documents

Assessment of the Project against the relevant objectives and policies of the AUP:OP is contained in the AEE. Within this Report, the Project has also been considered against the outcomes and objectives of applicable transport design guidance and policy directives including:

- Auckland Transport's Transport Design Manual, which sets out outcomes, engineering design and construction requirements for the Project;
- Auckland Transport's Vision Zero, and the Waka Kotahi Road to Zero policy, which adopt a "Safe System" approach to focus on road safety for all road users; and
- Auckland Transport's Roads and Streets Framework was also used to qualitatively assesses the typology (movement and place value) and modal priority for each corridor.

[3] Weekday daily traffic flows were estimated as a weighted aggregation of the three peak periods

[4] It is noted that specific LOS and other performance targets are relevant in the Puhinui area adjacent to SH20B as these are specifically referred to in the Puhinui Precinct Plan in the Auckland Unitary Plan. Those measures relate to land use planning in that precinct rather than to performance of the BRT corridor per se.

4.4.3 Assessment methodology – transport elements

Table 7 summarises how the operational effects resulting from the Project has been assessed for each component of the transport network.

Table 7: Summary of assessment methodology

Network component	Information source	Assessment method
Safety	CAS Database Project design drawings, modelled network-reduction in total vehicle travel	Assessment to determine alignment with Vision Zero and Road to Zero standards, design compliance with Transport Design Manual and network-wide estimate in reduced crashes from less vehicle travel.
Public Transport	Transport Model tools (MSM, BRT corridor model) SGA Remix File[5]	Quantification of expected change in accessibility, mode share and PT travel, including on other parts of the PT network.
Walking and Cycling	Walking and Cycling Network Plans Proposed Cross Sections Model forecasts of change in active model travel from Project	Assessment to determine alignment with walking and cycling strategic documents and design compliance with Transport Design Manual. Estimation of uplift in walk and cycle travel, including potential associated reductions in vehicle travel.
General Traffic	Transport Model tools: MSM (changes in overall demand), Airport to Botany Traffic Model (changes in traffic flows and network performance) and SIDRA (changes in intersection efficiency at key locations) Project design drawings	Assessment using key model outputs including traffic volumes, levels of service for corridor midblock performance and intersection performance. Assessment of surrounding network connections
Property access	Engineering Standards Project design drawings	Assessment identifying where there is a potential effect on access in the existing environment
Parking	Engineering Standards and existing on-street parking provisions	Assessment identifying where there is a potential effect on both off-street / private and on-street parking in the existing environment
Freight	Auckland Strategic Freight Network Plan, traffic models	Assessment to determine alignment with the Auckland Strategic Freight Plan and to identify any potential effect on the freight movements
Note: A Road Safety Audit and Safe System assessment will be completed as part of the implementation business case / detailed design stage, prior to implementation, and have not been undertaken during this route protection phase.		

[5] SGA Remix file provided by Auckland Transport, June 2022, showing draft bus network plan to be implemented by 2038

4.5 Approach to assessment of construction effects

4.5.1 Construction traffic effects

An indicative construction methodology has been prepared to enable assessment of the potential construction traffic effects of the Project. This can be found in Section 6.2 of the AEE. Given the long-term nature of the NoRs, these construction methodologies are indicative only to identify the general type of adverse transport effects that could eventuate, and thereby inform the scope of proposed management plans. The scope of this assessment is for impacts on the operation of the transport system and does not directly address any potential business economic impact because of potential temporary access disruption.

Based on the indicative construction methodology, an assessment of construction effects has been completed for the Project sufficient to support each NoR. This assessment considers:

- An overview of key considerations including speed, potential impacts to pedestrians and cyclists and property access;
- Identification of any works that should not occur at the same time; and
- Assessment of potential conflict areas with vulnerable road users that will need specific mitigation within a Construction Traffic Management Plan (**CTMP**) and/or Site-Specific Traffic Management Plans (**SSTMP**).

The project specific construction effects will be managed via a CTMP and/or SSTMP, which will be developed immediately prior to implementation, when the greatest certainty is available. The Project works are generally within the existing road corridors, so major movement of trucks for earthworks or bulk materials is not anticipated. While construction traffic will still be present, the corridors are generally within dense urban road networks with multiple alternative routes. Given this context and the uncertainty of the future construction methodologies, this assessment has not assessed detailed estimates of construction traffic movements.

4.5.2 Temporary traffic management

The impact of any temporary traffic management measures implemented to undertake the Project will be re-assessed in the future, prior to construction, when a greater level of detail is available in terms of the specific construction methodology and traffic environment.

It is noted that most of the Project works will be undertaken ‘online’, within or immediately adjacent to operational arterial corridors. Any future assessment should be required to consider network capacity reductions through potential road closures, capacity reductions on key corridors through lane closures, effects on property access through road or lane closures, and any other ancillary effects such as shoulder closures or temporary loss of access to individual properties.

5 Airport to Botany Assessment overall project overview

5.1 Overview of Project sections

The Airport to Botany overall project provides a BRT corridor between Auckland Airport and Botany Town Centre. It connects important economic hubs (Airport precinct, Manukau, and Botany urban centres, East Tāmaki industrial area) as well as residential areas. The rapid transit corridor includes accessible stations which serve its communities. Improvements are made to the transport corridors along the route to maintain the reliability of the rapid transit service and help to maintain acceptable access along the corridor. The Airport to Botany Project also incorporates dedicated walking and cycling facilities.

An overview of the Airport to Botany Project is provided in Figure 8 and summarised in Table 8 below.

Figure 8: Airport to Botany overview of NoRs for assessment

Table 8: Airport to Botany Project summary

Notice	NoR description	Description	Requiring Authority
NoR 1	Botany Town Centre to Rongomai Park	Upgrade of Te Irirangi Drive to enable a two-way rapid transit corridor and four-lane arterial cross-section with walking and cycling facilities on both sides	Auckland Transport

Notice	NoR description	Description	Requiring Authority
NoR 2	Rongomai Park to Puhinui Station	• **Puhinui Road:** the upgrade of the existing Puhinui Road to include a two-way rapid transit corridor and a two-lane arterial with separated active modes. • **Lambie Drive:** the upgrade of the existing Lambie Drive to include a two-way rapid transit corridor and a four-lane arterial with separated active modes • **Manukau Station Road**: the upgrade of the existing Manukau Station Road to include a two-way rapid transit corridor and a four-lane arterial with separated active modes • **Davies Crescent**: the upgrade of the existing Davies Crescent to include a two-way rapid transit corridor and a two-lane local road with separated active modes • **Ronwood Avenue**: the upgrade of the existing Ronwood Avenue to include a two-way rapid transit corridor and a two-lane arterial with separated active modes • **Great South Road**: the upgrade of the existing Great South Road to include a two-way rapid transit corridor and a four-lane arterial with separated active modes • **Te Irirangi Drive**: the upgrade of the existing Te Irirangi Drive to include a two-way rapid transit corridor and a four-lane arterial with separated active modes.	Auckland Transport
NoR 3	Puhinui Station to SH20/20B Interchange	• **Puhinui Road:** the upgrade of the existing Puhinui Road to include a two-way rapid transit corridor and a two-lane arterial with separated active modes.	Auckland Transport
NoR 4a	SH20/20B Interchange to Orrs Road	A new two-way rapid transit corridor, 1.8 m footpath and 3.0 m bi-directional cycle path.	Auckland Transport
NoR 4b	SH20/20B Interchange to Orrs Road	To alter the existing SH20B Designation 6717 to allow for the proposed rapid transit corridor: Upgrade of sections of State Highway 20B to accommodate a two-way rapid transit corridor, a ramp to connect SH20B with SH20 in a southbound direction, 1.8 m footpath and 3.0 m bi-directional cycle path.	Waka Kotahi

Please refer to the AEE for further information on the Project, including a project description, key project features and the planning context.

5.2 Design philosophy

The Project for which the NoRs are sought is a 14.9-kilometre component of the BRT corridor between the Airport and Botany, connecting residential, public service, social and important economic hubs between the Airport precinct, Manukau, and Botany urban centres. The full proposed BRT corridor extends west into the Airport terminal, however the NoRs only apply to the section east of Orrs Road. The section west of Orrs Road is within the jurisdiction of the Auckland Airport and is to be progressed as a separate, but linked project. The full rapid transit corridor includes twelve accessible stations which serve their local communities as well as interchange stations. Nine of these stations are within the boundaries of the NoRs. The Project also incorporates fully separated walking and cycling facilities along the corridor.

The Project includes key interchange stations to facilitate connections to other existing or planned rapid transit corridors, including at Botany (to the planned Eastern Busway), Manukau (to the existing rail and bus networks), Puhinui (to the existing southern rail corridor) and at the Airport (to the planned City Centre to Māngere (**CC2M**) light rail project). It connects to many local bus services, some of which intersect multiple times, resulting in more connections and increasing the variety of public transport opportunities for customers in southern and eastern Auckland. Some existing bus services will be re-routed to optimise these connections and maintain the simple, intuitive service pattern planned for this corridor.

The walk and cycle components of the Project provide both access to the BRT stations as well as additional, safe, and attractive travel choices along the corridor. The walk and cycle components are integrated with other existing or planned facilities to provide a connected network. These include similar facilities proposed along the Eastern Busway, a network of improved facilities within Manukau Central being progressed by Auckland Transport and Auckland Council and the recently completed elements along the SH20B corridor.

The Project has an overall goal to improve accessibility to key locations by non-car modes and encourage mode shift to public transport and active modes. It also supports more intensive and less car-dependent land use activities among the corridor, particularly at high priority centres such as Manukau. Factors that influence public transport uptake include provision of high quality, frequent, reliable services, and safe, attractive, accessible stations.

The key features of the Project are:

- Articulated, low-floor electric BRT service running at high frequency in dedicated lanes between the Airport and Botany;
- A patronage demand of around 2,000 passengers per hour in the AM peak in 2048. This requires a high frequency service with a 3-minute headway if a high-capacity BRT vehicle is adopted;
- A relatively high operating speed and level of reliability to enable mode shift and to support the specific needs of customers;
- A long span of service to enable access and travel choice for shift workers and travellers (domestic and international);
- Accessible and integrated station designs and locations;
- Allows for level boarding all-door boarding, off-board ticketing and tag-on (like train or light rail) at stations, providing a best practice customer experience and reduced dwell times;
- Integration with rapid transit, local bus, cycle, and road networks;

- Opportunities to provide walking, cycling and multi-modal interventions for station access and along the route;
- Opportunities to leverage land use change through transit-oriented development;
- A staged delivery enabling access and travel choice problems that exist now to be addressed early; and
- Investment to be aligned with related projects, and capacity and performance to be aligned with growth in demand.

The project system can be scaled to meet demand as it grows and includes:

- A single bi-directional service between the Airport and Botany (designed with flexibility to incorporate future additional services) with headways of as short as three minutes during peak times;
- Fast, reliable journey times in both directions between Botany and Auckland Airport;
- Separated running ways, with at-grade intersections;
- Twelve stations (nine of which are within the Project boundaries) with off-board ticketing, level boarding and all-door boarding (all provided to reduce vehicle dwell times, and provide a more reliable and accessible service);
- Connections to four existing and proposed rapid transit lines, including the proposed CC2M light rail project at the Airport; and
- Potential to promote and support transit-oriented development at key centres.

The proposed typical corridor cross section design (generally two general traffic lanes in each direction) is shown in the following figures.

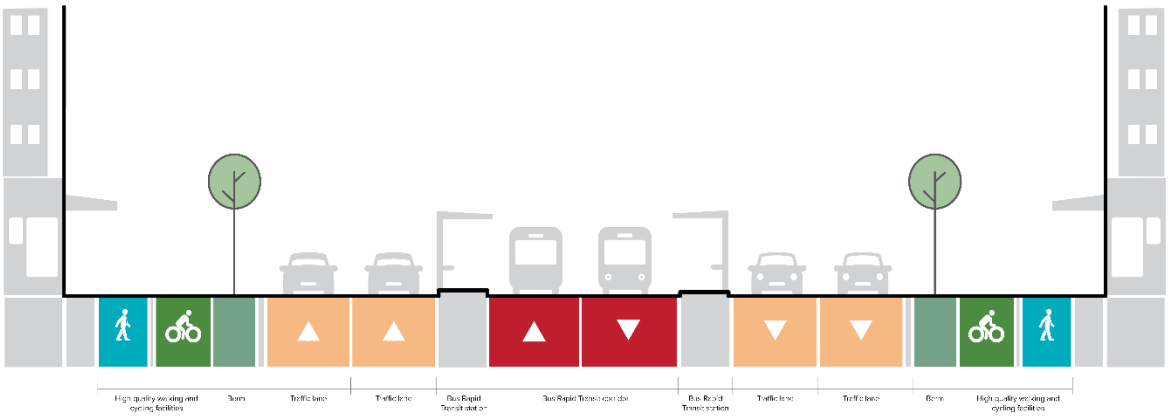


Figure 9: NoR 1 and NoR 2 Typical Cross Section

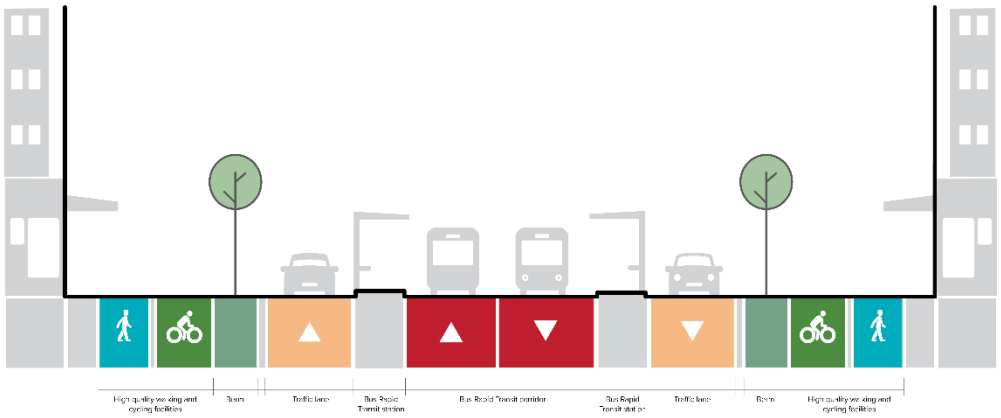


Figure 10: NoR 3 Typical Cross Section (with station)

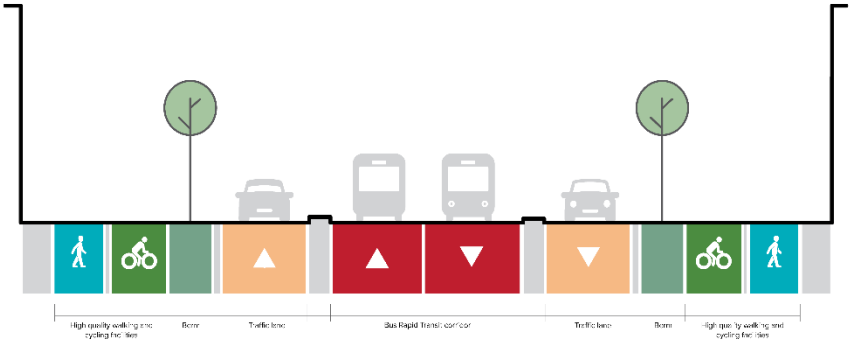


Figure 11: NoR 3 Typical Cross Section (without station)

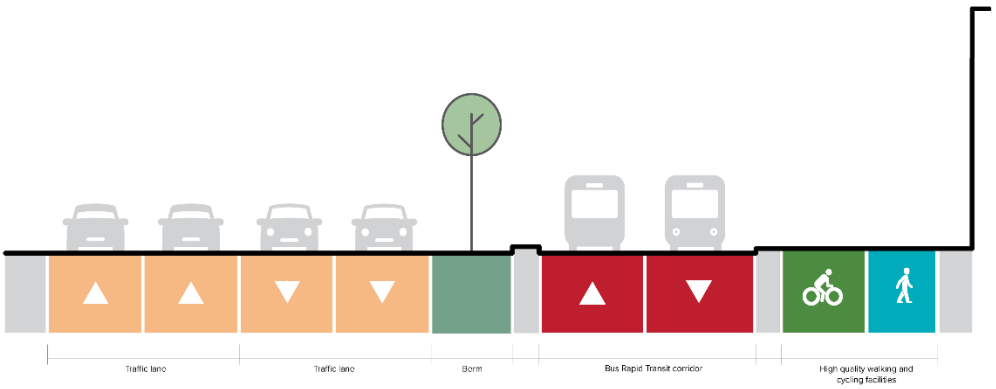


Figure 12: NoR 4a Typical Cross Section

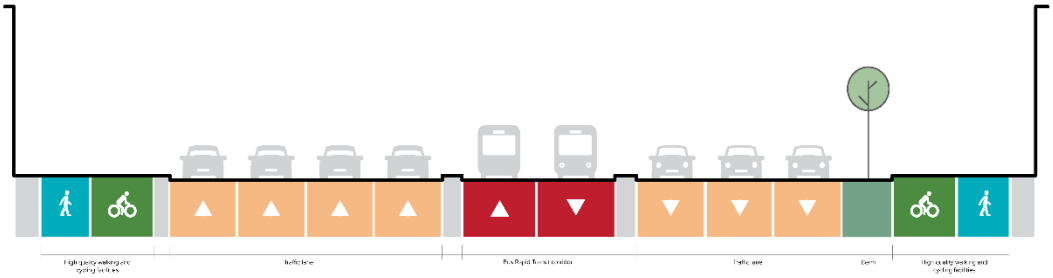


Figure 13: NoR 4b Typical Cross Section

5.3 Overall system outcomes summary

Figure 14 summarises the system-level outcomes expected of the Airport to Botany Project, as identified in the Business Case. That information is focussed on the investment outcomes of the business case and includes other elements included in the business case for longer-term implementation, but not part of this NoR. This data is provided as background context for the Project. Some indicators from the business case have been updated in the following Chapters due to updated model inputs and the Project's focus only on the BRT element, however the BRT concept assessed here remains consistent with the Business Case.

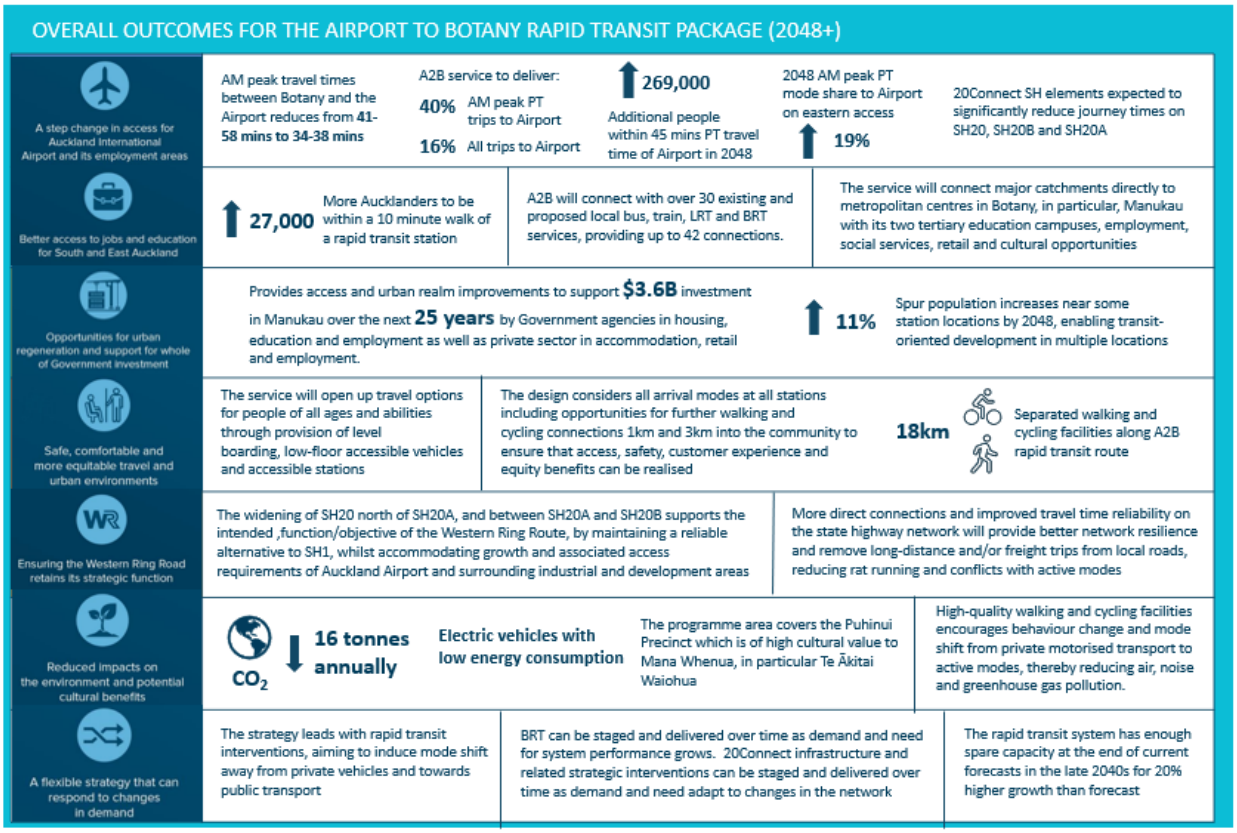


Figure 14: Overall outcomes summary

5.4 Assessment of project objectives

There is one set of project objectives for the Auckland Transport NoRs (NoRs 1 – 4a) and a separate project objective for the proposed alteration to existing Designation 6717 (NoR 4b). Of particular relevance to this assessment are the objectives that are focused predominantly on the themes of supporting growth, safety, urban form, mode shift/choice and connectivity. The assessment of how the Project achieves these objectives is set out in detail in the AEE.

5.5 Impacts on overall transport system elements

This assessment of potential effects on the transport system is focused on the key transport elements of road safety, walking and cycling, public transport, general traffic, property access, parking, and freight. These elements are represented in the project objectives and project outcomes.

The following sections of this Report summarise the effects of the Project as a whole, along the entirety of the corridor and adjacent transport network. A more detailed assessment has been undertaken for each NoR in subsequent sections, focusing on local detail specific to that NoR.

5.6 Public transport

5.6.1 Customer experience and accessibility

The Project corridor connects Auckland Airport and its surrounding employment areas with two major urban centres (Manukau and Botany) via a number of predominantly residential areas.

The BRT system has been specifically designed to offer an intuitive and attractive customer experience that operates with the following service characteristics:

- A relatively high operating speed service, separated from general traffic, that provides an efficient, high frequency and reliable service;
- Articulated, low-floor electric vehicles with centrally managed operations to provide bus pre-emption at traffic signals, manage dwell times and vehicle headways and provide real-time traveller information;
- A simple, single-service design providing a direct, trunk route to key activity generators and interchanges running at high frequencies (up to 3-minute headway in the peak hours) that enable intuitive ‘walk up and ride’ usage;
- Operating times that enable access and travel choice for shift workers and travellers (domestic and international) - 04:30am - 01:30am (next day), seven days a week;
- Accessible and integrated station designs and locations with off-board ticketing to minimise boarding/alighting times at stations;
- A direct route alignment, manged operations and rapid transit-style station spacing to enable fast and reliable journey times; and
- Connections to local bus services to expand accessibility of the system.

The transport models developed for the Project seek to predict the relative attractiveness of competing transport modes by estimating the perceived costs of travel by each mode. For public transport modes these ‘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. These are reflected in terms of equivalent minutes, including converting fare costs in dollars to minutes using estimated values of time. Because of the inclusion of perception factors and fares, these perceived costs are typically significantly higher than the actual time spent travelling.

These estimates of how customers perceive the overall 'costs' of travel by PT are referred to as generalised costs in the models.

Figure 15 below shows the predicted change in these perceived costs due to the Project for a selection of movements between key locations. Because the Project provides both faster BRT times as well as more frequent, reliable services, the use of these total perceived costs better reflects the impact than just the travel time spent in the vehicle itself.

The graph shows the perceived costs with and without the Project and the estimated savings. In the data the fare costs are assumed to remain common with or without the Project, so fares do not contribute to the savings. The models indicate significant reductions in these perceived costs of travel, which make this mode a much more attractive choice. For example, the Project is predicted to reduce perceived costs of PT travel from Botany by 26 minutes to Manukau central, 44 minutes to the Airport precinct and 20 minutes south to Drury, via improved connections to the southern rail line. Overall, this shows that accessibility between key locations by PT is significantly improved, and the improvements extend beyond just movements along the corridor itself.

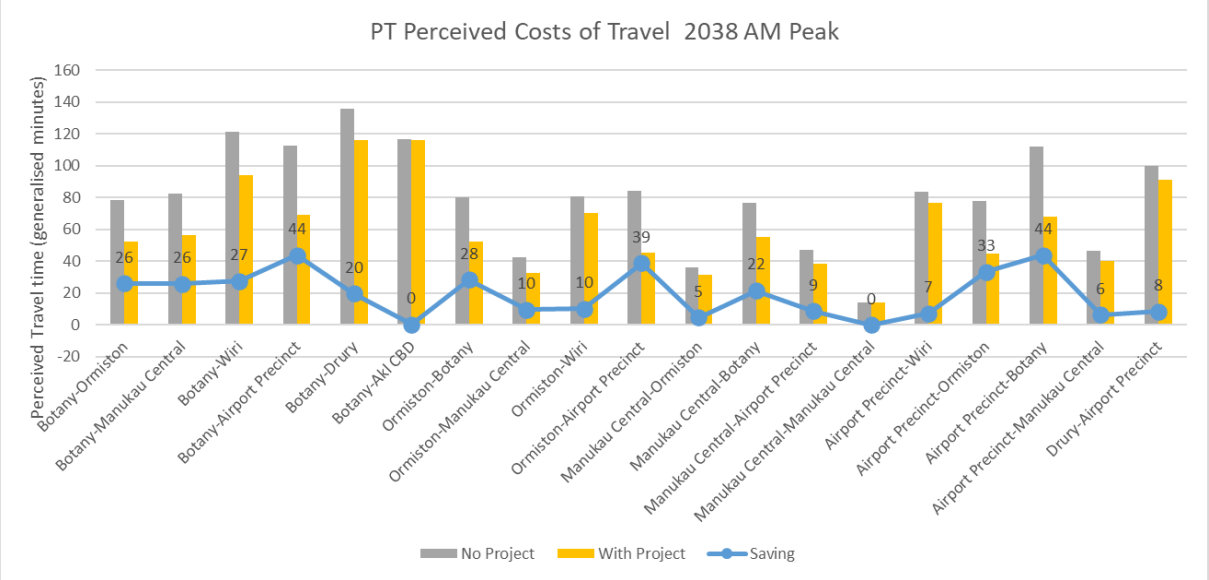


Figure 15: Change in PT perceived costs of travel

5.6.2 Estimated BRT demand

The regional multi-modal model (**MSM**) predicts that the Project will enable a significant increase in public transport usage in this area, increasing the PT mode share and reducing travel by light vehicles. The following graphs summarise those predicted changes, including:

- Station demand and BRT occupancy profiles;
- Changes in total regional travel by PT and light vehicle;
- Change in car and PT usage through the corridor, measured via screenlines that capture both the immediate and parallel corridors (so that any diversion to/from parallel routes is captured); and

- Estimated BRT travel times.

Figure 16 shows the estimated daily boarding and alighting at each station. This accumulates to some 31,100 passengers per day expected to use the BRT service in 2038. For context, this level of daily usage is similar to the current daily traffic flows on Te Irirangi Drive (near Smales Road). This graph indicates that the terminal and interchange stations are expected to be the busiest, namely Auckland Airport (terminals and The Quad), Puhinui, Manukau and Botany.

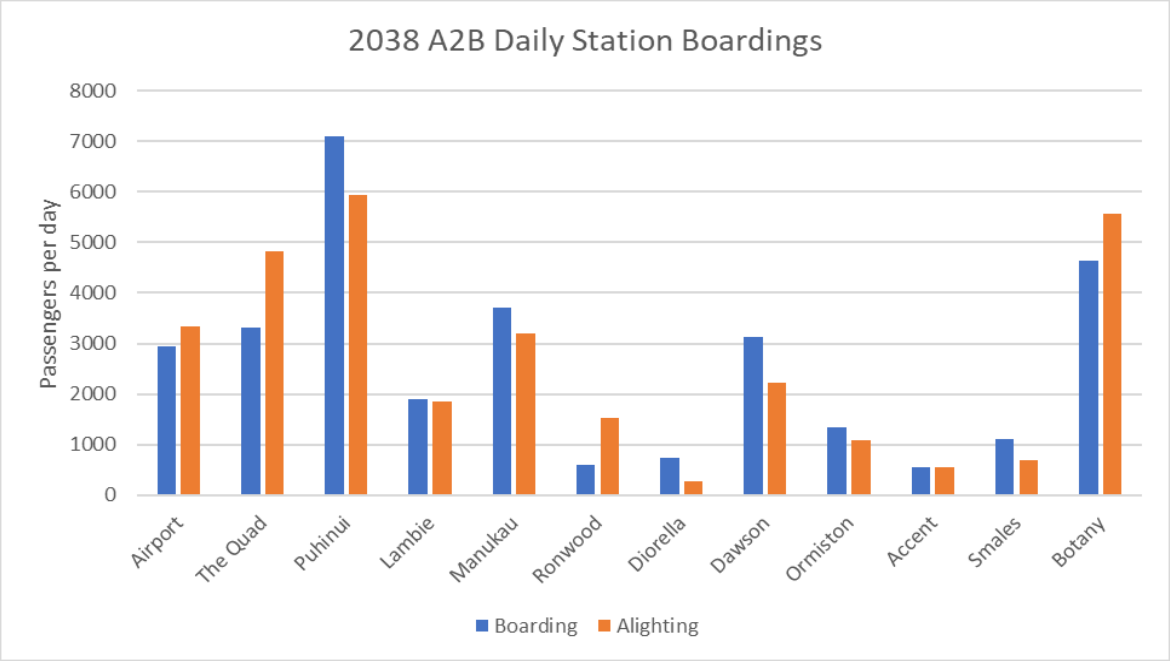


Figure 16: 2038 Daily station boarding

Figure 17 shows the estimated hourly occupancy of the BRT system. This occupancy volume is the number of passengers on the service between stations, after accounting for boarding and alighting at each station. This indicates highest occupancy levels between Puhinui and Lambie stations, reflecting the interchange with the rail line at Puhinui Station.

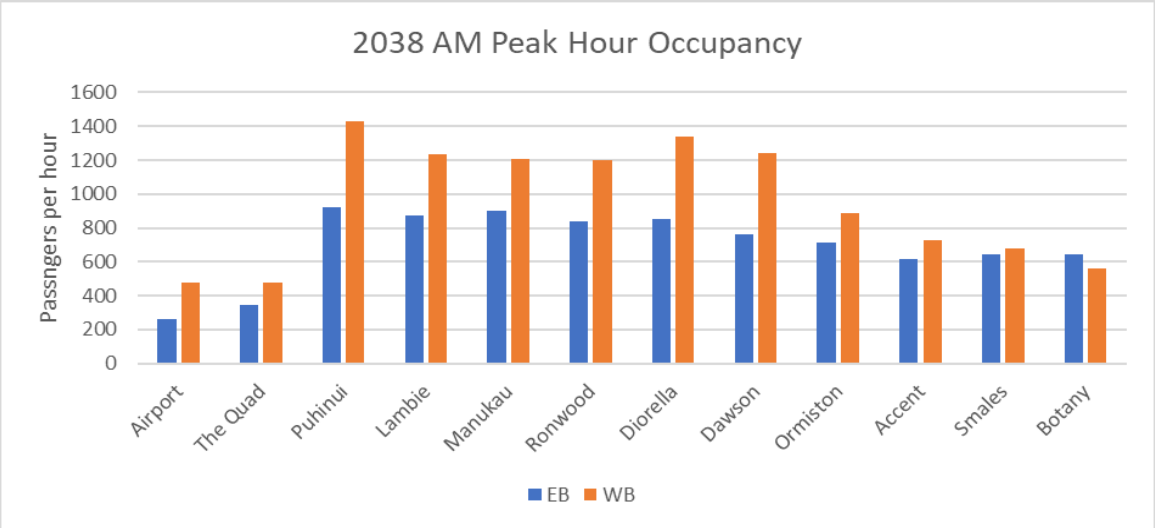


Figure 17: 2038 AM peak hour BRT occupancy

5.6.3 Change in regional travel patterns

Figure 18 shows the change in total regional travel with the implementation of the BRT for each modelled weekday peak, as well as the estimated daily totals. This shows that the anticipated passenger kilometres travelled by public transport increases by **144,600 km per day** whilst the travel by light vehicle reduces by approximately **60,800 vehicle kilometres per day**. This reduced vehicle travel is expected to reduce a range of total system costs or externalities, such as road crashes (as detailed further below) and will also contribute positively towards reducing carbon vehicle emissions.

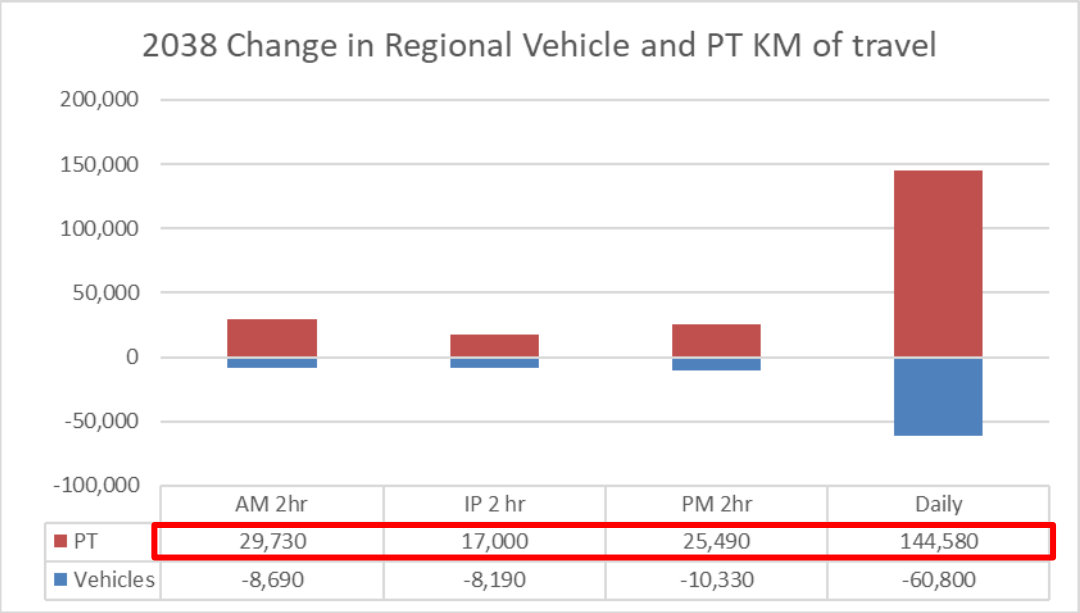


Figure 18: Forecast 2038 change in regional travel

Figure 19 indicates the source of the daily increase in PT usage, showing both an increase in BRT/bus usage (as could be expected), but also an increase in rail patronage. This indicates that the BRT is well integrated with, and complementary to the rail services rather than in competition. A small reduction in ferry usage is predicted, primarily on the Half Moon Bay service as residents of the Howick area change their destination from the Auckland City Centre to Manukau.

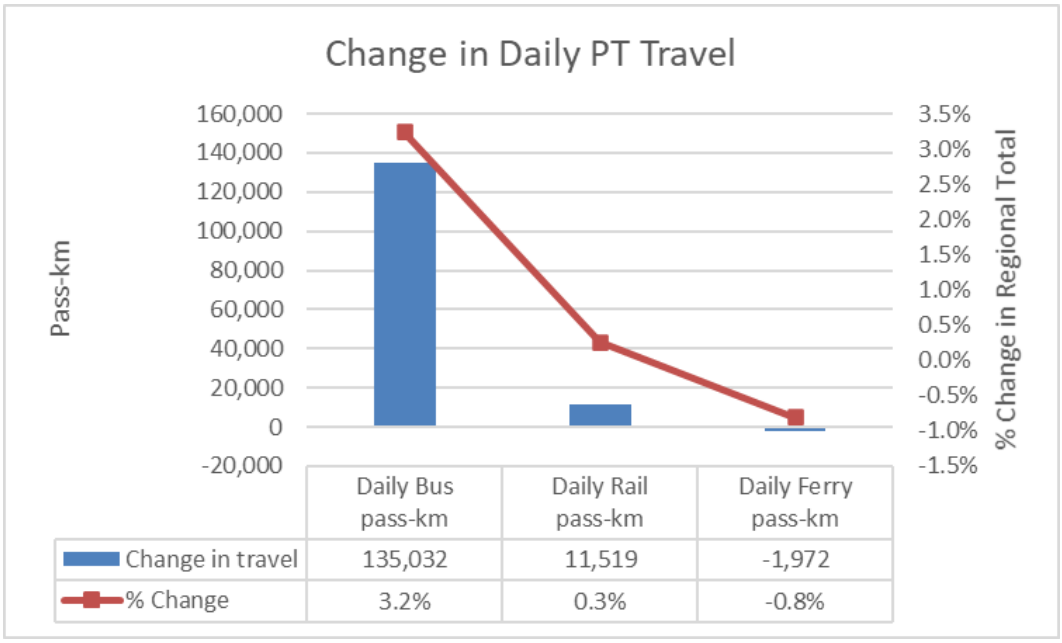


Figure 19: Forecast 2038 change in regional PT travel by sub-mode

Figure 20 shows the location of the predicted increase in PT patronage (2038 morning peak period). The predicted increase in patronage (relative to the 2038 No Project scenario), is indicated by the width of the band, with increases shown in red and decreases shown in green. This shows a strong increase in patronage along the Project corridor, with small decreases in some parallel or alternative local bus services. Figure 21 shows the same information for the Manukau central area, indicating:

- The significant uplift in PT patronage through the corridor;
- Some small reductions in local bus services on the wider network, such as Hollyford Drive, Manukau Station Road, and Great South Road, likely as these passengers transfer to BRT; and
- Small increases in patronage on the southern rail line to/from the south, with smaller reductions north of Puhinui station and on the Manukau rail spur.

Figure 20: 2038 PT Patronage change and screenline map

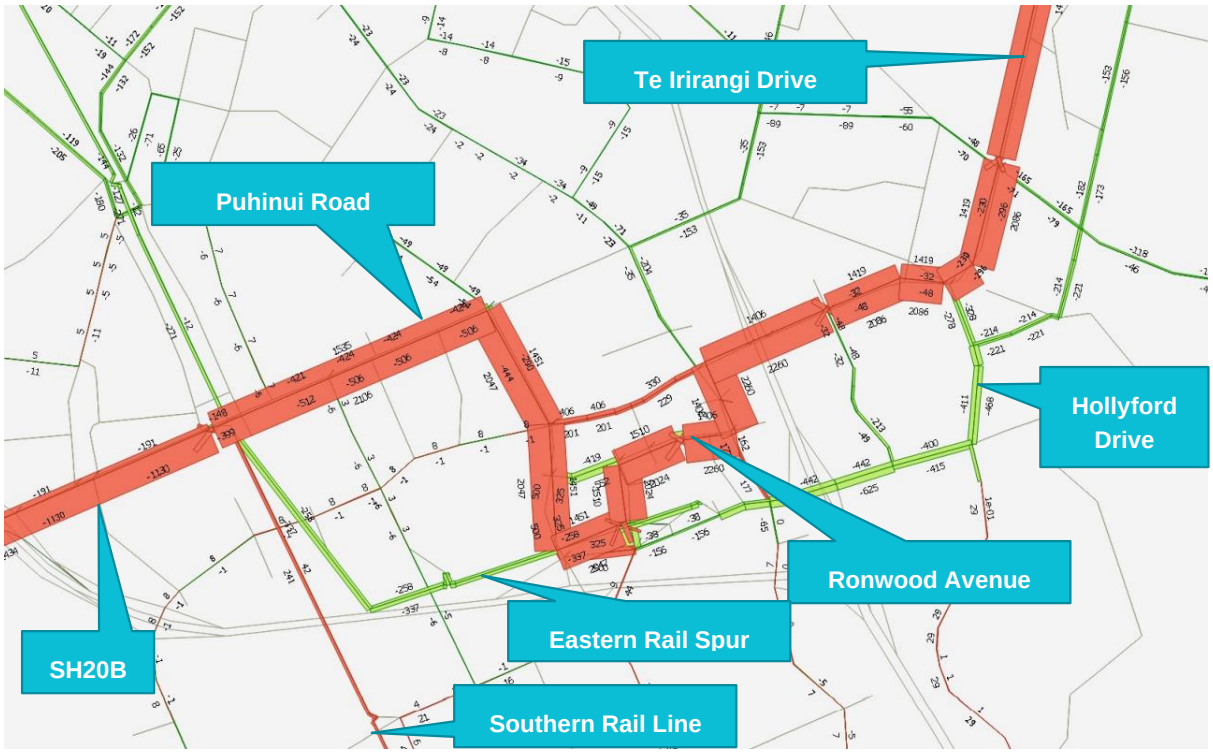


Figure 21: 2038 PT Patronage change with Project - 2038 AM peak

5.6.4 Wider corridor mode shift

A screenline assessment has also been undertaken to understand the change in public transport mode share from a wider corridor perspective. Figure 20 above shows the locations of the screenlines taken with changes in the mode shares and total PT usage indicated in the following graphs.

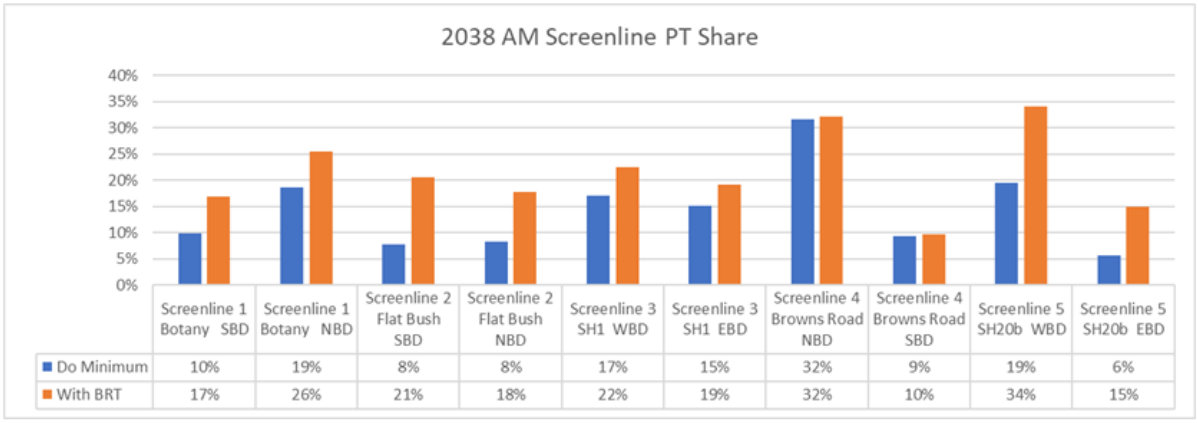


Figure 22: 2038 AM peak public transport mode share

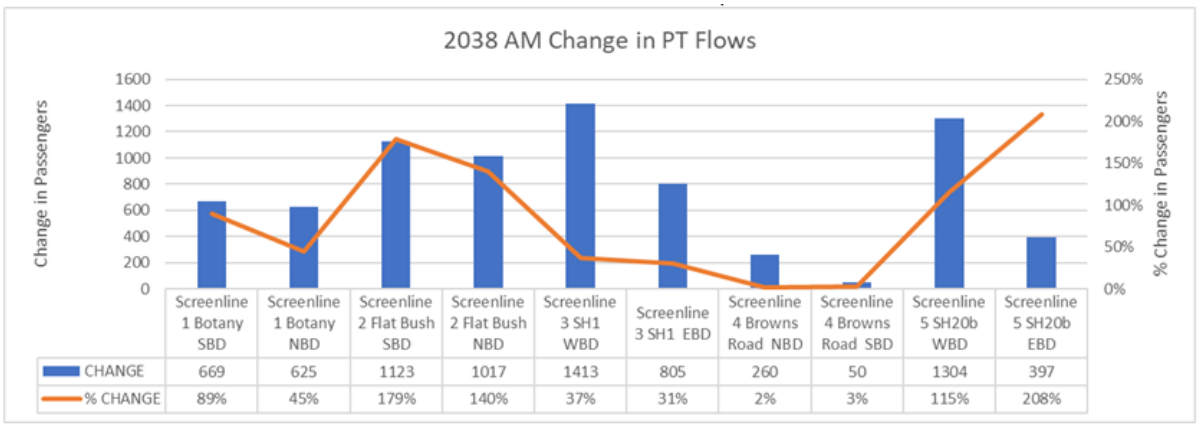


Figure 23: 2038 AM peak change in public transport flows

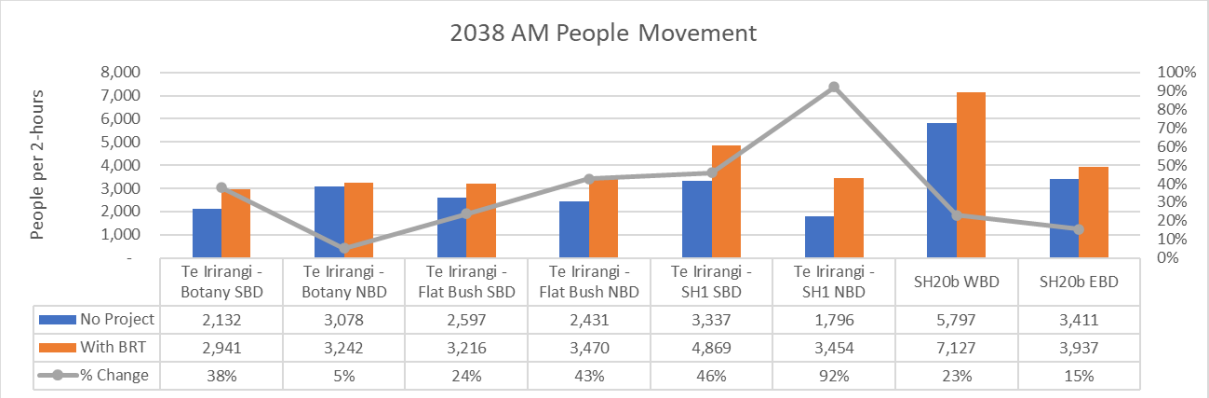
Figure 24: 2038 PT Patronage change with Project – AM peak

Figure 23 shows the change in mode share on screenline totals[6]. The models indicate a significant increase in public transport mode share across all screenlines, excluding screenline 4 (which does not cross the Project corridor). For example, the share by PT is expected to increase from 8% to 21% at Botany (southbound), 17% to 22% crossing SH1 (westbound) and from 19% to 34% on SH20B (westbound). This demonstrates that the Project provides an attractive facility that increases the mode share of public transport and reduces travel by light vehicle through the corridor

Figure 24 shows the public transport patronage increase (in actual and percentage flows) across all screenlines. Public transport patronage increases across all screenlines and exceeds 100% on screenlines 2 (Flat Bush) and 5 (SH20B), which demonstrates the positively effect of the Project on both general commuter travel and more specifically access to the Airport. Overall, a 31%-208% increase in public transport share can be seen across the screenlines assessed (excluding screenline 4) because of the Project.

Although some changes to general traffic patterns are expected due to the Project (detailed further below), the increased use of PT is expected to increase the people-moving capacity of the corridor (i.e., people moving through the corridor by car or by PT). This is shown in Figure 25 below for the key sections along the BRT corridor. For example, the expected number of people using Te Irirangi Drive is expected to increase by 38% in the peak AM southbound direction. This demonstrates that this network will be able to carry more people with the Project.

[6] Here mode share includes the share of people movement between vehicles and public transport and doesn't include active-mode travel.



	Te Irirangi - Botany SBD	Te Irirangi - Botany NBD	Te Irirangi - Flat Bush SBD	Te Irirangi - Flat Bush NBD	Te Irirangi - SH1 SBD	Te Irirangi - SH1 NBD	SH20b WBD	SH20b EBD
No Project	2,132	3,078	2,597	2,431	3,337	1,796	5,797	3,411
With BRT	2,941	3,242	3,216	3,470	4,869	3,454	7,127	3,937
% Change	38%	5%	24%	43%	46%	92%	23%	15%

Figure 25: 2038 AM people movement[7]

5.6.5 Local bus services

The Project is effective in improving access to opportunities for people in southern and eastern Auckland and increasing labour and customer catchments for business. Specifically, these additional catchments deliver an additional population of 269,000 (76% increase) and 203,000 (162% increase) jobs within 45 minutes public transport travel time of the Airport in 2048.

In addition to the above, the Project's potential operational effects on public transport are:

- Reduced delays and significantly improved reliability for BRT services along the Project corridor;
- Faster travel times, to a point where peak time journeys by public transport can be as fast and, in some cases faster than a comparable car journey;
- Improved integration with the future public transport network (local buses, Frequent Transit Network, rail network) and improved east-west connectivity, as well as improved access to employment and social amenities;
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits and positive operational benefits for freight and general traffic using the corridor; and
- It will serve as a key enabler for greater use of active transport modes by providing a safe connector route between urban areas and Auckland Airport.

The local bus network will be re-designed to maximise the new BRT corridor, reduce duplication, and provide better opportunities for travel. The Project corridor provides a significant north-south connection between Botany and Manukau and an east-west connection between the Airport and Manukau. In this regard, the BRT stations provide core local bus network connections to enable the wider network to access the key hubs along the Project corridor. This will improve network legibility and attractiveness, contributing to increased overall public transport patronage when the Project is in place.

Figure 26 shows the draft local bus network proposed for 2038 with the Project corridor in place (black east-west link). The integrated local bus, train and LRT connections to the Project stations will enable access to and from the wider Auckland region, including central Auckland, eastern Auckland and southern Auckland. It is noted the local bus network connections are indicative only and there will be future opportunities to optimise the supporting/connecting services where necessary.

[7] Source: MSM for PT and Vehicle trips

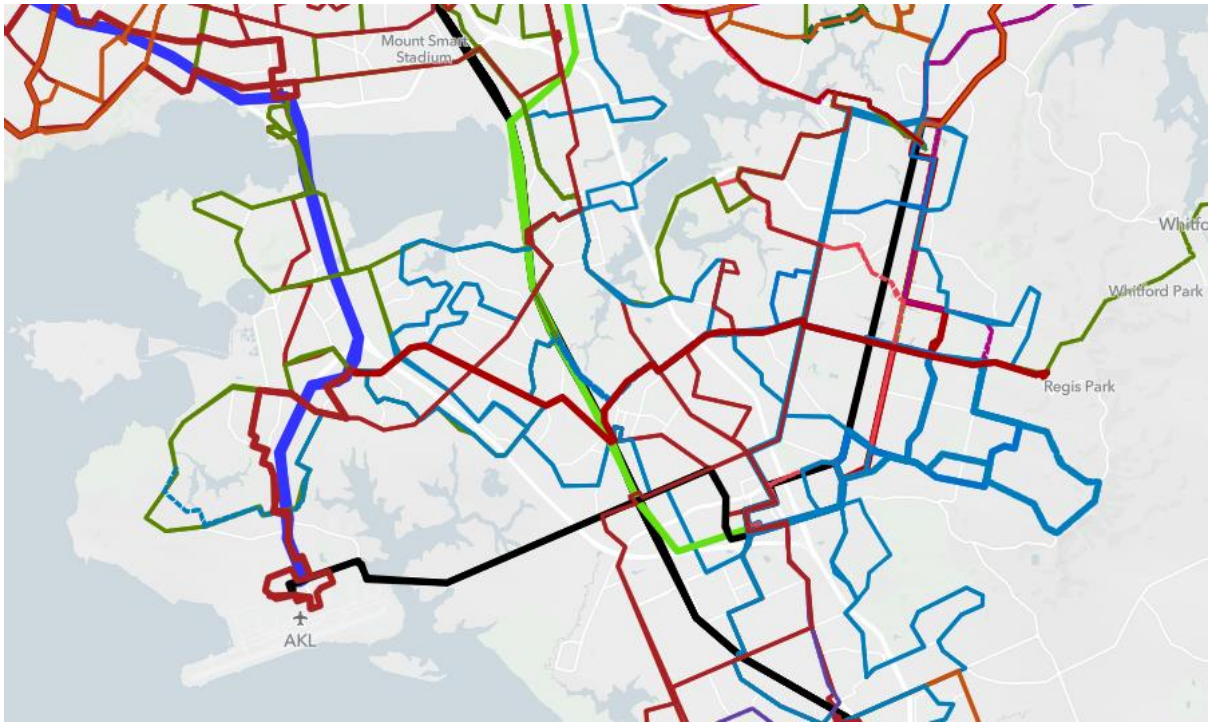


Figure 26: Indicative local bus network

Table 9 shows the potential connections with the proposed local bus network at each station and connecting rapid transit lines.

Table 9: Potential local bus network and rapid transit line connections at each BRT station

Station	Number of bus route connections	Number of train / LRT connections
Botany	12	0
Smales	1	0
Accent	1	0
Ormiston	4	0
Dawson	3	0
Diorella	2	0
Ronwood	5	0
Manukau	16	1
Lambie	2	0
Puhinui	1	2
The Quad	0	0
Airport	2	1

5.6.5.1 Station access

Station access (the first and last kilometre) is an integral part of every public transport trip and therefore safe and convenient station access is critical. These include:

- High quality, dedicated walking and cycling facilities along the full length of the rapid transit route and connecting proposed stations;
- Suitable station platform design, specifically regarding capacity and safety; and
- Adequate crossing facilities to and from the station platforms.

5.6.6 Station capacity

A station capacity assessment has been developed using 2038 patronage data to confirm that the proposed station design is suitable to accommodate the anticipated demand.

The capacity assessment for each station platform is summarised in Table 10.

Table 10: Station capacity assessment

NoR	Station	Station platform area (one platform in one direction)	Maximum number of passengers waiting to board		Maximum passenger occupancy area (1 m^2 / passenger)
			Eastbound	Westbound	
NoR 1	Smales Road	270 m^2	5	12	12 m^2
	Accent Drive	270 m^2	0	4	4 m^2
	Ormiston Road	270 m^2	3	15	15 m^2
NoR 2	Dawson Road	270 m^2	8	33	33 m^2
	Diorella Drive	270 m^2	3	10	10 m^2
	Ronwood Avenue	270 m^2	1	1	1 m^2
	Manukau Station	270 m^2	18	15	18 m^2
	Lambie Drive	270 m^2	8	12	12 m^2

Based on the above, Dawson Road Station has the highest estimated number of passengers waiting to board at any time (33 passengers). The station capacity of approximately 270 m^2 is more than sufficient to accommodate this level of demand, indicating that passenger safety is not compromised in any way. It is noted that there is also sufficient capacity for the 2048 estimated patronage numbers.

All stations provide adequate crossing facilities to and from the station platforms. The signalised pedestrian crosswalk and specifically the pedestrian waiting area (on either side of the crosswalk) has been considered from both safety and capacity perspectives. The signalised crosswalks at intersections have been designed to provide full length crosswalks between the public footpaths on either side of the road carriageway (i.e. no pedestrian refuge islands proposed). There is sufficient space available for passengers waiting on the public footpath to cross to the stations at all locations, such that that no overspill occurs.

5.7 Walking and cycling

The Project corridor comprises the following active mode elements:

- Separated walking and cycling facilities along the length of the Project corridor; and

- Bike storage facilities at stations (especially major stations) and controlled crossing facilities to access the BRT stations.

The goal of the walking/cycling facilities is both to enable more modal options for access to the BRT stations and to encourage walking and cycling more generally through the corridor. These facilities will be separated from traffic so will provide safer and more attractive travel by alternative modes. The improvements will be relatively modest for walking as dual-sided footpaths already exist on most of the corridor (there are some gaps on Te Irirangi Drive where it crosses SH1 and on Puhinui Road where it passes under SH20). However, the improvements to cycling will be significant as protected cycle facilities only currently exist for small sections of the corridor, such as along parts of Puhinui Road and SH20B.

Auckland Transport and Auckland Council (via Eke Panuku), have active projects in place to enhance walking and cycling facilities within the Manukau Central area, including prioritised works on Cavendish Drive, Sharkey Avenue, Ronwood Avenue (west) and parts of Manukau Station Road. The facilities along the Project corridor are being planned to integrate with those changes to enable full network coverage for key movements.

Given the focus on long-term route protection for the Project corridor, the NoR has focussed on providing sufficient footprint to allow separated walk/cycle facilities within the corridor, with the flexibility to align with the future networks that exist or are planned at the time that the Project is implemented. This NoR has not attempted to specify exact design details for walking and cycling facilities.

The active mode model (**SAMM**) was used to estimate the change in active mode usage in response to the Project. The with and without-project models were run under two sets of assumptions on the wider network:

- Committed only projects – this scenario for 2038 only included walk/cycle projects in the wider network that were considered committed by 2038; and
- Full Network – this included assumed improvements to the active mode network over the wider network. Those projects are not considered committed or certain, but were included to understand if they would alter the predictions.

The change in total, daily regional cycle travel is presented in Table 11. As expected, the models showed no material change in pedestrians, so those results are not presented. The models indicate an increase of 510-520 cycle trips per day and approximately 4,200 additional cycle-km per day. It should be noted that extra kilometres of cycle travel come from both new cycle trips and increased travel length of existing[8] trips.

Table 11: Regional daily cycle travel

Scenario	**S1: Committed Wider Network**		**S2: Full Wider Network**	
	Daily Cycle Trips	Daily Cycle Travel (km)	Daily Cycle Trips	Daily Cycle Travel (km)
Without Project	54,639	217,974	55,347	223,213
With Project	55,150	222,243	55,868	227,413

[8] Here 'existing' refers to the 2038 scenario without the Project

Scenario	S1: Committed Wider Network		S2: Full Wider Network	
	Daily Cycle Trips	Daily Cycle Travel (km)	Daily Cycle Trips	Daily Cycle Travel (km)
Change	511	4,269	521	4,200

Figure 27 below maps the pattern of predicted change in cycle flows due to the Project, where the following can be noted:

Project Corridor:

- Approximately, an additional 360 per day (2-way) on Te Irirangi Drive, north of Dawson Road;
- Approximately, an additional 320 per day (2-way) on Te Irirangi Drive, crossing SH1;
- Approximately, an additional 130 per day (2-way) on Lambie Drive, south of Puhinui Road;
- Approximately, an additional 80-100 per day (2-way) on Puhinui Road; and
- Minimal change on SH20B (20 per day increase) as that section already has separated cycle facilities in place.

Wider Network:

- Increases on feeder routes to Te Irirangi Drive, such as Ti Rakau Drive and Botany Road;
- Reductions in routes parallel to Te Irirangi Drive, such as Harris Road (70 less per day) and Chapel Road (50 less per day);
- Reductions in parallel crossings of SH1, such as Redoubt Road (40 less per day) and Reagan Road (80 less per day); and
- Increases in north-south feeder routes into Manukau Central, such as Great South Road (40 per day) and Druces Road (50 per day).

Figure 27: Change in 2038 daily cycle flows

It should be noted that the active mode travel reported here only relates to those making single-mode trips by walk or cycling. It does not include those accessing the BRT system by walk or cycle (as those are captured in the PT trips discussed elsewhere).

5.8 Road safety

A search of the Waka Kotahi CAS database has been undertaken for all reported crashes occurring along the Project route for the five-year period from 2017-2021 including all available data for 2022.

Overall, a total of 7 fatal, 228 injury and 698 non-injury crashes have occurred within the study area of the last five years.

Table 12 summarises the crash history by crash type.

Table 12: Overall crash history by crash type

Crash type	Number	%
Overtaking crashes	99	11%
Straight road lost control / head on	81	9%
Bend – lost control / head on	65	7%
Rear end / obstruction	376	40%
Crossing / turning	285	30%
Pedestrian crashes	25	3%
Miscellaneous crashes	2	<1%
TOTAL	933	100%

Based on the above, the predominant crash type along the Project route appears to be rear end / obstruction and crossing / turning type crashes.

Table 13 summarises the crash history by crash factors. Noting that crashes can have more than one crash factor, thus numbers do not necessarily add to the total number of crashes identified (933).

Table 13: Overall crash history by crash factor

Crash factor	Numbers	%	Comment
#N/A	334	18%	Unknown crash factors
Driver specific factors (including alcohol, disabled / old age / illness, fatigue)	198	11%	A large proportion (161 crashes) of alcohol related crashes were identified
Driver error factors (including failed to give way /stop, incorrect lanes / position, overtaking, poor handling, poor	1,065	59%	Of the driver error crashes, poor observation (379) and failure to give-way / stop (252) were the predominant crash factors

Crash factor	Numbers	%	Comment
judgement, poor observation, position on road)			
Miscellaneous factors	52	3%	No further information
Pedestrian factors	22	1%	These crashes involved a pedestrian walking along road / crossing the road
Travel speed	72	4%	Likely due to speeding
External factors (including vehicle factors, road factors, weather)	65	4%	Of the external factors, road factors (27) was the predominant crash factor, which involves slippery surfaces, surface conditions / markings, street lighting

Other crash history statistics include the following:

- Vulnerable road user related crashes:

  - Cyclist crashes – 2%
  - Pedestrian crashes – 3%
  - Motorcycle crashes – 4%
  - All other crashes – 91%

- Intersection vs midblock crashes:

  - Intersection – 80%
  - Midblock – 20%

The indicative location and numbers of crashes along the Project route are shown in Figure 28 below.

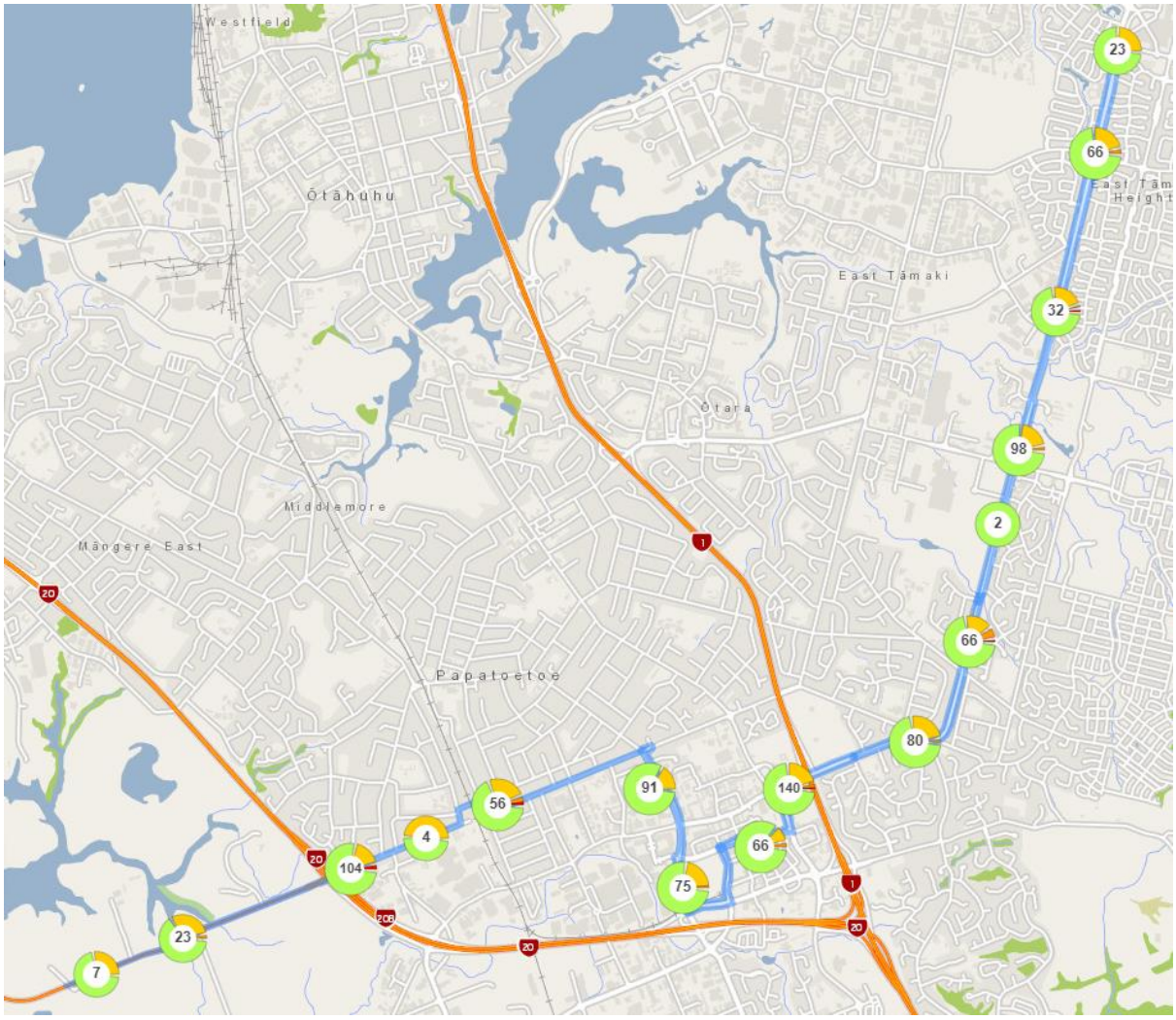


Figure 28: Indicative crash locations / numbers

The Ministry of Transport, Waka Kotahi and Auckland Transport have adopted the Vision Zero philosophy as part of the 'Road to Zero: New Zealand's Road Safety Strategy 2020-2030' and 'Vision Zero for Tāmaki Makaurau: A Transport Strategy and Action Plan to 2030'.

The Project is expected to result in positive effects on safety when compared to the existing corridor, these overall effects are summarised below.

Table 14: Summary of proposed safety improvements

Crash History	Relevant safety improvements and comments
Vulnerable user related crashes	• Separated walking and cycling facilities along the entire 18 km Project corridor with raised crossings at all side streets, and signalised intersections providing a safe and attractive environment for pedestrians and cyclists (signalised crosswalks). • All existing overbridges on Te Irirangi Drive will be converted to at-grade signalised crosswalks, improving the accessibility, thus encouraging vulnerable users to utilise the facilities. • This should contribute to a reduction in likely crashes involving these users (currently 5% of the total).

Crash History	Relevant safety improvements and comments
Vehicle speed related crashes resulting in rear end / loss of control crash types	• The Project proposes to reduce the posted speed limit for number of roads along the Project corridor, noting that Auckland Transport and Waka Kotahi have already implemented the speed limit reduction on several roads. • These roads include: SH20B (80 km/hr to 60 km/hr) Puhinui Road (60 km/hr to 50 km/hr), Lambie Drive (60 km/hr to 50 km/hr), Manukau Station Road (60 km/hr to 50 km/hr), Davies Avenue (60 km/hr to 30 km/hr), Ronwood Avenue (50 km/hr to 30 km/hr), Great South Road (60 km/hr to 50 km/hr), Te Irirangi Drive (60 km/hr to 50 km/hr). • The proposed reduction in speed limits is anticipated to lower the average vehicle speeds along the Project corridor, thus reducing the risk of speed related crashes.
Driver error related crashes, specifically with regards crossing / turning and head-on type crashes	• The Project provides a central BRT lane, thus fully separating the opposing traffic lanes and preventing vehicles from turning right in and right out of properties (excluding intersections). • The design is anticipated to reduce potential for conflict between opposing vehicles and turning vehicles, therefore reducing the risk of turning and head-on type crashes.
Intersection related crashes	• As per the crash statistics, the majority of crashes have occurred at intersections (80% of all crashes). • While the major intersections such as Smales Road / Te Irirangi Drive, Dawson Road / Te Irirangi Drive, Cavendish Drive / Te Irirangi Drive, Lambie Drive / Manukau Station Road, Rowland Avenue / Lambie Drive (RAB) and motorway interchanges are considered 'hot-spots', the higher number of crashes at these high-volume intersections is expected due to the higher number of opposing movements that occur at these intersections. • The Project proposes to upgrade all existing intersections along the Project corridor. The upgrades typically include the removal of left turn slip lanes (both signalised and priority controlled), conversion of priority controlled intersections to signalised intersections and improvement of signalised crosswalks. • Overall, these intersection upgrades will contribute to reducing the risk of crashes, especially with regards to the removal of potential conflict between left turning vehicles (i.e. via slip lanes) and opposing movements (including pedestrian movements crossing the slip lanes).

It is anticipated that the number of pedestrians and cyclists will increase when the BRT Project is in place as people walk and cycle to stations. The traffic volume on the Project corridor will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project proposes to provide segregated walking and cycling facilities to reduce the likelihood and severity of crashes.

In addition to road safety improvements, the Project provides for safe BRT station environments with CCTV, help points, passive surveillance, and good lighting as well as good connectivity for identified station access routes.

The impact on overall network crashes has been estimated based on the change in VKT. The historic crash rates and monetised costs over the recent 5-year period across the whole Auckland network

were assessed to estimate crash rates by different road types. These crash rates were assessed in terms of death and serious injury crashes, total crashes, and monetised crash costs[9]. The rates were applied to the predicted change in vehicle travel across the whole Auckland region, as shown in Table 15. That system-wide analysis indicated that the mode shift effects of the Project could save some 2.4 deaths and serious injuries per year, 183 total crashes per year and $2.44 m of social crash costs per year.

Table 15: Regional crash cost analysis

Road Type	Speed Limit	Rates, $/km	DSI/100 m km	Crashes/10m km	VKT Change	Cost Change, $m	DSI Change	Total Crashes Change
Motorway	<=60	2.69	1.59	256.94	1,215,872	$0.03	0.02	3.12
	<80	2.69	1.59	256.94	930,944	$0.03	0.01	2.39
	>=80	2.69	1.59	256.94	1,928,704	$0.05	0.03	4.96
Arterial	<=60	11.28	11.99	838.32	12,914,176	$1.46	1.55	108.26
	<80	11.28	11.99	838.32	2,933,504	$0.33	0.35	24.59
	>=80	14.56	9.34	1,092.93	393,328	$0.06	0.04	4.30
Local	<=60	8.22	7.14	745.70	5,140,864	$0.42	0.37	38.34
	<80	8.22	7.14	745.70	358,176	$0.03	0.03	2.67
Rural	<=60	4.43	3.63	213.05	320,528	$0.01	0.01	0.68
	<80	4.43	3.63	213.05	217,952	$0.01	0.01	0.46
	>=80	17.46	13.42	881.27	1,120,000	$0.20	0.15	9.87
All categories					20,748,992	$2.44	2.4	183

5.9 General traffic

The Project generally retains all existing vehicle movements, except as follows:

- Closure of the southern end of Davies Avenue in Manukau Central (100 m section between Putney Way and Manukau Station Road) to general traffic to create a shared space for pedestrians and between the various bus, rail, BRT, and campus sites, including movement by the BRT vehicles (see Figure 29);
- Restricting right turns in or out of properties along the corridor to facilitate the central running of the BRT (these restrictions are assessed in greater detail under Property Access section); and
- Closing the current access to the SH20B southbound on-ramp from Puhinui Road (east of SH1). This movement will instead use the service road between Puhinui Road and Roscommon Road to access the southbound on-ramp at Roscommon Road. This change is to accommodate the new ramp from SH20B to SH20, that removes the high-volume traffic movement from the interchange and allows reallocation of space to the BRT system (see Figure 30).

[9] Based on Waka Kotahi's Monetised Benefits and Costs Manual

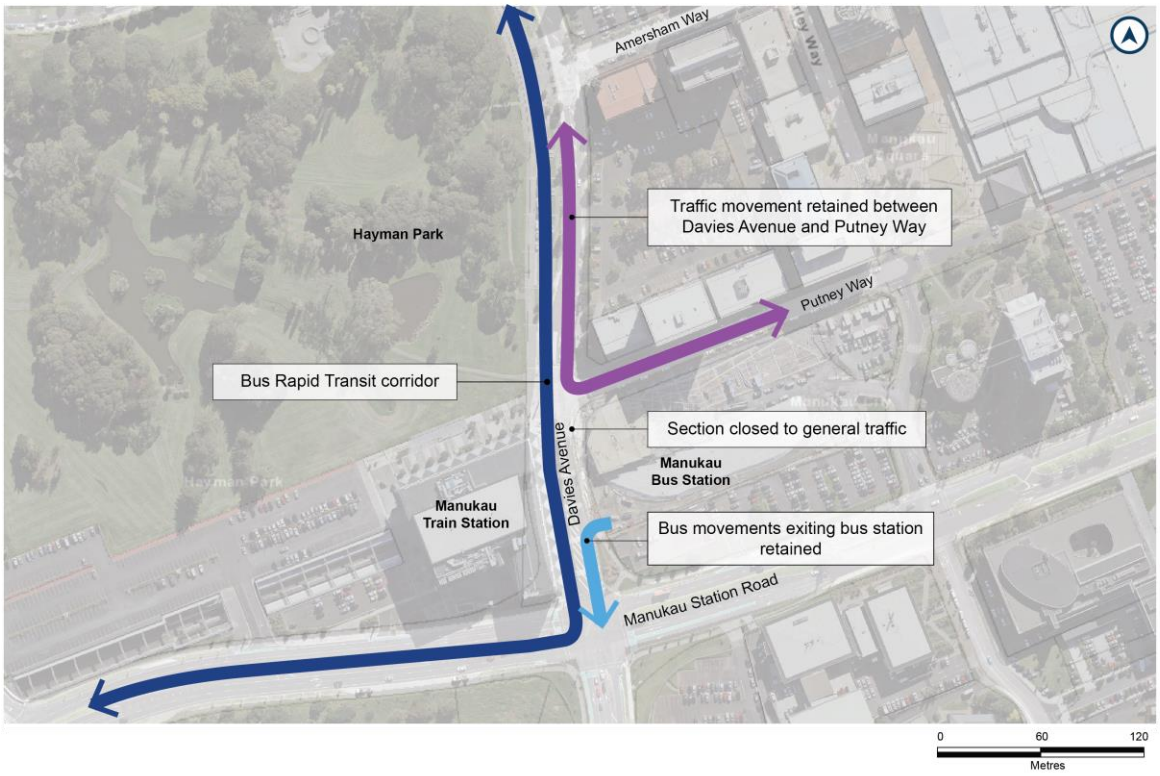


Figure 29: Changes to Davies Avenue

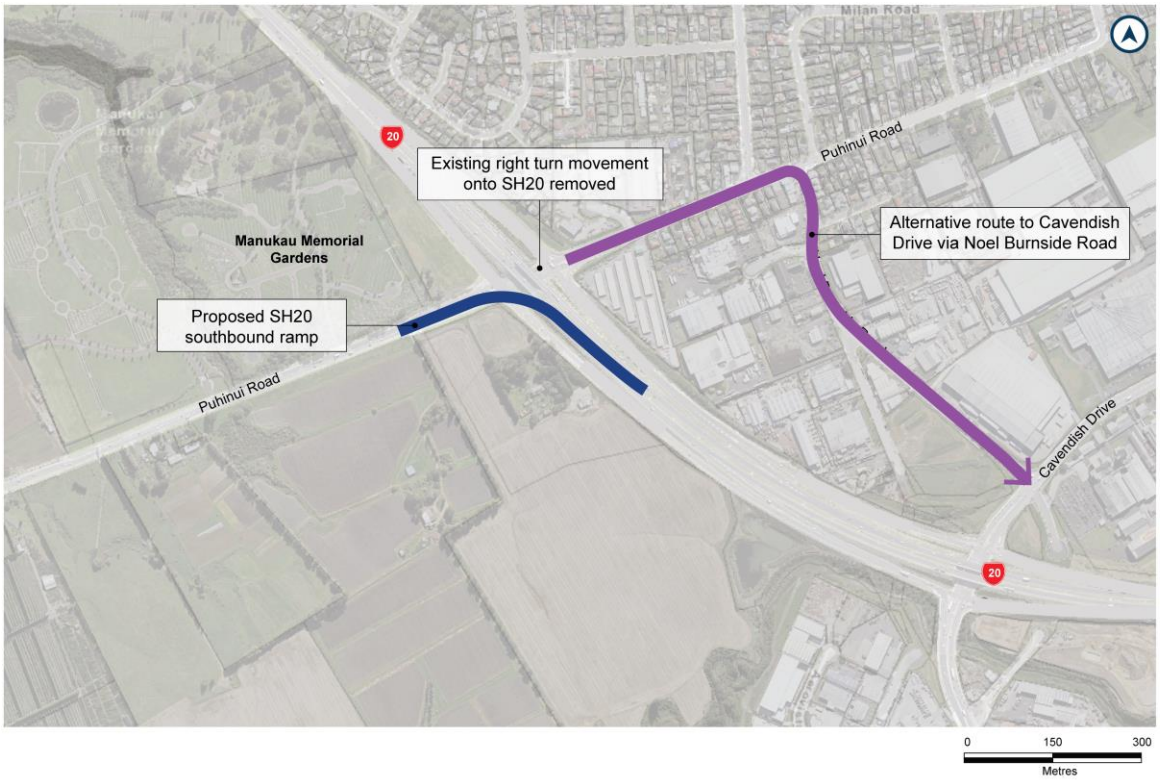


Figure 30: Change to SH20 southbound access

Changes to traffic capacity are also expected from the following elements of the Project:

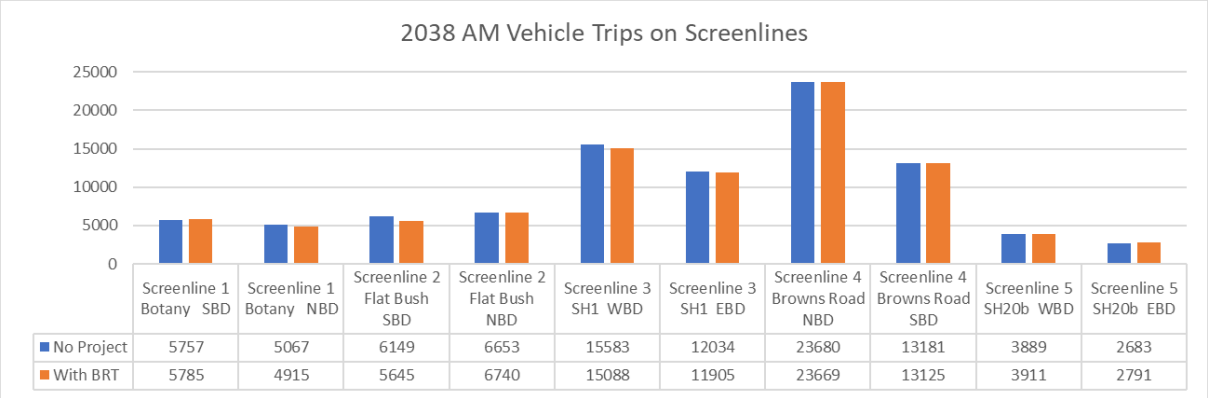
- Removal of left turn (uncontrolled) slip lanes at traffic signal-controlled intersections along the corridor to provide safe walk/cycle crossings;
- Reduced queue storage length of some turn lanes and removal of some right turn lanes (where more than one currently exists) at intersections, especially on Te Irirangi Drive to facilitate the central BRT corridor and stations;
- Change from roundabouts to traffic signal control to facilitate safer pedestrian crossing, BRT pre-emption and access to stations (such as on Ronwood Avenue); and
- Provision of extra signalised pedestrian crossings to facilitate safer road crossings.

These changes are expected to alter the attractiveness of some existing traffic routes, resulting in diversion to other roads. These changes were assessed by comparing the modelled traffic 2038 daily flows for the No Project and With Project scenarios.

5.9.1 Network performance

A screenline assessment has been undertaken to understand the change in traffic flows from a network perspective, capturing both traffic along the Project corridor as well as the anticipated traffic diversion (for the AM peak hour). Figure 31 below shows the locations of the screenlines taken.

Figure 31: Screenline map



	Screenline 1 Botany SBD	Screenline 1 Botany NBD	Screenline 2 Flat Bush SBD	Screenline 2 Flat Bush NBD	Screenline 3 SH1 WBD	Screenline 3 SH1 EBD	Screenline 4 Browns Road NBD	Screenline 4 Browns Road SBD	Screenline 5 SH20b WBD	Screenline 5 SH20b EBD
No Project	5757	5067	6149	6653	15583	12034	23680	13181	3889	2683
With BRT	5785	4915	5645	6740	15088	11905	23669	13125	3911	2791

Figure 32: 2038 AM vehicle trips on screenlines[10]

Figure 32 shows that the change in vehicle trips between the With and Without Project scenarios is minimal at each screenline during the AM peak hour. This indicates that the number of vehicle trips undertaken within the surrounding network is not significantly affected by the Project. However, as noted earlier, the people-moving capacity of the Project corridor is significantly increased with this Project.

The forecast 2038 annual average daily traffic (**AADT**) and maximum peak hour flows (one direction only) are summarised in Table 16 and Table 17 based on the locations shown in Figure 33. The predicted change in daily traffic flows on key corridors is indicated in Figure 33 show the increase (red) and reduction (green) in traffic flows. The scale of change is reflected by the relative width of the lines, with red representing an increase in traffic (relative to the No Project scenario), and green lines representing an expected decrease.

[10] Source: MSM

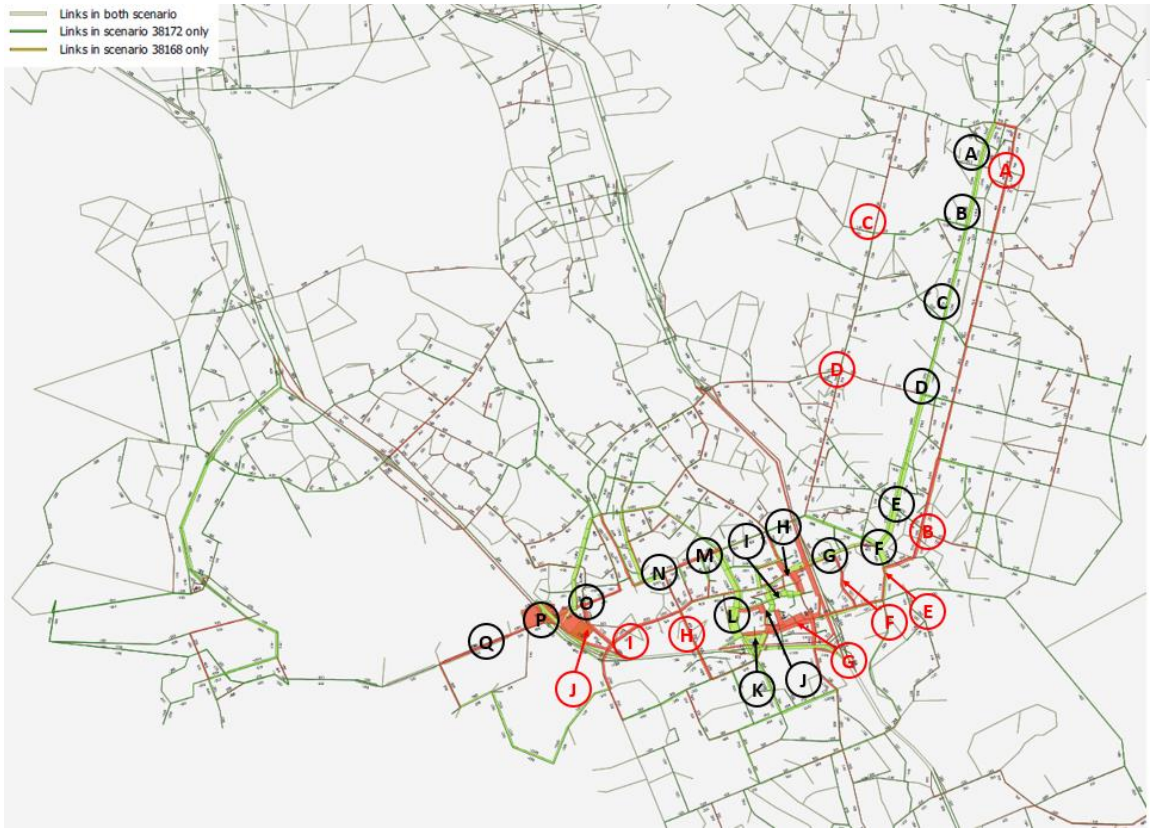


Figure 33: Location of key traffic flow estimates (overall)

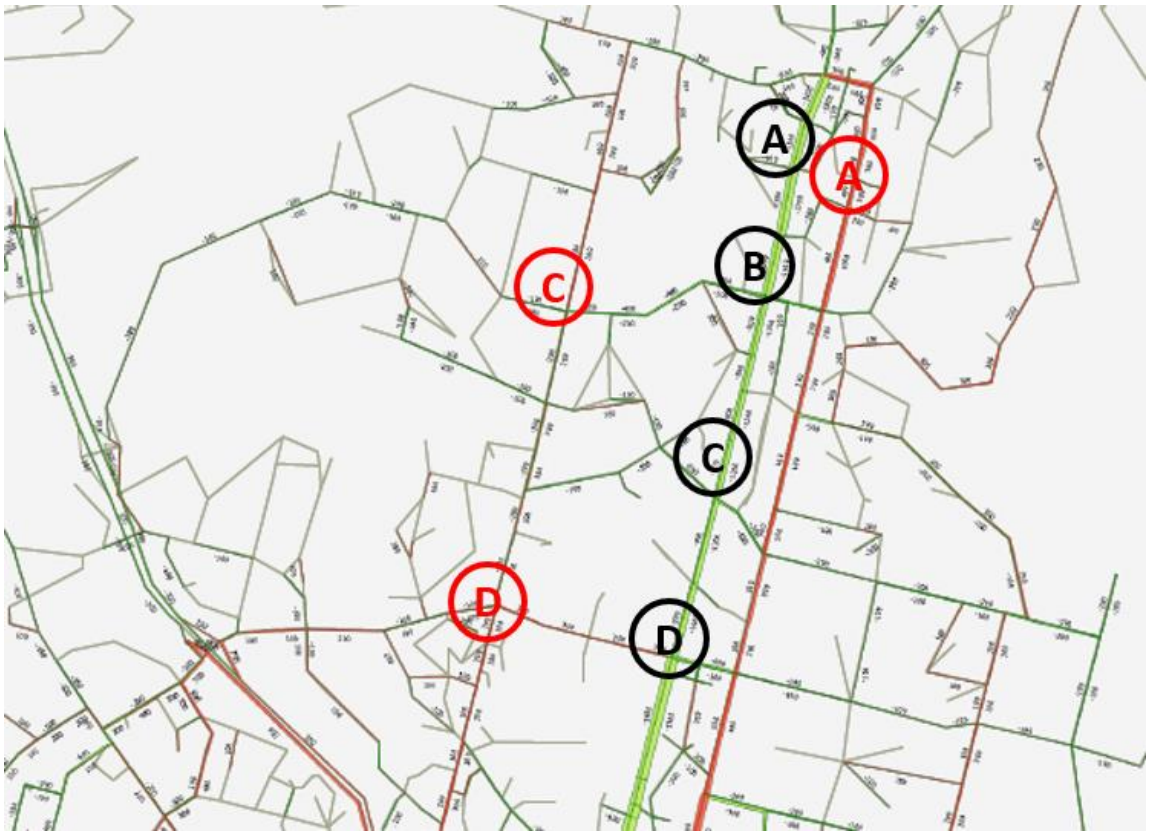


Figure 34: Location of key traffic flow estimates (zoomed)

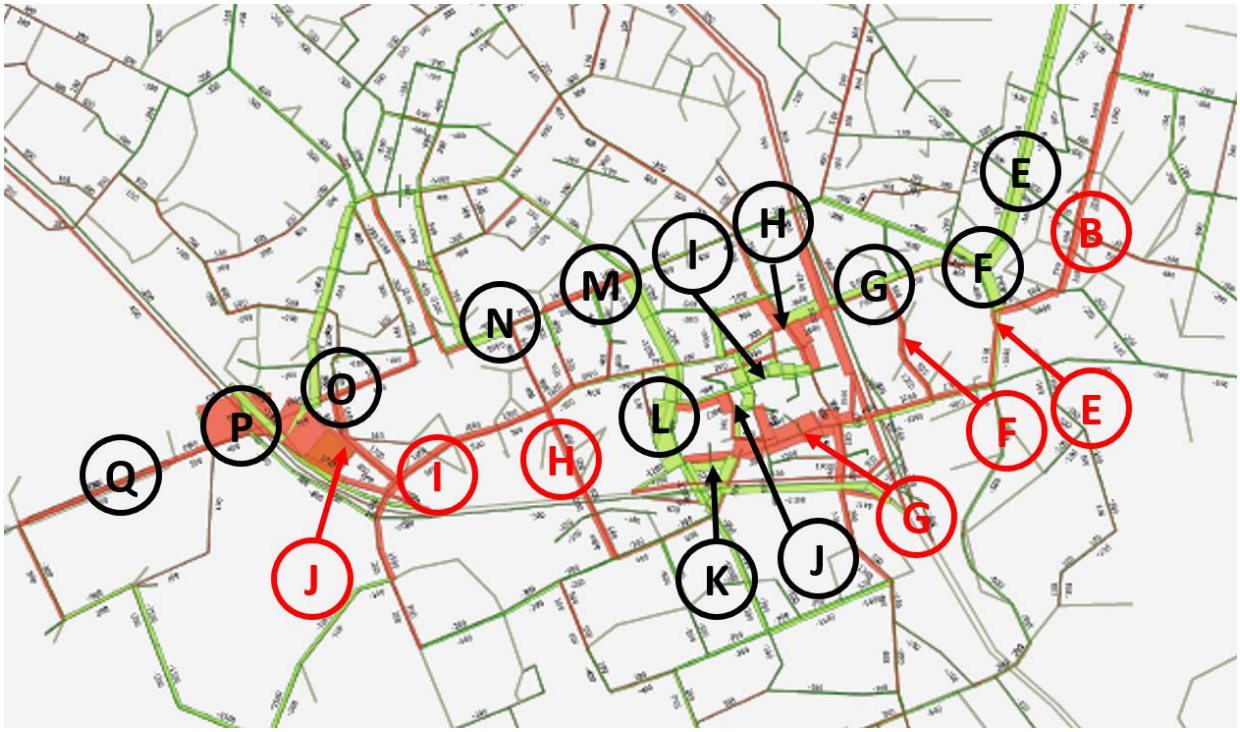


Figure 35: Location of key traffic flow estimates (zoomed)

Table 16: Modelled traffic flow estimates along BRT corridor (black labels)

			A2B option		Do-minimum		Difference between Do-minimum and A2B option			
	Location	A2B Corridors	AADT 2-way	Max peak	AADT 2-way	Max peak	AADT difference	AADT % difference	Max peak difference	Max peak % difference
NoR 1	A	Te Irirangi Drive (near Leixlep Lane)	16,600	1,994	19,400	2,427	- 2,800	-14%	- 433	-18%
	B	Te Irirangi Drive (near Smales Road)	19,400	2,302	22,300	2,826	- 2,900	-13%	- 524	-19%
	C	Te Irirangi Drive (near Accent Drive)	11,100	1,676	13,100	1,676	- 2,000	-15%	-	0%
	D	Te Irirangi Drive (near Ormiston Road)	9,200	1,503	11,100	1,579	- 1,900	-17%	- 76	-5%
NoR 2	E	Te Irirangi Drive (near Dawson Road)	15,200	2,548	19,000	2,667	- 3,800	-20%	- 119	-4%
	F	Te Irirangi Drive (near Hollyford Drive)	19,800	3,083	24,600	3,304	- 4,800	-20%	- 221	-7%
	G	Te Irirangi Drive (near Diorella Drive)	23,200	3,321	25,100	3,363	- 1,900	-8%	- 42	-1%
	H	Great South Road	20,600	2,263	15,500	1,668	5,100	33%	595	36%
	I	Ronwood Avenue	11,000	1,197	14,400	1,188	- 3,400	-24%	9	1%
	J	Davies Avenue	23,200	2,851	19,000	2,605	4,200	22%	247	9%
	K	Manukau Station Road	16,000	2,054	16,300	1,945	- 300	-2%	109	6%
	L	Lambie Drive (near Cavendish Drive)	16,500	1,360	20,800	1,662	- 4,300	-21%	- 302	-18%
	M	Lambie Drive (near Puhinui Road)	15,700	1,321	20,300	1,662	- 4,600	-23%	- 342	-21%
	N	Puhinui Road (near Plunket Avenue)	18,600	2,312	21,500	2,464	- 2,900	-13%	- 152	-6%
NoR 3	O	Puhinui Road (near Wylie Road)	17,500	1,840	15,600	1,741	1,900	12%	99	6%
NoR 4a / 4b	P	SH20 Interchange	19,600	1,570	22,400	2,200	- 2,800	-13%	- 630	-29%
	Q	SH20B (near Memorial Gardens)	45,100	4,234	43,500	4,074	1,600	4%	160	4%

Table 17: Modelled traffic flow estimates outside the corridor (red labels)

		A2B option	Do-minimum	Difference between Do-minimum and A2B option	
Location	Adjacent Corridors	AADT 2-way	AADT 2-way	AADT difference	AADT % difference
A	Chapel Road (near Armoy Drive)	21,400	20,200	1,200	6%
B	Matthews Road (near Thomas Road)	20,600	18,500	2,100	11%
C	Harris Road (near Allens Road)	30,600	30,200	400	1%
D	Preston Road (near Ormiston Road)	17,700	17,400	300	2%
E	Hollyford Road	23,800	23,700	100	0
F	Diorella Drive	6,500	5,000	1,500	30%
G	Manukau Station Road (outside NoR)	26,300	18,600	7,700	41%
H	Plunket Avenue	16,900	15,300	1,600	10%
I	Cavendish Drive (near Nesdale Avenue)	10,300	8,300	2,000	24%
J	Noel Burnside Road	10,900	8,200	2,700	33%

The predicted daily diversion of traffic flows and delay experienced on key corridors are shown in the figures below.

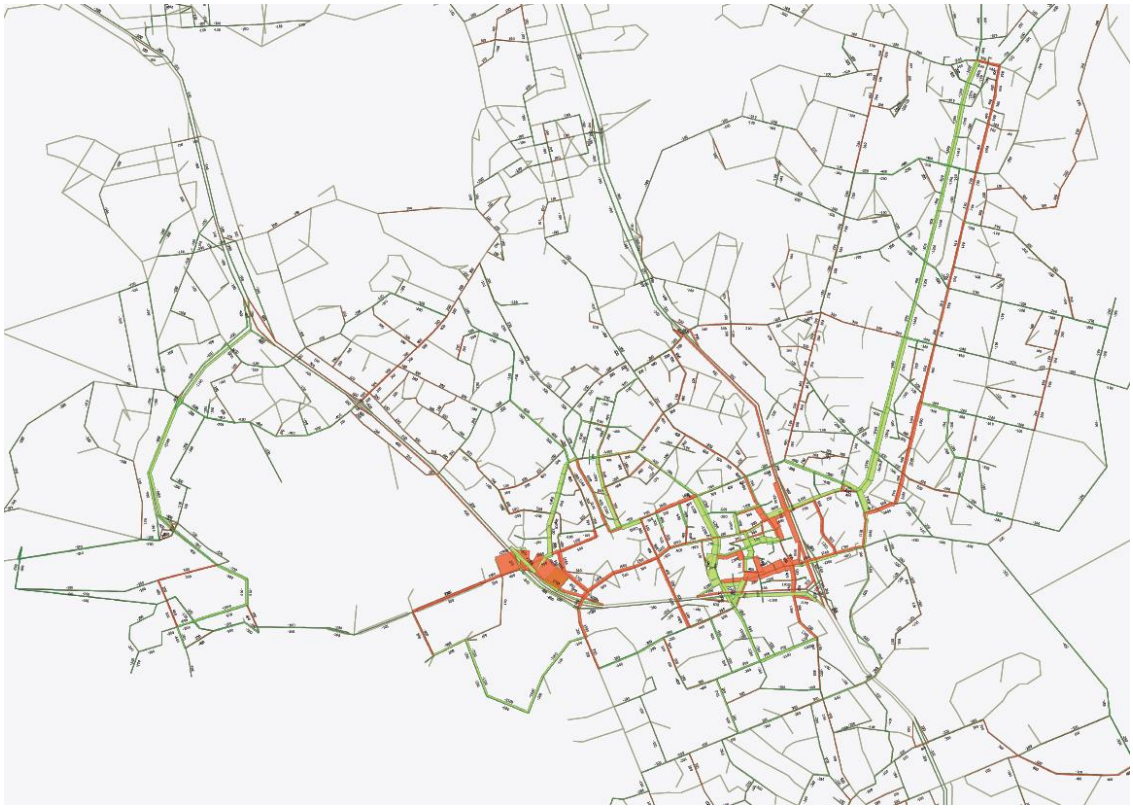


Figure 36: Traffic diversion comparison plots 2038 daily (With vs Without Project)

Figure 37: Delay comparison plots 2038 AM Peak (With vs Without Project)

Figure 38: Delay comparison plots 2038 PM Peak (With vs Without Project)

Key points to note include:

NoR 1:

- A general pattern of reduced traffic along most of Te Irirangi Drive (up to 15% in the northern sections and approximately 20% in the southern sector), with some traffic diverted onto Chapel Road (parallel to Te Irirangi Drive), leading to a slight increase in traffic flows (approximately 6% of daily flows) compared to the without Project scenario. Chapel Road is a north-south Arterial Road connection, therefore suitable to accommodate this minimal increase in traffic flows, which is also indicated by delay plots showing minimal delay on Chapel Road.

NoR 2:

- There is a slight increase of traffic flows within NoR 2 Manukau Central (Ronwood Avenue and Davies Avenue) and Manukau Station Road (41% outside of the Project corridor), with a decrease in daily flows along Ronwood Avenue (24%), the section of Manukau Station Road (2%) within the Project corridor. The increase in flows along these corridors is likely a result of the slower speed environment and lower general traffic priority of the Project corridor encouraging motorists to utilise alternative routes to travel through the Manukau Centre;
- An increase in traffic on Manukau Station Road is also likely prompted by traffic that has re-routed away from Te Irirangi Drive, onto Chapel Road then uses Redoubt Road to access Manukau Central from the south;
- Although daily flows are anticipated to increase on Davies Avenue, Great South Road, and Manukau Station Road (outside of the corridor), the forecast future AADT is broadly within the

anticipated capacity of each corridor and the modelled delay plots indicate minimal delay as a result of the Project. In this regard, these roads are considered suitable to accommodate the increase in daily flows;

- A reduction in traffic on Ronwood Avenue (24%) is also observed, due to the conversion from roundabouts to traffic signal control (the same number of traffic lanes is retained) and the closure of the southern end of Davies Avenue to general traffic, which then prompts vehicles to choose other routes through the centre of Manukau. Increased delay is noted for Ronwood Avenue. This is likely due to the conversion of roundabouts to signals, which inherently attract more delay. Intersection performance measures reported below indicate that the proposed signals operate within acceptable parameters;
- A reduction in traffic on Lambie Drive of 21-23% as the additional traffic signals make this a less attractive route (especially outside commuter peaks when the existing roundabout at Ronwood Avenue is more efficient for vehicles);
- Some Lambie Drive traffic reroutes to Plunket Avenue and Roscommon Road. This is also prompted by the change in access to the SH20 interchange at Puhinui Road; and
- There is a predicted increase in use of SH1 between Manukau and Papatoetoe interchanges.

NoR 3:

- No notable change in traffic flows along Puhinui Road (NoR 3) are observed. However, the modelling indicates an increase in daily flows from 8,200 vpd to 10,900 vpd on Noel Burnside Road, likely due to the access changes at the SH20 interchange. 10,900 vpd on Noel Burnside Road is not considered excessive given the form and function of the route, however some increased delay is experienced on Noel Burnside Road;
- Noel Burnside Road is an important north-south connection between Puhinui Road and Cavendish Drive and predominantly provides access to commercial / industrial activities. Noel Burnside Road also provides a cycle connection, with on-road painted cycle facilities currently provided on some sections of the road; and
- Given the increase in daily flows along Noel Burnside Road and its role with respect to the wider cycling network, consideration should be given to protect the existing cycle lanes (i.e. in the form of physical barriers) and investigate the potential for improved pedestrian crossing facilities and the removal of on-street parking to extend the dedicated cycle path along Noel Burnside Road.

NoR 4

- Puhinui Road at the SH20 interchange experiences a slight reduction in traffic flows (13% decrease in daily flows), which is likely as a result of the change in access to the SH20 interchange;
- The wider state highway network in this area (SH20, SH1 and SH20B) all operate close to or at capacity at peak times. Waka Kotahi uses ramp metering at the SH20 and SH1 on-ramps to manage demand and queuing on a wider network basis. As such, there is a small increase in daily flows on SH20B (4%), likely due to additional through volumes on SH20B, which have diverted from other corridors to use the southbound ramp between SH20B and SH20. Delay plots indicate that additional delay experienced on midblock SH20B is minimal; and
- If additional capacity were provided for at the SH20B ramps, or on SH20B itself, e.g. by replacing the existing T3 lanes with general traffic lanes, this would cause adverse downstream effects on SH20 and SH1. The operation of SH20B therefore needs to be considered in the wider network context, and it will need to continue to be carefully managed to maintain its strategic function. This will include prioritising strategic movements over accessing movements when necessary,

managing ramp access capacity onto SH20 and managing the overall demand for use of SH20B through both its operation and access.

Based on Table 17 above, the Project is anticipated to increase traffic flows on some adjacent corridors (outside the Project). In particular, Diorella Drive, Manukau Station Road, Cavendish Drive and Noel Burnside Road are expected to experience increased volumes as a result of the Project.

However, from a comparison between the AADT of the With Project and Without Project scenarios, it is considered that only Manukau Station Road (from 18,600 vpd to 26,300 vpd) has a relatively substantial increase in AADT. While the other roads identified will carry increased traffic volumes, these likely future volumes are consistent with the anticipated operation, function and classification of each corridor.

Further assessment has been undertaken to consider the impact on bus services on Manukau Station Road (outside the Project corridor), that may continue to operate when the BRT service is operational.

The existing bus routes within the surrounding area are shown below.

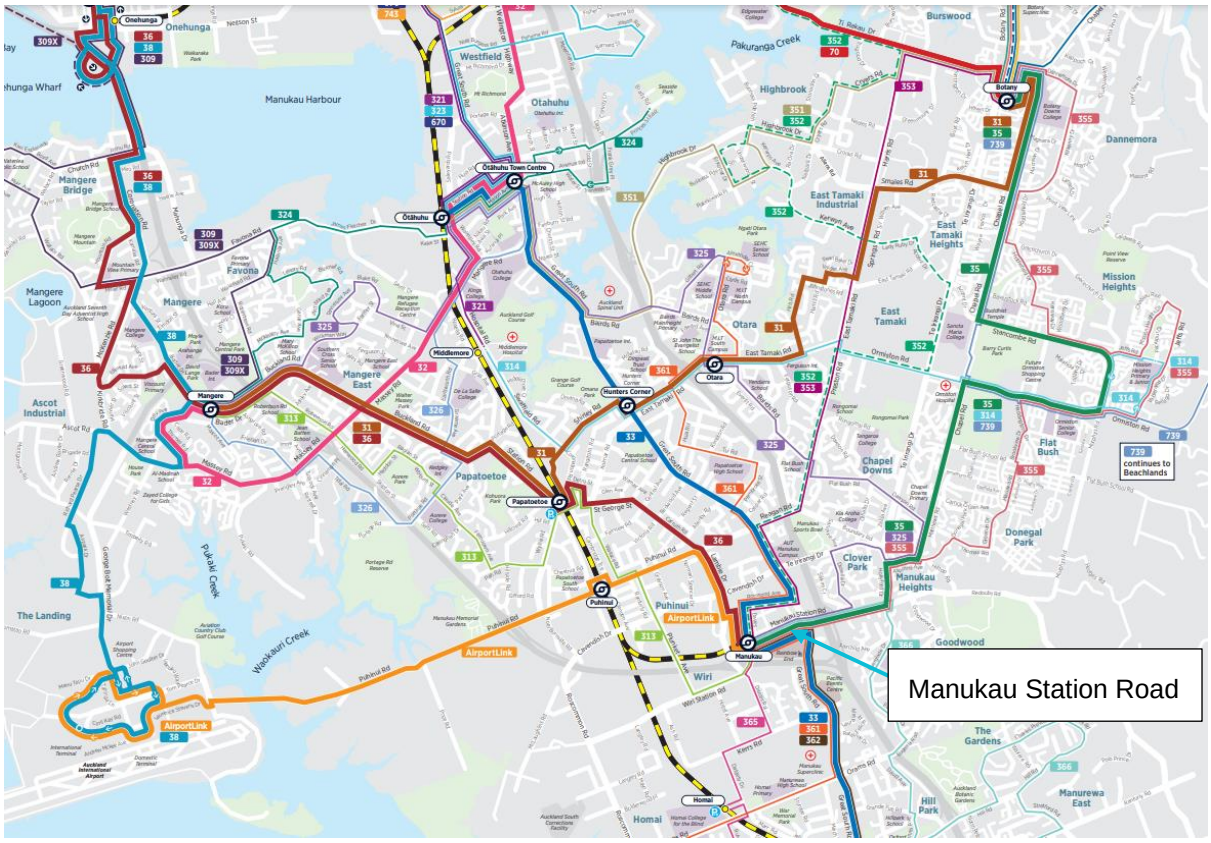


Figure 39: Existing bus routes[11]

As shown above, Manukau Station Road is a major bus route that connects the Manukau Bus Station with eastern and southern Auckland (providing access for seven bus routes). This is further detailed in Figure 40 below.

11 https://at.govt.nz/bus-train-ferry/timetables/ (updated August 2022)

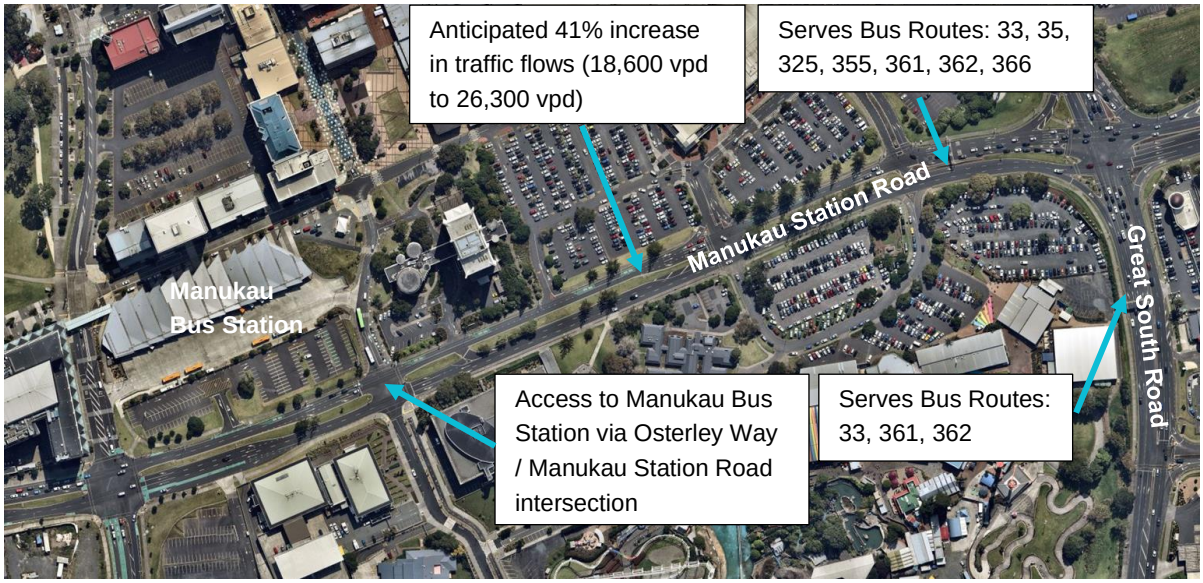


Figure 40: Existing bus services on Manukau Station Road

Manukau Station Road is anticipated to carry an additional 7,700 vpd, which increases the AADT to approximately 26,300 vpd. This level of AADT is typical of an Arterial Road in Auckland, and the increase in flows can be readily accommodated on this six-lane Arterial Road.

The existing volumes on this section of Manukau Station Road indicate that eastbound traffic is generally higher than westbound traffic (12,700 vpd vs 5,900 vpd), and based on Figure 35 (i.e. the bar widths), the increase in eastbound traffic flows is noticeably greater than the increase in westbound traffic flows, with the anticipated eastbound AADT being 17,600 vpd and westbound AADT being 8,700 vpd. Manukau Station Road currently provides an eastbound bus lane between Osterley Way and Leyton Way and in this regard, the delay experienced for eastbound buses will likely be minimal. The increase in westbound traffic flows is not as significant, and it is therefore not considered necessary to provide additional priority / dedicated facilities for buses for the anticipated change in flows.

Overall, there are considered to be no significant adverse effects / delay for buses travelling to and from Manukau Bus Station via Manukau Station Road and Great South Road. However, some of the opportunities to further enhance bus priority as part of separate projects are summarised below.

- Opportunities to reroute bus routes into and out of Manukau Bus Station;
- Signal priority for buses at the intersections of Osterley Way / Manukau Station Road and Manukau Station Road / Great South Road; and
- Provision of westbound bus lanes on Manukau Station Road.

It is further noted that that bus lanes on Great South Road are being actively investigated by Auckland Transport through Te Tupu Ngātahi.

5.9.2 Intersection performance

Outputs from AIMSUN have been used to understand the performance of key intersections. SIDRA has also been used to understand isolated intersection performance with respect to capacity, predicted LOS and anticipated queue lengths.

The SIDRA analysis of key intersections along the Project corridor (noting all intersections are signalised) compares outputs from the with and without-project scenarios for the 2038 design year. For the degree of saturation and queue distance measures, the difference in outputs between the with and without Project scenarios has been reported. A summary of the key performance outputs is shown in Table 18.

Table 18: Summary of intersection performance 2038

NoR	Intersection	Peak Period	Overall Level of Service		Change in Overall Average Delay (s)	Change in Overall Queue Length (m)
			No Project	With Project		
NoR 1	Te Irirangi Drive / Smales Road	Morning	LOS D	LOS E	+4	-5
		Evening	LOS D	LOS E	+23	+100
NoR 1	Te Irirangi Drive / Accent Drive	Morning	LOS E	LOS D	-10	-155
		Evening	LOS D	LOS D	+10	+5
NoR 1	Te Irirangi Drive / Ormiston Road	Morning	LOS D	LOS D	-11	-105
		Evening	LOS D	LOS E	+30	+105
NoR 2	Te Irirangi Drive / Dawson Road	Morning	LOS C	LOS D	+11	-110
		Evening	LOS F	LOS E	-76	-225
NoR 2	Te Irirangi Drive / Hollyford Drive	Morning	LOS F	LOS F	-41	-470
		Evening	LOS E	LOS F	+45	+95
NoR 2	Te Irirangi Drive / Diorella Drive	Morning	LOS F	LOS F	+99	+2
		Evening	LOS F	LOS F	+47	+0
NoR 2	Te Irirangi Drive / Great South Road	Morning	LOS F	LOS F	-182	-480
		Evening	LOS F	LOS F	+5	-100
NoR 2	Great South Road / Ronwood Avenue	Morning	LOS F	LOS E	-16	-1060
		Evening	LOS E	LOS F	+115	+280
NoR 2	Davies Avenue / Manukau Station Road	Morning	LOS E	LOS D	-15	-70
		Evening	LOS E	LOS D	-10	-35
NoR 2	Manukau Station Road / Lambie Drive	Morning	LOS C	LOS D	+11	+45
		Evening	LOS C	LOS D	+20	+95
NoR 2	Lambie Drive / Ronwood Avenue (existing is a roundabout control)	Morning	LOS A	LOS D	+34	+90
		Evening	LOS A	LOS F	+109	+355

NoR	Intersection	Peak Period	Overall Level of Service		Change in Overall Average Delay (s)	Change in Overall Queue Length (m)
			No Project	With Project		
NoR 2	Lambie Drive / Cavendish Drive	Morning	LOS D	LOS E	+10	+190
		Evening	LOS F	LOS F	+0	+125
NoR 2	Lambie Drive / Puhinui Road	Morning	LOS F	LOS F	+7	+180
		Evening	LOS F	LOS F	+123	+375
NoR 2	Puhinui Road / Plunket Avenue (existing is a priority give-way control)	Morning	LOS F	LOS F	+97	-1195
		Evening	LOS F	LOS F	+272	+545
NoR 3	Puhinui Road / Noel Burnside Road	Morning	LOS C	LOS C	+3	+80
		Evening	LOS B	LOS C	+8	+85
NoR 3	Puhinui Road / Wylie Road	Morning	LOS F	LOS F	+72	+370
		Evening	LOS F	LOS F	+24	+215
NoRs 4a and 4b	SH20B / Manukau Memorial Gardens Access	Morning	LOS A	LOS C	+20	+55
		Evening	LOS B	LOS C	+12	-80
NoRs 4a and 4b	SH20B / Campana Road	Morning	LOS D	LOS F	+95	+445
		Evening	LOS F	LOS F	+102	+630

Key points to note include:

- The ‘With Project’ results indicate that the Project generally does not significantly worsen the intersection performance, with regards to LOS, and difference in average delay and queue length;
- Where there are noticeable increases in delay and queue length, this is predominantly as a result of the removal of priority left-turn slip lanes for pedestrian and cyclist safety or the conversion of roundabouts / priority control intersections to signals to allow BRT pre-emption. The conversion of priority controlled to signalised intersections inherently attracts more delay;
- Furthermore, the potential impacts of the proposed intersection layout changes are mitigated through the diversion of general traffic onto adjacent corridors (as discussed in Section 6.9.1) and general mode shift as a result of the BRT service. This is indicated by the reduction in queue length and delay at some intersections in the With Project scenario;
- A number of intersections perform near or at capacity in 2038 for the ‘No Project’ scenario, as a result of the anticipated level of growth and commensurate increase in traffic volumes along this corridor by 2038. Accordingly, the ‘With Project’ also indicates poor performance for these intersections, with the difference due to the impacts of the Project corridor typically small;

- The SH20B / Campana Road intersection was assessed assuming that the existing T3 lane restrictions (outer lane approaches only) remain for both the 'No Project' and 'With Project' scenarios. This reflects the existing environment and Waka Kotahi's commitment to prioritising public transport and high occupancy/productivity vehicles over general traffic. Priority is also given to through traffic on SH20B rather than traffic accessing the State Highway from side roads, to ensure that the strategic function of SH20B is retained. As the performance of this intersection is relatively poor in most scenarios, it is recognised that there could be an opportunity in the future to improve the operational function at this intersection if additional vehicle types (e.g. freight or other strategically important vehicles) were permitted to use these lanes;
- The anticipated performance of the State Highway Interchanges: SH1 / Te Irirangi Drive and SH20 / SH20B Interchanges has been assessed using the AIMSUN modelling software. SH1 / Te Irirangi Drive Interchange (NoR 2) – the modelling indicates that this interchange will perform at an LOS F in the AM and LOS C in the PM peak hour with the Project, while it is anticipated to perform at LOS D during both peak hours without the Project; and
- SH20 / SH20B Interchange (NoRs 4a and 4b) – this interchange is anticipated to perform at an LOS F during both peak hours with the Project, and an LOS F and LOS E during the AM and PM peak hours (respectively) without the Project. In this regard, the Project does not significantly worsen the performance of this interchange.

Overall, the Project generally does not significantly worsen the performance of key intersections.

5.10 Access and parking

5.10.1 Property access

The Project alters the cross section of the corridor to incorporate a BRT corridor and separate 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 via the new separated facilities), and the ability to access all properties by vehicles will retained. This assessment therefore focuses on the restrictions to specific movements (especially right turns) by vehicles.

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 restricted. These movements will require alternative routes through the network to instead utilise the left-in or left-out access. The potential effects of the restrictions are assessed by considering the length of those alternative routes, along with the expected volume and familiarity of impacted users and any specific safety issues identified. In some instances, the Project designation includes the entirety of a property, therefore eliminating access impacts for those properties[12]. Where front lots are designated and rear lots are not, adequate access provisions to the rear lots are established.

Table 19 summarises the typical access impacts along the full Project route (per each NoR section), typical mitigation measures and the overall severity of impacts along each section.

[12] If the residual properties are to be re-used for non-transport purposes then suitable (albeit restricted) access will be provided for any newly titled properties.

Table 19: Summary of access impacts

NoR	Access impacts	Mitigation measures
NoR 1	An existing solid median runs down the centre of the corridor on Te Irirangi Drive, therefore right turn access is currently restricted for all properties along this corridor. Left-in/out is provided in some locations via parallel service lanes.	There are no significant changes to property access in this section. Where front lots are designated, access to rear lots will be established to adequate standard.
NoR 2	Lambie Drive, Manukau Station Road, Ronwood Avenue, Great South Road, and Te Irirangi Drive provide an existing central solid median. However, currently gaps in the median allow all-movements access into some, predominantly commercial, properties, Therefore, some properties with existing all-movements access will be restricted to left turn in and left turn out access (i.e. right turns prohibited) Of the 36 applicable properties within NoR 2, approximately nine had a notable but mitigatable impact. 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 no more than 2.5 km (further discussed under Alternative Route section below). Some properties have existing alternative access points. Note where buildings are located within the designation, the full lot will be designated, therefore there will be no impacts on access Where front lots are designated, access to rear lots will be established to adequate standard.
NoR 3	All properties within NoR 3 with access onto Puhinui Road will be restricted to left turn in and left turn out (i.e. right turn ban). Currently all movements are possible at individual access points.	Affected properties are required to use alternative routes for access. The local residential side street pattern and general road network in the surrounding area, is such that these alternative routes are achievable and the increase in expected travel distance is no more than 2.5 km (further discussed under Alternative Route section below). Note where buildings are located within the designation, the full lot will be designated, therefore there will be no impacts on access Where front lots are designated, access to rear lots will be established to adequate standard.
NoRs 4a and 4b	NoR 4a – Proposed designation has no effect on property access. NoR 4b – Proposed designation has no effect on property access. There is an existing median barrier along SH20B, therefore right turn access is currently restricted for all properties along this corridor.	There are no significant changes to property access in this section.

Property access impacts are further discussed within each NoR section (Sections 7, 8, 9 and 10). **Appendix B** includes a table summarising the access impacts and mitigation measures for relevant properties along the Project corridor.

5.10.2 Alternative routes

As a result of the centre running BRT, a number of properties within NoR 2 and NoR 3 will have restricted access onto the fronting road. The affected properties currently have all-movements access, and the Project will restrict right turn in and right turn out access.

Property users will be required to take alternative routes due to this access restriction. An assessment has been undertaken to determine the anticipated alternative routes and additional travel distance required for each affected property.

Figure 41 and Figure 42 show the general location of affected properties within NoR 2 and NoR 3 (outlined in red dash lines) and the routes that may be used for alternative access (inbound alternative routes in blue and outbound alternative routes in yellow).

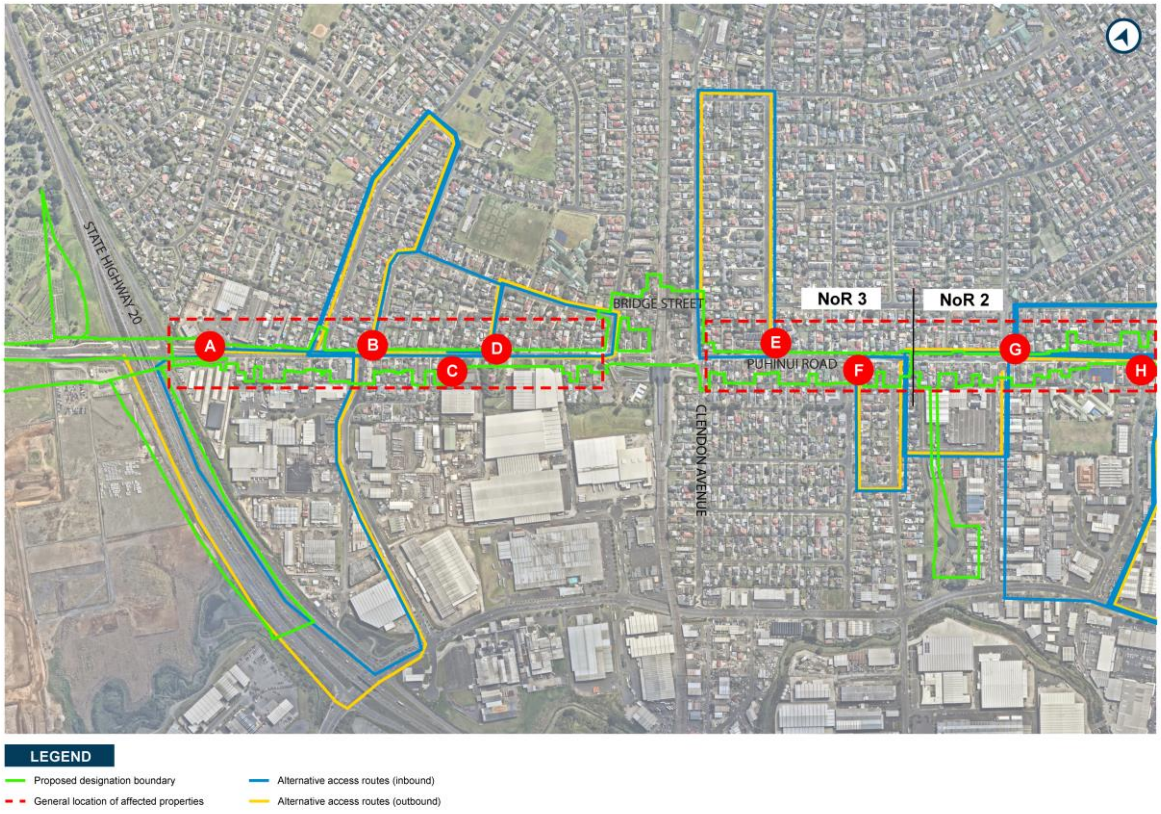


Figure 41: Alternative route Summary 1

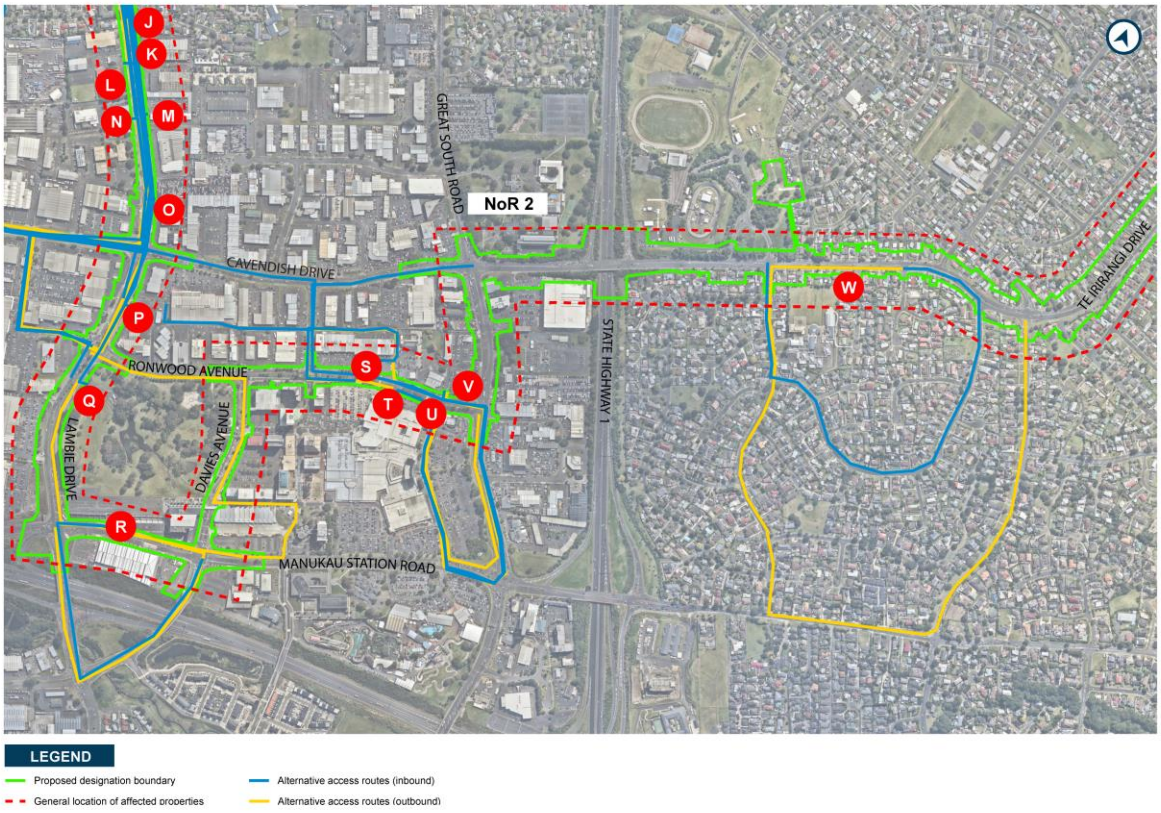


Figure 42: Alternative route summary 2

Table 20 summarises alternative routes that are anticipated to be frequently used.

Table 20: Frequently used alternative routes

NoR	Alternative route
NoR 2	• Cambridge Terrace • Wallace Road • Ranfurly Road • Plunket Avenue • Grayson Avenue • Cavendish Drive • Norman Spencer Drive • Fitzroy Street • Carruth Road • Wiri Station Road • Putney Way • Sharkey Street • Leyton Way • Diorella Drive • Hollyford Drive • Charntay Avenue
NoR 3	• Noel Burnside Road • Wylie Road

NoR	Alternative route
	• Milan Road • Raymond Road • Kenderdine Road

Figure 41 and Figure 42 also show Locations A-V, these are the locations that the alternative routes were measured from (based on the location of affected properties). The existing route length and the alternative route length from each point were compared to determine the additional travel distance required because of the right turn in and right turn out bans. The following should be noted:

- **Points A, B, D, E-J, U and W** are located at intersections with side streets where the assessment represents the alternative routes for blocks of properties adjacent to the Project corridor near the respective intersections, as well as properties on side streets gaining access via the intersections;
- **Points C, K-T and V** are located at the access point for individual properties (predominantly commercial / retail properties) that currently have all-movements access. These properties will be affected by the right turn ban;
- The location of each point (on either side of the corridor) represents the side of the road the routes were measured from; and
- This assessment excludes affected properties with alternative access points.

Figure 43 summarises the additional travel distance (inbound and outbound distance measured separately) anticipated from each point because of the right turn restrictions.

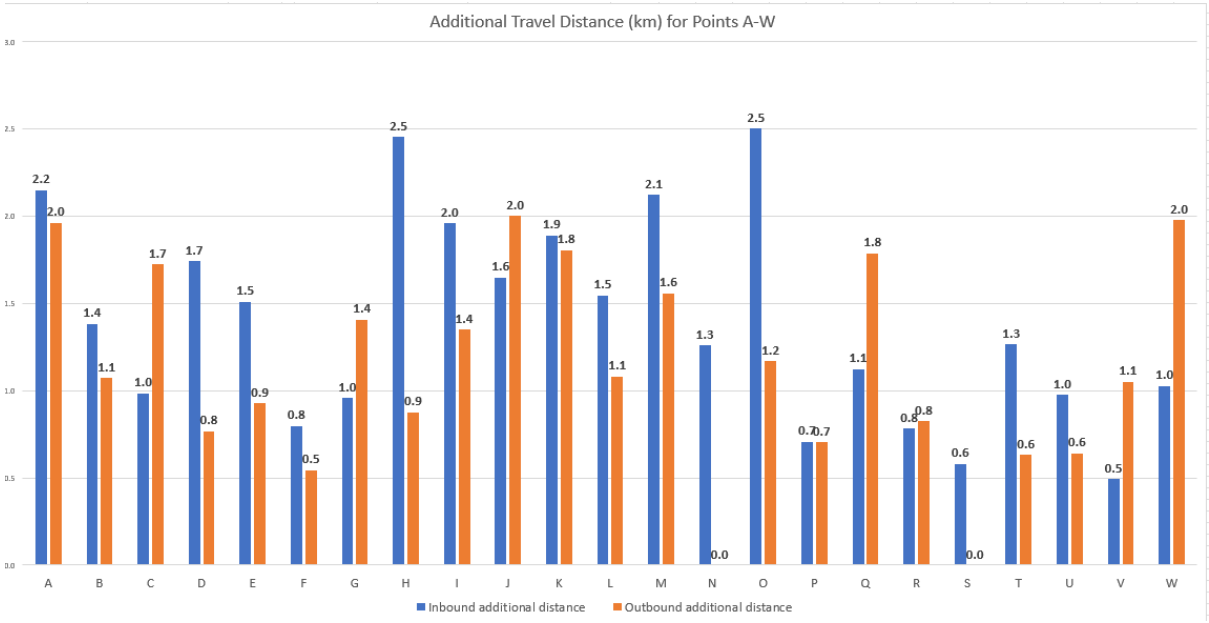


Figure 43: Alternative routes additional travel distance summary

As shown, the additional travel distance via the alternative routes is less than 2.5 km for all points measured, which translates to approximately 3-4 minutes of additional travel time (maximum). In most cases, the additional travel distance required will be much less than this maximum.

In addition to the additional travel distance and travel time, an assessment was undertaken to determine the severity of access impacts and whether the alternative route was a feasible method to access the site. The assessment criteria consisted of aspects such as:

- Existing activity and likely traffic generation of the site;
- Whether users were likely to be familiar with the site (e.g., residents, staff, delivery drivers) or unfamiliar (e.g., retail customers);
- Perceived safety of the available alternative routes; and
- Whether the alternative route passed through sensitive areas.

The Points A-W in Figure 43 were assessed using these criteria. No significant concerns were identified for the majority of locations and the alternative routes are considered a feasible and acceptable method to maintain access. However, two sites were identified for further analysis. These are described further below.

The assessment identified that restricting right turns in and out of the Mitre 10 and Bunnings Warehouse (located at 55-61 Lambie Drive) and the Papatoetoe Fire Station (located at 15A Lambie Drive) sites as a result of the Project would create an unacceptable safety risk.

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.

High volumes of retail customers use the existing access to the Mitre 10 and Bunnings sites, where currently all movements are permitted. It is considered that restricting right turn access at this location may lead to unsafe u-turn manoeuvres at the Lambie Drive SH20 motorway ramp intersection, immediately adjacent to this location when unfamiliar drivers feel they have no alternative access options.

For these two locations, signalised intersections allowing all-movements access have been provided.

Further details on the alternative route assessment (i.e. specific addresses) can be found in **Appendix B.**

With the inclusion of these two signalised intersections, the alternative routes and additional distances are all considered to be within acceptable standards.

5.10.3 Parking

On-street parking

The Project will remove all existing on-street parking spaces along the route. The removal of on-street parking spaces will occur within NoR 2 and NoR 3. There are no existing on-street spaces within NoRs 1, 4a and 4b.

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

The indicative number and location of these existing on-street parking spaces are summarised in Table 21.

Table 21: Summary of affected on-street parking spaces[13]

NoR	Location	Length / Number	Total On-street Parks Affected
NoR 1	Te Irirangi Drive	No existing on-street parking spaces	0
NoR 2	Te Irirangi Drive	No existing on-street parking spaces	117
	Great South Road	No existing on-street parking spaces	
	Ronwood Avenue	170 m of on-street parking space (approx. 28 spaces typically supporting commercial / retail activity	
	Davies Avenue	19 on-street parking spaces (supporting Hayman Park)	
	Manukau Station Road	12 on-street parking spaces (pick up and drop off spaces for MIT)	
	Lambie Road	No existing on-street parking spaces	
	Puhinui Road	350 m of on-street parking (approx. 58 spaces typically supporting residential activity)	
NoR 3	Puhinui Road	130 m of on-street parking space (approx. 21 spaces typically supporting residential activity)	21
NoR 4a/ 4b	SH20B	No existing on-street parking spaces	0

The BRT network proposed by the Project will provide a high quality, attractive alternative to car use and supports mode shift away from private vehicle use. The local bus network will be re-designed 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 / 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 Auckland Transport's policy direction regarding on-street parking on arterial roads. In this regard, the removal of on-street parking along the Project corridor is in accordance with the draft Auckland Parking Strategy[14].

The impacts of the removal of on-street parking can be managed through existing measures and will be further discussed in detail within each NoR section.

On-site Parking

The Project intends to widen the existing designation and alter the cross section of the corridor to incorporate a BRT corridor and separated walking and cycling facilities. As a result, existing car parking provision for properties adjacent to the Project corridor will be affected.

Approximately 21 commercial properties are affected within the Project boundary (predominantly within NoR 1 and NoR 2) and a total of 361 on-site parking spaces (excluding sites that will be fully

[13] Assumes 6m length for one on-street space.
Total length does not include vehicle crossing widths along the kerb as vehicles are not permitted to park on-street in front of a crossing Vehicle crossing widths along the kerb assumed to be 5 m each.
[14] Draft Auckland Parking Strategy, April 2022

designated) will be affected, typically along site frontages. In some instances, the Project designation includes the entirety of the property, therefore eliminating residual parking effects.

An assessment was undertaken to determine the severity of onsite parking impacts specifically for commercial properties to ensure that parking spaces affected by the Project would not result in substantial adverse effects for the operation of each business. The following was identified:

- Of the 361 onsite parking spaces located within the proposed designation, a total of 203 carparks are not located within the Project corridor cross section. These parking spaces may only be required temporarily for construction purposes, and therefore may be reinstated and returned to affected landowners for use as parking spaces once the works are complete;
- All impacted properties are considered to have sufficient alternative parking available on-site such that the operation of these businesses is not impacted significantly; and
- **Appendix B** describes the properties affected and the number of parking spaces affected due to the Project. In addition, the NPS:UD was gazetted on 23 July 2020 and took effect from 20 August 2020. This statement specifically removes all parking minimum requirements from the Auckland Unitary Plan. In this regard, the removal of on-site parking spaces because of the Project does not infringe any relevant standards.

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

5.10.4 Freight

The Project passes through and adjacent to some of Auckland's main industrial, warehousing and distribution areas. Multiple freight-related operations are located in the area due to the many competitive advantages that proximity affords, including shorter transit times to end destinations and improving overall supply chain efficiency. Auckland Airport, Wiri / Manukau, East Tāmaki and their surrounds are major freight generators and attractors. Airport access for freight from the south and east is heavily reliant on SH20B and SH20. SH20 is an important link for heavy commercial vehicles (**HCV**) that travel from the industrial area in Onehunga/Penrose to Wiri/Manukau (and vice versa).

The Project has a significant positive impact on the SH20B section, with the provision of a separate rapid transit lane encouraging mode shift and removing significant volumes of general traffic, thereby reducing congestion on the state highway. This has the additional benefit of creating capacity on the state highway network for freight. This will be discussed further in the Section 10. Impacts on freight in the central commercial and residential areas (NoRs 3 and 4) are minimal and generally focussed around heavy vehicle accessibility as opposed to improved freight travel time.

6 Construction effects

6.1 Construction traffic effects assessment

It is anticipated that the larger part of works required for the Project will likely be adjacent to or on the live carriageway, which means that temporary traffic management will be required. The scale of temporary traffic management to delineate live traffic away from the construction zones is largely dependent on the various stages and requirements of the construction activities. It is expected that short term temporary road closure for nights or weekends may be required for specific activities, such as road surfacing, traffic switches and gas / other utilities relocation. Other activities may require stop/go or contraflow traffic management, such as drainage, utility relocation, survey, and investigation work.

The effect of temporary road closure or other traffic management methods to existing traffic on the specific corridor and adjacent road network should be confirmed in the future as part of the CTMP for each project, based on the current traffic environment at the time of construction. This will consider the level of growth and activities that has occurred in the surrounding area, the availability of alternative routes, and any additional sensitive land use activities.

The construction of the Projects will each likely require earthworks. Final cut and fill volumes will be confirmed following detailed design, prior to construction. The construction traffic movements to accommodate the earthworks will likely result in the increase of traffic volume on construction routes used during the construction period for each of the Projects.

6.1.1 Traffic routes

Given the timing and staging of the construction of the Project has yet to be determined, there is a degree of uncertainty associated with any predicted construction methodology and associated traffic routes. This means:

- The routes that will be used by construction vehicles will depend on the location of quarries and disposal sites, which are not yet certain;
- The exact location and extent of compound sites/lay down areas has yet to be determined; and
- The timing of construction of each NoR could impact on likely construction vehicle routes, for example, if Puhinui Road is constructed prior or after to the upgrade of SH20B.

Access to compound sites, laydown areas and construction zones for construction vehicles, plant and materials will be via site access points identified as part of future CTMPs.

Details of routes and time restrictions will need to be updated and refined as part of the CTMP process. It is anticipated that routes for construction traffic will likely be limited to arterial corridors, the adjacent state highway network (SH1, SH20 and SH20B) and intersections with the provision of adequate vehicle tracking.

The specific CTMPs will need to consider the suitability and effects prior to the use of those other road corridors and may require specific mitigation, such as restrictions on the number or time of day / week that construction vehicles could utilise those corridors.

Other key considerations relating to the construction traffic and transport effects of the NoR corridors are discussed below, such as speed limits, pedestrians and cyclists, property access and parking, as well as on-street and public parking.

6.1.2 Speed limits

To maintain the safety of all road users, it is recommended to implement a safe and appropriate temporary speed limit during the construction period on the network within the extent of works, and along construction routes, if needed. This should be in accordance with the latest traffic management standards at the time of construction. These recommended measures and other measures highlighted in the CTMP are expected to reduce the potential safety risks that may be associated with construction traffic.

6.1.3 Pedestrians and cyclists

The existing provision for pedestrian and cyclists is variable across the network. It is likely that the demand for these modes will increase if further development occurs prior to construction, but the existing network of parallel collector roads, mostly with footpaths on both sides of the road, and off-road walking and cycling facilities will remain available and could also be used as alternative routes during construction. Effects should be assessed again when a greater level of detail is available about demand and adjacent development, prior to construction. It is recommended that residents and stakeholders (such as Bike Auckland and cycling clubs) be kept informed of construction times and progress. General observations of pedestrian and cyclist activity should be used to inform appropriate traffic management measures in the CTMP.

6.1.4 Property access for residents and businesses

During construction, temporary traffic management controls such as temporary concrete or steel barriers will be required along the corridor. Existing driveways that are required to remain operational during construction will require temporary access provision. It is anticipated that the contractor would undertake a property-specific assessment of any affected driveways and provide temporary access arrangements if required. Temporary access should ensure the ability for residents to safely access and exit the property. These requirements should be captured in the CTMP or SSCTMP.

6.1.5 Land use activities that will need further consideration in the CTMP

The following table provides a summary of the key land use activities that are located adjacent to the corridor and will need consideration during the development of the CTMP. Consideration could include restricted truck movements during school pick up and drop off times, or additional controls at key access locations. Loading and servicing arrangements for commercial and industrial properties should also be considered as part of the CTMP where necessary, especially within NoR 2.

The below is not a final or complete list, with land use changes likely, this list will change over time.

Table 22: Sites for Consideration within future CTMP

Corridor	NoR	Sites for Consideration
Te Irirangi Drive	NoR 1	• Sancta Maria College; and • Botany Town Centre.

Corridor	NoR	Sites for Consideration
Puhinui Road	NoR 2	Puhinui School
Lambie Drive	NoR 2	Papatoetoe Fire Station
Manukau Station Road	NoR 2	• Manukau Institute of Technology; • Manukau District Court; and • Counties Manukau Police Station.
Davies Avenue	NoR 2	• Manukau Public Defence Services; and • Auckland Council Manukau Service Centre.
Ronwood Avenue	NoR 2	• Hillpark School; • Manukau Town Centre; and • Westfield Shopping Centre.

6.1.6 Temporary traffic management effects assessment

It is considered that temporary effects on the network from construction activities can be adequately managed through the implementation of a CTMP during the construction phase of each NoR. The purpose of the CTMP is to ensure the construction of each NoR is managed in such a way that enables safe and efficient movement of local traffic throughout the construction period and to minimise disruption to road users, particularly adjacent businesses, and residential properties and local, social and community activities. If required, SSTMPs should be developed to manage constraints on access to affected properties.

6.1.7 Recommended measures to avoid, remedy or mitigate construction effects

It is recommended that the potential construction traffic effects be accommodated and managed appropriately via a CTMP. Based on the assessment of transport construction effects, it is recommended:

1) A CTMP be prepared prior to the Start of Construction for a Stage of Work. Any potential construction traffic effects shall be reassessed prior to construction, considering the specific construction methodology and traffic environment at the time of construction.
2) 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 shall include:
   a) Methods to manage the effects of temporary traffic management activities on traffic;
   b) Measures to ensure the safety of all transport users;
   c) 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;
   d) 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;
   e) Identification of detour routes and other methods to ensure the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads;

f) Methods to maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be;
g) 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;
h) Method that will be undertaken to communicate traffic management measures to affected road users (e.g., businesses, residents, public, stakeholders, emergency services);

3) Auditing, monitoring, and reporting requirements relating to traffic management activities shall be undertaken in accordance with Waka Kotahi's Code of Practice for Temporary Traffic Management.
4) Any CTMP prepared for a Stage of Work shall be submitted to Council for information ten (10) working days prior to the Start of Construction for a Stage of Work.

7 NoR 1: Te Irirangi Drive section

7.1 Project corridor features

7.1.1 Project overview

NoR 1 runs in a north-south alignment between Botany Town Centre (in the vicinity of Leixlep Lane) and Rongomai Park for approximately 5.0 km and ties in with the Botany Transport Interchange at its northern end, which is proposed as part of the Eastern Busway.

NoR 1 connects Botany Town Centre and Manukau Town Centre, and traverses a mixture of town centre, commercial and residential environments. This north-south connection will support active modes and public transport connectivity, with separated walking and cycling facilities and a central BRT corridor provided along its entire length. In addition, the future Eastern Busway which adjoins the Project corridor to the north enables further connectivity to the wider eastern public transport network.

Te Irirangi Drive currently provides a wide road reserve width, with a central solid median (approximately 10 m wide) established along the length of this Project segment. In this regard, there are, in general, minimal impacts to the existing road reserve, given that the rapid transit corridor (two-way) will essentially replace the existing solid median.

An overview of the proposed design for the Te Irirangi Drive Project is provided in Figure 44 below.

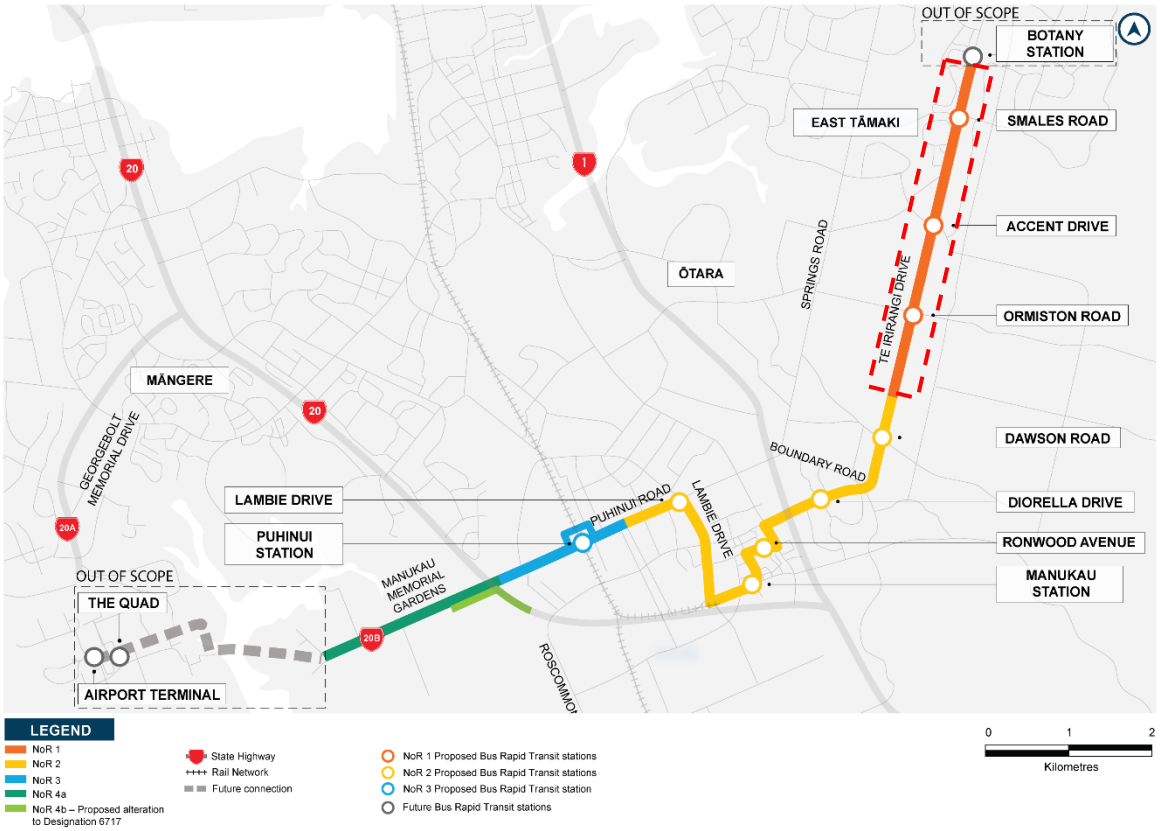


Figure 44: Overview of the NoR 1 Te Irirangi section

Table 23 summarises the proposed changes and effects of the Project for the NoR 1 section.

Table 23: NoR 1 proposed changes and effects summary

What is changing	Discussion
New BRT corridor	• Significantly better quality, frequency, and reliability of PT services; • Better connections to local PT services; • Better access to the wider network; and • Better access provisions for pedestrians, cyclists, and mobility impaired passengers.
Cycle facilities	• Dedicated cycle paths are not currently provided along the full length of this Te Irirangi Drive section; • Dedicated and separated cycle path on both sides of the road within this section, therefore improving connectivity and safety; and • Better connection to BRT / PT stations and overall better connection.
Pedestrian facilities	• Existing pedestrian footpaths provided on both sides of the road; • Increased pedestrian crossing opportunities / facilities along the route (dedicated signalised crosswalks), therefore improving pedestrian safety; • Better priority at signalised intersections; and • Better connectivity to BRT / PT stations.
On-street parking	• No on-street parking currently provided along the Te Irirangi Drive, no changes proposed.
On-site parking	• Minimal impact on on-site parking for adjacent properties. A total of 46 on-site parking spaces affected across three commercial sites.
Property access	• An existing solid median is provided along the full length of Te Irirangi Drive; therefore, the Project does not require new right turn bans at property access points.
Intersection operation	• The 'With Project' results indicate that the Project corridor does not significantly worsen the intersection performance, with regards to LOS, average delay and queue length; and • Model outputs indicate that the intersections within NoR 1 for both the 'No Project' and 'With Project' scenario perform at acceptable capacity levels.

7.2 Network and corridor design

The Project was developed as part of transport network planning for the wider area. The wider networks were developed through the business case process that considered the key problems, benefits, outcomes, and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Te Irirangi Drive, an existing urban four-lane arterial corridor, will change to incorporate components for PT and active modes. The proposed cross-section will be generally consistent through this section, with the two-way rapid transit corridor replacing the existing central solid median and a separated footpath and cycle lane established along both sides of the

corridor. It is noted that an existing footpath is already provided along the length of the corridor on both sides. Te Irirangi Drive will continue to provide two vehicle lanes in either direction. All signalised intersections along this section will be retained and upgraded to include priority for rapid transit services and, at some locations, rapid transit stations.

The typical cross section for this section is shown in Figure 45.

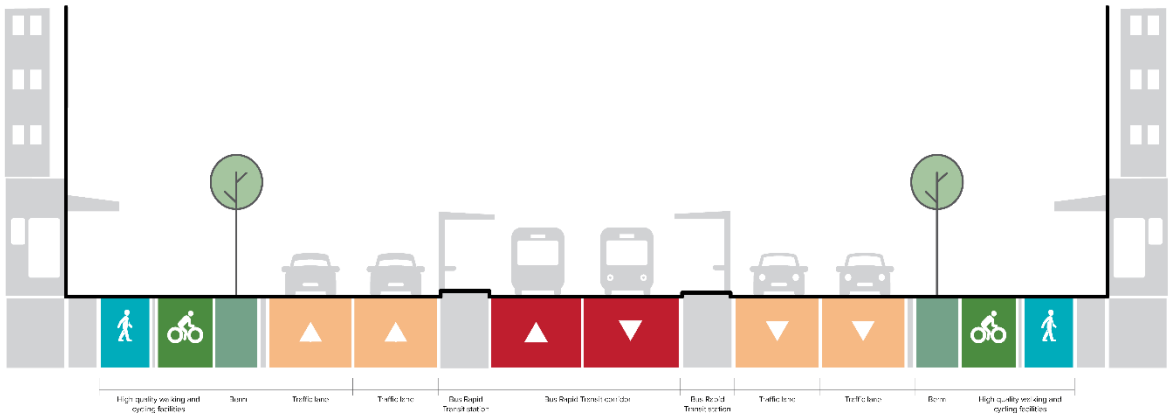


Figure 45: NoR 1 Typical cross section

7.3 Existing and likely future environment

7.3.1 Planning context

Within the Te Irirangi Drive section, the proposed rapid transit corridor traverses land zoned for a range of activities under the AUP:OP.

- To the east of Te Irirangi Drive land is predominantly zoned Residential – Mixed Housing Urban, with a small portion of land zoned as Residential – Terraced Housing and Apartment Buildings and Business – Local Centre;
- Santa Maria Catholic Primary School and College is located on the eastern side of Te Irirangi Drive (north of Ormiston Road) and falls under Special Purpose Zone, with the land surrounding the school zoned as Open Space – Informal Recreation Zone; and
- A mixture of land uses is provided to the west of Te Irirangi Drive, with the land near the southern end of the section being Residential – Mixed Housing Urban; Business – Light Industry Zone and Business – Mixed Use Zone in the central section; and Residential – Mixed Housing Suburban Zone and Residential – Terrace Housing and Apartment Buildings Zone towards the northern end. Open Space – Informal Recreational Zoning is also provided intermittently throughout the route.

Botany Town Centre is located immediately north of the Project corridor and is zoned Business – Metropolitan Centre. Table 24 below provides a summary of the Te Irirangi Drive section existing and likely future environment, noting that all adjacent land has live zoning, which is not considered likely to change.

Table 24: Te Irirangi Drive existing and likely future environment

Environment today	Zoning	Likelihood of Change for the environment[15]	Likely Future Environment[16]
Business	Business (Light Industry, Mixed Use, Metropolitan Centre)	Low	Business (Light Industry, Mixed Use, Metropolitan Centre)
Residential	Residential	Low	Residential
Special Purpose (School)	Special Purpose	Low	Special Purpose
Open Space	Open Space – Informal Recreational	Low	Open Space

Please refer to the AEE for further information on the planning context.

7.3.2 Transport environment

7.3.2.1 Existing

The existing corridor is predominantly surrounded by residential, commercial, and industrial development. It is comprised of two vehicle lanes in each direction, separated by a wide central solid median as shown in Figure 46. Footpaths are provided on both sides of the corridor for its entire length.

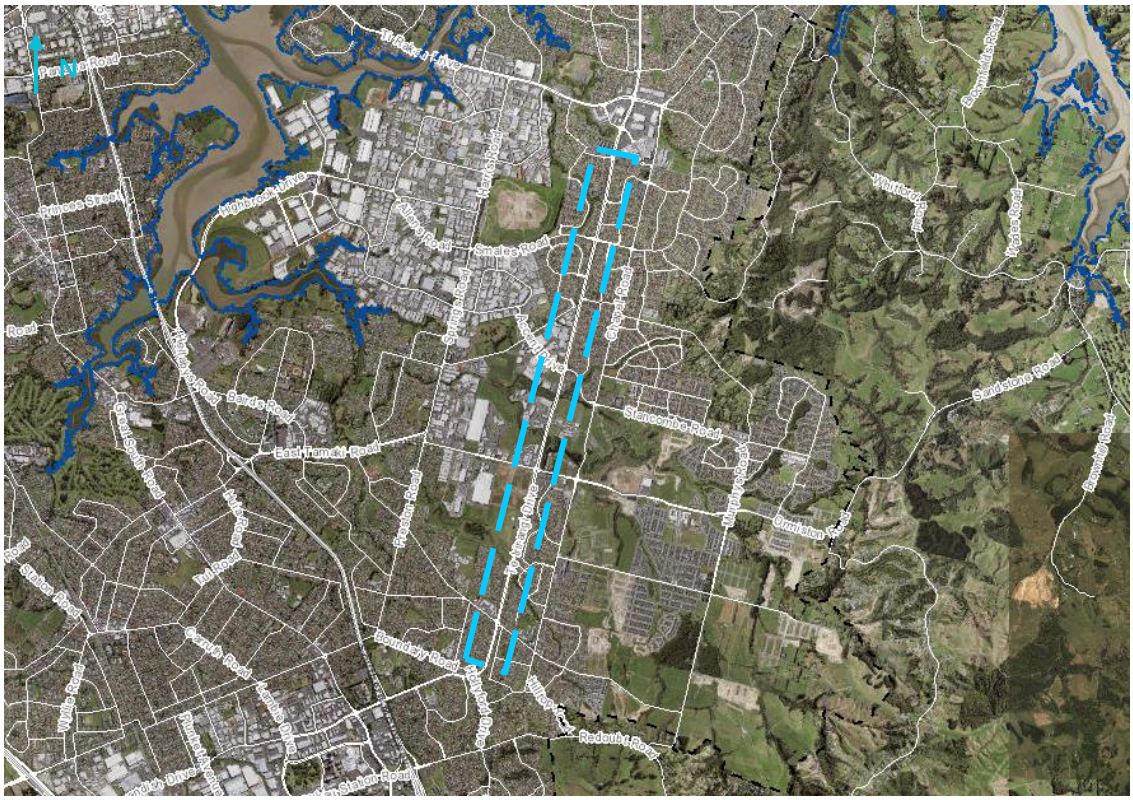


Figure 46: Aerial photo of existing Te Irirangi Drive corridor

[15] Based on AUP:OP zoning/policy direction
[16] Based on AUP:OP zoning/policy direction

Table 25 summarises the existing transport features of the Te Irirangi Drive corridor.

Table 25: Te Irirangi Drive: existing transport features

	Existing transport features
Corridor Characteristics	• 60 km/h speed limit (between Great South Road and 100 m north of Belinda Avenue) and 80 km/h speed limit (between 100 m north of Belinda Avenue to Ti Rakau Drive); • Urban character, one or two vehicle lanes in each direction generally separated by a central solid median; • Operates as a regionally important connecting through route as well as providing residential access; • Pedestrian footpaths provided on both sides of the road, with pedestrian crossing facilities along the route, generally at signalised intersections; and • No dedicated cycle facilities are provided on Te Irirangi Drive within NoR 1
Traffic Volume	The latest traffic data for Te Irirangi Drive was obtained from Auckland Transport[17]. The data was recorded in 2021 and shows Te Irirangi Drive (between Dawson Road and Parkway Drive) carried a 5 Day Average Daily Traffic in the order of 30,000 vehicles per day (vpd), and 2,300-2,600 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic intersections	• Te Irirangi Drive / Penion Drive priority controlled; • Te Irirangi Drive / Belinda Avenue priority controlled; • Te Irirangi Drive / Whetstone Road priority controlled; • Te Irirangi Drive / Florence Carter Way priority controlled; • Te Irirangi Drive / Botany Way priority controlled; • Te Irirangi Drive / Ormiston Road signals; • Te Irirangi Drive / Bishop Lenihan Place priority controlled; • Te Irirangi Drive / Bishop Dunn Place / Sancta Maria Way signals; • Te Irirangi Drive / Accent Drive signals; • Te Irirangi Drive / Strundeen Close priority controlled; • Te Irirangi Drive / Shingleton Lane priority controlled; • Te Irirangi Drive / Banville Drive priority controlled; • Te Irirangi Drive / Redcastle Drive priority controlled; • Te Irirangi Drive / Balarath Road priority controlled; • Te Irirangi Drive / Smales Road signals; • Te Irirangi Drive / Chapel Town Drive priority controlled; and • Te Irirangi Drive / Brinlack Drive priority controlled.
Walking and Cycling	• Pedestrian footpaths provided on both sides of the road, with pedestrian crossing facilities along the route, typically at signalised intersections; and • No dedicated cycle facilities are provided on Te Irirangi Drive within NoR 1.
Public Transport	• Existing public transport provision on Te Irirangi Drive is relatively limited, with Route 325 (connector service) running through a short section of this route; and • Route 325 connects Mangere Town Centre and Manukau via Otahuhu Town Centre.

[17] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

7.3.2.2 Likely future

The surrounding land is currently live zoned, therefore there is no significant anticipated change in land use or corridor characteristics.

The Project proposes a high frequency, high quality, two-way rapid transit system and four rapid transit stations along the length of Te Irirangi Drive. The stations are located at Smales Road, Accent Drive, Ormiston Road, and Dawson Road. Provision of improved transport access via stations presents an opportunity to allow for intensified development and growth. The recent NPS:UD which took effect on 20 August 2020, is applicable to the Project and is expected to further enable intensification around stations. Among other things, the NPS:UD requires Auckland Council to enable "building heights of at least 6 storeys within at least a walkable catchment of existing and planned rapid transit stops." In this regard, policy and zoning changes along the corridor are anticipated, with future residential development within the vicinity of the rapid transit stations likely to be of multi-storey developments to better support transit-oriented development.

Furthermore, Auckland will be subject to the Medium Density Residential Standard (**MDRS**) from August 2022, which allow landowners to develop up to three homes of up to three stories on most sites without the need for a resource consent. This Bill introduced by the Government will enable a wider variety of housing choices and supports greater housing density within Auckland, including future residential developments along the Project corridor.

7.4 Assessment of operational transport effects

This section addresses operational transport effects specific to NoR 1 only. Section 5.5 describes broader effects of the Project on the overall transport network.

7.4.1 Public transport

The Project will provide a central BRT corridor (two-way) down the centre of Te Irirangi Drive and will be a key public transport connection between the Botany and Manukau Metropolitan Centres. Three BRT stations are provided along this section; Ormiston Road Station, Accent Drive Station and Smales Road Station, thus enabling users from residential and commercial properties within the vicinity of the stations to gain access to the Project's rapid transport services.

The Botany Station is located at the commercial / employment centre of Botany Town Centre. Customers will be able to transfer from the new Eastern Busway BRT service and up to nine local bus routes at the future Botany Station.

Furthermore, customers will be able to transfer between four local bus routes at the Project's Ormiston Station, substantially improving access for the eastern suburbs of Flat Bush and Ormiston to jobs and other opportunities.

BRT patronage forecasts have been extracted from the Auckland regional strategic model (MSM). This information provides likely usage patterns and means/locations of access to the system and helps to understand how the Project integrates with the wider transport system. Taking a forecast screenline on Te Irirangi Drive at the State Highway 1 crossing entering Manukau in 2048 (Figure 47) shows that:

- Just over half of all passengers crossing the screenline at Manukau have transferred from buses making operational and physical connections with local bus services crossing Te Irirangi Drive and at Botany Station.
- Botany Station is the largest source of transfers, but collectively the local bus interchanges at Smales, Ormiston and Dawson Road stations are almost equal to Botany.
- Approximately 42% of people crossing the screenline at Manukau have walked or cycled to stations, making pedestrian quality around stations important.
- Approximately 42% of people who are on the BRT as it enters Manukau are still on the system as it enters the Airport, showing that the Airport and its employment areas (including its specific customer groups and their needs) are significant considerations in the system design.

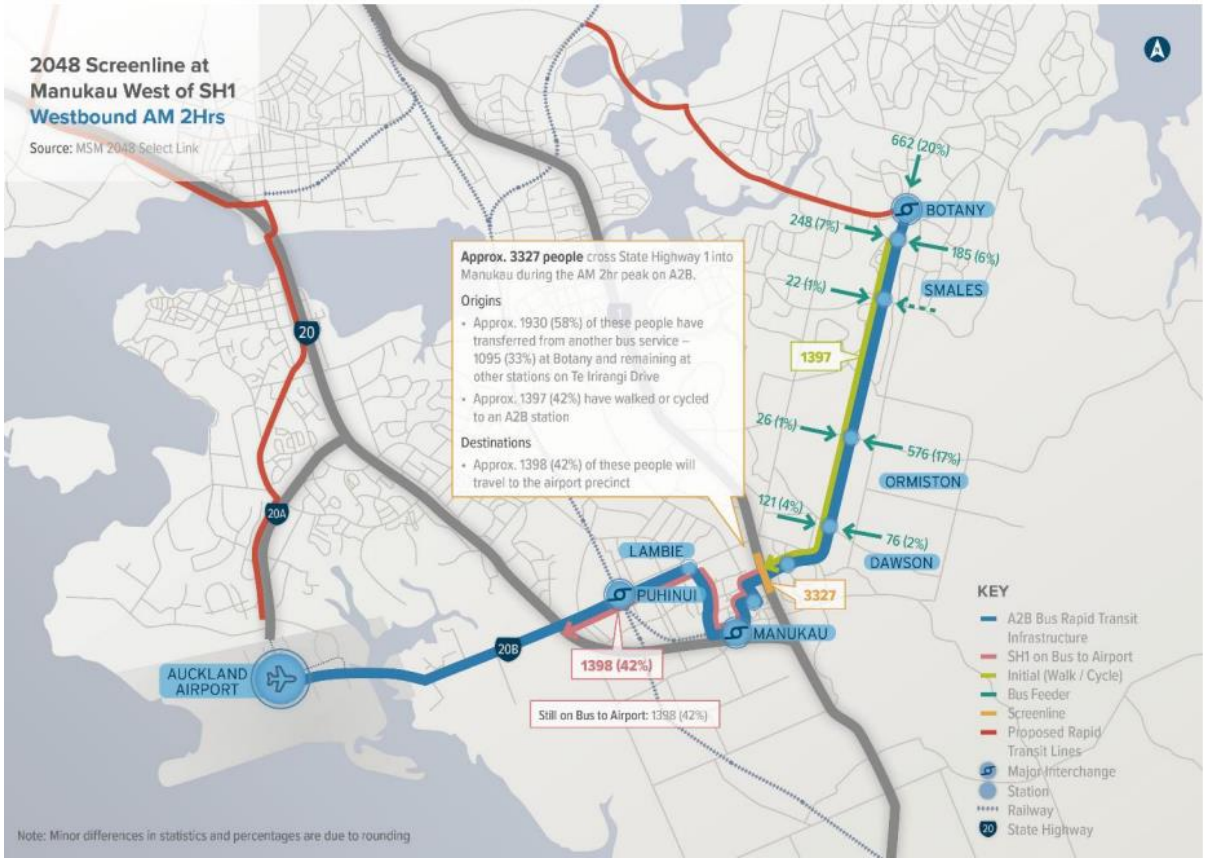


Figure 47: Demand origins and destinations. Screenline on Te Irirangi Dr, west of SH1 (source MSM i11.5 2048)

7.4.2 Walking and cycling

The Project proposes separated walking and cycling facilities on both sides of Te Irirangi Drive. It also includes dedicated pedestrian and cycle crossing facilities at all signalised intersections, which provide for safe movement across the corridor and also importantly, safe walking and cycling access to station platforms, which are located in the road median. Furthermore, the existing overbridge on Te Irirangi Drive located immediately south of Wando Lane will be converted to an at-grade signalised crosswalk.

The proposed walking and cycling facilities have been designed in accordance with relevant Auckland Transport standards and policies as summarised in Table 26.

Table 26: Te Irirangi Drive Auckland Transport standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[18]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that proposed designs should feature separated cycling facilities for arterial corridors in excess of 30 km/h. The traffic speeds on Te Irirangi Drive are proposed to be 50 km/h, therefore the proposed design of the walking and cycling facilities is considered appropriate for these standards.
Auckland Transport Transport Design Manual[19]	Footpaths: 1.8 m minimum	A 1.8 m footpath is proposed on all corridors and a 2.0 m cycle path with a berm of various widths. This is in accordance with the Auckland Transport TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance.

The Project will positively affect walking and cycling as it will:

- Serve as a key enabler for greater use of active transport modes by providing safe routes to BRT stations;
- Reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Te Irirangi Drive;
- Improve integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity;
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips; and
- Support growth surrounding Te Irirangi Drive and improve safety and access to employment and social amenities.

7.4.2.1 Station access

The NoR 1 section comprises of three station locations: Smales Road Station, Accent Drive Station, and Ormiston Road Station. Ormiston Road Station is located within the commercial / employment centre and will substantially improve access for the eastern suburbs of Flat Bush and Ormiston to jobs and other opportunities. Sancta Maria Primary School and College is located within the station's 1 km catchment. These stations also enable residential properties within the vicinity of the stations to gain access to BRT services.

The station locations, the 1 km walking catchment and 3 km cycling catchment are shown in Figure 48.

[18] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf

[19] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

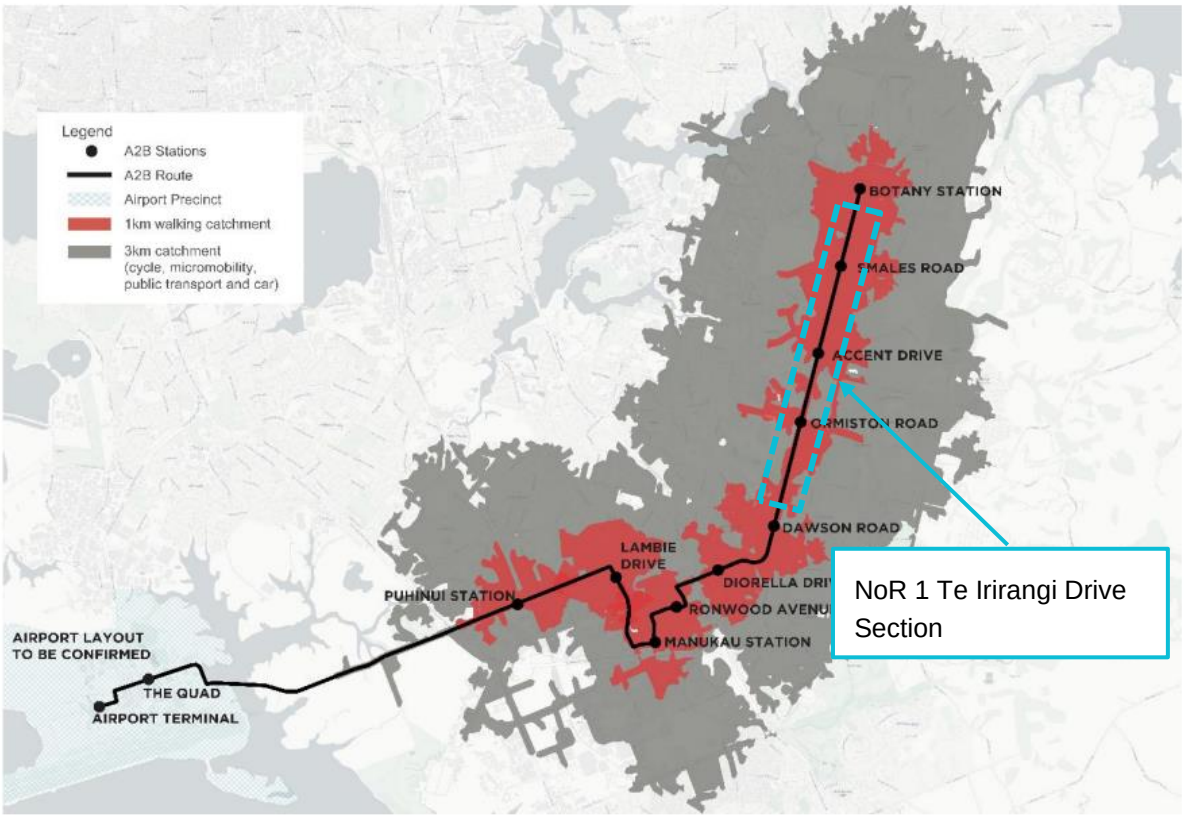


Figure 48: NoR 1 - 1 km walking and 3 km cycling catchment

The walking and cycling access to stations has been assessed and summarised in Table 27.

Table 27: NoR 1 – Walking and cycling station access

Station	Walking and cycling catchment description	Mitigation / Comment
Smales Road Station	• Smales Road Station is surrounded by predominantly residential zoning. The main Unitary Plan land use zones within a 1 km radius of the station are residential and Open Space - Informal Recreation. • The street network surrounding Smales Road Station offers high levels of pedestrian connectivity. A moderately well-connected street pattern is enhanced by pedestrian shortcuts and links through public open spaces. • Te Irirangi Drive bisects the catchment and forms a barrier due to the lack of safe crossing points and difficulty of crossing four lanes of high-speed traffic. Formal crossing points of Te Irirangi Drive aside from at the Smales Road intersection are limited to an underpass 400 m to the north. • The existing cycle network for station access is limited to painted on-road cycle lanes on Smales Road west of Te Irirangi Drive. No cycle network development is planned for the immediate area.	• The Project proposes separate walking and cycling connections along Te Irirangi Drive. • The Smales Road Station is located on Te Irirangi Drive at the intersection with Smales Road. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the Te Irirangi Drive / Smales Road intersection, thus ensuring that active mode users can safely access the station. • The nearby side streets such as Smales Road provide a separate pedestrian footpath on both sides, thus enabling safe pedestrian connectivity to the station.

Station	Walking and cycling catchment description	Mitigation / Comment
Accent Drive Station	• Accent Station is surrounded by a mix of residential, industrial, and public open space activities. The three predominant Unitary Plan land use zones within a 1 km radius of the station are Business - Light Industry, Open Space - Informal Recreation, and Residential - Mixed Housing. • The street network surrounding Accent Drive Station offers varying levels of pedestrian connectivity. The street network to the northeast of the station is a well-connected grid-like pattern for pedestrians, making use of footpath shortcuts between street cul-de-sacs and Te Irirangi Drive. • The existing cycle network for station access is limited to painted on-road cycle lanes on Stancombe Road and a shared path along Ōtara Creek to the east. No cycle network development is planned for the immediate area.	• The Project proposes separate walking and cycling connections along Te Irirangi Drive. • The Accent Drive Station is located on Te Irirangi Drive at the intersection with Accent Drive. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the Te Irirangi Drive / Accent Drive intersection, thus ensuring that active mode users can safely access the station. • This station will likely provide access to Sancta Maria College which is located 500 m to the south of this station. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the Te Irirangi Drive / Sancta Maria Way / Bishop Dunn Place intersection, therefore enabling safe and direct active mode access to the college. • The nearby side streets such as Accent Drive, Bishop Dunn Place, Sancta Maria Way, provide a separate pedestrian footpath on both sides, thus enabling safe pedestrian connectivity to the station.
Ormiston Road Station	• Ormiston Station is located at the junction of two arterial roads surrounded by a mix of activities. There are a range of Unitary Plan land use zones within a 1 km radius of the station, including Business - Light Industry, Open Space - Informal Recreation, Open Space - Sport and Active Recreation, and Residential - Terrace Housing and Apartment Buildings. • Ormiston Road and Te Irirangi Drive currently have high traffic speeds and volumes, with low levels of pedestrian and cycling infrastructure, creating severance barriers to movement by active modes. • The existing cycle network for station access is limited to painted on-road cycle lanes on Ormiston Road. • With a large park to the east, a stream network to the north and light industrial land use to the west limiting access, Ormiston Road will play a vital role in bringing passengers to the rapid transit station. Further growth is expected to the east of this station around Ormiston Town Centre.	• The Project proposes separate walking and cycling connections along Te Irirangi Drive. • The Ormiston Road Station is located on Te Irirangi Drive at the intersection with Smales Road. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the Te Irirangi Drive / Ormiston Road intersection, thus ensuring that active mode users can safely access the station. • Ormiston Road provides a separate pedestrian path and on-road cyclist path on both sides of the road, therefore enabling safe and direct pedestrian and cyclist connectivity to the station.

7.4.3 General traffic

The forecasted 2038 AADT and peak hour volumes for NoR 1 corridors are summarised below.

Table 28: NoR 1 forecasted 2038 AADT and peak hour volumes

Corridors	2038 AADT (two-way)	2038 maximum peak hour volumes (two-way)
Te Irirangi Drive (near Leixlep Lane)	16,600 vpd	1,994 vph
Te Irirangi Drive (near Smales Road)	19,400 vpd	2,302 vph
Te Irirangi Drive (near Accent Drive)	11,100 vpd	1,676 vph
Te Irirangi Drive (near Ormiston Road)	9,200 vpd	1,503 vph

The proposed typical corridor cross section design for Te Irirangi Drive (generally two general traffic lanes in each direction) is considered to meet the forecasted needs and is suitable to achieve the desired outcomes on the corridor.

The performance of the wider network and of individual intersections within NoR 1 is described in Section 5.9 above.

7.4.4 Access and parking

7.4.4.1 Access

The NoR 1 section predominantly provides direct access to residential properties, with a small number of commercial / retail activities located adjacent to this corridor.

As an existing urban arterial corridor, the role Te Irirangi Drive plays in the transport network is not expected to change. Primary access to the corridor is via a network of collector roads. Service lanes, serving residential dwellings are present along its eastern extents. Along its western extents properties access the corridor directly.

The Project proposes minor widening of the designation along this section to incorporate a central rapid transit corridor and separate walking and cycling facilities on both sides of the road. Te Irirangi Drive currently provides a wide central solid median, which will be replaced with the centre running BRT corridor.

In terms of existing property access, the overarching design philosophy for the Project has been to maintain driveway access, where practicable, and minimise impacting land other than where necessary. For properties with access onto Te Irirangi Drive within NoR 1, no significant property access impacts are anticipated as these properties are currently subject to a restricted right turn access due to the existing central solid median.

There is currently a gap in the solid median (approximately in front of 201 Te Irirangi Drive) which enables vehicles to undertake u-turn manoeuvres. The Project will remove this gap in the median and vehicles will need to use an alternative route for this manoeuvre. The alternative route will likely be via Dawson Road, Chapel Road, and Ormiston Road, which will add a maximum of approximately 3 km additional travel distance, or 4 minutes additional travel time, which is considered acceptable from a traffic perspective.

The general access effects of the Project are summarised below:

- The Project will impact the layout of vehicle crossings within the road reserve (and in some instances within private lots). Most driveways will need to be reformed to tie in adequately with Te Irirangi Drive;
- For rear sites with the front lot designated, driveways will be constructed to enable access to the rear lot;
- Several properties are fully within the proposed designation, as these lots will be fully designated property access effects will be eliminated; and
- One gap in the existing median, used for u-turn manoeuvres will be closed, resulting in an additional 3 km travel distance for some users.

7.4.4.2 Parking

The Project cross section and proposed designation affects existing on-street and off-street parking within NoR 1. The indicative number and location of affected spaces is summarised in Table 29 and Table 30.

Table 29: Summary of affected on-street parking spaces

NoR	Road	On-street parking spaces affected
NoR 1	Te Irirangi Drive	No existing on-street parking spaces

Table 30: Summary of affected off-street parking spaces

NoR	Address	Activity	Off-street parking spaces affected
NoR 1	1 Bishop Dunn Place	Commercial	5
	350 Te Irirangi Drive	Commercial	18
	360 Te Irirangi Drive	Commercial	23

The Project has no impact on on-street public parking within NoR 1, however approximately 46 on-site parking spaces will be affected, typically along site frontages. As the NPS:UD removes all minimum on-site parking requirements from the Unitary Plan, this is considered a relatively minor effect, as the Project does not infringe any relevant standards. Importantly, some parts of the designation will only be required temporarily for construction purposes and may be able to be returned to affected landowners for use as parking spaces once the works are complete.

The BRT network proposed by the Project will provide a high quality, attractive alternative to car use and supports mode shift away from private vehicle use. The increased attractiveness and forecast increased demand for public transport is likely to lead to less demand for on-site parking for commercial / retail properties, particularly where alternative facilities are available within proximity if necessary.

7.4.5 Freight

Te Irirangi Drive is a key arterial corridor that connects existing industrial/commercial land use activities with the State Highway network. This corridor is currently classified as Level 1B in the Auckland Transport Freight Plan, which is described as roads of the highest strategic value to freight

movement where efficient freight movements must be actively supported to maintain levels of service, where competing modes and land uses require active management[20].

Te Irirangi Drive will continue to support the overall freight connections in this area. The Project will also result in improved journey times and reliability for existing and future freight because of mode shift away from general traffic and towards public transport.

7.5 Project interdependencies

7.5.1 Eastern Busway Project

The Eastern Busway project is currently preparing Notices of Requirement and consent documentation, due for lodgement in late 2022. This project is due to be operational by 2026. A key component of that project is the proposed Botany Transport Interchange. To achieve the full benefits of an integrated network the interchange has been designed to accommodate BRT services in the future. This will enable passengers to easily transition between Airport to Botany and Eastern Busway services.

7.5.2 Notices of Requirement

NoR 1 interfaces with NoR 2, which in turn interfaces with NoR 3 then NoRs 4a and 4b. To achieve the full benefits of the Project, all its elements are required to be operational.

7.6 Recommended measures to avoid, remedy or mitigate operational effects

Overall, the Project provides positive benefits and in terms of measures to mitigate operational effects, the reformation / regrading of driveways along Te Irirangi Drive that are affected by the Project corridor are recommended to facilitate safe access for these existing properties.

7.7 Summary of operational transport effects

The assessment of transport effects for the Project is summarised in Table 31.

Table 31: Assessment of operational effects summary for NoR 1

Operational Transport Effects	
Safety	• Improved walking and cycling facilities along Te Irirangi Drive (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved walking and cycling crossing facilities (crossing Te Irirangi Drive), resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.
Public Transport	• Significantly better quality, frequency, and reliability of PT services (BRT services);

[20] Auckland Transport Freight Plan

Operational Transport Effects	
	• 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.
Walking and Cycling	• Reduced the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along corridors along Te Irirangi Drive; • Improve integration with the future walking and cycling network, resulting in improved north-south walking, and cycling connectivity; • Lead to environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; and • Support growth surrounding Te Irirangi Drive and improve safety and access to employment and social amenities.
General Traffic	• Minimal operational impacts along the corridor and intersection capacity because of the Project corridor; • The provision of this Project supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and reduced VKT via private vehicle; and • Improved driver safety with the removal of all give-way controlled slip lanes at the intersections along the NoR 1 corridor. Fully signalised intersections will control vehicle and pedestrian movements, further reducing potential conflict with pedestrians and cyclists.
Access and Parking	• Minimal operational impacts on existing access provisions and on-street / off-street parking along Te Irirangi Drive; and • All existing access points are to be maintained (excluding for sites fully designated) with minor reforming and regrading proposed.
Freight	Te Irirangi Drive will continue to support the overall freight connections in this area. The Project will also result in improved journey times and reliability for existing and future freight.

8 NoR 2: Manukau section

8.1 Project corridor features

8.1.1 Project overview

The Manukau Section extends for approximately 6.5 km between the Puhinui Station to the west and Rongomai Park to the northeast and consists of a number of arterial and local roads, including the following:

- Puhinui Road;
- Lambie Drive;
- Manukau Station Road;
- Davies Avenue;
- Ronwood Avenue;
- Great South Road; and
- Te Irirangi Drive

NoR 2 runs through an existing urban residential environment at each end, with the middle section being a mix of town centre (Manukau City Centre) and commercial environments.

The Project will provide a new east-west Bus Rapid Transit connection that improves public transport access within Manukau and ultimately connects to other important regional destinations such as Botany town centre and Auckland Airport. It is proposed to either utilise the existing central median width and / or widen the existing road reserve to include a central BRT corridor. The project also provides improved walking and cycling facilities along its length on both sides of the road. Intersections (listed in Table 32 below) will be upgraded to accommodate the rapid transit corridor.

Within NoR 2, rapid transit stations will be provided at Dawson Road, Diorella Drive, Ronwood Avenue, Manukau Station, and Lambie Drive. The BRT station locations are shown in Figure 49 below.

Intersections within NoR 2 that are currently priority controlled or roundabouts will be upgraded to signalised intersections to assist the operation of the BRT corridor.

An overview of the proposed design is provided in Figure 49 below.

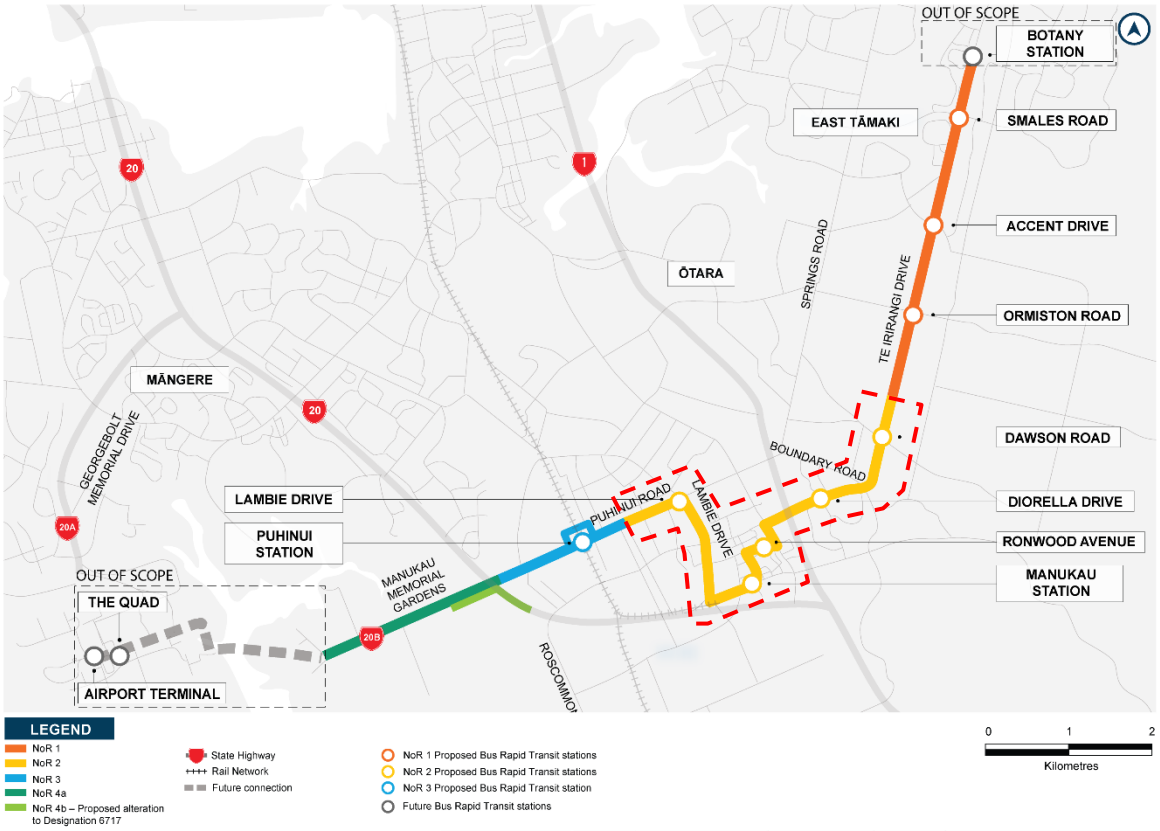


Figure 49: Overview of the Manukau section (NoR 2)

Table 32 below summarises the proposed changes and effects of the Project for the NoR 2 section.

Table 32: NoR 2 proposed changes and effects summary

What is changing?	Discussion
New BRT	• Significantly better quality, frequency, and reliability of PT services.; • Better connections to local PT services; • Better access to the wider network; and • Better access for pedestrians, cyclists, and mobility impaired passengers.
Cycle facilities	• Dedicated on-road painted cycle paths (not separated) are provided on some sections of NoR 1 (including Te Irirangi Drive, Great South Road, Lambie Drive and Manukau Station Road); • The Project proposes a dedicated and separated cycle path on both sides of all roads within this section, therefore improving connectivity and safety; and • Better connection to BRT stations and overall safer cycling in an urban centre.
Pedestrian facilities	• Existing pedestrian footpaths provided on both sides of the road; • Increased pedestrian crossing opportunities / facilities along the route (dedicated signalised crosswalks), therefore improving pedestrian safety; • Better priority at signalised intersections; and • Better connectivity to BRT / PT stations.
On-street parking	• Intermittent on-street parking currently provided along the roads within the Manukau Section. The Project affects a total of 117 on-street parking spaces; and

What is changing?	Discussion
On-site parking	• A total of 295 on-site parking spaces are affected across 14 commercial sites adjacent to the Project corridor.
Property access	• Due to the Project corridor, some properties with existing all-movements access will be restricted to left turn in and left turn out access (i.e. right turn ban); • These properties would be required to use alternative routes for access. The adjacent road network within the surrounding area is relatively granular and therefore these alternative routes are achievable. The increase in expected travel distance is no more than 2.5 km. Also, some properties have existing alternative access points; and • Note that in the instance that buildings are within the designation boundary, the full lot will be designated, therefore there will be no residual impacts on access
Intersection operation	• The 'With Project' results indicate that the Project corridor generally does not significantly worsen the intersection performance, with regards to LOS, average delay and queue length; and • A number of intersections perform near or at capacity in 2038 for the 'No Project' scenario.

8.2 Network and corridor design

The Project was developed as part of transport network planning for the wider area. The wider network was developed through the business case process that considered the key problems, benefits, outcomes, and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the form and function of the various local roads within the Manukau section will change to include a central rapid transit corridor (two-way) and five rapid transit stations. Separated walking and cycling facilities will be provided on both sides of the corridor.

The proposed cross-section varies along the corridor, based on the existing road reserve width, number of lanes and surrounding land use activities. The typical cross section is shown in Figure 50.

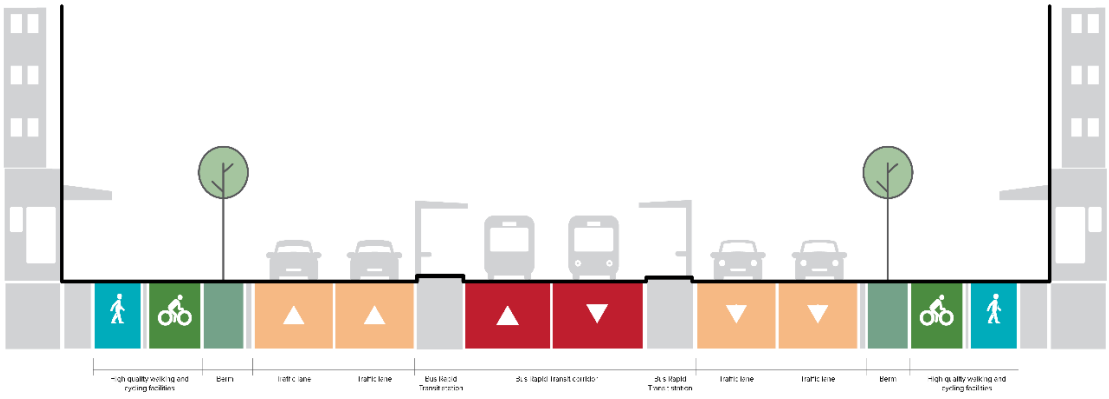


Figure 50: NoR 2 Typical cross section

8.3 Existing and likely future environment

8.3.1 Planning context

The proposed Project within the Manukau (NoR 2) section traverses land zoned for a range of activities under the AUP:OP. Table 33 below summarises the existing land use immediately adjacent to the rapid transit route.

Table 33: Manukau section – existing surrounding land use

Section of route	Land use zone description
Puhinui Road between Kenderdine Drive and Lambie Drive	Predominantly Residential – Mixed Housing Suburban Zoned land to the north of Puhinui Road, with a mixture of Residential – Single House Zoning and Business – Light Industry Zoning on the southern side of the route.
Lambie Drive, Manukau Station Road, Davies Avenue Ronwood Avenue and Great South Road	This section runs through Manukau City Centre and is generally surrounded by land zoned as Business – Light Industry Zone, Business – General Business Zone and Business – Metropolitan Centre Zone.
Te Irirangi Drive	Residential – Mixed Housing Urban zoned land is located on either side of Te Irirangi Drive, with Residential – Mixed Housing Suburban Zoning provided on the southern side of this route segment.

Table 34 below provides a summary of the Manukau section existing and likely future environment

Table 34: Manukau section upgrade existing and likely future environment

Environment today	Zoning	Likelihood of Change for the environment[21]	Likely Future Environment[22]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (General Business)	Low	Business (General Business)
	Business (Metropolitan Centre)	Low	Business (Metropolitan Centre)
Residential	Residential	Low	Residential

Please refer to the AEE for further information on the planning context.

[21] Based on AUP:OP zoning/policy direction
[22] Based on AUP:OP zoning/policy direction

8.3.2 Transport environment

8.3.2.1 Existing

The existing NoR 2 Manukau section is predominantly surrounded by commercial and residential activity and runs through Manukau City Centre. The route generally comprises of one or two vehicle lanes in each direction. An existing central solid median or existing flush median is present on most parts of the corridor. A number of intersections, including priority T-intersections and roundabouts and large-scale signalised intersections are located along the route. The extent of the route is shown in Figure 51.

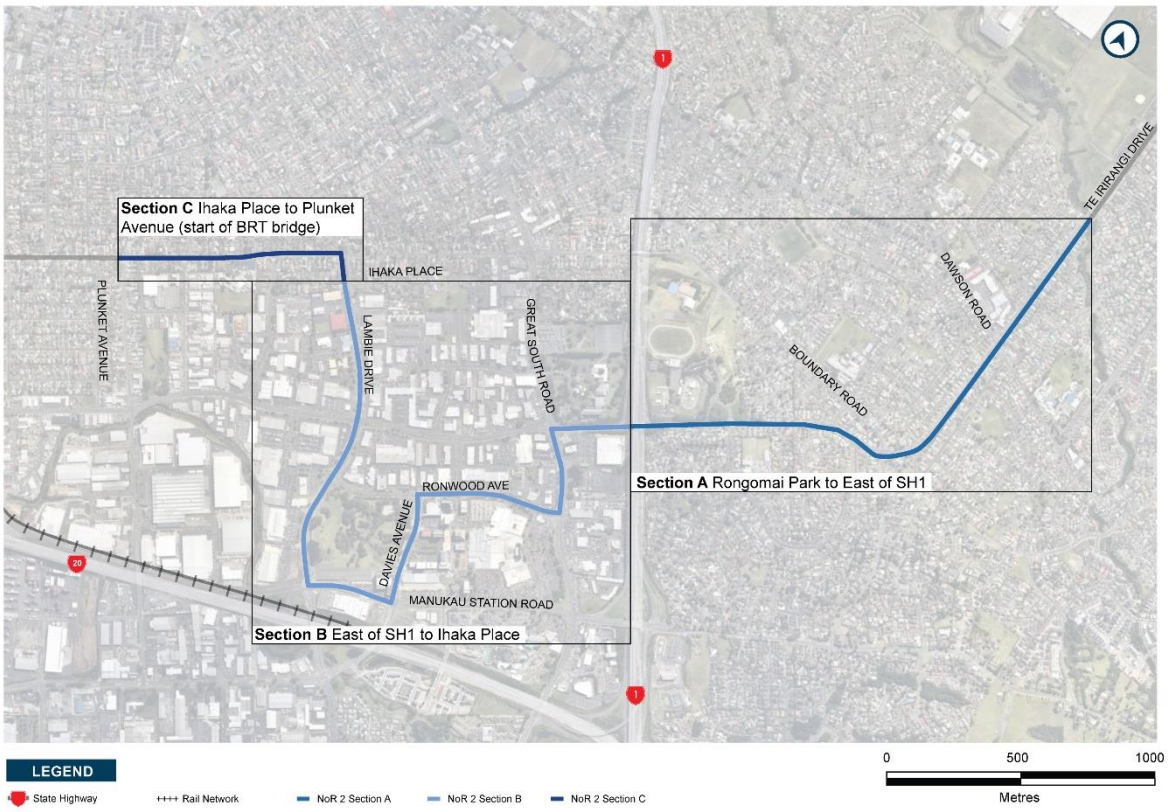


Figure 51: Aerial of existing Manukau section corridor

Table 35 summarises the existing transport features of the Manukau section corridor.

Table 35: Manukau section route: existing transport features

Existing Manukau section route: transport features			
	Section A Puhinui Road between Puhinui Train Station and Lambie Drive	Section B Lambie Drive, Manukau Station Road, Davies Avenue, Ronwood Avenue and Great South Road	Section C Te Irirangi Drive
Corridor Characteristics	• Has a 50 km/h speed limit;	• Has a 50-60 km/h speed limit;	• Has a 60 km/h speed limit;

Existing Manukau section route: transport features			
	• Urban character with two vehicle lanes (one in each direction), with additional bus lanes in each direction; • Pedestrian footpaths provided on both sides of the road, with pedestrian crossing facilities along the route; • No on-road cycle lanes provided on either side of the road; and • Intermittent on-street parking permitted.	• Urban character with one or two vehicle lanes in each direction; • **Lambie Drive, Manukau Station Road** and **Ronwood Avenue** have a wide central solid median; • **Davies Avenue** currently provides mainly access function for the adjacent activities; • Pedestrian footpaths provided on both sides of the road, with pedestrian crossing facilities along the route; • Dedicated cycle paths provided on **Great South Road, Lambie Drive** and **Manukau Station Road**; and • Intermittent on-street parking permitted.	• Urban character one or two vehicle lanes in each direction generally separated by a central solid median; • Operates as a connecting through route as well as providing residential access; • Pedestrian footpaths provided on both sides of the road, with pedestrian crossing facilities along the route; • Dedicated on-road cycle lanes provided on both sides of the road; and • Intermittent on-street parking permitted.
Traffic Volume	The latest traffic data for was obtained from Auckland Transport[23]. The data was recorded in 2020 and shows **Puhinui Road** (between SH20 and Lambie Drive) generally carried a 5 Day Average Daily Traffic of approximately **15,000-18,000 vehicles per day (vpd),** and 1,400-1,600 vehicles per hour (vph) during the morning and afternoon peak hours.	The latest traffic data for was obtained from Auckland Transport[24]. • **Lambie Drive** (2020): 5-day AADT of **22,000-26,000 vpd** and 1,700-2,100 vph during the morning and afternoon peak hours; • **Manukau Station Road** (2021): 5-day AADT of **16,600 vpd** and 1,200-1,300 vph during the morning and afternoon peak hours; • **Davies Avenue** (2021): 5-day AADT of **5000 vp**d and 400-500 vph during the morning and afternoon peak hours; • **Ronwood Avenue** (2021): 5-day AADT of **13,000-15,000 vpd** and 1,000-	The latest traffic data for was obtained from Auckland Transport[25]. The data was recorded in September 2021 and shows **Te Irirangi Drive** (between Great South Road and Dawson Road) carried a 5-day AADT of approximately **29,000 vpd**, and 2,300-2,500 vph during the morning and afternoon peak hours.

[23] Auckland Transport Traffic Counts, July 2012 to May 2021, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[24] Auckland Transport Traffic Counts, July 2012 to May 2021, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[25] Auckland Transport Traffic Counts, July 2012 to May 2021, https://at.govt.nz/about-us/reports-publications/traffic-counts/

Existing Manukau section route: transport features			
		1,300 vph during the morning and afternoon peak hours; and • **Great South Road** (2020): 5-day AADT of **30,000 vpd** and 1,700-2,100 vph during the morning and afternoon peak hours.	
Road Network / General Traffic intersections	• Puhinui Road / Wylie Road signals; • Puhinui Road / Noel Burnside Road priority controlled; • Puhinui Road / Milan Road priority controlled; • Puhinui Road / Raymond Road priority controlled; • Kenderdine Road / Milan Road priority controlled; • Kenderdine Road / Bridge Street priority controlled; • Bridge Street / Cambridge Terrace priority controlled; • Puhinui Road / Clendon Avenue priority controlled; • Puhinui Road / Wallace Road priority controlled; • Puhinui Road / Ranfurly Avenue priority controlled; • Puhinui Road / Plunket Avenue priority controlled; • Puhinui Road / Grayson Avenue priority controlled; • Puhinui Road / York Road priority controlled; • Puhinui Road / Norman Spencer Drive priority controlled; and • Puhinui Road / Lambie Drive signals.	• Lambie Drive / Ihaka Place priority controlled; • Lambie Drive / Cavendish Drive signals; • Lambie Drive/ Ronwood Avenue roundabout; • Lambie Drive / Manukau Station Road signals; • Manukau Station Road / Davies Avenue signals; • Davies Avenue / Putney Way priority controlled; • Davies Avenue / Amersham Way priority controlled; • Davies Avenue / Ronwood Avenue priority controlled; • Ronwood Avenue / Sharkey Street / Osterley Way roundabout; • Ronwood Avenue / Leyton Way priority controlled; • Ronwood Avenue / Great South Road signals; and • Great South Road / Cavendish Drive / Te Irirangi Drive signals.	• Te Irirangi Drive SH1 on-ramp and off-ramp signals; • Te Irirangi Drive / Diorella Drive signals; • Te Irirangi Drive / Sandrine Avenue priority controlled; • Te Irirangi Drive / Shalimar Place priority controlled; • Te Irirangi Drive / Leila Place priority controlled; • Te Irirangi Drive / Othello Drive priority controlled; • Te Irirangi Drive / Charntay Avenue priority controlled; • Te Irirangi Drive / Hollyford Drive signals; and • Te Irirangi Drive / Dawson Road signals.
Walking and Cycling	Pedestrian footpaths and on-road cycle lanes are	Pedestrian footpaths provided on both sides of all roads, with on-road cycle lanes provided	Pedestrian footpaths and on-road cycle lanes are

Existing Manukau section route: transport features			
	provided on both sides of Puhinui Road.	on Lambie Drive and Manukau Station Road.	provided on both sides of Te Irirangi Drive.
Public Transport	• The Airport Link (frequent service[26]) currently operates on Puhinui Road and connects Manukau and the Airport via Puhinui; and • The Puhinui Train Station is accessed off Puhinui Road. It provides access to the wider PT network via the Southern Line, connecting Pukekohe and Britomart via Papakura, Manurewa, Papatoetoe, Ellerslie, and Newmarket.	• The Airport Link and Route 36 (frequent service) runs along Lambie Drive; • Route 36 connects Manukau and Onehunga Transport Centre via Papatoetoe and Mangere Town Centre; • Route 33 (frequent service), 361 (connector service[27]), 352 (peak service[28]) and 353 (connector service) runs through Manukau Station Road, Davies Avenue and Ronwood Avenue; • Route 33 connects Papakura and Otahuhu Station, Route 361 connects Manurewa and MIT North Campus, Route 352 connects Panmure and Manukau and Route 353 connects Manukau and Botany Town Centre; and • The Manukau Train Station is accessed from Manukau Station Road. It provides access to the wider PT network via the Eastern Line, connecting Manukau and Britomart via Papatoetoe, Sylvia Park, Glen Innes and Orakei and Southern Line.	• Existing public transport provisions on Te Irirangi Drive is relatively limited, with Route 325 (connector service) running through a short section of this route; and • Route 325 connects Mangere Town Centre and Manukau via Ōtāhuhu Town Centre.

8.3.2.2 Likely future

The surrounding land is currently live zoned, therefore there is no significant anticipated change in land use or corridor characteristics.

The Project proposes a high frequency, high quality, two-way BRT system and five rapid transit stations within NoR 2. The stations are located at Dawson Road, Diorella Drive, Ronwood Avenue,

[26] This service operates at least every 15 minutes, 7am – 7pm, 7 days a week. Lower frequencies early morning and evenings
[27] This service operates at least every 30 minutes, 7am – 7pm, 7 days a week. Lower frequencies early morning and evenings
[28] This service operates weekdays only, during morning and afternoon peak

Manukau Station, and Lambie Drive. Provision of improved transport access via stations presents an opportunity to allow for intensified development and growth. The NPS:UD is applicable to the Project and is expected to further enable intensification around stations. Among other things, the NPS:UD requires Auckland Council to enable "building heights of at least six storeys within at least a walkable catchment of existing and planned rapid transit stops." In this regard, policy and zoning changes along the corridor are anticipated, with future residential development within the vicinity of the rapid transit stations likely to be of multi-storey developments to better support transit-oriented development.

Furthermore, since August 2022 Auckland is subject to the MDRS, which allows landowners to develop up to three homes of up to three stories on most sites without the need for a resource consent. These changes enable a wider variety of housing choices and supports greater housing density within Auckland, including future residential developments along the Project corridor.

8.4 Assessment of operational transport effects

This section addresses operational transport effects specific to NoR 2 only. Section 5.5 describes broader effects of the Project on the overall transport network.

8.4.1 Public transport

The Project will provide a central BRT corridor (two-way) down the centre of a number of roads within NoR 2 and will provide a key public transport connection into and out of Manukau City Centre and associated employment areas, retail centres and community facilities.

Five BRT stations are provided along the NoR 2 section and are located within proximity to key land uses such as commercial, retail, recreational and community centres within Manukau City Centre as well as residential neighbourhoods. These include:

- Lambie Drive Station – provides access to nearby retail and commercial activities;
- Manukau Station – provides access to MIT, Manukau District Court, and Counties Manukau Police Station. Within proximity to Hayman Park and Rainbows End;
- Ronwood Avenue Station – provides access to nearby retail and commercial activities including Westfield Shopping Centre;
- Diorella Drive Station – provides access to the Manukau Sports Bowl, Redoubt North School, and connections to nearby residential properties;
- Dawson Road Station – provides a PT connection to residential properties within the walking and cycling catchment around the station; and
- There is a strong link with the southern growth areas of Auckland. Approximately half of all people on the BRT as it enters Manukau from the west have come from Papakura or further south.

Manukau Station is an existing train station, and thus provides a strong link between the rapid transit network and the wider Auckland area via rail and bus services. Project customers will be able to interchange with 16 bus routes at the Manukau Bus Station and the Eastern Rail Line train service at the Manukau Train Station.

8.4.2 Walking and cycling

The Project proposes separated walking and cycling facilities on both sides of all corridors within NoR 2, with improved pedestrian and cyclist crossing facilities at intersections and midblock sections along

the route. Furthermore, the existing overbridge on Te Irirangi Drive located adjacent to Rongomai Park will be converted to an at-grade signalised crosswalk.

The proposed walking and cycling facilities have been designed in accordance with relevant Auckland Transport standards and policies as summarised in Table 36.

Table 36: Auckland Transport standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[29]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that proposed designs should feature separated cycling facilities for arterial corridors in excess of 30 km/h. The traffic speeds on NoR 2 corridors are proposed to be 50 km/h, therefore the proposed design of the walking and cycling facilities is appropriate for these standards.
Auckland Transport Transport Design Manual[30]	Footpaths: 1.8 m minimum	A 1.8 m footpath is proposed on all corridors and a 2.0 m cycle path. The berm width varies along this section. This is in accordance with the Auckland Transport TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have positive effects on walking and cycling as it will:

- Reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across arterial corridors within NoR 2;
- Improve integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity;
- Lead to significant environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips;
- Serve as a key enabler for greater use of rapid transport and active transport modes; and
- Support growth surrounding the NoR 2 corridors and improve safety and access to employment and social amenities.

8.4.2.1 Station access

NoR 2 has five BRT station locations: Lambie Drive Station, Manukau Station, Ronwood Avenue Station, Diorella Drive Station, and Dawson Road.

There are many important destinations within the walking catchment of these stations, including major retail destinations (Westfield Manukau City shopping mall), education facilities (Auckland University of Technology, South Campus, Manukau Institute of Technology) and civic facilities (Auckland Council facilities, Counties Manukau Police Station, Manukau District Court). Therefore, these stations, particularly Manukau Station, are anticipated to be frequently used.

[29] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[30] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

The station locations, the 1 km walking catchment and 3 km cycling catchment are shown in Figure 52.

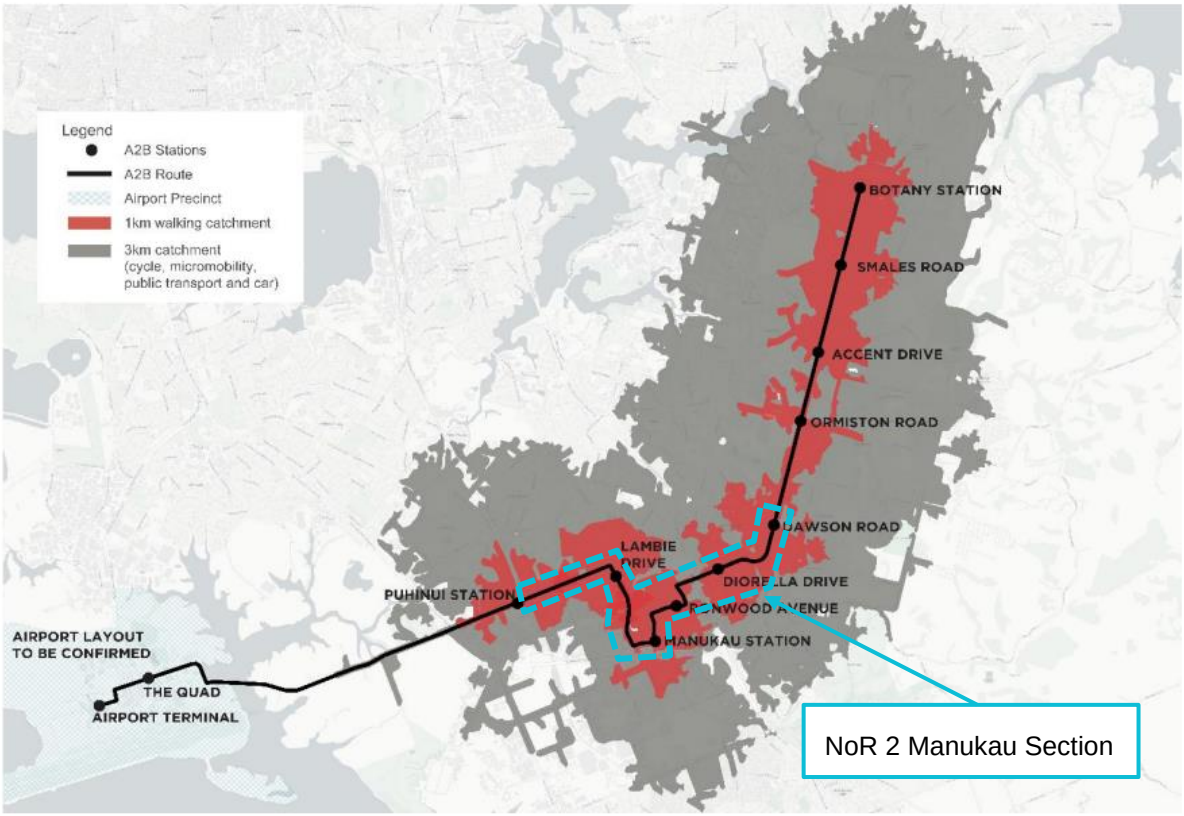


Figure 52: Manukau Section - 1 km walking and 3 km cycling catchment

The walking and cycling access to stations has been assessed and is summarised in Table 37.

Table 37: NoR 2 Manukau Section – walking and cycle station access

Station	Walking and cycling catchment description	Comment / Mitigation
Lambie Drive	• Lambie Drive Station is located to the north of the Manukau Metropolitan Centre and to the southeast of Papatoetoe Town Centre. The land use zoning to the north of Puhinui Road is mostly residential and to the south is mostly industrial zoning. • The street pattern around Lambie Drive Station offers varying levels of connectivity for station access by walking and cycling. North of Puhinui Road, the street network offers a moderate level of connectivity; there are long blocks but there are also existing pedestrian crossings (of varying quality). • Lack of connectivity is amplified by the number of high traffic volume, over-dimensioned carriageways that surround the station, with limited crossing opportunities. Busy roads, including State Highway 1, Cavendish Drive and	• The Project proposes separate walking and cycling connections along Lambie Drive and Puhinui Road. • The Lambie Drive Station is located at the Lambie Drive / Puhinui Road / Carruth Road intersection. A separate pedestrian and cyclist crosswalk is provided on all four approaches, thus ensuring that active mode users can safely access the station. • In addition, the existing signalised crosswalk to the west of the station on Puhinui Road is proposed to be improved to provide a separate pedestrian and cycling signalised crosswalk. • Side streets such as Carruth Road, Norman Spencer Drive, Allenby Road and Fitzroy Street provide a separate public footpath on both sides, therefore facilitating

Station	Walking and cycling catchment description	Comment / Mitigation
	Great South Road create a severance barrier for walking and cycling movements to and from the station. • The existing cycle network for access to this location is limited to painted on-road cycle lanes on Puhinui Road and Cavendish Drive, and a shared path on Great South Road.	pedestrian movement to and from the station.
Manukau Station	• Manukau Station is located on Davies Avenue, adjacent to the existing Manukau rail and bus stations surrounded by a mix of business, industrial and residential zoning. • The street pattern around Manukau Station offers varying levels of connectivity for station access by walking and cycling. To the north and east, a 'super-block' grid structure and connecting lower order streets in some areas offer a moderate level of connectivity, although the limited number of bridges over the Southern Motorway (SH1) reduce connectivity. • Busy arterial roads, including Te Irirangi Drive/Cavendish Drive, Manukau Station Road, Lambie Drive and Great South Road, in combination with large format industrial and retail activities foster traffic conditions that are unsafe and unpleasant for active modes travellers, and have a lack of amenity and human scale that will further discourage station access by active modes. • The existing cycle network for station access is limited to painted on-road cycle lanes and shared paths along arterial roads around the station, including Te Irirangi Drive/Cavendish Drive and Great South Road.	• The Project proposes separate walking and cycling connections along Manukau Station Road, Lambie Drive and Davies Avenue. • Manukau Station is located on Davies Avenue between Ronwood Avenue and Manukau Station Road. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the intersections of Ronwood Avenue / Davies Avenue and Manukau Station Road / Davies Avenue, thus ensuring that active mode users can safely access the station. • Furthermore, an existing pedestrian crossing on Davies Avenue (near Amersham Way) will be converted to a signalised crossing as part of the Project, providing a safer facility for vulnerable users. • The estimated boardings and alighting at the Manukau Station are relatively high, therefore secure cyclist facilities should be provided to enable cyclists to utilise the BRT service. Given the nearby Hayman Park, it is recommended that secure cycle park facilities are provided at entrance to Hayman Park adjacent to Davies Avenue to benefit both park visitors and Project users.
Ronwood Avenue	• Ronwood Station is surrounded by a mix of business, industrial and residential zoning. The predominant Unitary Plan land use zones within a 1 km radius of the station are Business - Metropolitan Centre, and Business - Light Industry. • The street pattern around Ronwood Avenue Station offers varying levels of connectivity for station access by walking and cycling. Within the centre, a 'super-block' grid structure and connecting lower order streets in some areas offer a moderate level of connectivity, although the limited number of bridges over the SH1 reduce connectivity.	• The Project proposes separate walking and cycling connections along Ronwood Avenue, Davies Avenue and Great South Road. • The Ronwood Avenue Station is located between Sharkey Street and Great South Road. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the intersections on Ronwood Avenue with Davies Avenue, Sharkey Street and Great South Road, thus ensuring that active mode users can safely access the station. • Furthermore, two signalised separate pedestrian and cyclist crosswalks are

Station	Walking and cycling catchment description	Comment / Mitigation
	• Busy arterial roads, including Te Irirangi Drive/Cavendish Drive and Great South Road, in combination with large format industrial and retail activities, foster unsafe and unpleasant traffic conditions, and a lack of amenity and human-scale design, that will discourage station access by active modes. • The existing cycle network is limited to painted on-road cycle lanes on arterial roads around the station, including Te Irirangi Drive/Cavendish Drive and Great South Road.	provided on Ronwood Avenue (one at the station and one in front of Westfield Shopping Centre), improving active mode connectivity between the station and the nearby commercial / retail centres. • The nearby side streets such as Sharkey Street, Osterley Way, Leyton Way, and the western end of Ronwood Avenue all provide a separate pedestrian footpath on both sides, thus enabling safe pedestrian connectivity to the station.
Diorella Drive	• Diorella Drive Station is located beyond Manukau Metropolitan Centre, opposite the Manukau Sports Bowl and near the AUT South Campus. The predominant Unitary Plan land use zones within a 1 km radius of the station are residential land uses. • The street pattern around Diorella Drive Station offers varying levels of connectivity for station access by walking and cycling. To the north and east, the lack of a fine-grained street network, prevalence of curvilinear streets and cul-de-sacs reduce connectivity. • The limited crossing opportunities of the Southern Motorway (SH1) and the proximity of Ronwood Avenue Station to the west will limit the demand of Diorella Drive Station from the west. The exception to this is likely to be students and staff from AUT South campus travelling between the campus and east Auckland, for whom it will likely be most convenient to walk to Diorella Drive Station (assuming it feels safe to make this trip on foot). • The existing cycle network for station access is limited to painted on-road cycle lanes on Te Irirangi Drive and other multi-lane arterials to the west of SH1.	• The Project proposes separate walking and cycling connections along Te Irirangi Drive and Great South Road. • The Diorella Drive Station is located on Te Irirangi Drive at the intersection with Diorella Drive. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the Te Irirangi Drive / Diorella Drive intersection, thus ensuring that active mode users can safely access the station. • The nearby side streets such as Diorella Drive and the Manukau Sports Bowl access provide a separate pedestrian footpath on both sides, thus enabling safe pedestrian connectivity to the station.
Dawson Road	• Dawson Road Station is surrounded by predominantly residential zoning. The main Unitary Plan land use zones within a 1 km radius of the station are residential land uses. • The street network surrounding Dawson Station offers high levels of pedestrian connectivity relative to other stations. A moderately well-connected street pattern is enhanced by pedestrian shortcuts and links through public open spaces. • Te Irirangi Drive bisects the catchment and forms a severance barrier due to the high volumes and speeds of vehicles using the road. Existing	• The Project proposes separate walking and cycling connections along Te Irirangi Drive. • The Dawson Road Station is located on Te Irirangi Drive at the intersection with Dawson Road. A separate pedestrian and cyclist crosswalk is provided on all four approaches at the Te Irirangi Drive / Dawson Road intersection, thus ensuring that active mode users can safely access the station. • The nearby side streets such as Dawson Road provide a separate pedestrian

Station	Walking and cycling catchment description	Comment / Mitigation
	walking infrastructure along Te Irirangi Drive is not appropriate for the conditions, being adjacent to the busy road. Formal crossing points aside from at the Dawson Road intersection are limited to signalised intersections and an overbridge 600 m either side of the station. • The existing cycle network for station access is limited to painted on-road cycle lanes on Te Irirangi Drive south of the Dawson Road intersection (and none to the north). No cycle network development is planned for the immediate area.	footpath on both sides, thus enabling safe pedestrian connectivity to the station. •

8.4.3 General traffic

The forecasted 2038 AADT and peak hour volumes for the NoR 2 corridors are summarised below.

Table 38: NoR 2 forecasted 2038 AADT and peak hour volumes

Corridors	2038 AADT (two-way)	2038 maximum peak hour volumes (two-way)
Te Irirangi Drive (near Dawson Road)	15,200 vpd	2,548 vph
Te Irirangi Drive (near Hollyford Drive)	19,800 vpd	3,083 vph
Te Irirangi Drive (near Diorella Drive)	23,200 vpd	3,321 vph
Great South Road	20,600 vpd	2,263 vph
Ronwood Avenue	11,000 vpd	1,197 vph
Davies Avenue	23,200 vpd	2,851 vph
Manukau Station Road	16,000 vpd	2,054 vph
Lambie Drive (near Cavendish Drive)	16,500 vpd	1,360 vph
Lambie Drive (near Puhinui Road)	15,700 vpd	1,321 vph
Puhinui Road (near Plunket Avenue)	18,600 vpd	2,312 vph

The proposed typical corridor cross section design (generally two general traffic lanes in each direction) is considered to meet the forecasted needs and is suitable to achieve the desired outcomes on the corridor.

The performance of the wider network and of individual intersections within NoR 2 is described in Section 5.9 above.

8.4.4 Access and parking

8.4.4.1 Access

The NoR 2 section comprises of Puhinui Road and Te Irirangi Drive which predominantly serve as a residential access function, while Lambie Drive, Ronwood Avenue, Manukau Station Road, Davies Avenue and Great South Road are located within Manukau City Centre and generally provide access to commercial / retail activities, education, and civic facilities.

The Project widens the transport designation to provide a centre running BRT corridor along the above-mentioned roads. The extent of the widening and the central BRT corridor results in varying impacts on property access across the different roads within the NoR 2 section.

In terms of existing property access, the overarching design philosophy for the Project has been to maintain driveway access, where practicable, and minimise impacting land other than where necessary.

The property access effects for each road, specifically with relation to restricting movements, are summarised below.

- The Project corridor will affect the layout of vehicle crossings within the road reserve (and in some instances within private lots). As such, most driveways will need to be reformed to tie in adequately with the fronting road;
- All properties currently gain all-movements access onto Puhinui Road. Due to the central BRT corridor, these properties will be restricted to left turn in / out movement (i.e. right turns will be prohibited). Alternative routes are available for users who need to turn right out or right into their properties;
- Lambie Drive, Ronwood Avenue, Manukau Station Road, and Great South Road currently provide a central solid median, therefore already ban right turn in and out movement for most properties. However, gaps in the median are intermittently provided to enable all-movement access to some properties, especially retail centres. The Project corridor prohibits all right turn access to these properties;
- The alternative routes identified add less than 2.5 km of travel distance (maximum some 3-4 minutes), which is considered acceptable from a traffic perspective;
- For rear sites with the front lot designated, driveways will be constructed to enable access to the rear lot; and
- Where buildings are located within the proposed designation, these lots will be fully designated, eliminating any property access impact.

Refer to Section 5.10.2 of the Report for the detailed alternative routes assessment for affected properties.

8.4.4.2 Parking

The Project corridor cross section and proposed designation affects existing on-street and off-street parking spaces within NoR 2. The indicative number and location of the existing on-street and off-street parking spaces affected are summarised in Table 39 and Table 40.

Table 39: Summary of affected on-street parking spaces

NoR	Road	Length / Number	Total On-street Parks Affected
NoR 2	Te Irirangi Drive	No existing on-street parking spaces	117
	Great South Road	No existing on-street parking spaces	
	Ronwood Avenue	170 m of on-street parking space (approx. 28 spaces typically supporting commercial / retail activity	
	Davies Avenue	19 on-street spaces (supporting Hayman Park)	
	Manukau Station Road	12 on-street spaces (pick up and drop off spaces for MIT)	
	Lambie Road	No existing on-street parking spaces	
	Puhinui Road	350 m of on-street parking space (approx. 58 spaces typically supporting residential activity)	

Table 40: Summary of affected off-street parking spaces

NoR	Address	Activity	Off-street parking spaces affected
NoR 2	5 Te Irirangi Drive	Commercial	61
	136 Dawson Road	Retail	1
	676 Great South Road	Retail	23
	654 Great South Road	Commercial	7
	652 Great South Road	Commercial	9
	621 Great South Road	Commercial	9
	639 Great South Road	Retail	34
	635 Great South Road	Commercial	23
	627 Great South Road	Commercial	9
	1 Bakerfield Place	Retail	6
	21 Ronwood Avenue	Services	16
	67 Cavendish Drive	Offices	36
	28/72 Cavendish Drive	Offices	52
	1/32 Lambie Drive	Services	9
	TOTAL		295

The BRT network proposed by the Project will provide a high quality, attractive alternative to car use and supports mode shift away from private vehicle use.

The Project affects 117 on-street public parking spaces within NoR 2 and approximately 295 on-site parking spaces across 14 individual properties, typically along site frontages. The increased use of public transport is likely to lead to less demand for on-site parking for commercial / retail properties, particularly where alternative facilities such as paid car park buildings are available within proximity if necessary. It is noted that the NPS:UD removes all minimum on-site parking requirements from the

Unitary Plan and as such the Project does not infringe any relevant standards. Where land within the proposed designation is only required temporarily for construction purposes, there is potential for it to be returned to landowners, therefore some off-street parking spaces may potentially be reinstated once the works are complete.

The removal of on-street parking is a consequence of intensification anticipated, and encouraged, by Auckland Transport's policy direction regarding on-street parking on arterial roads. In this regard, the removal of on-street parking along the Project corridor is in accordance with the draft Auckland Parking Strategy[31].

8.4.5 Freight

Three sections of the NoR 2 route are currently classified under the Auckland Transport Freight Plan, these are:

- **Te Irirangi Drive** (between Great South Road and SH1) is currently classified as Level 2, which is described as local freight networks within strategic freight areas where there are no competing land use demands i.e. the land adjacent to these roads are primarily used for industrial/commercial purposes and free from sensitive community or other residential impacts. Planning and design should consider the efficiency of freight movements.
- **Lambie Drive** (between Cavendish Drive and Manukau Station Road) and **Great South Road** (between Cavendish Drive and Manukau Station Road) are currently classified as Level 3, which is described as supporting freight networks connecting to/between strategic freight areas where planning and design should consider the efficient movement of freight, noting that land uses adjacent to the road are such that the impacts of freight movement requires active management.
- **Te Irirangi Drive** (between SH1 and Dawson Road) is classified as Level 1B, which is described as roads of the highest strategic value to freight movement being Arterials where efficient freight movements must be actively supported to maintain Levels of Service, where competing modes and land uses require active management.

The corridors identified above will continue to serve their respective freight roles in the long term. Similar to general traffic, the improved corridor capacity because of the Project will result in improved journey times and reliability for existing and future freight. The corridor will be able to accommodate freight movements along the mid-block and through the intersections.

As such it is considered that the proposed Project footprint provides a flexible corridor width to enable resilient and reliable freight movements on a long-term basis.

8.5 Project interdependencies

8.5.1 Transform Manukau programme

Eke Panuku has a substantial programme of change planned for Manukau Central, by 2040. Relevant to NoR 2 are plans to redevelop Hayman Park, Manukau Plaza, Osterley Way, and Manukau Station Road, with enhanced urban spaces and improved walking and cycling connections. These proposals will complement the Project, making it easier for people to travel to and through Manukau Central.

[31] Draft Auckland Parking Strategy, April 2022

8.5.2 Notices of Requirement

NoR 2 interfaces with the NoR 1 and NoR 3, which in turn interfaces with the NoR 4a/4b. To achieve the full benefits of the Project, all its elements are required to be operational.

8.6 Recommended measures to avoid, remedy or mitigate operational effects

Overall, the project provides positive benefits and in terms of measures to mitigate operational effects, the reformation / regrading of driveways along the NoR 2 corridors that are affected by the Project corridor are recommended to facilitate safe access for these existing properties.

With reference to Section 5.9.1, the modelling indicates that Manukau Station Road (outside the corridor) will have a relatively substantial increase in AADT, with the increase in eastbound traffic flows noticeably greater than the increase in westbound traffic flows. This road is a major bus route that connects the Manukau Bus Station with eastern and southern Auckland (providing access for seven bus routes). Manukau Station Road currently provides an eastbound bus lane between Osterley Way and Leyton Way and in this regard, the delay experienced for eastbound buses will likely be minimal. The increase in westbound traffic flows is not as significant, and it is therefore not considered necessary to provide additional priority / dedicated facilities for buses for the anticipated change in flows.

Overall, there are considered to be no significant adverse effects / delay for buses travelling to and from Manukau Bus Station via Manukau Station Road and Great South Road. However, some of the opportunities to further enhance bus priority as part of separate projects are summarised below.

- Opportunities to reroute bus routes into and out of Manukau Bus Station;
- Signal priority for buses at the intersections of Osterley Way / Manukau Station Road and Manukau Station Road / Great South Road; and
- Provision of westbound bus lanes on Manukau Station Road.

It is further noted that that bus lanes on Great South Road are being actively investigated by Auckland Transport through Te Tupu Ngātahi.

As detailed in Section 5.10.2, it was identified that restricting right turns in and out of the Mitre 10 and Bunnings Warehouse (located at 55-61 Lambie Drive) and the Papatoetoe Fire Station (located at 15A Lambie Drive) sites as a result of the Project would create an unacceptable safety risk. As a mitigation measure for these two locations, signalised intersections allowing all-movements access have been incorporated into the corridor design and therefore provided as part of the Project.

8.7 Summary of operational transport effects

The assessment of transport effects for the Project is summarised in Table 41.

Table 41: Assessment of operational effects summary for NoR 2

Operational transport effects	
Safety	In summary, the effects of the Project on safety are: • Significantly improved walking and cycling facilities along corridors within NoR 2 (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users. • Improved walking and cycling crossing facilities, resulting in a safer environment for all road users. • Consequential reductions in the risk of Death or Serious Injuries (DSIs).
Public Transport	In summary, the effects of the Project on public transport are: • Significantly better quality, frequency, and reliability of PT services (BRT services) • Good integration with the future public transport network and significantly improved connectivity and improved access to employment and social amenities • Better and safer access provisions for pedestrians, cyclists, and mobility impaired passengers
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along corridors within NoR 2. • Improve integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity • Lead to environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips • Support growth within and surrounding Manukau Central and improve safety and access to employment and social amenities.
General Traffic	In summary, the effects of the Project on general transport are: • Minimal operational impacts along the corridor and intersection capacity because of the Project corridor • The provision of this supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and less VKT via private vehicle. • Improved driver safety with the removal of all give-way controlled slip lanes at the intersections along the NoR 2 corridor. Intersections will be upgraded to provide fully signalised vehicle and pedestrian movements, further reducing potential conflict with pedestrians and cyclists.
Access and Parking	In summary, the effects of the Project on access and parking are: • The overarching design philosophy for the Project has been to maintain driveway access, where practicable, and minimise impacting land other than where necessary. • All existing access points are to be maintained (excluding for sites fully designated) with minor reforming and regrading proposed. • Where right turn access is banned at certain properties because of the centre running BRT, access will be achieved via alternative routes. An assessment of alternative travel routes indicated that the additional travel distance is

Operational transport effects	
	generally less than 2.5 km for all affected properties, which translates to approximately 3-4 minutes of additional travel time (maximum). Overall, the alternative route travel distances are considered within acceptable range from a traffic perspective. • The Project removes a number of on-street and off-street parking spaces within NoR 2. However, the BRT provides a desirable alternative to car use and supports mode share. • The increased use of public transport is likely to lead to less demand for on-street and off-street parking within commercial / retail areas, with adequate parking facilities such as paid car park buildings available within proximity if necessary. Where land within the proposed designation is unused, there is potential for land to be returned to landowners, therefore a portion of off-street parking spaces may potentially be reinstated.
Freight	In summary, the effects of the Project on freight are: • Te Irirangi Drive, Lambie Road and Great South Road will continue to serve as its respective freight role in the long term. • The improved corridor capacity because of the Project (mode shift away from private travel to public transport) will result in improved journey times and reliability for existing and future freight. • The proposed Project footprint provides a flexible corridor width to enable resilient and reliable freight movements on a long-term basis.

9 NoR 3: Puhinui Road section

9.1 Project corridor features

9.1.1 Project overview

NoR 3 includes Puhinui Road (1.0 km) between the SH20/20B interchange and Puhinui Station. This section runs through a predominantly residential environment, with a small number of commercial and industrial activities accessed from Puhinui Road.

Puhinui Road within NoR 3 provides one general traffic lane in each direction, pedestrian footpaths on both sides of the road and a dedicated cycle path along the southern side. This road does not currently provide a central median; therefore, the Project proposes to widen the existing road reserve / designation largely to the southern side to include a central rapid transit corridor (two-way) and separate walking and cycling facilities on both sides. No BRT stations are provided within the NoR 3 section.

As the Project proposes to widen the existing road, a number of properties will be designated as part of the proposed works.

An overview of the proposed design is provided in Figure 53 below.

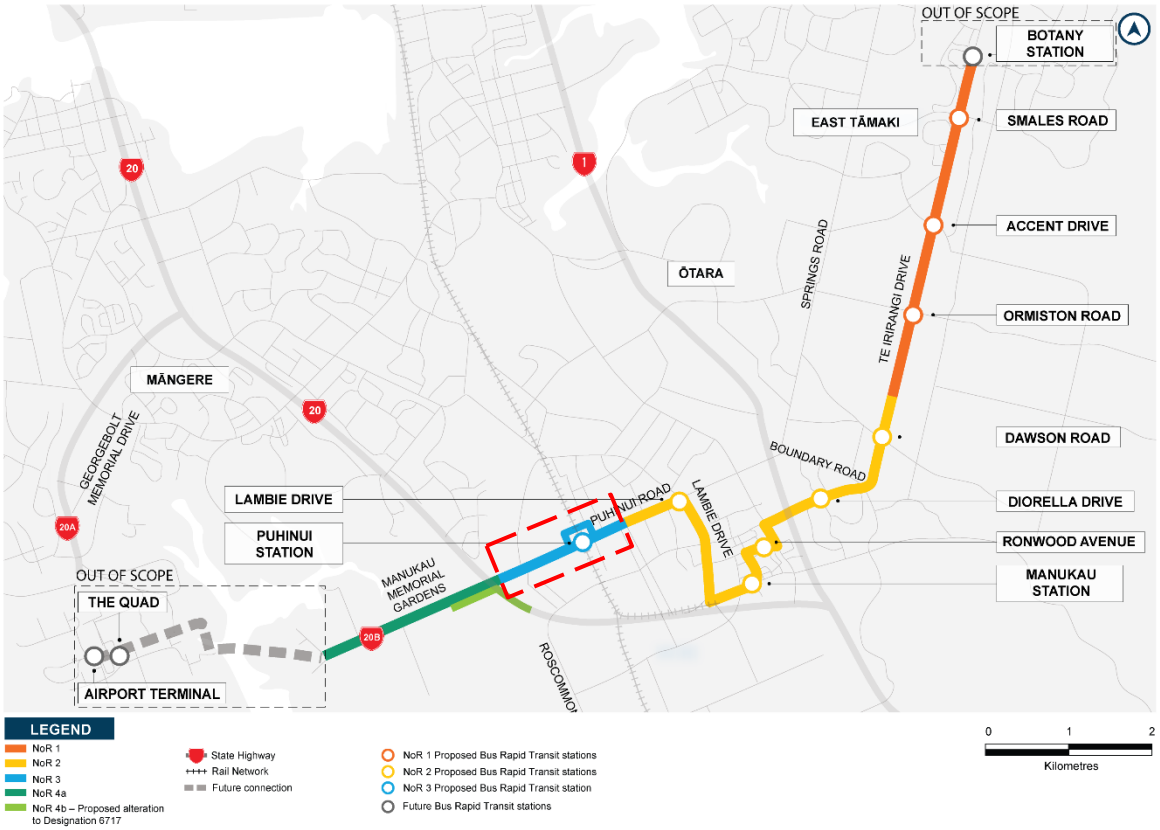


Figure 53: Overview of Puhinui Road (NoR 3)

Table 42 below summarises the proposed changes and effects of the Project for the NoR 3 section.

Table 42: NoR 3 proposed changes and effects summary

What are we changing?	Is it better or worse?
New BRT	• Better PT services especially in terms of quality, frequency, and reliability • Better connections to local PT services • Better access to the wider network • Better access provisions for pedestrians, cyclist, and mobility impaired passengers
Cycle facilities	• An existing on-street cycle path is provided along both sides of the road • The Project proposes a dedicated and separated cycle path on both sides of the road, therefore improving connectivity and safety
Pedestrian facilities	• Existing pedestrian footpaths provided on both sides of the road • Increased pedestrian crossing facilities along the route (dedicated signalised crosswalks), therefore improving pedestrian safety • Better priority at signalised intersections • Better connectivity to BRT / PT stations
On-street parking	• Minimal on-street parking currently provided along Puhinui Road within NoR 3 section. The Project removes on-street parking (21 spaces), but this effect is considered negligible.
On-site parking	• The Project corridor has a minimal impact on on-site parking for adjacent properties. A total of 20 on-site parking spaces are affected across three individual sites. Where the access provision is completely affected for residential properties, these properties have been designated.
Property access	• Due to the Project corridor, all properties with access onto Puhinui Road will be restricted to left turn in and left turn out access (i.e. right turns prohibited) • All properties are required to use alternative routes for right-turn access. The layout of local residential side streets and the general road network within the surrounding area means these alternative routes are achievable and the increase in expected travel distance is no more than 2.5 km • Note that where buildings are located within the designation, the full lot will be designated, as such there will be no residual access effects. • For rear sites with the front lot designated, driveways will be constructed to enable access to the rear lot.
Intersection operation	• The 'With Project' results indicate that the Project corridor does not significantly worsen intersection performance, with regards to LOS, average delay and queue length. • The Puhinui Road / Wylie Road intersection performs near or at capacity in 2038 for the 'No Project' scenario

9.1.2 Network and corridor design

The Project was developed as part of transport network planning for the wider area. The wider networks were developed through the business case process that considered the key problems,

benefits, outcomes, and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the form and function of Puhinui Road within NoR 3 will change to include a central BRT corridor (two-way) and walking and cycling facilities on both sides of the corridor. The proposed cross-section will be generally consistent along the length of the section, with one general traffic lane in each direction, a central two-way rapid transit corridor and dedicated and separated walking and cycling paths on both sides of the road.

The typical cross sections are shown in Figure 54 and Figure 55.

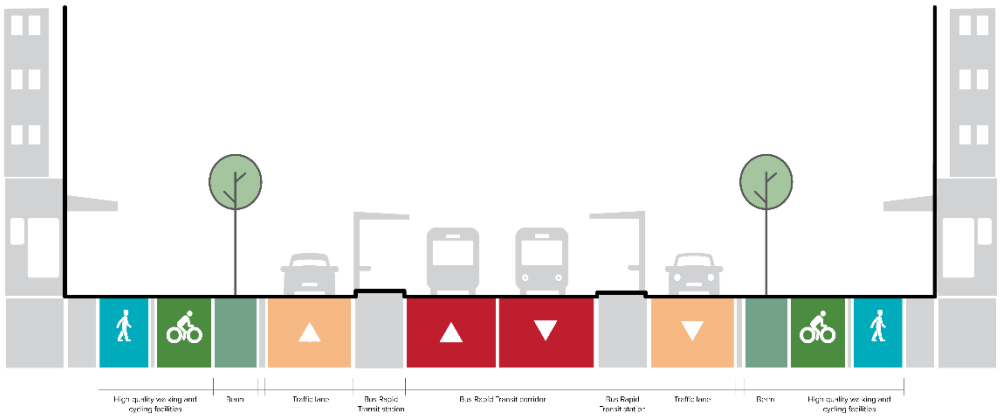


Figure 54: NoR 3 Typical cross section (with BRT station)

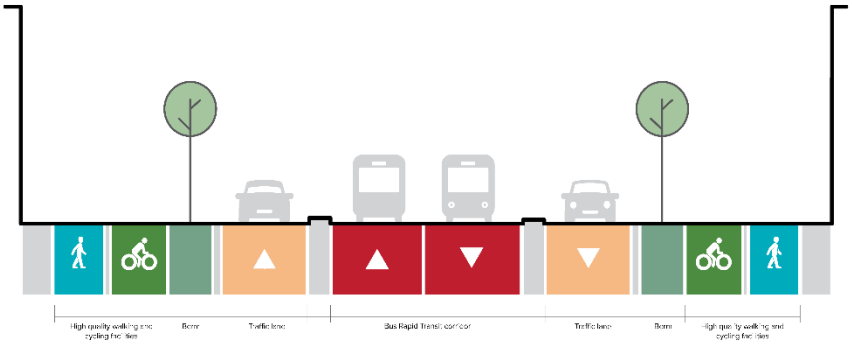


Figure 55: NoR 3 Typical cross section (without BRT station)

9.2 Existing and likely future environment

9.2.1 Planning context

The proposed rapid transit corridor within the Puhinui Road section traverses land zoned for a range of activities under the AUP:OP. Predominantly Residential – Mixed Housing Suburban Zoned land is

located to the north of Puhinui Road, with a mixture of Residential – Single House Zoning and Business – Light Industry Zoning on the southern side of the route.

Table 43 below provides a summary of the Puhinui Road section existing and likely future environment

Table 43: Puhinui Road section upgrade existing and likely future environment

Environment today	Zoning	Likelihood of Change for the environment[32]	Likely Future Environment[33]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
Residential	Residential	Low	Residential

Please refer to the AEE for further information on the planning context.

9.2.2 Transport environment

9.2.2.1 Existing

The Puhinui Road section is predominantly surrounded by residential development. The route comprises of one vehicle lane in each direction, with some segments providing a central flush median. A number of intersections ranging from priority T-intersections and signalised intersections are provided along the route. The extent of the route is shown in Figure 56.

Figure 56: Aerial of existing Puhinui Road corridor

[32] Based on AUP:OP zoning/policy direction
[33] Based on AUP:OP zoning/policy direction

Table 44 summarises the existing transport features of the Puhinui Road section corridor.

Table 44: Puhinui Road section: existing transport features

	Puhinui Road between SH20 and Lambie Drive
Corridor Characteristics	• Has a 50 km/h speed limit; • Urban character with two vehicle lanes (one in each direction); • Pedestrian footpaths provided on both sides of the road, with pedestrian crossing facilities along the route; and • Dedicated on-road cycle lanes provided on both sides of the road • Intermittent on-street parking permitted.
Traffic Volume	The latest traffic data for was obtained from Auckland Transport[34]. The data was recorded in 2020 and shows Puhinui Road (between SH20 and Lambie Drive) generally carried a 5 Day Average Daily Traffic of approximately 15,000-18,000 vehicles per day (vpd), and 1,400-1,600 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Puhinui Road / Wylie Road signals; • Puhinui Road / Noel Burnside Road priority controlled; • Puhinui Road / Milan Road priority controlled; and • Puhinui Road / Raymond Road priority controlled.
Walking and Cycling	Pedestrian footpaths and on-road cycle lanes are provided on both sides of Puhinui Road.
Public Transport	The Airport Link (frequent service[35]) currently operates on Puhinui Road and connects Manukau and the Airport via Puhinui. The Puhinui Train Station is accessed from Puhinui Road, which provides access to the wider road network via the Southern Line, connecting Pukekohe and Britomart via Papakura, Manurewa, Papatoetoe, Ellerslie, and Newmarket. It also connects to the Eastern Line, connecting Glen Innes, Orakei and Meadowbank.

9.2.2.2 Likely future

The surrounding land is currently live zoned, therefore there is no significant anticipated change in land use or corridor characteristics.

The Project proposes rapid transit stations throughout the Project corridor. Although no new stations are included in the NoR 3 section, Puhinui Station is an existing facility that the Project will connect to. Provision of improved access via stations presents an opportunity to allow for intensified development and growth. The NPS:UD is applicable to the project and is expected to further enable intensification around stations. Among other things, the NPS:UD requires Auckland Council to enable “building heights of at least 6 storeys within at least a walkable catchment of existing and planned rapid transit stops.” In this regard, policy and zoning changes along the corridor are anticipated, with future

[34] Auckland Transport Traffic Counts, July 2012 to May 2021, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[35] This service operates at least every 15 minutes, 7am – 7pm, 7 days a week. Lower frequencies early morning and evenings

residential development within the vicinity of the rapid transit stations likely to be of multi-storey developments to better support TOD.

Furthermore, Auckland will be subject the MDRS from August 2022, which allow people to develop up to three homes of up to three stories on most sites without the need for a resource consent. This Bill introduced by the Government will enable a wider variety of housing choices and supports greater housing density within Auckland, including future residential developments along the Project corridor.

9.3 Assessment of operational transport effects

This section addresses operational transport effects specific to NoR 3 only. Section 5.5 describes broader effects of the Project on the overall transport network.

9.3.1 Public transport

The Project will provide a separate BRT corridor (two-way) down the centre of the corridor. The Project will connect to the existing Puhinui Train Station. Puhinui Road within NoR 3 connects Puhinui Train Station and central Manukau to SH20B and further to the Airport.

There is a strong link with rail services at Puhinui Station. This station will also serve as an origin station due to the residential land north of the alignment and as a lower order destination station on account of the industrial activities to the south. When the Project is in place, Puhinui Station will enable access to and from the wider Auckland area via the Southern and Eastern Train Line Service. The patronage utilising the Puhinui Station in 2048 is as follow:

- Almost half (45%) of the 2048 patronage forecast entering the airport has come from trains (11% from the north and 34% from the south). This reinforces the importance of Puhinui Train Station and the importance of maintaining and enhancing a seamless transfer;
- Over half (67%) of the patronage entering the Manukau from the west has come from trains (8% from the north and 59% from the south);
- The estimated daily boardings at Puhinui Station is approximately 15,000 people by 2040, which is the second highest number of boardings across all stations (Botany Station being the highest); and
- There is a strong link with the southern growth areas of Auckland. Approximately half of all people on the BRT as it enters the Manukau from the west have come from Papakura or further south.

9.3.2 Walking and cycling

The Project proposes separated walking and cycling facilities on both sides of all corridors within the NoR 3 section. New pedestrian and cyclist signalised crosswalks are provided at the intersection of Puhinui Road / Kenderdine Road and Puhinui Road / Cambridge Terrace, facilitating the increased active mode users in the area because of the Puhinui station.

The proposed walking and cycling facilities have been designed in accordance with relevant Auckland Transport standards and policies as summarised in Table 45.

Table 45: Auckland Transport standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[36]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that proposed designs should feature separated cycling facilities for arterial corridors in excess of 30 km/h. The traffic speeds on NoR 3 corridors are proposed to be 50 km/h, therefore the proposed design of the walking and cycling facilities is appropriate for these standards.
Auckland Transport Transport Design Manual[37]	Footpaths: 1.8 m minimum	A 1.8 m footpath is proposed on all corridors and a 2.0 m cycle path. The berm width varies along this section. This is in accordance with the Auckland Transport TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have positive effects on walking and cycling as it will:

- Reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across arterial corridors within NoR 3;
- Improve integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity;
- Lead to significant environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips;
- Serve as a key enabler for greater use of rapid transport and active transport modes; and
- Support growth surrounding the NoR 3 corridors and improve safety and access to employment and social amenities.

9.3.2.1 Station access

Puhinui Train Station is located within NoR 3 and is proposed to operate as a BRT Station. This station will function predominantly as a point of interchange between the Project and rail services. The area covered by the station's 1 km walking catchment accommodates 5,600 residents and 700 jobs (2013 Census). It is projected to have a resident population of 5,800 and to accommodate 1,200 jobs in 2048. The 1 km walking and 3 km cycling catchment is shown in Figure 57 below.

[36] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf

[37] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

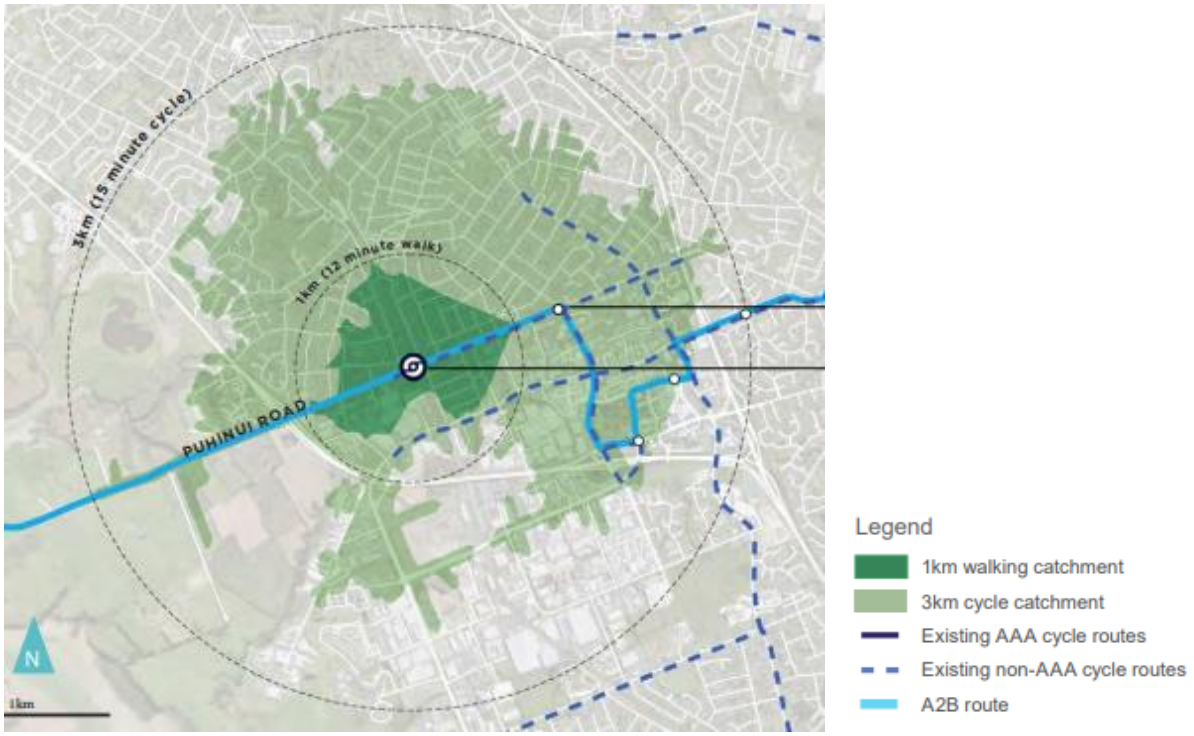


Figure 57: Puhinui Station - 1 km walking and 3 km cycling catchment

Puhinui Station will be an important interchange and should provide a high quality of active mode access. The street pattern around Puhinui Station offers varying levels of connectivity for station access by walking and cycling. North of Puhinui Road, the street network offers a moderate level of connectivity, although the limited number of crossings over the rail line reduce east-west connectivity. Busy roads, including Puhinui Road and Wyllie Road create a severance barrier for walking and cycling movement to and from the station. The existing cycle network for station access is limited to painted on-road cycle lanes on Puhinui Road, Cavendish Drive and Noel Burnside Road.

The NoR 3 corridor is proposed to be reconstructed as part of the Project, including separate walking, and cycling facilities on Puhinui Road, Kenderdine Road, Bridge Street and Cambridge Terrace, thus creating a safer environment for vulnerable users and encourages access to the Puhinui Station via active modes. New pedestrian and cyclist signalised crosswalks are provided at the intersection of Puhinui Road / Kenderdine Road and Puhinui Road / Cambridge Terrace, facilitating the increased active mode users in the area because of the Project. Furthermore, the Puhinui Train Station already provides secure cycle racks for customers that travel to the station via bicycle.

9.3.3 General traffic

The forecasted 2038 AADT and peak hour volumes for the NoR 3 corridors are summarised in Table 46.

Table 46: Forecasted 2038 AADT and peak hour volumes

NoR	Corridors	2038 AADT	2038 peak hour volumes
NoR 3	Puhinui Road (near Wyllie Road)	17,500 vpd	1,840 vph

The proposed typical corridor cross section design (generally one general traffic lanes in each direction) is considered to meet the forecasted needs and is suitable for the interim and longer-term outcomes on the corridor.

The performance of the wider network and of individual intersections within NoR 3 is described in Section 5.9 above,

9.3.4 Access and parking

9.3.4.1 Access

The NoR 3 section predominantly provides direct access to residential properties, with a small number of industrial and commercial activities located adjacent to this corridor.

The Project widens the designation mainly to the southern side along this section to incorporate a central BRT corridor and separate walking and cycling facilities on both sides of the road.

In terms of existing property access, the overarching design philosophy for the Project has been to maintain driveway access, where practicable, and minimise impacting land other than where necessary. The general access impacts because of the Project are summarised below:

- The Project corridor will impact the layout of vehicle crossings within the road reserve (and in some instances within private lots). Most driveways will need to be reformed to tie in adequately with Puhinui Road;
- All properties currently gain all-movements access onto Puhinui Road. Due to the central BRT corridor, all properties will be restricted to left turn in / out movement (i.e. right turns prohibited). Alternative routes are available for residents who need to turn right out or right into their properties;
- The alternative routes identified add less than 2.5 km of travel distance (maximum some 3-4 minutes), which is considered acceptable from a traffic perspective;
- For rear sites with the front lot designated, driveways will be constructed to enable access to the rear lot; and
- Several properties lie fully within the proposed designation, these lots will be fully designated thereby eliminating residual property access effects.

Refer to 5.10.2 of the Report for the detailed alternative routes assessment for affected properties.

9.3.4.2 Parking

The Project corridor cross section and proposed designation affects existing on-street and off-street parking spaces within NoR 3. The indicative number and location of affected on-street and off-street parking spaces is summarised in Table 47 and Table 48.

Table 47: Summary of affected on-street parking spaces

NoR	Location	Length / Number	Total on-street parks affected
NoR 3	Puhinui Road	130 m of on-street parking (approx. 21 spaces typically supporting residential activity)	21

Table 48: Summary of affected off-street parking spaces

NoR	Address	Activity	Off-street parking spaces affected
NoR 3	316 Puhinui Road	Industrial	4
	153 Wylie Road	Commercial	4
	222 Puhinui Road	Religious	12
	TOTAL		20

The Project affects 21 on-street public parking spaces within NoR 3 and approximately 20 on-site parking spaces, typically along site frontages.

It is noted that the NPS:UD removes all minimum on-site parking requirements from the Unitary Plan and as such the Project does not infringe any relevant standards. Where land within the proposed designation is only required temporarily for construction purposes, there is potential for it to be returned to landowners, therefore some off-street parking spaces may potentially be reinstated once the works are complete.

The removal of on-street parking is a consequence of intensification anticipated, and encouraged, by Auckland Transport's policy direction regarding on-street parking on arterial roads. In this regard, the removal of on-street parking along the Project corridor is in accordance with the draft Auckland Parking Strategy[38].

The BRT network proposed by the Project will provide a high quality, attractive alternative to car use and supports mode shift away from private vehicle use. The increased attractiveness and forecast increased demand for public transport is likely to lead to less demand for on-street and on-site parking.

9.3.5 Freight

Puhinui Road within NoR 3 is classified as Level 3 under the Auckland Transport Freight Plan. Level 3 is described as supporting freight networks connecting to/between strategic freight areas where planning and design should consider the efficient movement of freight, noting that land uses adjacent to the road are such that the impacts of freight movement requires active management[39].

The improved corridor capacity because of the Project will result in improved journey times and reliability for existing and future freight. The corridor will be able to accommodate freight movements along the mid-block and through the intersections, therefore supporting the efficient movement of freight.

[38] Draft Auckland Parking Strategy, April 2022
[39] Auckland Transport Freight Plan

9.4 Project interdependencies

9.4.1 NoRs

NoR 3 has been designed to integrate with adjacent key projects. NoR 3 is part of the Notices of Requirement for the full Project. NoR 2 and NoRs 4a and 4b provide a two-way rapid transit facility, general traffic lanes and walking and cycling facilities. This NoR has allowed for a connection to these facilities, and ideally these NoRs would be implemented concurrently. However, if this is not achievable, then consideration will need to be given during the subsequent design phase to how rapid transit, walking and cycling facilities are integrated into the existing road corridor in a safe manner.

9.5 Recommended measures to avoid, remedy or mitigate operational effects

Overall, the Project provides positive benefits and in terms of measures to mitigate operational effects, the reformation / regrading of driveways along Puhinui Road are recommended to facilitate safe access for these existing properties.

It is understood that Waka Kotahi is investigating an active mode improvement project, which includes the provision of a separated cycle path adjacent to SH20 between Cavendish Drive on-ramp and Puhinui Road. This Project has completed the concept design stage, however, is not scheduled to commence detailed design until FY 2023/2024.

Provided that Project is implemented as planned, it is considered that the SH20 cycle path can mitigate the effects on cyclists of the anticipated increase in traffic on Noel Burnside Road as a result of the Project (as discussed in Section 5.9.1). However, in the instance that the SH20 cycle path project does not proceed to implementation, consideration should be given to protect the existing cycle lanes on Noel Burnside Road (i.e. in the form of physical barriers) and the potential for improved pedestrian crossing facilities and the removal of on-street parking to extend the dedicated cycle path should be investigated.

9.6 Summary of operational transport effects

The operational transport effects in NoR 3 are positive and there are no adverse operational transport effects, including wider network effects, resulting from the Project. The assessment of effects for the Project is summarised in Table 49

Table 49: Assessment of operational effects summary for NoR 3

Operational transport effects	
Safety	• Improved walking and cycling facilities along Puhinui Road (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved walking and cycling crossing facilities (crossing Puhinui Road), resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.

Operational transport effects	
Public Transport	• Significantly better quality, frequency, and reliability of PT services (BRT services); • Good integration with the future public transport network and significantly improved connectivity and improved access to employment and social amenities; and • Better and safer access provisions for pedestrians, cyclists, and mobility impaired passengers.
Walking and Cycling	• Reduced the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along Puhinui Road; • Improve integration with the future walking and cycling network, resulting in improved walking, and cycling connectivity; • Lead to environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; and • Support growth within and surrounding Puhinui Road and improve safety and access to employment and social amenities.
General Traffic	• Minimal operational impacts along the corridor and intersection capacity because of the Project corridor; and • The provision of this Project supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and less VKT via private vehicle.
Access and Parking	• The overarching design philosophy for the Project has been to maintain driveway access, where practicable, and minimise impacting land other than where necessary; • All existing access points are to be maintained (excluding for sites fully designated) with minor reforming and regrading proposed; • Where right turn access is banned because of the centre running BRT, access will be achieved via alternative routes. An assessment of alternative travel routes indicates that the additional travel distance is generally less than 2.5 km for all affected properties, which translates to approximately 3-4 minutes of additional travel time (maximum). Overall, the alternative route travel distances are considered within acceptable range from a traffic perspective; and • The Project removes a minimal number of on-street and off-street parking spaces within NoR 3. The increased use of public transport is likely to lead to less demand for on-street and off-street parking.
Freight	• The improved corridor capacity because of the Project will result in improved journey times and reliability for existing and future freight; and • The corridor will be able to accommodate freight movements along the mid-block and through the intersections, therefore supporting the efficient movement of freight.

10 NoRs 4a and 4b: SH20B section

10.1 Project corridor features

10.1.1 Project overview

SH20B is an existing state highway corridor, 2.1 km in length, extending from the SH20/20B interchange to the east to Orrs Road in the west. The Project extends along the full length of this corridor and provides an important east-west connection from Manukau to Auckland Airport.

The NoR 4a section extends between SH20/20B to Orrs Road, while NoR 4b runs for approximately 700-800 m between the SH20/20B interchange to the Manukau Memorial Gardens Intersection and is an alteration to Designation 6717.

SH20B traverses land zoned for a range of activities under the AUP:OP (Future Urban Zone (**FUZ**), Business – Light Industry, and Special Purpose (Manukau Memorial Gardens). The recommended form and function of the corridor reflects the adjacent existing and future land use.

The Project proposes that the function of SH20B will change to incorporate new BRT, walking and cycling facilities. NoR 4a section proposes an Auckland Transport designated rapid transit and active mode corridor located to the south of the existing general traffic lanes, with no changes to the existing Waka Kotahi SH20 designation. At the interface with NoR 4b (i.e. at the Manukau Memorial Gardens intersection), the BRT corridor is proposed to deviate to the centre of the general traffic lanes, with the active mode corridor continuing along the southern side of the road. In this regard, the existing Designation 6717 is proposed to be altered to accommodate the central BRT corridor and the four general traffic lanes.

An overview of the proposed design is provided in Figure 58.

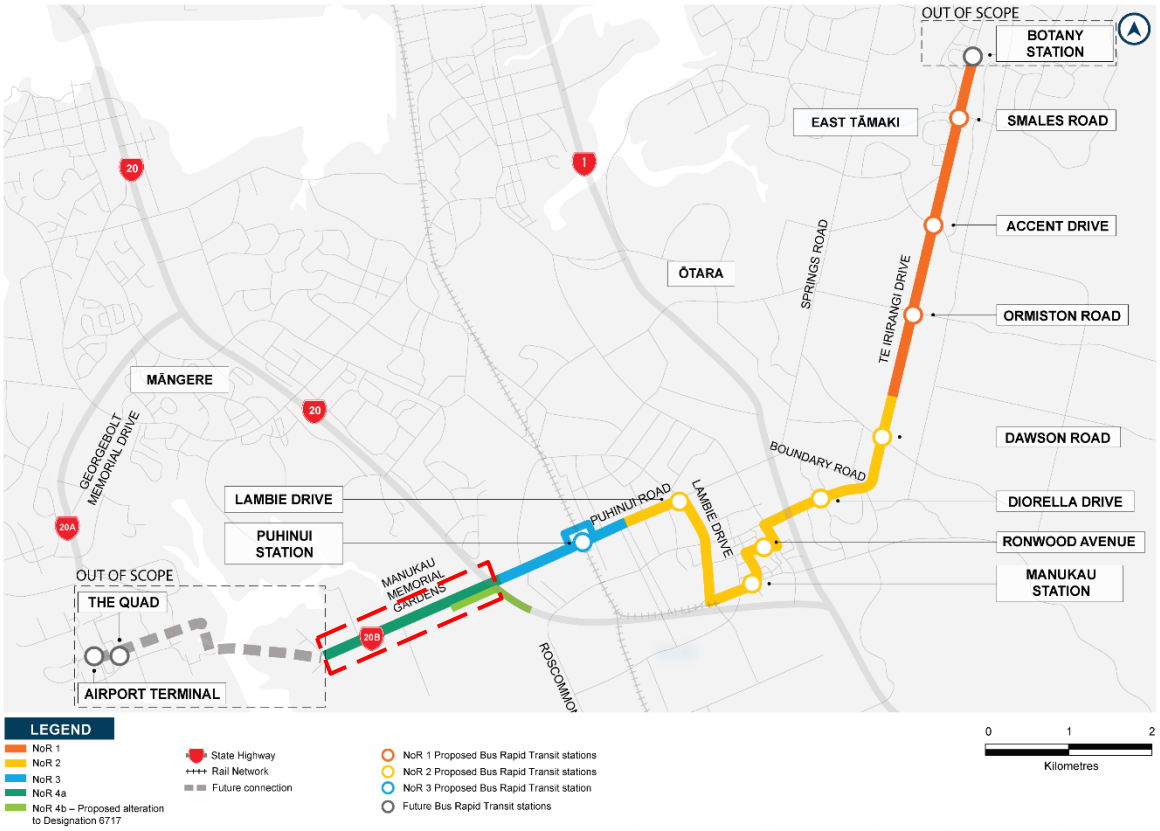


Figure 58: Overview of the NoRs 4a and 4b Corridor

Table 50 below summarises the proposed changes and effects of the Project for the NoRs 4a and 4b section.

Table 50: NoRs 4a and 4b proposed changes and effects summary

What is changing?	Discussion
New BRT	• Mode shift from general traffic to BRT along this section improves PT mode share and efficiency for general traffic; • No connections provided to the local public transport network on this section; and • No stations provided along this section.
Cycle facilities	An existing shared path was recently constructed along the entire length of this section. The Project relocates and widens the path to create a dedicated bi-directional cycleway, therefore an improvement in cyclist facilities and safety.
Pedestrian facilities	• An existing shared path is provided along the length of this section. The Project proposes to provide a dedicated separate pedestrian path therefore reduces conflict between cyclists and pedestrians and improves the overall safety of vulnerable users; and • Crosswalks are currently provided at intersections along the section, no changes proposed.
On-street parking	• No on-street parking currently provided along SH20B, no changes proposed; and

What is changing?	Discussion
On-site parking	• The Project does not impact on-site parking within adjacent properties.
Property access	• NoR 4a – SH20B designation and road corridor will remain as existing and existing property access will be retained. BRT will be provided along the southern side, not crossing any property accesses, thus no access effect; • NoR 4b – SH20B designation widens, however no changes to property access; and • No change in need for right turns and no loss of manoeuvring ability.
Intersection operation	• The 'With Project' results indicate that the Project corridor does not significantly worsen intersection performance, with regards to LOS, average delay and queue length; and • The Campana Road / SH20B intersection performs near or at capacity in 2038 for the 'No Project' scenario.
Freight	• SH20B is currently classified as Level 1A under the Auckland Transport Freight Plan; and • Upgrades to SH20B and the BRT corridor maximise the productivity of the corridor and provide reliable travel for the most critical users, which include freight and high occupancy vehicles.

10.2 Network and corridor design

The Project was developed as part of transport network planning for the wider area. The wider networks were developed through the business case process that considered the key problems, benefits, outcomes, and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of SH20B will change from the existing four lanes (two general traffic and two bus / transit lanes) in a rural context to a four-lane urban arterial corridor, with a new BRT and upgraded active mode corridor. Priority lanes for high-occupancy vehicles will be retained.

The function of NoRs 4a and 4b is consistent, however the cross-section differs in terms of the location of the rapid transit and active mode corridor. As shown in Figure 59, for NoR 4a, both the BRT corridor and the walking and cycling facilities run along the southern side of SH20B, with no changes to the footprint of the existing four traffic lanes. For NoR 4b, the BRT corridor is proposed to run down the centre of the existing road carriageway separating the directional traffic lanes, and walking and cycling facilities will be provided along both sides of the corridor, as shown in Figure 60.

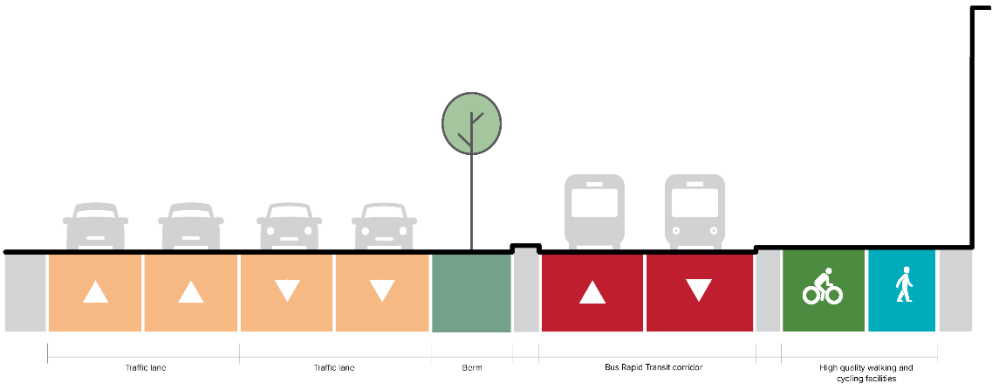


Figure 59: NoR 4a Typical cross section

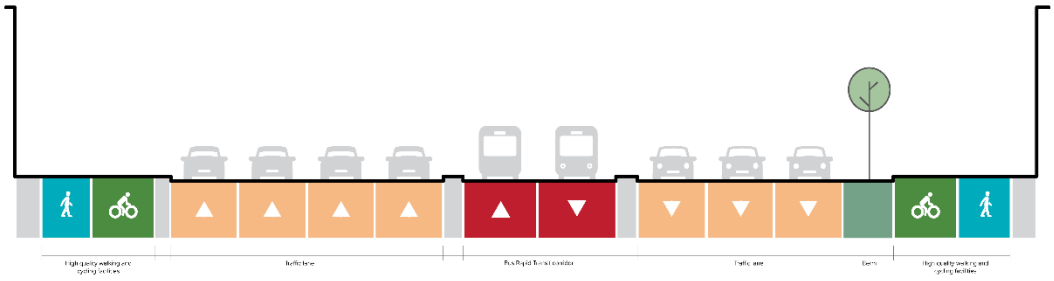


Figure 60: NoR 4b Typical cross section

10.3 Existing and likely future environment

10.3.1 Planning context

SH20B (between SH20 and Orrs Road) is an existing corridor with land zoned under the AUP:OP as follows:

- The southern side of SH20B is predominantly zoned Business – Light Industry Zone (currently greenfield land and industrial), with Business – Heavy Industry Zoning and Open Space – Sport and Active Recreation Zone located further south;
- The northern side of SH20B contains a variety of land uses. Adjacent land to the north of the corridor is currently zoned Special Purpose Zone (Manukau Memorial Gardens). Future Urban Zoned land is located to the west of Prices Road, with a small portion of Business – Light Industry Zone to the east of Prices Road; and
- Land immediately west of Orrs Road (past western boundary of project extents) is zoned Business – Light Industry Zone.

It is noted that the land to south of SH20B is within the Puhinui Precinct (specifically sub-precinct D and E). The Puhinui Precinct Plan is shown in Figure 61 below.

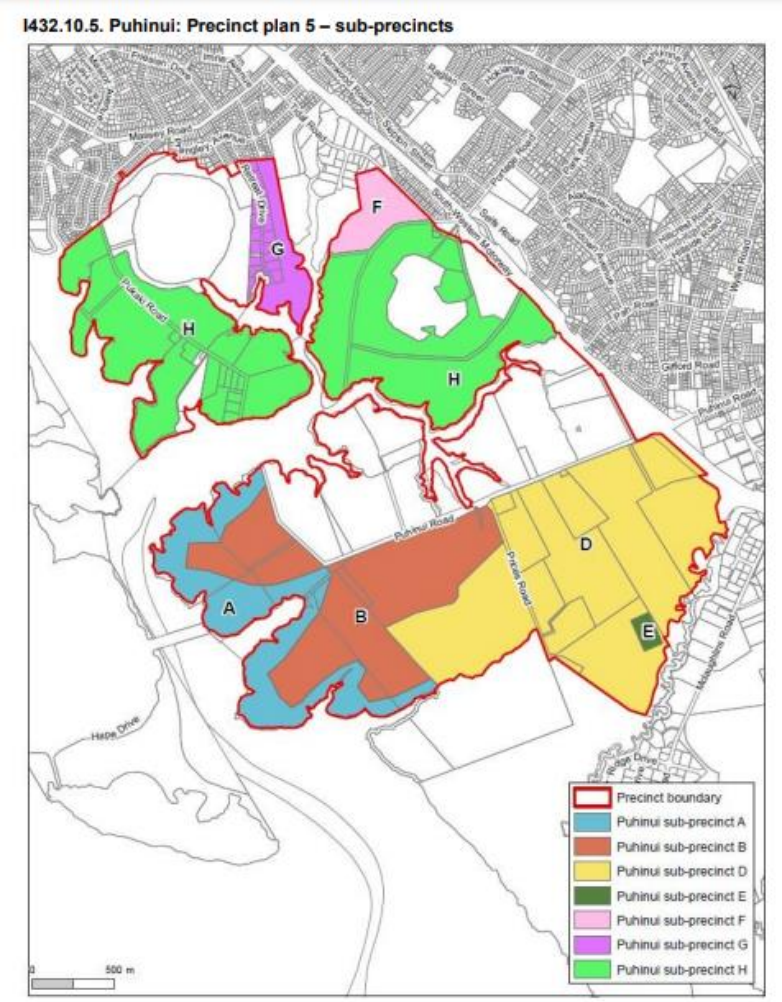


Figure 61: Auckland Unitary Plan – Puhinui Precinct Plan 5 – sub-precincts

Table 51 below provides a summary of the existing and likely future surrounding environment.

Table 51: SH20B Existing and likely future environment

Environment today	Zoning	Likelihood of Change for the environment[40]	Likely Future Environment[41]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
Special Purpose (cemetery)	Special Purpose	Low	Special Purpose
Undeveloped greenfield areas	Future Urban Business (Light Industrial)	High High	Industrial

Please refer to the AEE for further information on the planning context.

[40] Based on AUP:OP zoning/policy direction
[41] Based on AUP:OP zoning/policy direction

10.3.2 Transport environment

10.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfield land to the north and south, with some horticultural activity, industrial businesses, and a cemetery (Manukau Memorial Gardens) accessed from SH20B. SH20B runs in a general east-west alignment and provides two vehicle lanes (a general traffic lane and a bus / transit lane) in each direction separated by a central flush median along most of the length. Flexible median barrier further divides the carriageway at some locations. The posted speed limit is 50 km/h between SH20 interchange and the Manukau Memorial Gardens intersection, and 60 km/h for the remainder of the corridor, to Orrs Road. The existing corridor is shown in Figure 62.

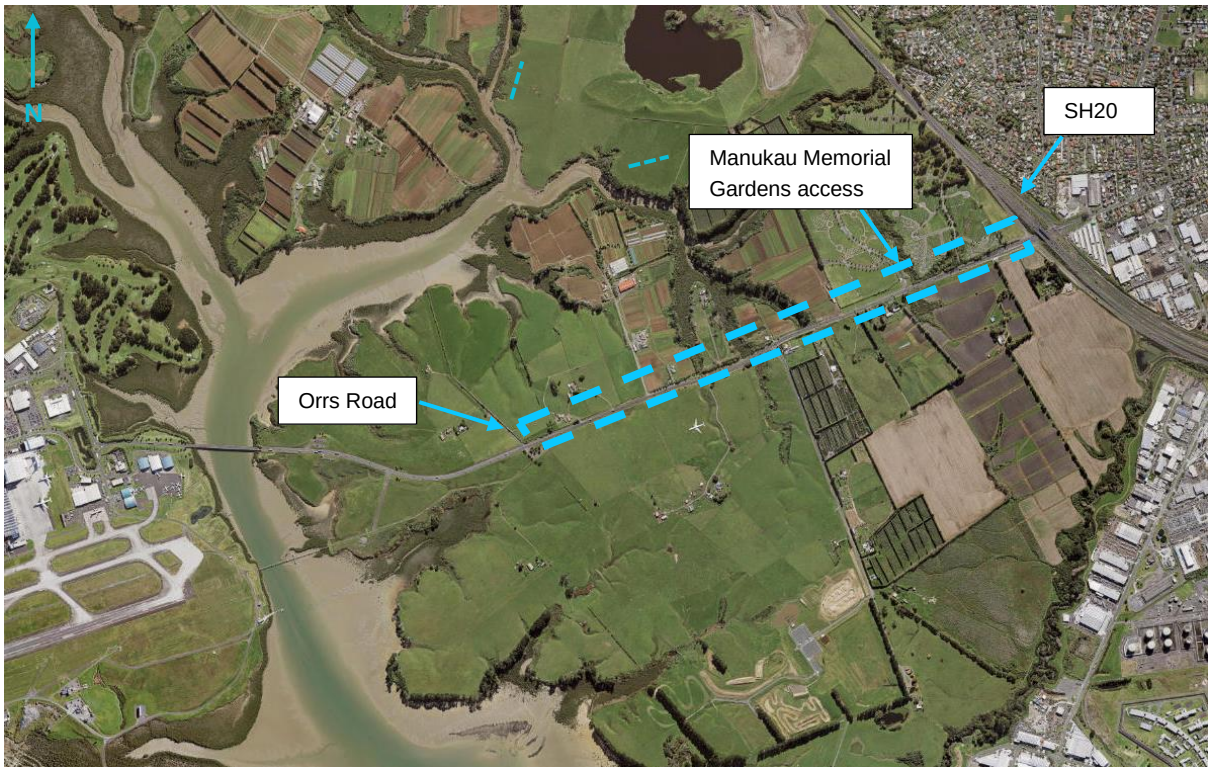


Figure 62: Aerial photo of existing SH20B corridor (NoRs 4a and 4b)

Table 52 summarises the existing transport features of the SH20B corridor.

Table 52: SH20B: Existing transport features

Existing SH20B transport features	
Corridor Characteristics	• Rural context, largely greenfield activity adjacent; • 60 km/h posted speed; • Two vehicle lanes in each direction (one general traffic and one bus / transit lane in each direction); • No on-street parking permitted; and • A 3.0 m shared path is provided along the southern side of SH20B.

Existing SH20B transport features	
Traffic Volume	The latest traffic data for was obtained from Waka Kotahi[42]. The data was recorded in 2020, which revealed an Annual Average Daily Traffic (AADT) volume of **17,563 vehicles per day (vpd).** An AADT of 28,725 vpd was recorded for 2019. Due to its proximity to Auckland Airport, 2020 traffic volumes are significantly less than 2019 due to COVID travel restrictions.
Road Network / General Traffic	• SH20B / SH20 on-ramp signals with give-way controlled slip lanes; • SH20B / SH20 off-ramp signals with give-way controlled slip lanes; • SH20B / Manukau Memorial Gardens signalised intersection; • SH20B / Prices Road priority control intersection; • SH20B / Campana Road signalised intersection; and • SH20B / Orrs Road priority control intersection.
Walking and Cycling	• A shared walking and cycling path is provided on the southern side of the corridor between Orrs Road and the Manukau Memorial Gardens access, generally 3.0 m wide, and further extends west past Orrs Road towards the Airport; and • A 4.5 m shared path is provided on the northern side of the corridor between the SH20 interchange and the Manukau Memorial Gardens. No pedestrian or cycle facilities are provided further to the west on the northern side of the corridor; however, a signalised pedestrian crossing is provided to connect to the shared path on the southern side.
Public Transport	The Airport Link bus service currently operates on SH20B and connects Manukau and the Airport via Puhinui station. This service operates at least every 15 minutes, 7am – 7pm, 7 days a week. Lower frequencies early morning and evenings.

10.3.2.2 Likely future

The area to the south of SH20B, between SH20 and Prices Road, falls within the Puhinui Precinct (sub-precinct D and E). This land is zoned as Business – Light Industry, however, is currently predominantly undeveloped. It is likely that this area will develop in coming years, consistent with this zoned activity and no meaningful change in zoning is anticipated.

A Park and Ride facility is currently being developed by Auckland Airport, to the south SH20B between Prices Road and Campana Road, consistent with the direction set out in the Puhinui Precinct.

The Manukau Memorial Gardens is located to the north of the SH20B corridor. This activity is anticipated to remain unchanged in the future.

There is an area of Business – Light Industry land and Future Urban Zoned (FUZ) land to the north of the SH20B corridor, west of the Manukau Memorial Gardens. This is currently predominantly used for horticulture and livestock grazing. It is anticipated that the FUZ will change to Business – Light Industry zoning, consistent with adjacent zones. Residential activity is not permitted in this location due the High Aircraft Noise Area Overlay in the AUP:OP.

[42] State highway traffic monitoring – annual average daily traffic (https://www.nzta.govt.nz/resources/state-highway-traffic-volumes/)

10.4 Assessment of operational transport effects

This section addresses operational transport effects specific to NoRs 4a and 4b only. Section 5.5 describes broader effects of the Project on the overall transport network.

10.4.1 Public transport

The Project will provide a separate BRT corridor (two-way) along the southern side of SH20B within the NoR 4a section, which deviates to the centre of the road within the NoR 4b section. No BRT stations are provided along SH20B. A new southbound ramp between SH20B and SH20 enables more reliable movement of the rapid transit service through the busy SH20 motorway interchange.

10.4.2 Walking and cycling

The Project proposes separated walking and cycling facilities on the southern side of SH20B (between Orrs Road and the SH20 interchange). It also includes separated walking and cycle crossing facilities at the Manukau Memorial Gardens and Campana Road signalised intersections, which connect with expected future developments.

The proposed walking and cycling facilities have been designed in accordance with relevant Auckland Transport standards and policies as summarised in Table 53.

Table 53: Auckland Transport standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[43]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that proposed designs should feature separated cycling facilities for arterial corridors in excess of 30 km/h. The traffic speeds on NoR 4a / 4b corridors are proposed to be 60 km/h, therefore the proposed design of the walking and cycling facilities is appropriate for these standards.
Auckland Transport Transport Design Manual[44]	Footpaths: 1.8 m minimum	A 1.8 m footpath is proposed on all corridors and a 2.0 m cycle path. The berm width varies along this section. This is in accordance with the Auckland Transport TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have positive effects on walking and cycling as it will:

- Reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across SH20B;
- Improve integration with the future walking and cycling network, particularly the provision of improved east-west walking and cycling connectivity;
- Lead to environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips;

[43] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[44] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Manukau urban centre and Auckland Airport; and
- Support growth surrounding SH20B and significantly improve safety and access to employment and social amenities.

10.4.3 General traffic

The forecasted 2038 AADT and peak hour volumes for NoRs 4a and 4b corridors are summarised below.

Table 54: Forecasted 2038 AADT and peak hour volumes

NoR	Corridors	2038 AADT	2038 peak hour volumes
NoRs 4a and 4b	SH20B (near Memorial Gardens)	45,100 vpd	4,234 vph

The proposed typical corridor cross section design (generally two general traffic lanes in each direction, including current provision for high occupancy (T3) vehicles) is considered to meet the forecasted needs and is suitable for the interim and longer-term outcomes on the corridor.

The performance of the wider network and of individual intersections within NoRs 4a and 4b is described in Section 5.9 above.

10.4.4 Access and parking

10.4.4.1 Access

As a future urban arterial corridor, access to SH20B is expected to be limited. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within an urbanised area both to the north and south of SH20B. No new public roads are anticipated to connect to the SH20B corridor.

The collector network will be developed and agreed with Auckland Transport and Waka Kotahi as developers progress these connections through the plan change and resource consent process.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain existing driveway access where practicable and minimise impacting land other than where necessary.

For the NoR 4a section, the SH20B designation widens, however no significant changes are proposed to individual property access other than changes to the access layout. The SH20B designation remains as existing along the NoR 4b section as the BRT and active mode corridor will be provided along the southern side of the road. 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, with no changes proposed as part of the Project.

10.4.4.2 Parking

No on-street parking is currently permitted on SH20B (within NoRs 4a and 4b). In this regard, the Project has no impact on on-street parking along this corridor.

The Project does not impact on-site private parking within properties adjacent to the corridor.

10.4.5 Freight

SH20B is classified as Level 1A under the Auckland Transport Freight Plan. This is defined as roads of the highest strategic value to freight movement, including the motorways and most state highways (typically the Waka Kotahi, NZ Transport Agency road network), being arterials where efficient freight movements must be actively supported to maintain Levels of Service through active planning and design[45]. The corridor therefore plays a key part in the overall freight story and will continue to play a strategic freight role in the long term.

Upgrades to SH20B and the separate rapid transit corridor maximise the corridor's productivity and provide reliable travel for the most critical users, which include freight and high occupancy vehicles.

Overall, it is considered that the proposed footprint provides a flexible corridor width to enable resilient and reliable freight movements.

10.5 Project interdependencies

10.5.1 Auckland Airport

As established, the BRT corridor continues further west from Orrs Road to an integrated public transport station at the Auckland Airport. These works will be undertaken by Auckland Airport and will be the subject of separate resource consent processes, led by Auckland Airport.

10.5.2 NoRs

NoRs 4a and 4b has been designed to integrate with adjacent key projects. NoRs 4a and 4b interfaces with the NoR 3, which in turn interfaces with the NoR 2 and NoR 1. To achieve the full benefits of the Project, all its elements are required to be operational.

10.6 Recommended measures to avoid, remedy or mitigate operational effects

Overall, the project provides positive benefits, particularly for public transport, walking and cycling. No mitigation measures are recommended for NoRs 4a and 4b.

10.7 Summary of operational transport effects

The assessment of transport effects for the Project is summarised in Table 55.

Table 55: Assessment of operational effects summary for NoRs 4a and 4b

Operational Transport Effects	
Safety	• Improved walking and cycling facilities along SH20B (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users;

[45] Auckland Transport Strategic Freight Plan

Operational Transport Effects	
	• Improved walking and cycling crossing facilities (crossing SH20B), resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.
Public Transport	• Significantly better quality, frequency, and reliability of PT 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.
Walking and Cycling	• Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along corridors along SH20B; • Improve integration with the future walking and cycling network, resulting in improved north-south walking, and cycling connectivity; • Lead to environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; and • Support growth surrounding SH20B and improve safety and access to employment and social amenities.
General Traffic	• Manageable operational impacts along the corridor and intersection capacity because of the Project corridor; and • The provision of the Project supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and less VKT via private vehicle.
Access and Parking	• Negligible operational impacts on existing access provisions and on-street / off-street parking along SH20B; and • All existing access points are to be maintained, with minor reforming and regrading proposed.
Freight	• Upgrades to SH20B and the separate rapid transit corridor maximise the corridor's productivity and provide reliable travel for the most critical users, which include freight and high occupancy vehicles; and • The proposed footprint provides a flexible corridor width to enable resilient and reliable freight movements.

11 Conclusion

Table 56: Assessment of operational effects summary for all NoRs

Operational transport effects	
Safety	• Improved walking and cycling facilities along all corridors (including separation) commensurate with an urbanised environment, resulting in improved protection for vulnerable road users; • Improved, separated walking, and cycling crossing facilities resulting in a safer environment for all road users; and • Consequential reductions in the risk of DSIs.
Public Transport	• Significantly better quality, frequency, and reliability of PT services (BRT services); • Good integration with the future public transport network and significantly improved connectivity and improved access to employment and social amenities; • Better and safer access provisions for pedestrians, cyclists, and mobility impaired passengers; • Enables a significant increase in public transport usage in this area, increasing the PT mode share and reducing travel by light vehicles, with some 31,100 passengers per day expected to use the BRT service in 2038; • The anticipated passenger kilometres travelled by public transport increases by 144,600 km per day whilst the travel by light vehicle reduces by approximately 60,800 vehicle kilometres per day. This reduced vehicle travel is expected to reduce a range of total system costs or externalities, such as road crashes; and • The screenline models indicate a significant increase in public transport mode share across all screenlines, excluding screenline 4 (which does not cross the Project corridor). Public transport patronage increases across all screenlines and exceeds 100% on screenlines 2 (Flat Bush) and 5 (SH20B)
Walking and Cycling	• Reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along the Project corridor; • Improve integration with the future walking and cycling network, resulting in improved network-wide walking, and cycling connectivity; • Lead to environmental and health benefits because of increased active mode trips and reduced reliance on vehicle trips; and • Support growth surrounding the Project corridor and improve safety and access to employment and social amenities.
General Traffic	• Minimal adverse operational impacts along the corridor and intersection capacity because of the Project; • The provision of this Project supports wider network outcomes. In particular, the improved public transport provisions lead to improved mode share and reduced VKT via private vehicle; and • Improved driver safety with the removal of all give-way controlled slip lanes at the intersections along the Project corridor. Fully signalised intersections will control vehicle and pedestrian movements, further reducing potential conflict with pedestrians and cyclists.

Operational transport effects	
Access and Parking	• The overarching design philosophy for the Project has been to maintain driveway access, where practicable, and minimise impacting land other than where necessary; • All existing access points are to be maintained (excluding for sites fully designated) with minor reforming and regrading proposed; • Where right turn access is banned at certain properties because of the centre running BRT, access will be achieved via alternative routes. An assessment of alternative travel routes indicated that the additional travel distance is generally less than 2.5 km for all affected properties, which translates to approximately 3-4 minutes of additional travel time (maximum). Overall, the alternative route travel distances are considered within acceptable range from a traffic perspective; and • The Project affects a number of on-street and off-street parking spaces predominantly within NoR 2 and NoR 3. However, the Project provides a desirable alternative to car use and supports mode shift away from private vehicles. The increased use of public transport is likely to lead to less demand for on-street and off-street parking within commercial / retail areas, with adequate parking facilities such as paid car park buildings available within proximity if necessary. Where land within the proposed designation is not required as part of the permanent project works, there is potential for it to be returned to landowners, such that some off-street parking spaces may potentially be reinstated.
Freight	• SH20B, Te Irirangi Drive, Lambie Drive, Manukau Station Road, and Great South Road will continue to adequately serve their freight role in the long term; • The improved corridor capacity because of the Project (mode shift away from private travel to public transport) will result in improved journey times and reliability for existing and future freight, maximising the productivity of these corridors; and • The proposed Project footprint provides a flexible corridor width to enable resilient and reliable freight movements on a long-term basis.

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Appendix A

Station capacity and access

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

Appendix A: Station capacity and access

1.1 Station access

Station access (the first and last kilometre) is an integral part of every public transport trip and therefore safe and convenient station access is critical. These include:

- High quality, dedicated walking and cycling facilities along the full length of the rapid transit route and connecting proposed stations;
- Suitable station platform design, specifically regarding capacity and safety; and
- Adequate crossing facilities to and from the station platforms.

Figure 63 illustrates the 1 km and 3 km catchments of proposed stations. The 1 km catchment is a reasonable catchment for walk-up passengers, is consistent with good practice for rapid transit corridors and is supported by the *Walkable Catchment Analysis at Auckland Train Stations technical report*[46]. A 3 km catchment is applied to a range of modes including cycling, micro-mobility, taxi, ride share, drop-off and pick-up. The 3 km catchment includes a sizeable proportion of the south and eastern Auckland urban area. Overall, the proposed BRT and stations provide significant spatial reach, well beyond the immediate BRT route itself.

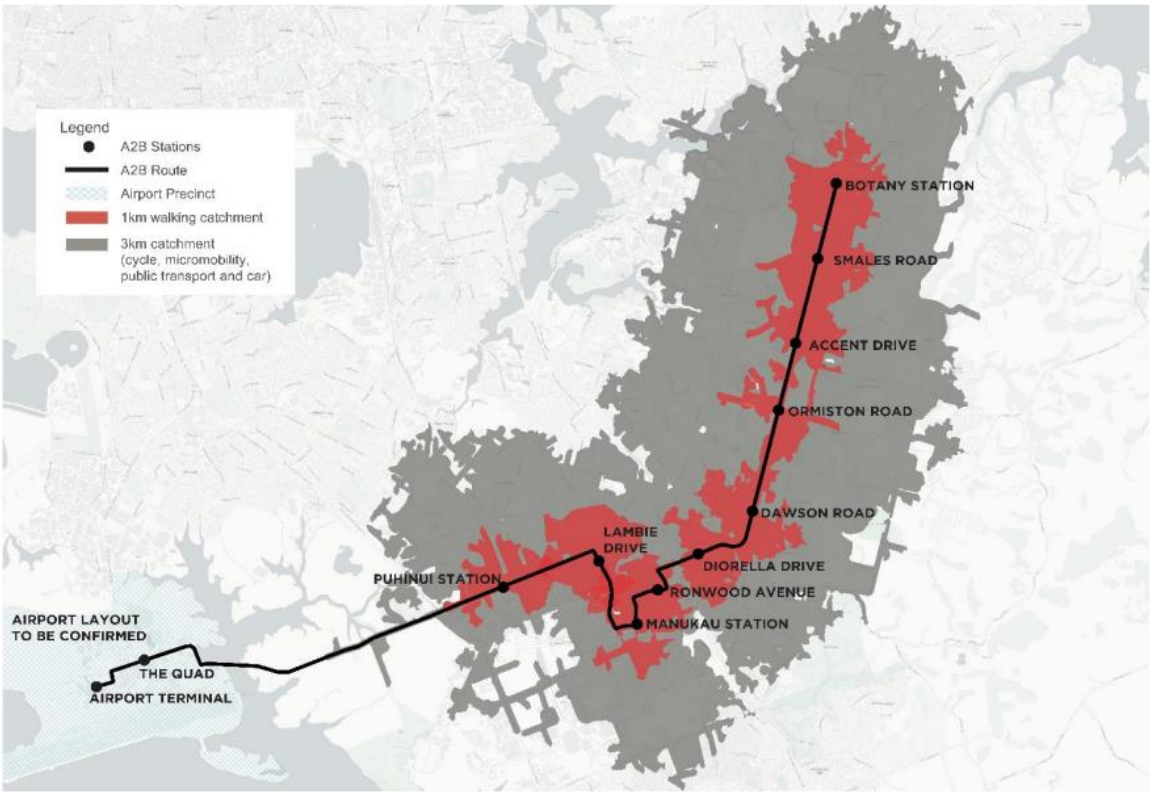


Figure 63: 1 km walking and 3 km cycling catchment for BRT stations

[46] Auckland Council 2012, TR2012/023

1.2 Station capacity

The station capacity assessment uses 2038 patronage data to determine whether the proposed station design is suitable to accommodate the anticipated demand.

- The following assumptions have been considered for the assessment:
- The AM peak hour boardings will likely result in the highest number of passengers on a station platform at any time, therefore, AM peak hour boarding numbers have been assessed;
- Eastbound and westbound boarding will occur via separate station platforms, therefore, have been assessed separately;
- A peak hour BRT headway of 3 minutes has been assumed. Conservatively, a 5-minute headway has been assumed, giving 12 BRT arrivals in a 1-hour peak period;
- Based on the above, the maximum number of passengers waiting to board at any time has been calculated as [Peak hour boarding numbers / 12 BRT];
- Each passenger on the station platform has been assumed to occupy 1 m^2 of area.

The eastbound and westbound AM peak hour boarding numbers at each station based on 2038 patronage data are shown in Figure 64.

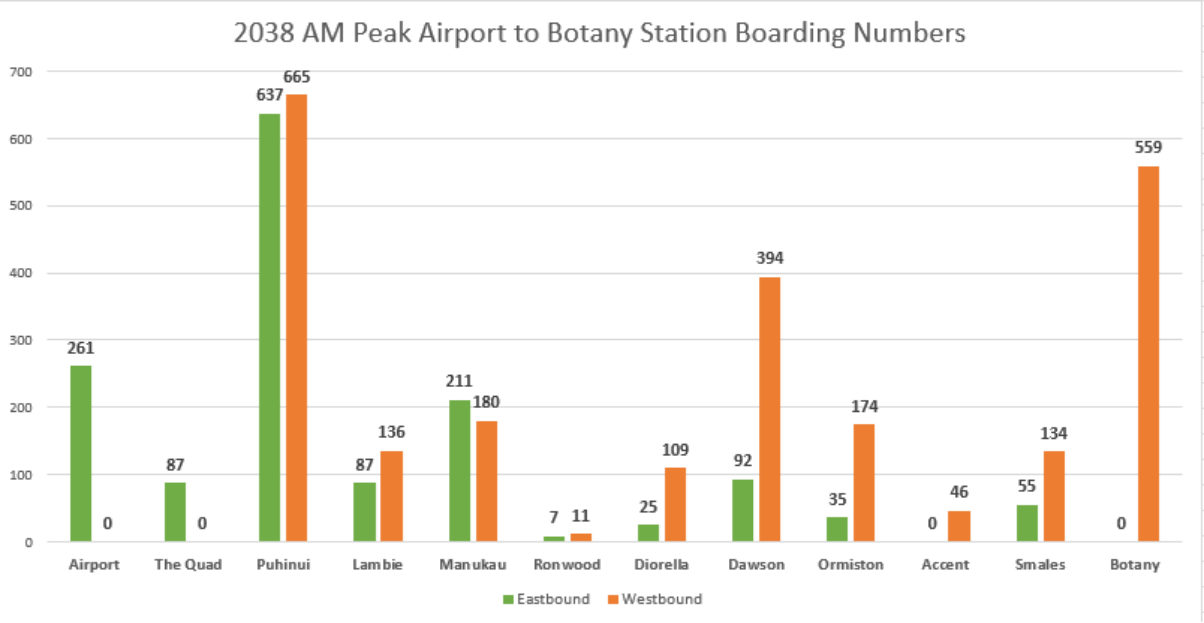


Figure 64: 2038 AM peak – station boarding numbers

For reference, the 2048 patronage boarding data are also shown in Figure 65.

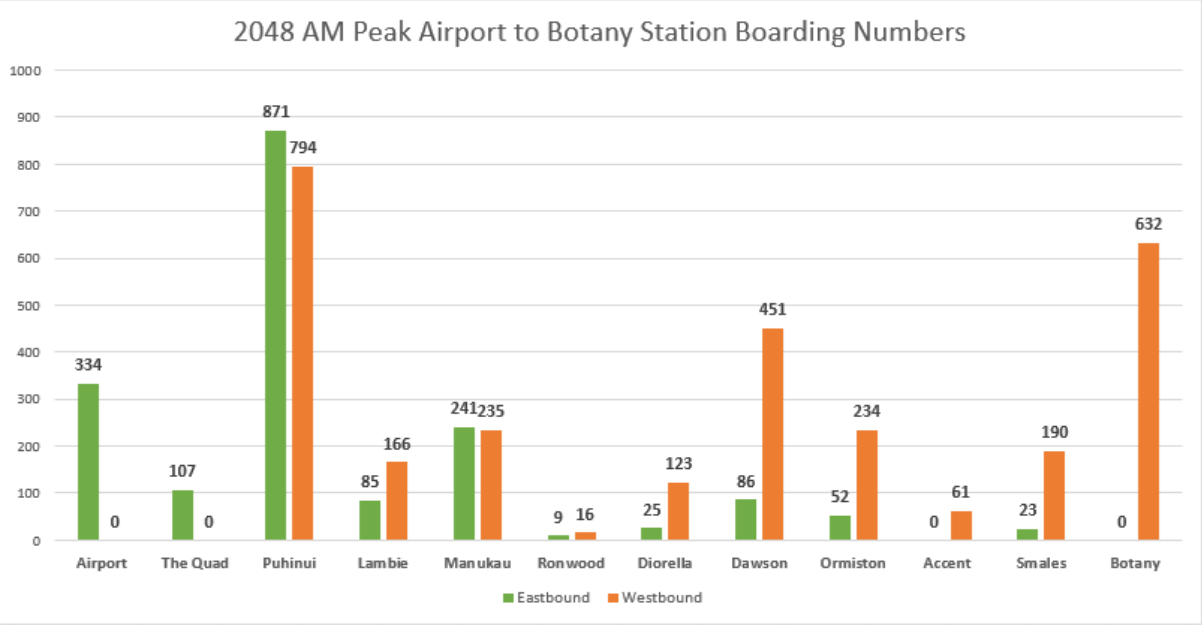


Figure 65: 2048 AM peak – station boarding numbers

The capacity assessment for each station platform (based on 2038 data) is summarised in Table 57.

Table 57: Station capacity assessment

NoR	Station	Station platform area (one platform in one direction)	Maximum number of passengers waiting to board		Maximum passenger occupancy area (1 m^2 / passenger)
			Eastbound	Westbound	
NoR 1	Smales Road	270 m^2	5	12	12 m^2
	Accent Drive	270 m^2	0	4	4 m^2
	Ormiston Road	270 m^2	3	15	15 m^2
NoR 2	Dawson Road	270 m^2	8	33	33 m^2
	Diorella Drive	270 m^2	3	10	10 m^2
	Ronwood Avenue	270 m^2	1	1	1 m^2
	Manukau Station	270 m^2	18	15	18 m^2
	Lambie Drive	270 m^2	8	12	12 m^2

Based on the above, Dawson Road Station has the highest estimated number of passengers waiting to board at any time (33 passengers), therefore occupying 33 m^2 of passenger waiting area. In this regard, the station capacity of approximately 270 m^2 is more than sufficient for the estimated 2038 patronage, thus ensuring that passenger safety is not compromised in any way.

It should be noted that there is also sufficient capacity for the 2048 estimated patronage numbers. Dawson Road Station is again estimated to have the highest passenger boardings (451 passengers per hour) in 2048, which equates to 38 passengers waiting at any time. The station platform area of 270 m^2 can easily cater for the maximum 38 m^2 of passenger waiting area required for Dawson Road Station.

All stations provide adequate crossing facilities to and from the station platforms. The signalised pedestrian crosswalk and specifically the pedestrian waiting area (on either side of the crosswalk) has been considered from both safety and capacity perspectives.

The signalised crosswalks at intersections have been designed to provide full length crosswalks between the public footpaths on either side of the road carriageway (i.e. no pedestrian refuge islands proposed). There is sufficient space available for passengers waiting on the public footpath to cross to the stations at all locations, such that that no overspill occurs.

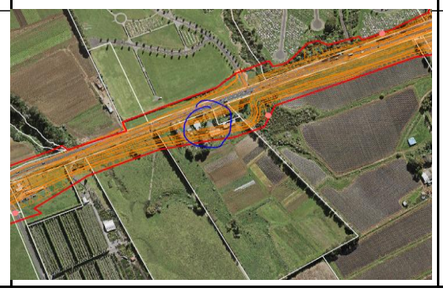
TE TUPU NGĀTAHI
SUPPORTING GROWTH

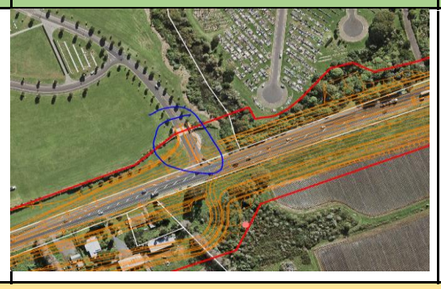
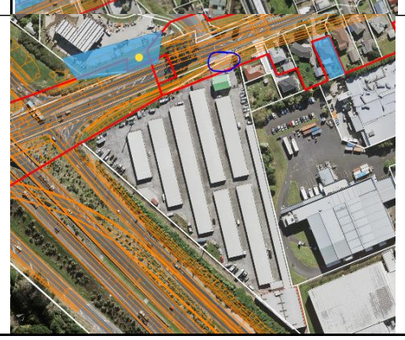
Appendix B

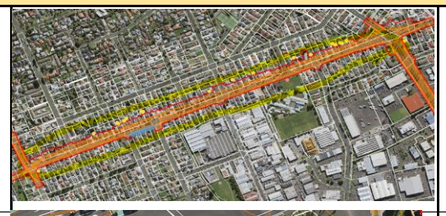
Property access and parking assessment

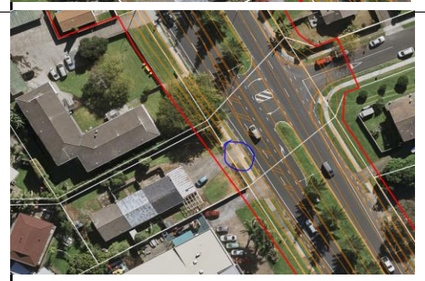
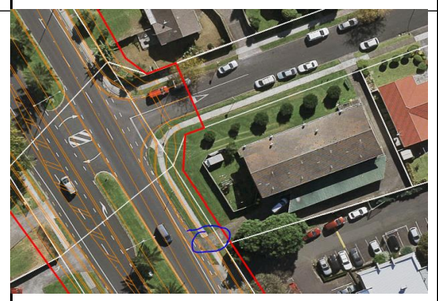
WAKA KOTAHI
NZ TRANSPORT AGENCY

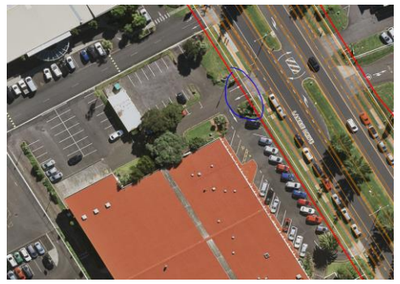
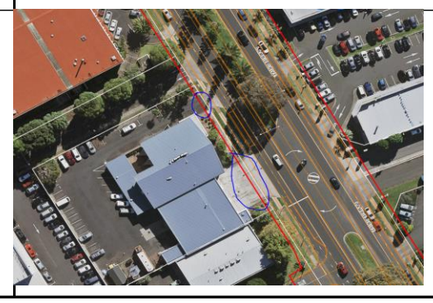
New Zealand Government

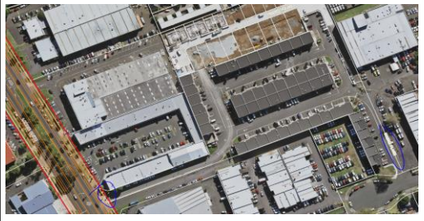
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
SH20B Section (NoR 4a /4b) - key commercial / industrial activities identified with residential lots assessed in bulk												
Residential lots between Orrs Road and SH20	Residential			No	Existing central safety barrier banning right turn ingress and egress movements. A2B does not impact possible movements at access points. Properties are acquired along this section where necessary due to rapid transit corridor	No		0	No			0
454 Puhinui Road	Commercial	Park & Ride South		No	SH20B/ Campana Road intersection will be upgraded to provide access to the Park & Ride	No		0	No			0
436 Puhinui Road	Horticulture	Black Bridge Big Tree Nurseries		No	No critical impact, access will be set back due to RTN corridor	No		0	No			0
408 Puhinui Road	Industrial	NKA Services Limited		Yes	Access will be removed due to a portion of the lot being acquired. Adequate access provisions (vehicle crossing and driveway) should be provided to continue access	No		0	No			0

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
361 Puhinui Road	Cemetary	Manukau Memorial Gardens		No	A2B proposes to reform intersection / access into cemetary. No issues	No		0	No			0
Puhinui Road Section (NoR 3). Note that residential lots have been grouped / bulk assessment. For all other activities, only impacted commercial businesses / properties have been assessed below												
Residential lots between Vision Place and Kenderdine Road	Residential			Yes	No existing solid median - A2B bans right turn access for all lots or acquires the property. Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes		2	No			0
Residential lots on Kenderdine Road, Bridge Street and Cambridge Terrace	Residential			No	No existing solid median, however BRT route does not run along these roads. The Project will only improve active mode facilities along these roads.	No		0	No			0
316 Puhinui Road	Industrial	Safe Store Papatoetoe		Yes	No existing solid median - A2B bans right turn access for this property. Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes		1	Yes	A few visitor car parks within the designation	4	1

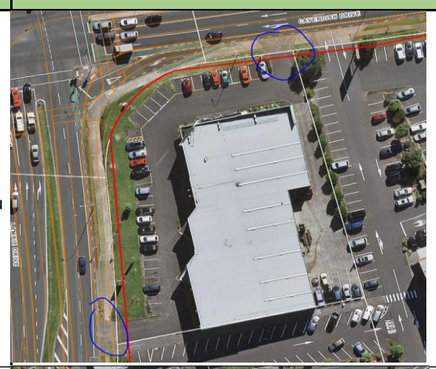
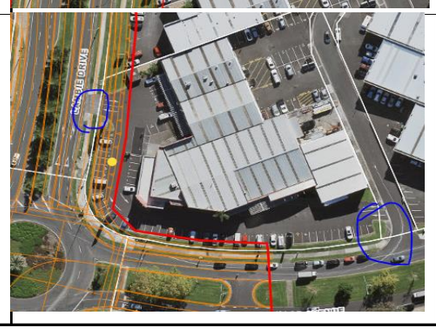
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
153 Wyllie Road	Commercial	Mama's Desserts Chines Choice Takeaway		Yes	A2B bans right turn access on Puhinui Road (no solid median in front of existing access on Puhinui Road). Alternative accesses provided on Wyllie Road	Yes	Yes	0	Yes	removes 4 parallel spaces. High turnover spaces given the activity	4	1
Manukau Road Section (NoR 2). Note that residential lots have been grouped / bulk assessment. For all other activities, only impacted commercial businesses / properties have been assessed below												
Residential lots between Cambridge Terrace and Lambie Drive	Residential			Yes	No existing solid median - A2B bans right turn access for all lots or acquires the property. Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes		2	No			0
80 Puhinui Road	Residential			No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
74 Puhinui Road	Residential			No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0

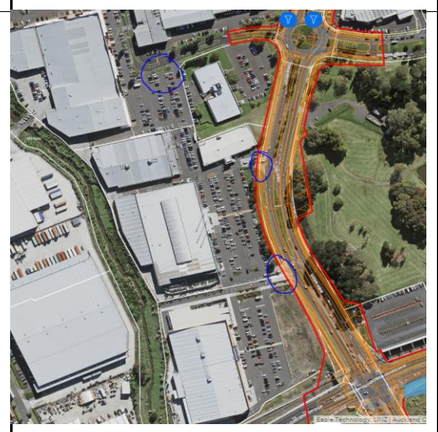
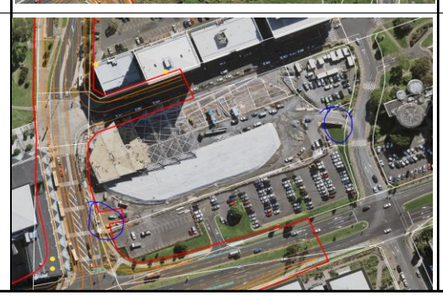
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
5 Lambie Drive	Residential			No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
7 Lambie Drive	Residential			No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
1 Ihaka Place	Residential			No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
9 Lambie Drive	Commercial	Pop Up OP Shop MCBC BestStart Lambie Drive		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0

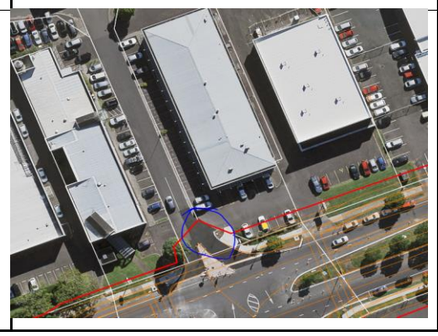
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
13 Lambie Drive	Church	Universal Church UCKG		Yes	No existing solid median - A2B bans right turn access for this property. Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes		1	No			0
8 Lambie Drive	Commercial	Panda Inspire UVL Logistics magwarehous.com		Yes	No existing solid median - A2B bans right turn access for this property. Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes		1	No			0
12 Lambie Drive	Commercial	Vehicle Import Centre Wayne Carson Motors Technofix		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
15A Lambie Drive	Fire Station	NZ Fire Service Counties Manukau		No	Identified as a significant access concern given the emergency services, currently right turn access possible. However, A2B design has been amended to now provide an additional signalised intersection to allow right turn out movements for fire trucks (signal preemption).	No		0	No			0

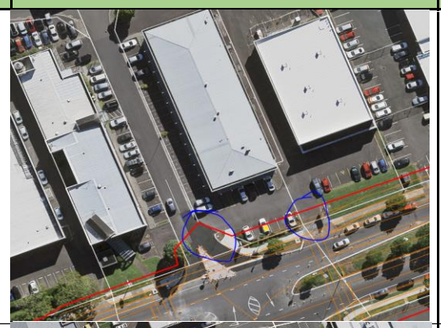
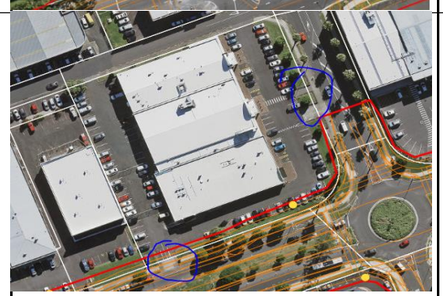
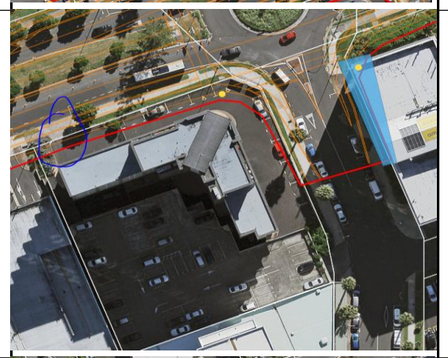
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
17/ 16 Lambie Drive	Commercial	Muti-unit stores		Yes	Currently provides two access points, north access not impacted as RT already banned due to solid median. South accesss impacted with RT ban (currently possible)	Yes	Yes	1	No			0
17, 17/A, 19 Lambie Drive	Mixed	Auckland Uni Tamaki Campus Lambie Studios Counties Manukau District Healthboard		No	Vehicle crossing and driveway will need to be reformed / regraded. 2 access points provided to shared car park. RT already banned due to median, no impacts	No		0	No			0
18 Lambie Drive	Commercial	Muti-unit stores		Yes	Currently gap in solid median in front of access, right turn access possible. A2B removes right turn ingress and egress. Alternative access point available on Sohum Place	Yes	Yes	0	No			0
7/21 Lambie Drive	Commercial	Manukau Business Park (multi-unit)		Yes	Currently gap in solid median in front of access, right turn access possible. A2B removes right turn ingress and egress. Alternative access point available on Ryan Place	Yes	Yes	0	No			0
7/20 Lambie Drive	Mixed	Gym NZ Uniforms Manukau Micro Plumbing		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0

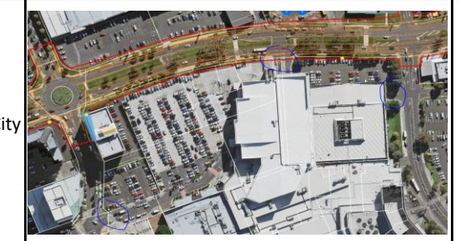
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
67 Cavendish Drive	Commercial	Spotlight ANZ manukau Branch Café		Yes	Currently gap in solid median in front of access, right turn access possible. A2B removes right turn ingress and egress. Alternative access point available on Cavendish Place	Yes	Yes	1	Yes	Carparks within desgination along Lambie Drive. Designation may reduce maneouvring space for remaining spaces.	36	3
28 Lambie Drive	Commercial	Fikaa Gym Chesters Plumbing & Bathroom centre Car and Truck Parts Manukau		Yes	2 access points, south access not impacted as RT banned due to median. North accesss impacted with RT ban (currently possible)	Yes	Yes	0	No			0
32 Lambie Drive	Commercial	Manukau Auto & Tyre Centre The Computer Warehouse Auckland Curry House & Care		No	Vehicle crossing and driveway will need to be reformed / regraded. 1 access point on Lambie Drive provided to shared car park. RT already banned due to median, no impacts. 2 alternative access points on Cavendish Drive	No		0	Yes	Some car parks along the Lambie Drive frontage inside desgination.	9	1
72 Cavendish Drive	Commercial	Manukau Supa Centre Multi-unit retail stores		No	Vehicle crossing and driveway will need to be reformed / regraded. Two access points (one ingress, one egress only) on Lambie Drive along A2B corridor. Currently no RT access due to solid median, therefore no impact. Furthermore, these access points are insignificant (likely for staff). Main access points to shopping centre provided off Cavendish Drive and Ronwood Avenue	No		0	Yes	Car parks along Lambie Drive frontage are inside designation. This includes two mobility spaces which will need to be relocated onsite	52	3

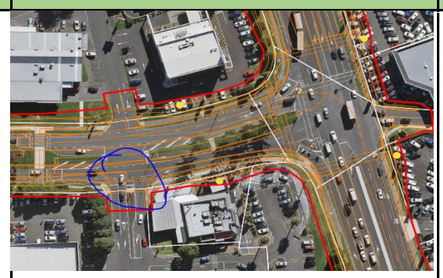
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
3/66 Cavendish Drive	Commercial	Lighting Direct Hospice Shop Manukau		No	One access point on Lambie Drive along A2B corridor. Currently no RT access due to solid median, therefore no impact. Alternative access point on Cavendish Drive	No		0	No			0
58 Cavendish Drive	Commercial	The Warehouse Manukau		Yes	Currently gap in solid median in front of access, right turn access possible. A2B removes right turn ingress and egress. Two alternative access points available on Cavendish Place	Yes	Yes	0	No			0
42 Lambie Drive	Commercial	Jaycar Electronics Mercury Printz Accurate Locksmiths & Security		Yes	No existing solid median - A2B bans right turn access for this property. Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes	No	1	No			0
21 Ronwood Avenue	Commercial	MoneyShop Manukau Corys Electrical Manukau Carpet Court Manukau		No	One access point on Lambie Drive along A2B corridor. Currently no RT access due to solid median, therefore no impact. Alternative access point on Ronwood Avenue	No		0	Yes	Car parks along Lambie Drive and Ronwood Ave frontage will be inside desgination.	16	2

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
Corner of Lambie Drive and Ronwood Ave	Park	Hayman Park		Yes	Currently gap in solid median in front of access, right turn access possible. A2B removes right turn ingress and egress. No alternative access	Yes	No	0	Yes	removeal of 4 car parks	4	1
55 Lambie Drive 61 Lambie Drive	Commercial	Bunnings Warehouse Kmart Warehouse Stationary Mitre 10 Mega Manukau		Yes	Two access points on Lambie Drive serving the retail stores. Both accesses ban right turn out movements, however the gap in the median in front of both access points allows right turn movements. The A2B corridor bans the right turn movement for the north access. A2B design has been amended to now provide an additional signalised intersection for the southern access on Lambie Drive to allow for right turn access (due to high volumes anticipated).	Yes	Yes	0	No			0
Corner of Manukau Station Road and Davies Ave (25 Davies Ave)	School	MIT Manukau Campus MIT Carpark		Yes	2 access points on Manukau Station Road, east access not impacted as RT access banned due to solid median. West accesss impacted with RT ban (currently RT ingress and egress possible due to gap in median). Refer to alternative route plan. Alternative routes can be provided to access the property via Left in / Left out access	Yes		1	No			0
12 Putney Way	Bus Station	Manukau Bus Station		Yes	Ingress movement off Osterley Way (no impact). RT / LT egress currently onto Davies Avenue. A2B will ban RT egress completely by redirecting buses southbound	Yes		1	No			0

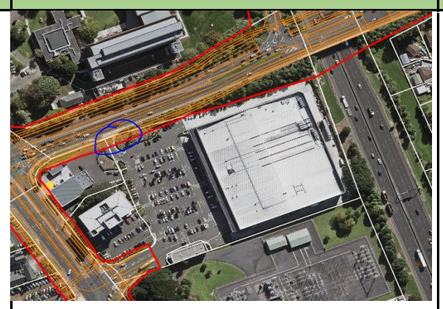
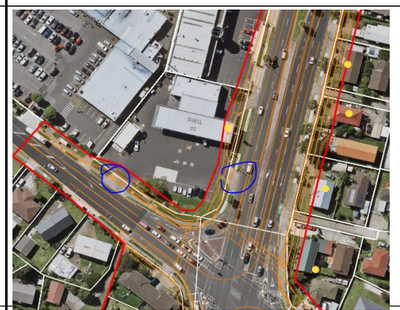
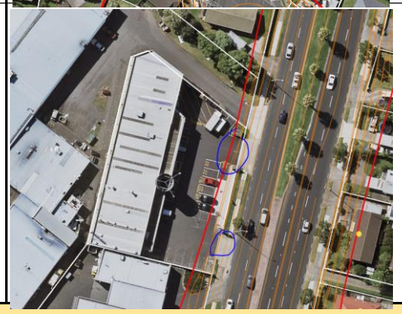
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
12 Davies Avenue	Mixed	Manukau Public Defence Service Immigration NZ Dropbox Work and Income Auckland Council Manukau Centre Jenny Craig Manukau		Yes	Two alternative access points provided onto Putney Way and Amersham Way. Minor impact of removed direct access from Davies Avenue due to A2B corridor (section of Davies Avenue banned to general traffic)	No		1	No			0
8 Davies Avenue	Car Park	Amersham Parking Lot		No	No impact to access points. Currently separate ingress and egress crossings on Amersham way.	No		0	No			0
2 Davies Avenue	Car Park	Ronwood Avenue Carpark		No	One access point on Ronwood Avenue along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	No			0
11 Ronwood Avenue	Unoccupied			No	Currently access provided off northern leg of Davies Ave / Ronwood Ave intersection. No impact	No		0	No			0

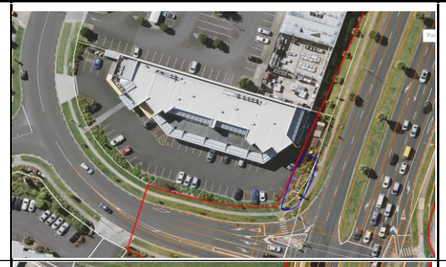
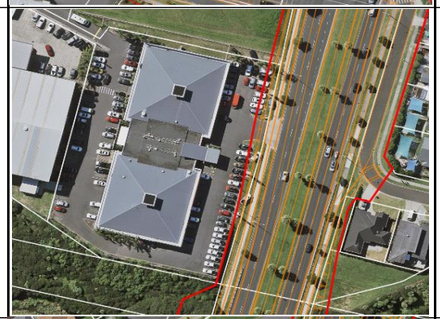
Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
9 Ronwood Avenue	Commercial	Flavours Grocery Store		Yes	Existing access fully removed due to proposed pedestrian crosswalk as part of A2B. Able to gain access via northern leg of Ronwood Ave / Davies Ave intersection, however will need to share with neighbouring site.	Yes	Yes	2	No			0
7 Ronwood Avenue	Commercial	Instant Finance Manukau		No	One access point on Ronwood Avenue along A2B corridor. Currently no RT access due to solid median, therefore no impact. Alternative access point provided on Sharkey St	No		0	No			0
18 Ronwood Avenue	Residential	The Rennaisance Centre (apartments)		No	One access point on Ronwood Avenue along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	No			0
5 Ronwood Avenue	Commercial	Chemist Warehouse Gravity NZ		No	One access point on Ronwood Avenue along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	No			0

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
3 Ronwood Avenue	Commercial	The Baby Factory Kathmandu Manukau Anytime Fitness Manukau Melba Manukau		Yes	Currently gap in solid median in front of access, right turn ingress movement possible, with right turn egress movement banned. A2B removes both right turn ingress and egress. Alternative LT in / LT out access point available to the east on Ronwood Ave, also access off Sharkey St is possible however is a longer route.	Yes	Yes	1	No			0
6-12 Amersham Way	Commercial	Westfield Manukau City		Yes	One access point on Ronwood Ave impacted by A2B corridor. A2B bans right turn in and out movements at main access currently possible due to gap in median. Alternative access point available on Osterley Way. Refer to alternative route plan	Yes	Yes	2	No			0
1 Ronwood Avenue	Commercial	Krispy Kreme Manukau Woodside Bar and Kitchen Functions Lifestyle Furniture Manukau		No	One access point on Ronwood Avenue along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	No			0
639 Great South Road	Commercial	Wendys Hamburgers Carls Jr Subway Noodle Canteen Bottle-O		Yes	Centre provides one access onto Rowlands Avenue and three access points onto GSR (some separated ingress / egress) - Rowlands access: Currently gap in solid median therefore all movements possible. A2B bans right turn access. - GSR south access: Only left turn out, no impacts (existing solid median in front) - GSR mid access: Only LT in and out, no impacts (existing solid median in front) - GSR north access: Only LT and RT out at signalised intersection. A2B provides signalised intersection here, so no impacts No significant concern with egress movements, SBD vehicles will need to drive alternative route to access site. Refer to alternative route plan	Yes		2	Yes	Carparks within designation along Great South Road and Ronwood Avenue	34	2

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
2 Ronwood Avenue	Commercial	McDonalds Leyton Way access from Ronwood Avenue		Yes	One access point on Ronwood Avenue along A2B corridor. Currently gap in solid median in front of access, therefore RT access possible. A2B bans RT access. Alternative access available via Leyton Way south end, refer to alternative route plan	Yes	Yes	1	No			0
1 Bakerfield Place	Commercial	Peugeot Manukau		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	Yes	Removing area for vehicles to park (aerial shows cars currently parked within designation)	6	1
686 Great South Road	Commercial	Manukau Hyundai		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
676 Great South Road	Commercial	Auckland Motors Mitsubishi		No	One access point on Great South Road along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	Yes	Removing area for vehicles to park (aerial shows cars currently parked within designation)	23	2
656 Great South Road	Industrial	Wiri Substation		No	One access point on Great South Road along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	No			0

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
635 Great South Road	Commercial	Motor Brothers - head office		No	2 access points on GSR. Currently no RT access due to solid median, therefore no impact.	No		0	Yes	Removing area for vehicles to park (aerial shows cars currently parked within designation)	23	2
631 Great South Road	Residential	Manukau Motor Lodge		No	One access point on Great South Road along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	No			0
627 Great South Road	School	NZMA Manukau Campus		No	One access point on Great South Road along A2B corridor. Currently no RT access due to solid median, therefore no impact.	No		0	Yes	Carparks inside designation along GSR frontage	9	1
621 Great South Road	School	NZMA		No	One access point on Cavendish Drive. Not impacted by A2B corridor.	No		0	Yes	Carparks inside designation along GSR frontage	9	1
652 Great South Road	Mixed	Caltex fuel station Westpac Manukau Centre Urban Soul Café		No	Two access points on GSR, one ingress on Te Irirangi Drive. Existing solid median in front of all access points, therefore no impact in terms of RT ban	No		0	Yes	A few carparks within designation	9	1

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
5 Te irirangi Drive	Commercial	Countdown Manukau Burgerfuel The Cheesecake shop		No	One access on Te Irirangi Drive, alternative access off intersection from GSR. Existing solid median in front of access on Te Irirangi Dirve, therefore no impact in terms of RT ban	No		0	Yes	Carparks within designation along Te Irirangi Drive frontage.	61	3
136 Dawson Road	Commercial	Z Fuel Station		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	Yes	Removes 1 car park	1	0
186 Te Irirangi Road	Commercial	Liquor Legends Vape Legends New Zealand		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
Te Irirangi Drive Section (NoR 1). Note the following assumptions: residential lots have been grouped / bulk assessment, for all other activities, only impacted businesses / properties have been assessed below												
Residential lots along Te Irirangi Drive	Residential			No	Generally no signficant impacts on these lots due to the existing solid median along the entire length of Te Irirangi Road. Right turn access is currently banned.	No		0	No	Generally no signficant impacts on parking		0

Address / Location	Activity	Name of Business	Aerial Screenshot	Assessment of impacts								
				Impacts on Access	Description	Ban RT ingress / egress due to A2B	Available alternative access points (i.e. not impacted by A2B)	Severity of Access Impacts	Impacts on Private Parking	Description	# of carparks within A2B designation (approximate)	Severity of Parking Impacts
1 Bishop Dunn Place	Commercial	Hot Spring Spa Pools		No	No impact	No		0	Yes	Designation cuts through parking - removes 5 spaces	5	0
350 Te Irirangi Drive	Commercial	Mitsubishi Motors		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	Yes	Designation removes 18 spaces along the Te Irirangi Drive frontage	18	1
455 East Tamaki Road	Commercial	Oracle Autos Limited		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0
30 Matarangi Road	Residential	Metlifecare Retirement Village		No	Vehicle crossing and driveway will need to be reformed / regraded. Existing solid median in front of access	No		0	No			0

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Appendix C

Roads and Streets Framework

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

Appendix C: Roads and Streets Framework

The development of the corridor design has included consideration of Auckland Transport's Roads and Streets Framework (**RASF**), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

NoR 1

The Te Irirangi Drive corridor is assessed to have the following RASF typology:

- Place value – P3 near the Botany Town Centre, transitioning to P2 in the middle section and P1 at its western end, west of Dawson Road. This reflects the transition from regionally important place to more local importance. These place features are to be retained in the longer term; and
- Movement value – M3, high strategic movement along its entire length. This important movement function is to be maintained in the long term.

Figure 66 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more sustainable modes of travel.

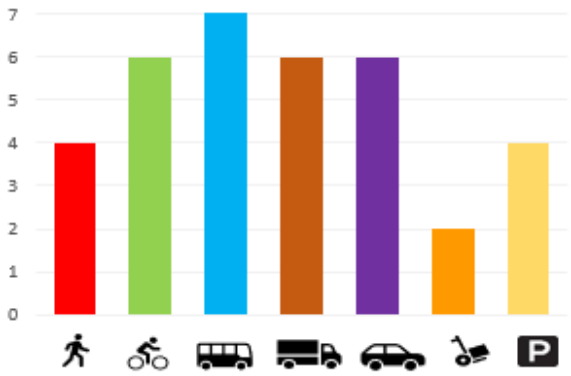


Figure 66: Future modal priority in 2048+ for Te Irirangi Drive

NoR 2

The NoR 2 corridor is assessed to have the following current RASF typology (where future typologies have been identified where necessary):

Table 58: NoR 2 – identified current and long-term place and movement values

Value	Function	Locations
Place value	P1	Typically residential in character, more local place function: • Puhinui Road (between Plunket Avenue and Lambie Drive); • Lambie Drive (between Puhinui Road and Ihaka Place); and • Te Irirangi Drive (between SH1 and Dawson Road).
	P2	Typically, commercial fringe locations: • Puhinui Road (between Wallace Road and Plunket Avenue); • Puhinui Road (in front of 116 Puhinui Road); • Lambie Drive (between Ihaka Place and Cavendish Drive); and • Te Irirangi Drive WBD (between Great South Road and SH1).
	P3	Typically, within the Manukau City Centre, a regionally important centre: • Kenderdine Road; • Bridge Street; • Cambridge Terrace; • Puhinui Road (between Cambridge Terrace and Wallace Road); • Lambie Drive (between Cavendish Drive and Manukau Station Road); • Manukau Station Road; • Davies Avenue; • Ronwood Avenue; • Great South Road; and • Te Irirangi Drive EBD (between Great South Road and SH1).
Movement value	M1	No roads currently or in the long term classify as M1
	M2	All roads below have been identified to transition to M3 in the long-term, which is consistent with the Airport to Botany long term intentions. • Kenderdine Road – transition to M3 long term; • Bridge Street – transition to M3 long term; • Cambridge Terrace – transition to M3 long term; • Puhinui Road (between Cambridge Terrace and Wallace Road) - transition to M3 long term; and • Puhinui Road (between Plunket Avenue and Lambie Drive) - transition to M3 long term.
	M3	Typically, within the Manukau City Centre, a regionally important centre: • Puhinui Road (between Wallace Road and Plunket Avenue); • Lambie Drive; • Manukau Station Road; • Davies Avenue; • Ronwood Avenue; • Great South Road; and • Te Irirangi Drive.

The movement value along all roads within NoR 2 will be M3 in the long term. This is consistent with the Project long term intentions as the BRT corridor will significantly increase regional and strategic public transport movement.

Figure 67 to Figure 73 indicate the likely long-term modal priorities for the corridor. Currently the mode split is weighted to general traffic, however existing walking and cycling facilities as well as public transport facilities are provided. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more sustainable modes of travel.

The modal priorities in 2048+ vary between roads within NoR 2 based on the surrounding land use, function, and connectivity.

Kenderdine Road, Bridge Street, Cambridge Terrace and Puhinui Road (between Cambridge Terrace and Lambie Drive) are considered to have a similar function and surrounding land use / environment, therefore the future modal priorities in 2048+ are consistent.

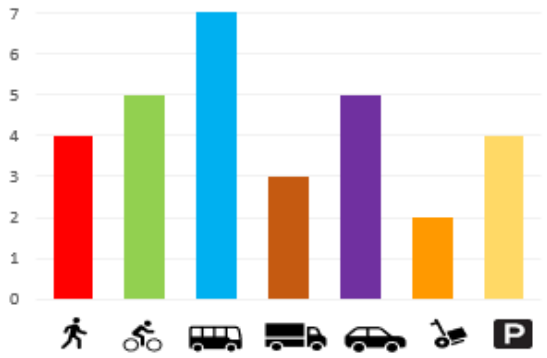


Figure 67: Future modal priority in 2048+ for Kenderdine Road, Bridge Street, Cambridge Terrace and Puhinui Road (between Cambridge Terrace and Lambie Drive)

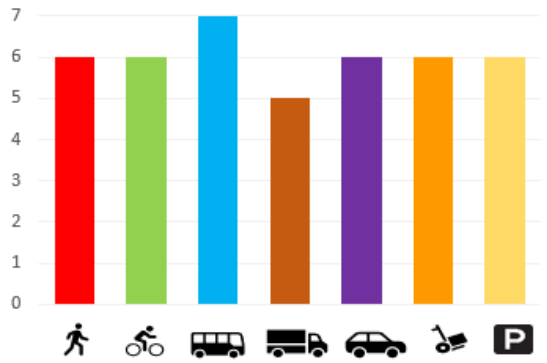


Figure 68: Future modal priority in 2048+ for Lambie Drive

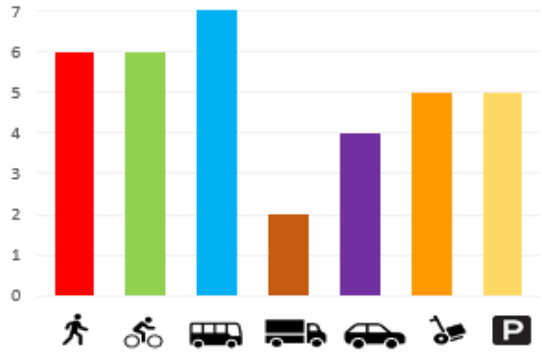


Figure 69: Future modal priority in 2048+ for Manukau Station Road

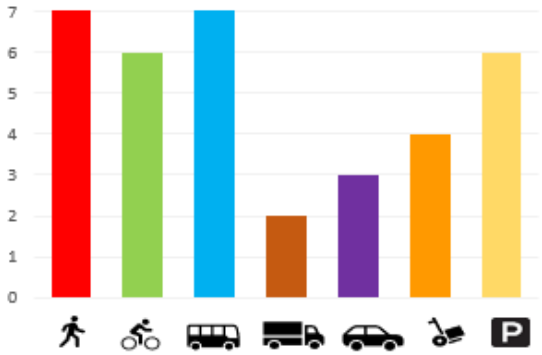


Figure 70: Future modal priority in 2048+ for Davies Avenue

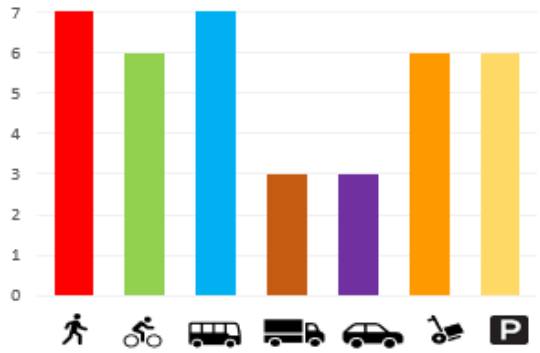


Figure 71: Future modal priority in 2048+ for Ronwood Avenue

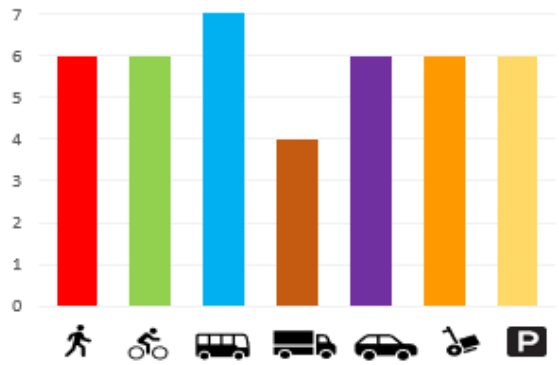


Figure 72: Future modal priority in 2048+ for Great South Road

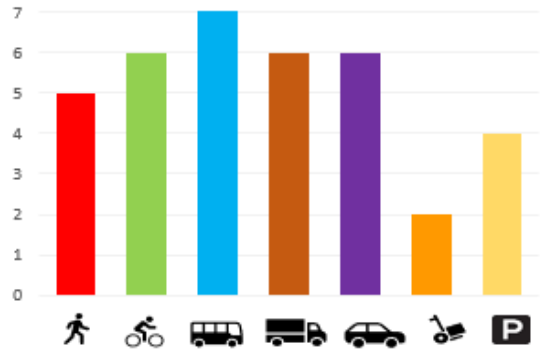


Figure 73: Future modal priority in 2048+ for Te Irirangi Drive

NoR 3

The NoR 3 corridor is assessed to have the following RASF typology:

- Place value – retain P1 / P2 / P3, SH20 to Wylie Road has a P1 function, Wylie Road to Nesdale Avenue has a P2 function, while Nesdale Avenue to Kenderdine Road has a P3 function; and
- Movement value – retain M3, Puhinui Road between SH20 and Kenderdine Road has a M3 function.

Figure 74 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more sustainable modes of travel. Puhinui Road will continue to serve as a connecting route for freight and loading and servicing will be limited given that the surrounding area is predominately residential. On-street parking will be affected because of the Project corridor, and access to residential properties will be retained.

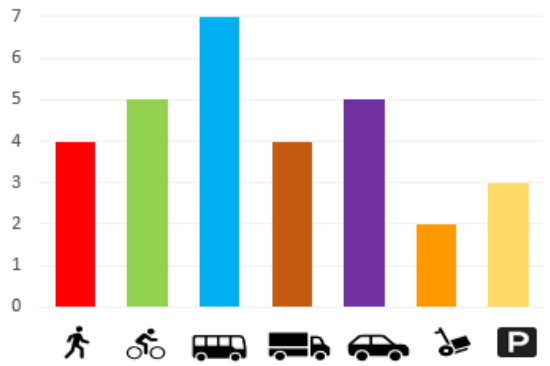


Figure 74: Future modal priority in 2048+ for Puhinui Road

NoRs 4a and 4b

The NoRs 4a and 4b corridor is assessed to have the following RASF typology:

- Place value – retain P1, the length of SH20B / Puhinui Road between Orrs Road and SH20 currently has a P1 function; and
- Movement value – retain M3, the length of SH20B / Puhinui Road between Orrs Road and SH20 currently has a M3 function.

Figure 75 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to rapid transit priority, with also increased priority for walking and cycling. Given the strategic nature of the SH20B corridor, priority for general traffic and freight will remain high. Loading and servicing and parking and access is currently low and will continue to be low due to limited access and the need to maintain movement function within the corridor. Existing access to properties will be retained and no existing on-street parking is permitted.

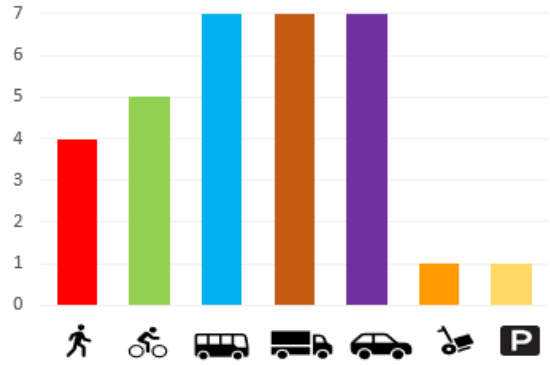


Figure 75: Future modal priority in 2048+ for SH20B