

Various mitigation options were tested, ranging from traffic signal phasing amendments to delaying specific pieces of the proposed works, to improve travel times⁴⁵. However, this testing indicated that the only alternative to improve general traffic travel times would be temporarily adding more lanes, which would add significant construction costs and delay to the construction programme.

Therefore, as part of the conditions to mitigate these effects, it is recommended that strategic public communication be undertaken to inform the travelling public of the planned works to enable the public to plan their trips accordingly.

It is recommended that appropriate public communication and advance warning of the planned works be undertaken before the works being initiated. It is also recommended that public communication and signage be provided during construction, informing motorists of the works and potential delays.

Strategic public communication could include measures such as:

- **Advanced Notification**
 - Provide early notification about the planned works through local newspapers, radio stations and community websites.
- **Variable Message Signs (VMS)**
 - Install VMSs on major routes leading up to construction areas, advising drivers of alternate routes and expected delays.
- **Social Media and Online Platforms**
 - Utilize social media platforms to reach a wider audience. Regularly post updates about construction progress, closures, and alternative routes.
- **Email and SMS Alerts**
 - Offer an email and/or SMS subscription service where invested individuals can sign up to receive construction updates and traffic alerts.
- **Public Meetings and Workshops**
 - Organise public meetings or workshops before construction begins to explain the project's scope, benefits and potential traffic impacts.
- **Community Liaison Officers**
 - Appoint community liaison officers as a point of contact for residents, businesses and commuters to provide timely information and address queries.
- **Press Releases**
 - Issue press releases to local media outlets, highlighting the project's significance and potential impact on traffic. Include information about alternative routes.
- **Temporary Signage**
 - Install temporary road signs along alternate routes to guide motorists and ensure they are aware of the recommended detours.
- **Radio Announcements**
 - Partner with local radio stations for regular announcements about construction updates and recommended routes.
- **Engage Major Freight Movers**
 - Communicate with major freight movers through the project area to schedule deliveries outside peak hours.

⁴⁵ See Appendix A

In turn, these measures could lead to changes in travel behaviour, such as travelling outside the peak periods or using alternative routes. This will be a condition of the project and will be managed through the CTMP.

It should be noted that these increases in travel times are temporary and are typical for transport projects of this scale. Furthermore, these levels of delay are predicted to occur during the AM and PM commuter peak hours. Outside of these periods and for most of the day, the transport network will experience lower levels of delay.

Also, the predicted increases in travel times are for the routes across the modelled network. Depending on their origins and destinations (e.g., the commercial areas in EB3C), many motorists will only be travelling on sections of the routes and may not experience the full effect of the predicted travel times.

Once constructed the RRF will, in part, alleviate congestion around the Pakūranga Town Centre. This in turn will improve travel times for general traffic along the Tī Rākau Drive corridor⁴⁶. Also, the completion of the Project is expected to further improve travel times (see **Section 6.3.3**).

Based on the above, the potential adverse effects to general traffic are considered to be mitigated as far as is reasonably practicable. Lastly, in light of the improvements that will be gained upon the Project's completion, this level of delay is considered acceptable.

⁴⁶ Refer to Appendix A, specifically Construction Scenario 2 which simulates the completion of the RRF among others.

5.2.4 Burswood Drive east and west closures

As stated in **Section 4.2.2**, the construction of the two new Burswood Drive / Busway intersections in EB3C is expected to require the temporary closure of one section of Burswood Drive while diverting all residential traffic along Burswood Drive to the other in an alternating fashion. Each closure is expected to have an indicative duration of three months.

Figure 54 shows the location of the Burswood Drive east and west closures.



Figure 54: Burswood Dr east and west closure locations

It should be noted that both the Burswood Drive east and west intersections with Tī Rākau Drive are currently signalised and will remain open. All existing traffic to/from the commercial properties fronting both Burswood Drive east and west will not require diversion.

For the purposes of this assessment, a conservative assumption was made that 90% of the traffic demand to/from both Burswood Drive east and west is residential traffic, i.e., 90% of the traffic volumes would be diverted during each closure. Simplified traffic demand distribution diagrams are provided in **Appendix F**.

Table 11 and **Table 12** provide a comparison of intersection performance in the peak periods between the Do-Minimum and the Burswood Drive east and west closures, respectively.

Table 11: Tī Rākau Dr / Burswood Dr east and west performance summary (east closure)

Intersection	Do-Minimum			Burswood Dr East Closure		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
AM Peak						
Tī Rākau Dr / Burswood Dr east	A	0.50	9	A	0.51	5
Tī Rākau Dr / Burswood Dr west	B	0.69	15	B	0.82	20
PM Peak						
Tī Rākau Dr / Burswood Dr east	C	0.89	21	B	0.68	15
Tī Rākau Dr / Burswood Dr west	C	0.88	26	D	0.95	50

Table 12: Tī Rākau Dr / Burswood Dr east and west performance summary (west closure)

Intersection	Do-Minimum			Burswood Dr West Closure		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
AM Peak						
Tī Rākau Dr / Burswood Dr east	A	0.50	9	B	0.68	11
Tī Rākau Dr / Burswood Dr west	B	0.69	15	B	0.68	13
PM Peak						
Tī Rākau Dr / Burswood Dr east	C	0.89	21	D	1.05	51
Tī Rākau Dr / Burswood Dr west	C	0.88	26	B	0.87	18

As expected, SIDRA analysis indicates that during the Burswood Drive east closure the intersection performance at the eastern intersection will improve slightly in both peak periods. The performance of the western intersection is expected to decrease but is still expected to operate with spare capacity.

Also as expected, the analysis indicates that intersection performance will increase at the western intersection and decrease at the eastern intersection during the Burswood Drive west closure. The Tī Rākau Drive / Burswood Drive east intersection is however still expected to operate at acceptable levels of service.

Therefore, the temporary effects of these closures on general traffic are considered to be low.

5.2.5 Temporary Effects to Bus Services and Facilities

The sections below provide details and assessment of the temporary effects to bus services and facilities during construction in the EB3C and EB4 project areas⁴⁷.

5.2.5.1 Bus Travel Times

Bus route travel times were determined using the AIMSUN model, with a 2028 horizon year. Travel times were determined in both directions during AM and PM peak periods for the following services and routes⁴⁸:

- **70** – Botany Town Centre bus station to Ellerslie Panmure Highway / Clare Place intersection
- **351** – Botany Town Centre bus station to Tī Rākau Drive / Harris Road intersection
- **352** – Tī Rākau Drive / Harris Road intersection to Panmure bus station
- **353** – Botany Town Centre bus station to Tī Rākau Drive / Harris Road intersection

Table 13 provides a comparison of the bus route travel times between the Do-Minimum and EB2/EB3/EB4 Construction Scenario, with a 2028 horizon year.

Table 13: Bus travel times – Do-Minimum vs EB2/EB3/EB4 Construction Scenario

AM Peak						
Modelled Route Extent	Westbound			Eastbound		
	Do-Minimum [min]	EB2/EB3/EB4 Const. Sce. [min]	Difference [min]	Do-Minimum [min]	EB2/EB3/EB4 Const. Sce. [min]	Difference [min]
70 – Botany bus station to Ellerslie Panmure Hwy / Clare Pl	42.3	50.2	7.9	26.9	30.9	4.0
351 – Botany bus station to Tī Rākau Dr / Harris Rd	16.2	22.1	5.9	5.3	6.9	1.6
352 – Tī Rākau Dr / Harris Rd to Panmure station	27.5	35.3	7.8	18.7	26.3	7.6
353 – Botany bus station to Tī Rākau Dr / Harris Rd	16.2	22.1	5.9	5.3	6.9	1.6

⁴⁷ Refer to Appendix A for an assessment of the temporary effects to bus services and facilities in the EB2 and EB3R project areas.

⁴⁸ The route descriptions refer to the extent of the routes in the AIMSUN model, not the total extent of the services from start to end on the wider network.

PM Peak						
Modelled Route Extent	Westbound			Eastbound		
	Do-Minimum [min]	EB2/EB3/EB4 Const. Sce. [min]	Difference [min]	Do-Minimum [min]	EB2/EB3/EB4 Const. Sce. [min]	Difference [min]
70 – Botany bus station to Ellerslie Panmure Hwy / Clare Pl	35.7	33.2	-2.4	38.1	40.1	2.0
351 – Botany bus station to Tī Rākau Dr / Harris Rd	8.2	7.8	-0.4	15.3	11.5	-3.8
352 – Tī Rākau Dr / Harris Rd to Panmure station	24.1	26.8	2.7	20.9	30.5	9.6
353 – Botany bus station to Tī Rākau Dr / Harris Rd	8.2	7.8	-0.4	15.3	11.5	-3.8

Again, on first inspection, the reduced travel times of the 351 and 353 services in the PM peak may seem counter-intuitive. However, it should be noted that Tī Rākau Drive in EB3C is predicted to experience less demand during construction. Also, the EB2/EB3/EB4 Construction Scenario model includes optimised phasing arrangements and timings, as opposed to the Do-Minimum model which includes calibrated signal phasing to obtain travel times similar to surveyed travel times.

Bus travel times of the 70 and 352 services (both directions) as well as the 351 and 353 services (westbound) are predicted to experience moderate to relatively large increases during the AM peak, compared to the Do-Minimum. The 352 service (eastbound) is also predicted to experience a relatively large increase in travel time in the PM peak. As stated in **Section 5.2.3**, this is not unexpected given the following factors:

- The addition of two new intersections to the network:
 - Tī Rākau Drive / William Roberts Road
 - Tī Rākau Drive / Aylesbury Street / Palm Avenue
- The closure of Reeves Road, whereby more vehicles are likely to divert to Tī Rākau Drive and Pakūranga Road
- Ongoing construction along Tī Rākau Drive in EB2 (Pakūranga Road to Reeves Road), EB3R (Reeves Road to Gossamer Drive) and EB3C (Burswood Drive east to Guys Reserve)

With the closure of Reeves Road and with the RRF potentially not completed by this stage, large queues are predicted in the westbound kerbside lane on Tī Rākau Drive as vehicles attempt to turn onto SEART. As the existing bus stops along Tī Rākau Drive are located along the kerbside lane, buses are likely to travel in this congested lane, resulting in increased travel times. Furthermore, at the western end of the modelled route of the 352 service, the service travels along Church Crescent and Queens Road and not the busway along Lagoon Drive.

Ti Rākau Drive is a congested corridor in the existing environment; therefore, it is very likely that redistributing traffic and/or reducing capacity due to road works will lead to increased queues and delays. Furthermore, increases in travel times through the Project area are inherent in the majority of transport projects of this scale.

Again, it is also important to note that the AIMSUN models simulate a worst-case scenario. Furthermore, the models do not account for various changes in travel behaviour that could reduce the predicted delays, such as peak spreading, flexible working options and alternate route selection (outside of the model extent). These changes in travel behaviour are also inherent in these types of transport construction projects.

As stated in **Section 5.2.3**, a number of mitigation options were tested. However, it is considered that the only alternative to improve bus travel times would be to reallocate a general traffic lane in each direction for bus priority. This would also be expected to have high impacts on general traffic travel times.

Therefore, as part of the conditions to mitigate these effects, it is recommended that strategic public communication be undertaken to inform the travelling public of the planned works to enable the public to plan their trips accordingly. It is recommended that appropriate public engagement be undertaken before and during construction. Strategic public communication could include measures such as:

- Advance notification
- Variable Message Signs (VMS)
- Social media and online platforms
- Email and SMS alerts
- Public meetings and workshops
- Community liaison officers
- Press releases
- Temporary signage
- Radio announcements, and
- Engaging with major freight movers

This in turn could lead to more manageable queues, reduced delays, and improved travel times on the network. This will be managed through the CTMP. It should also be noted that these predicted increases in travel times are temporary. Furthermore, these levels of delay are predicted to occur during the peak hours. Outside of these periods and for most of the day the network will experience lower levels of delay. Once constructed by early- to mid-2026 the RRF will, in part, alleviate congestion around the Pakūranga Town Centre. This in turn will improve travel times for buses along the Ti Rākau Drive corridor⁴⁹. Also, the completion of the Project is expected to further improve travel times, by means of the new dedicated bus lanes (see **Section 6.4.6**).

Based on the above, the potential adverse effects are considered to be mitigated as far as is reasonably practicable. Lastly, in light of the improvements that will be gained upon the Project's completion, this level of delay is considered acceptable.

⁴⁹ Refer to Appendix A, specifically Construction Scenario 2 which simulates the completion of the RRF among others.

5.2.5.2 School Bus Services

As stated in **Section 5.2.4**, the construction of the two new Burswood Drive / Busway intersections in EB3C is expected to require the closure of one section of Burswood Drive in an alternating fashion. In the existing environment, two school bus services travel along Burswood Drive, namely the:

- **S013** – Otara to Edgewater College, and
- **S421** – Burswood to Farm Cove Intermediate, St Marks School and Wakaaranga School

The sections below provide details of the existing school bus routes along Burswood Drive, an assessment of the effects to these routes during the proposed closures as well as recommended mitigation measures. Consultation will be undertaken with the affected schools, AT Metro, and the Ministry of Education and the measures will be refined for implementation. This will be achieved through the CTMP.

S013 Temporary Route Changes during Burswood Drive west Closure:

The S013 (inbound) currently travels along Harris Road, Tī Rākau Drive, Burswood Drive (anti-clockwise) and then Tī Rākau Drive towards Edgewater College. During the Burswood Drive west closure it is recommended that the service divert onto Elderberry Road eastbound, down Burswood Drive east and westbound along Tī Rākau Drive. The increase in travel distance is approximately 1.12km (or 1.7 minutes⁵⁰). **Figure 55** shows the current S013 inbound route (blue) and the recommended temporary route (yellow) during the western closure.



Figure 55: S013 inbound temporary route changes during Burswood Dr west closure

⁵⁰ Based on an average travel speed of 40km/h

Students currently boarding at Bus Stop 2132 on Burswood Drive west will instead board at Bus Stop 6139 on Tī Rākau Drive. This is a walking distance of approximately 270m (or 3.5 minutes⁵¹).

The S013 (outbound) currently travels along Tī Rākau Drive, Burswood Drive (clockwise), Tī Rākau Drive and then Harris Road towards Otara. During the Burswood Drive west closure it is recommended that the service divert onto Torrens Road eastbound, back onto Tī Rākau Drive, northbound on Burswood Drive and finally westbound along Elderberry Road. The increase in travel distance is approximately 1.35km (or 2.0 minutes).

Figure 56 shows the current S013 outbound route (blue) and the recommended temporary route (yellow) during the western closure.

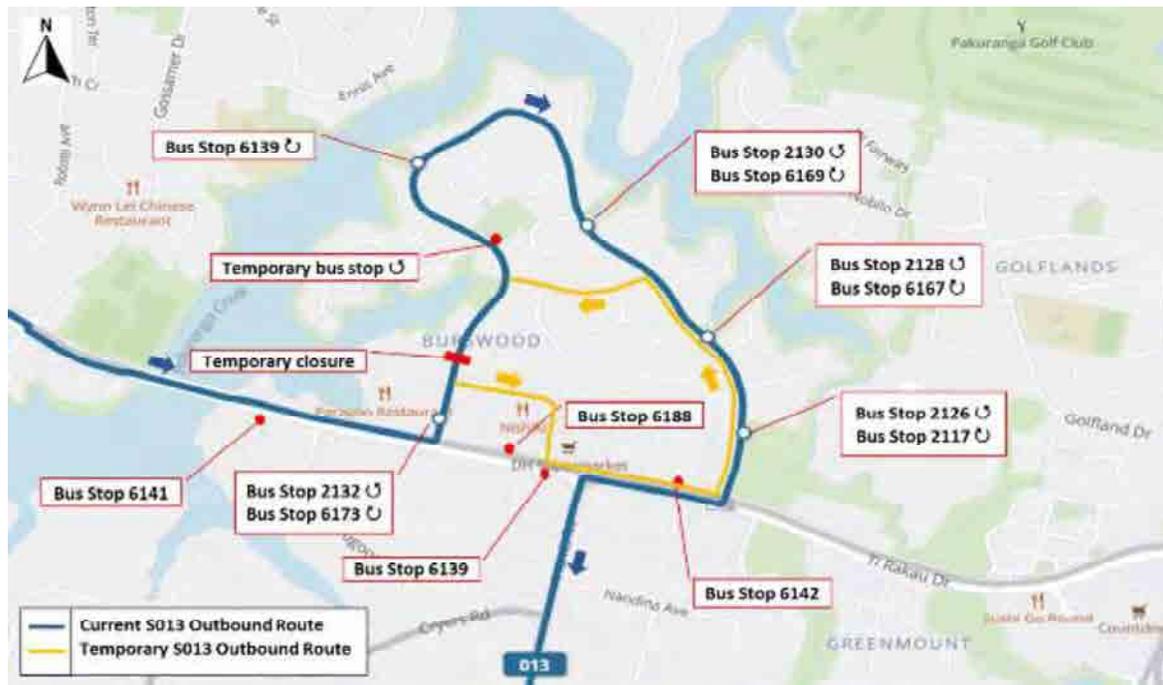


Figure 56: S013 outbound temporary route changes during Burswood Dr west closure

With the recommended detour route above, students would still be able to alight at their current bus stops.

⁵¹ Based on an average walking speed of 1.3m/s

S013 Temporary Route Changes during Burswood Drive east Closure:

During the Burswood Drive east closure it is recommended that the S013 inbound service divert onto Ti Rākau Drive westbound, Burswood Drive (clockwise) and eastbound along Elderberry Road. The increase in travel distance is approximately 140m (or 13 seconds).

Figure 57 shows the current S013 inbound route (blue) and the recommended temporary route (yellow) during the eastern closure.



Figure 57: S013 inbound temporary route changes during Burswood Dr east closure

Students currently boarding at Bus Stop 6142 on Ti Rākau Drive and Bus Stop 2126 on Burswood Drive will instead board at Bus Stop 6139 on Ti Rākau Drive. This is a walking distance of approximately 350m (or 4.5 minutes), and 570m (or 7.3 minutes), respectively. Students currently boarding at Bus Stop 2128 on Burswood Drive will instead board at Bus Stop 2130, which is a walking distance of approximately 390m (or 5 minutes).

It is recommended that the S013 outbound service divert onto Elderberry Road westbound, Burswood Drive southbound and then eastbound along Tī Rākau Drive during the Burswood east closure. Again, the increase in travel distance is approximately 140m (or 13 seconds).

Figure 58 shows the current S013 outbound route (blue) and the recommended temporary route (yellow) during the eastern closure.



Figure 58: S013 outbound temporary route changes during Burswood Dr east closure

Students currently alighting at Bus Stop 6167 on Burswood Drive will instead alight at Bus Stop 6169, approximately 370m (or 4.7 minutes) further north. Students currently alighting at Bus Stop 2117 on Burswood Drive will alight at either Bus Stop 6169 on Burswood Drive or Bus Stop 6188 on Tī Rākau Drive. This is a walking distance of approximately 670m (or 8.6 minutes) to either of these alternative bus stops.

S421 Temporary Route Changes during Burswood Drive west Closure:

The S421 (inbound) currently starts its journey at Bus Stop 6173 on Burswood Drive west travelling clockwise and then eastbound along Ti Rākau Drive. During the Burswood Drive west closure it is recommended that the service divert onto Torrens Road eastbound, Ti Rākau Drive eastbound, Burswood Drive (anti-clockwise) and finally westbound along Elderberry Road. The increase in travel distance is approximately 1.35km (or 2.0 minutes), this is similar to the S013 detour during the Burswood Drive west closure.

Figure 59 shows the current S421 inbound route (blue) and the recommended temporary route (yellow) during the western closure.

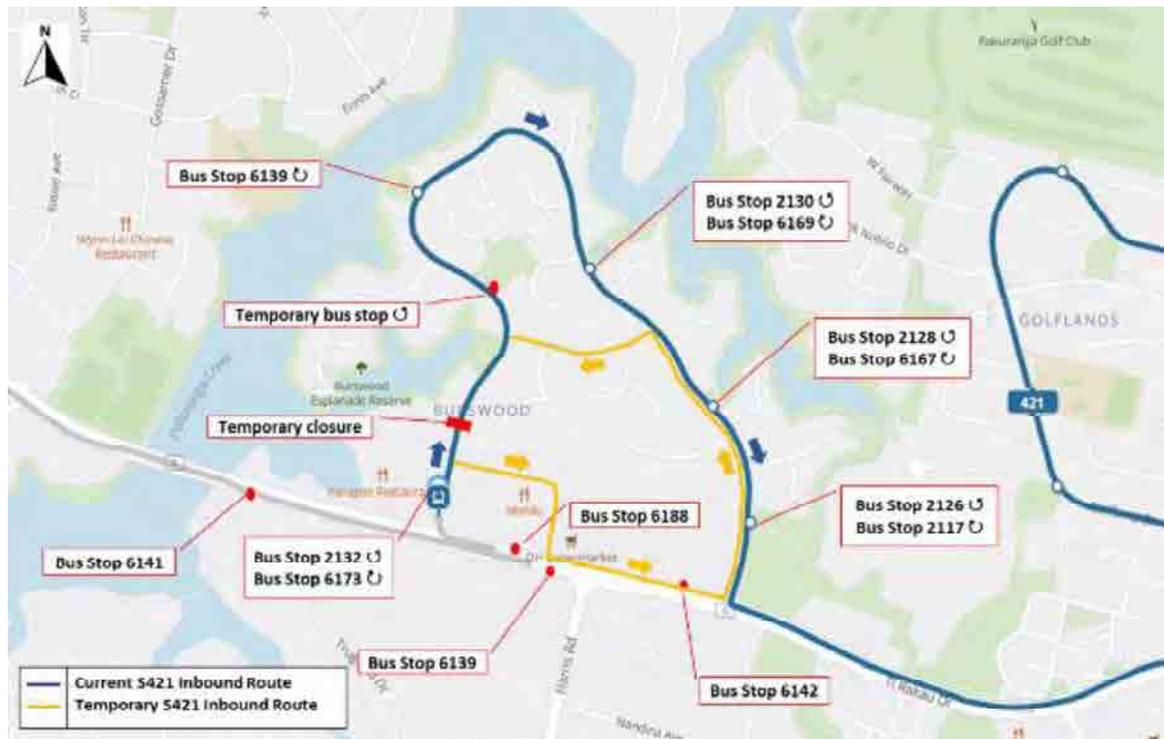


Figure 59: S421 inbound temporary route changes during Burswood Dr west closure

With the recommended detour route above, students would still be able to board at their current bus stops.

Currently, the S421 (outbound) service travels westbound along Ti Rākau Drive, anti-clockwise along Burswood Drive and terminates at Bus Stop 2132. It is recommended that a temporary bus stop be provided along Burswood Drive southbound near Burswood Park and that the service terminate here instead during the western closure.

Figure 60 shows the current S421 outbound route (blue) and the recommended temporary bus stop along Burswood Drive.

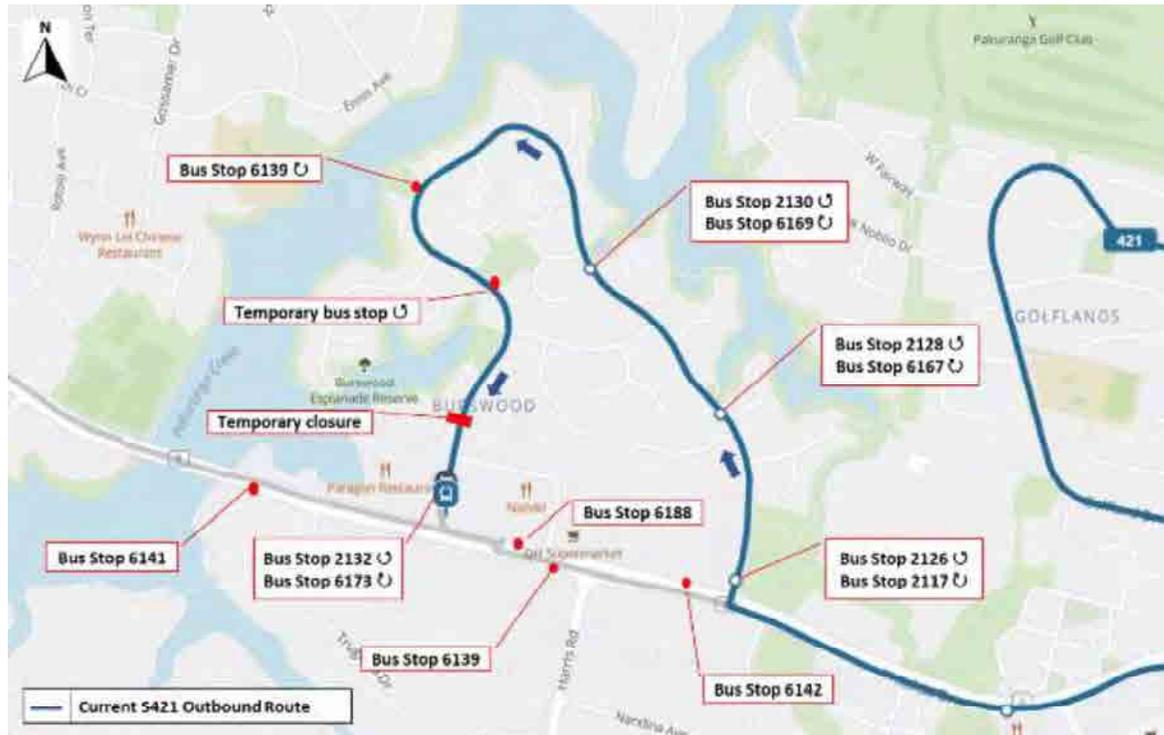


Figure 60: S421 outbound temporary route changes during Burswood Dr west closure

Students currently alighting at Bus Stop 2132 will instead alight at the temporary bus stop, approximately 460m (or 5.9 minutes) further north.

S421 Temporary Route Changes during Burswood Drive east Closure:

During the Burswood Drive east closure it is recommended that the S421 inbound service divert onto Elderberry Road westbound, Burswood Drive southbound and finally eastbound along Tī Rākau Drive. The increase in travel distance is approximately 730m (or 1.1 minutes).

Figure 61 shows the current S421 inbound route (blue) and the recommended temporary route (yellow) during the eastern closure.

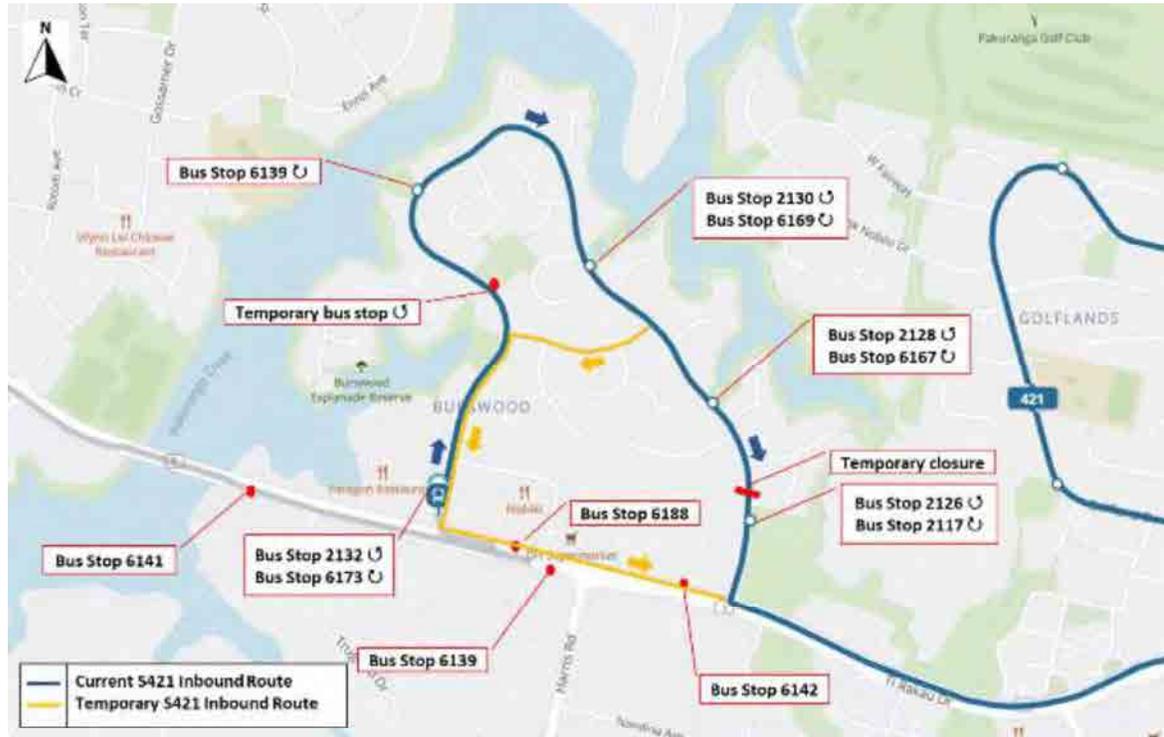


Figure 61: S421 inbound temporary route changes during Burswood Dr east closure

Students currently boarding at Bus Stop 6167 on Burswood Drive will instead board at Bus Stop 6169, approximately 370m (or 4.7 minutes) further north. Students currently boarding at Bus Stop 2117 on Burswood Drive will board at Bus Stop 6142 on Tī Rākau Drive instead, approximately 250m (or 3.2 minutes) further west.

It is recommended that the S421 outbound service divert onto Ti Rākau Drive westbound, Burswood Drive (clockwise) and Elderberry Road eastbound during the eastern closure. Again, the increase in travel distance is approximately 730m (or 1.1 minutes). **Figure 62** shows the current S421 outbound route (blue) and the recommended temporary route (yellow) during the eastern closure.



Figure 62: S421 outbound temporary route changes during Burswood Dr east closure

Students currently alighting at Bus Stop 2128 on Burswood Drive will instead alight at Bus Stop 2130, approximately 490m (or 5 minutes) further north. Students currently alighting at Bus Stop 2126 on Burswood Drive will alight at Bus Stop 6139 on Ti Rākau Drive instead, approximately 600m (or 7.7 minutes) further west. Alternatively, the S421 outbound service could terminate at Bus Stop 6142 on Ti Rākau Drive and these students could alight here instead. This a walking distance of approximately 250m (or 2.6 minutes) from Bus Stop 2117.

Overall, the proposed detour routes are expected to add no more than approximately 2 minutes in travel time to the S013 and S421 inbound and outbound services during both the eastern and western Burswood Drive closures. Furthermore, the proposed alternative boarding and alighting bus stops are still expected to be within the recommended 5–10-minute walking catchment⁵² for the majority of students in the Burswood residential area. It should be noted that the effects are temporary and that when considering the overall construction programme, these temporary closures will have a short duration. Based on these factors, and with the proposed mitigation measures in place, the temporary effects to these school bus services are considered to be low.

As above, consultation will be undertaken with the affected schools, AT Metro, and the Ministry of Education, and the measures will be refined for implementation. This will be achieved through the CTMP.

⁵² <https://www.nzta.govt.nz/walking-cycling-and-public-transport/public-transport/public-transport-design-guidance/getting-to-and-from-public-transport/walking/>

5.2.6 Summary of Temporary Effects to Road Traffic

General traffic travel times from Botany to Pakūranga (both directions), Botany towards SEART (westbound) as well as from Howick to SEART (westbound) are predicted to experience moderate to relatively large increases during the AM peak, compared to the Do-Minimum. Similar increases are also expected for the Botany to SEART (eastbound) route in the PM peak.

Bus travel times of the 70 and 352 services (both directions) as well as the 351 and 353 services (westbound) are predicted to experience moderate to relatively large increases during the AM peak, compared to the Do-Minimum. The 352 service (eastbound) is also predicted to experience a relatively large increase in travel time in the PM peak.

This is not unexpected due to the additional intersections on the network, the closures of Reeves Road and the subsequent diversion of traffic onto Ti Rākau Drive and Pakūranga Road, and the ongoing construction along Ti Rākau Drive in EB2, EB3R and EB3C. Ti Rākau Drive is a congested corridor in the existing environment; therefore, it is very likely that redistributing traffic and/or reducing capacity due to road works will lead to increased queues and delays.

It is important to note that the AIMSUN models simulate a worst-case scenario. Furthermore, the models do not account for various changes in travel behaviour that could reduce the predicted delays, such as peak spreading, flexible working options and alternate route selection (outside of the model extent). These changes in travel behaviour are also inherent in these types of transport construction projects.

A number of mitigation options were tested, ranging from traffic signal phasing amendments to delaying specific pieces of the proposed works, in an attempt to improve travel times⁵³. However, it is assessed that the only alternative to maintain existing travel times would be to add more lanes. This was not considered practicable as it would be expected to have significant implications on construction costs and programme.

Therefore, as part of the conditions to mitigate these effects, it is recommended that strategic public communication be undertaken to inform the travelling public of the planned works to enable the public to plan their trips accordingly. It is recommended that appropriate public engagement be undertaken before and during construction. Strategic public communication could include measures such as:

- Advance notification
- Variable Message Signs (VMS)
- Social media and online platforms
- Email and SMS alerts
- Public meetings and workshops
- Community liaison officers
- Press releases
- Temporary signage
- Radio announcements, and
- Engaging with major freight movers

⁵³ See Appendix A

This in turn could lead to more manageable queues, reduced delays, and improved travel times on the network. This will be managed through the CTMP.

It should also be noted that these effects are temporary, and once constructed, the RRF and the Project as a whole will alleviate congestion, particularly around the Pakūranga Town Centre. Furthermore, these levels of delay are predicted to occur during the peak hours. Outside of these periods and for most of the day the network will experience lower levels of delay.

Assessment of the Burswood Drive east and west closures in EB3C indicated that the temporary effects to general traffic are expected to be low.

Overall, with the proposed mitigation measures in place, the temporary effects to the S013 and S421 school bus services are also expected to be low during these closures. Consultation will be undertaken with the affected schools, AT Metro, and the Ministry of Education and the measures will be refined for implementation. This will be achieved through the CTMP.

Based on the above, the potential adverse effects are considered to mitigated as far as is reasonably practicable. Lastly, in light of the improvements that will be gained upon the Project's completion, this level of delay is considered acceptable.

5.3 Temporary Effects to Pedestrians and Cyclists

Currently, pedestrian footpaths are provided along both sides of Tī Rākau Drive, between Gossamer Drive and Te Koha Road.

Signalised pedestrian facilities for crossing Tī Rākau Drive are provided at the following intersections:

- Tī Rākau Drive / Trugood Drive western and southern approaches
- Tī Rākau Drive / Burswood Drive west northern and eastern approaches
- Tī Rākau Drive / Harris Road western and southern approaches
- Tī Rākau Drive / Burswood Drive east northern and eastern approaches
- Tī Rākau Drive / Greenmount Drive southern approach
- Tī Rākau Drive / Huntington Drive southern approach
- Tī Rākau Drive / Te Koha Drive western and southern approaches.

Pedestrian footpaths are provided along both sides of Burswood Drive.

In the Burswood residential area to the north of the new offline busway, pedestrian footpaths are provided in most sections of the cul-de-sacs in Tullis Place, Dulwich Place and Heathridge Place, with short sections of footpaths missing at the end of the cul-de-sacs.

In Guys Reserve, there are no footpaths currently provided in the northern section close to Tī Rākau Drive. In Whaka Maumahara there are footpaths from Cottesmore Place and Kirikiri Lane, curving around the stormwater pond, connecting to Te Koha Road, and ultimately Te Irirangi Drive.

As stated in **Section 3.6.2**, no cycle facilities are provided in the existing environment, except for the off-road shared path in the Burswood Esplanade Reserve connecting to Burswood Drive east. There is also a short section of recreational footpath which may be used by cyclists between Cottesmore Place, Guys Road and Te Koha Road.

The existing pedestrian crossings, footpaths and shared paths, including in the Burswood Esplanade and Guys Reserves will be maintained at all times during construction. Should this be unachievable in some places, safe temporary facilities will be provided to ensure pedestrian and cycling connectivity. This will be ensured through the CTMPs required by the consent conditions.

5.4 Temporary Effects to Property Access and Parking

The sections below provide assessment of the temporary effects of EB3C, EB4i and EB4L⁵⁴ on property access, as well as on-street and off-street parking during construction, split between the different project areas.

5.4.1 EB3C – 262 Tī Rākau Drive (Chinatown)

5.4.1.1 Property Access

Chinatown currently has two access points. One off Tī Rākau Drive allowing for ingress only, and another off Burswood Drive west allowing for both in/out movements (see **Figure 63**).



Figure 63: Chinatown accesses off Tī Rākau Dr (left) and Burswood Dr (right)

The new bidirectional cycleway will cross both access points. As such, the construction of the cycleway will be done in sections to ensure that vehicle ingress and egress can be maintained. Compared to the overall construction programme, the construction of the cycleway in this section of EB3C is expected to be short in duration (indicatively six months). Therefore, the temporary effects to property access are considered to be very low.

5.4.1.2 Parking

As stated in **Section 3.7.4**, the Chinatown carparking areas currently support 299 parking spaces on site. Based on the survey, the maximum utilisation of these parking spaces did not exceed 69% capacity (92 unoccupied spaces) on the typical weekday or weekend. Average utilisation of the carpark was determined to be much lower, with 51% on the weekend and 43% on the weekday.

A parcel of land will be acquired by AT to the rear of the property to enable the construction of the proposed Bridge B. In addition, temporary space will also be required to establish a work zone around the bridge. **Figure 64** shows the permanent occupation (blue) and the temporary occupation (orange) of the parking area to the rear of Chinatown.

⁵⁴ Refer to Appendix A for a description of the temporary effects to property access and parking during construction in the EB2 and EB3R project areas.

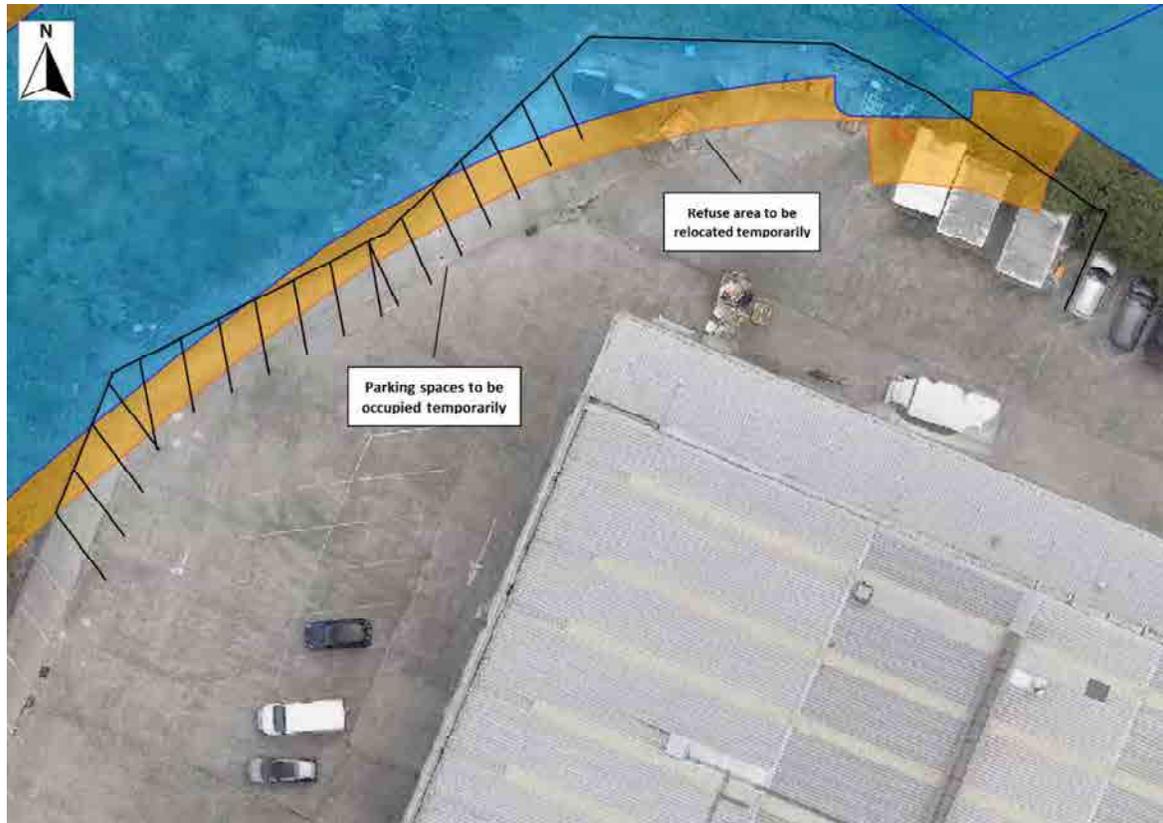


Figure 64: Chinatown carparking temporary (orange) and permanent (blue) occupation

It is expected that 15 parking spaces would require temporary occupation. In addition, the current refuse area which occupies roughly 30m of the property boundary would require relocation. This would translate to an additional 14 parking spaces lost temporarily. In total, 29 parking spaces are expected to be occupied temporarily for an indicative duration of two years.

However, considering the current surveyed maximum carparking utilisation of 69%, 63 spaces are still expected to be unoccupied on a typical weekday or weekend. Therefore, it is considered that the carpark has sufficient spare capacity and that the temporary effects to parking are low. Consultation with the property owners and tenants are ongoing. A temporary parking layout, including the relocation of the current refuse area will be developed and agreed with the owners/tenants. The property owners will be notified well in advance of the construction works and timeframes.

5.4.2 EB3C – 219, 225, 239 and 245 Burswood Drive (Commercial Properties)

In the existing environment, the commercial properties at 219, 225, 239 and 245 Burswood Drive have access points off Burswood Drive west, with an additional access off Ti Rākau Drive to 245 Burswood Drive (see Figure 65).

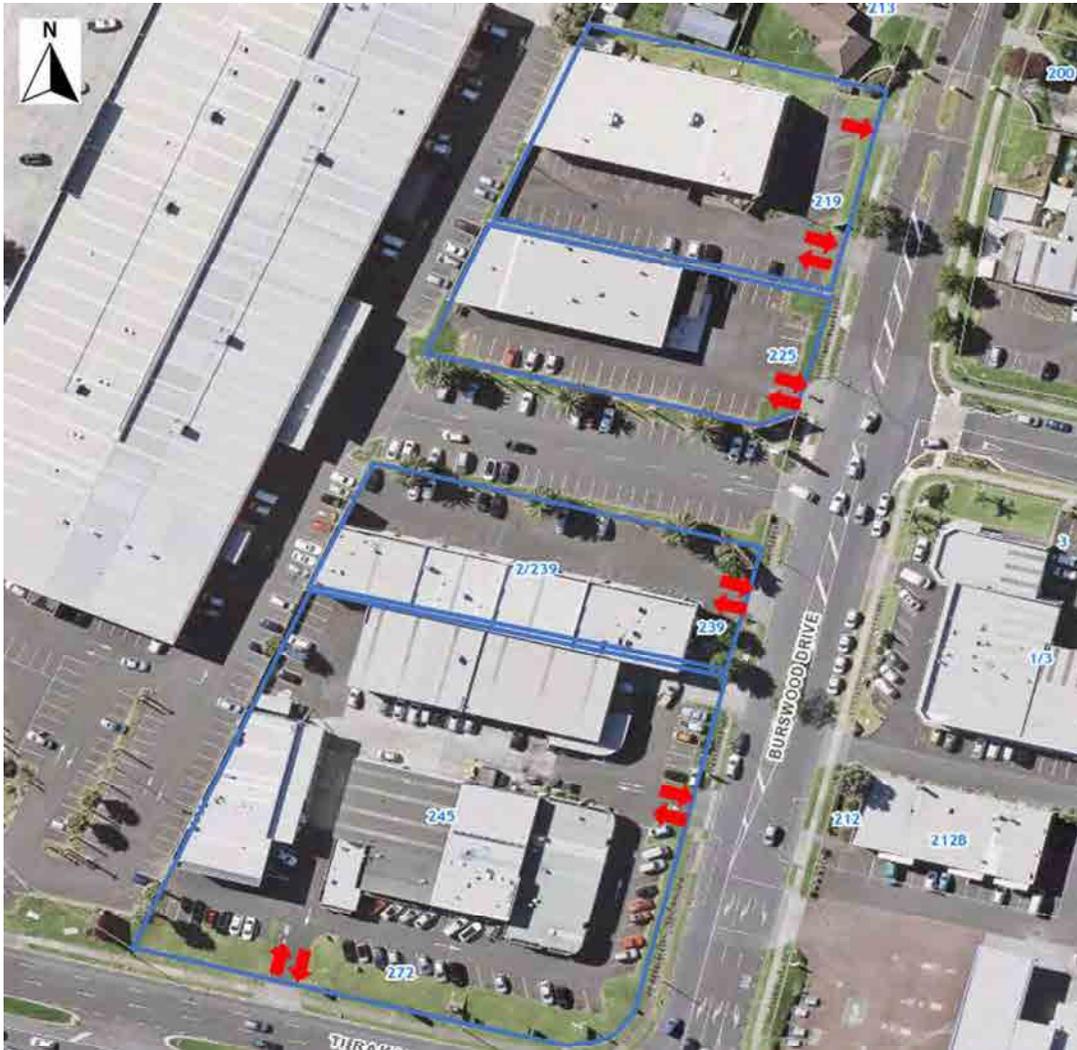


Figure 65: 219, 225, 239 and 245 Burswood Dr property boundaries (blue) and access points

Similar to the access for Chinatown, the bidirectional cycleway will cross access points on the western side of Burswood Drive. As such, the construction of the cycleway will be done in sections to ensure that vehicle ingress and egress can be maintained. Again, compared to the overall construction programme, the construction of the cycleway in this section of EB3C is expected to be short in duration (indicatively six months). At least one access point to each property is expected to be maintained for two-way movements during construction. The proposed construction methodology of the cycleway will not impact parking in these properties. The property owners will be notified well in advance of the construction works and timeframes. Therefore, the temporary effects to property access are considered to be very low.

5.4.3 EB3C – 320 Tī Rākau Drive (Bunnings Warehouse Botany)

The new offline busway intersection with Burswood Drive east will be in close proximity to the existing northern access of Bunnings Warehouse Botany. The access is currently used by loading vehicles to access the rear end loading area (see **Figure 66**).

During the estimated three-month closure of Burswood Drive east to construct the new intersection, the vehicle crossing is expected to be maintained as a left-in right-out only access. As the main regional route for larger sized vehicles (Tī Rākau Drive) is located to the south, the vast majority of the demand to and from this access would still be able to use the access during construction.

Therefore, the temporary effects to property access are considered to be very low. Consultation with the property owners and tenants are ongoing. The property owners will be notified well in advance of the construction works and timeframes.

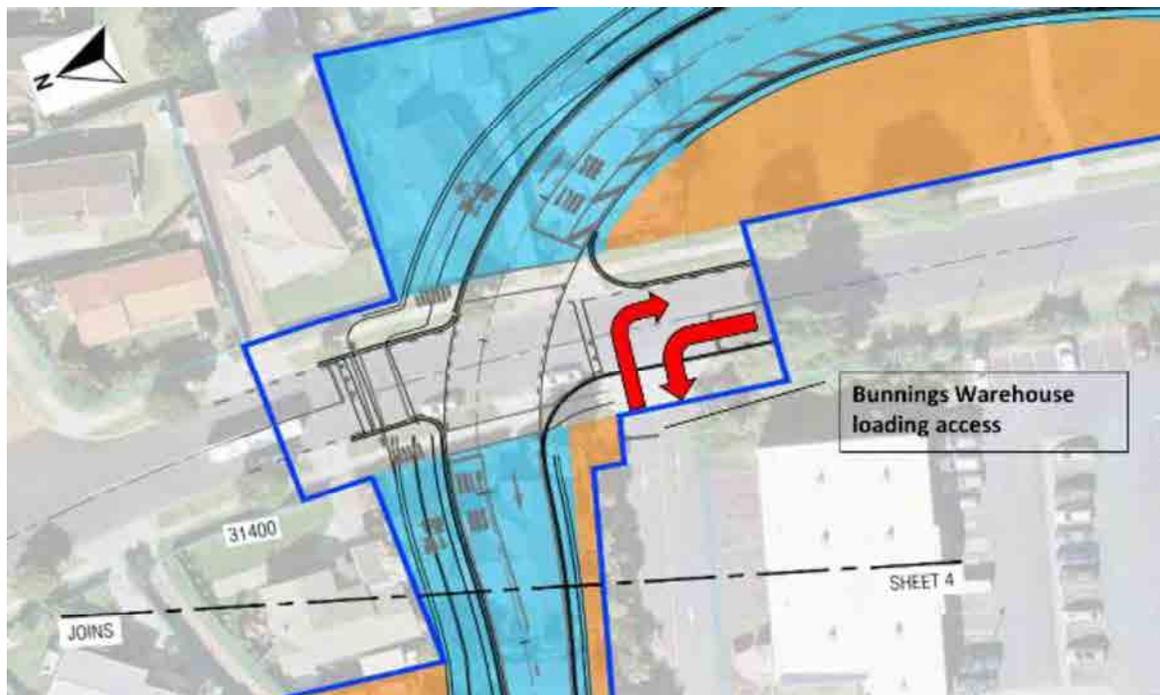


Figure 66: Bunnings Warehouse Botany loading vehicle access point on Burswood Dr east

5.4.4 EB3C – 25, 27, 28 and 203 Burswood Drive (Residential Properties)

Similar to **Section 5.4.3** above, the new Burswood offline busway will be constructed to form new intersections with Burswood Drive in close proximity to the vehicle crossings of 25, 27, 28 and 203 Burswood Drive shown in **Figure 67** and **Figure 68**, respectively.

The construction duration of the new signalised busway intersection is expected to be three months, starting from mid-2024⁵⁵. The accesses to these properties will be maintained and the property owners will be well notified in advance of the construction works and timeframes. Therefore, the temporary effects to these properties are expected to be negligible.

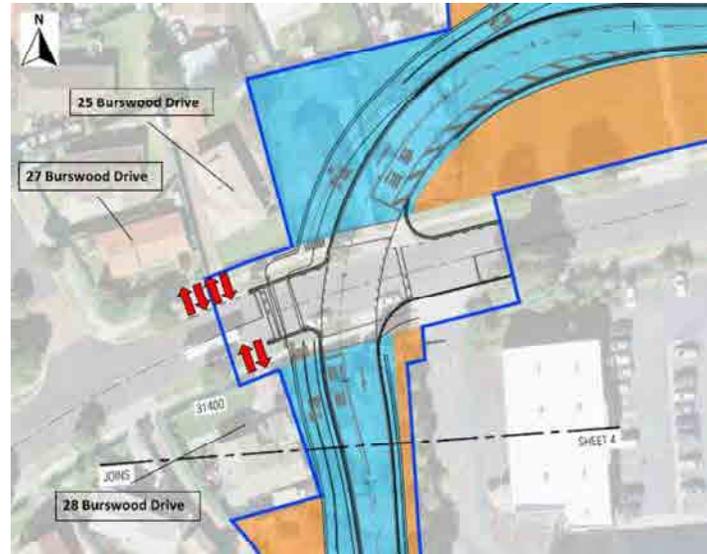


Figure 67: Property accesses (red arrows) to be maintained during construction at 25, 27 and 28 Burswood Dr



Figure 68: Property accesses (red arrows) to be maintained during construction at 203 Burswood Dr

⁵⁵ The construction start dates and duration are indicative.

5.4.5 EB3C – Burswood Drive and Burswood Residential area

As discussed in **Section 4.2.2**, the new busway alignment will intersect Burswood Drive at two locations. The proposed construction methodology is to close each connection point one at a time to enable access through the alternative connection point. Elderberry Road, which connects Burswood Drive west and Burswood Drive east, provides the option of a short detour route for residents. Residents at the northern end of the peninsula can travel similar distances to exit onto Ti Rākau Drive. Refer to **Section 5.2.4** for the assessment of the temporary effects to general traffic during these road closures. The construction of the Burswood Drive intersections is expected to take three months for each intersection. Residents will be notified well in advance of the construction works and timeframes.

The properties with the longest detour routes during construction for either intersection closures are shown in **Figure 69**. The detour routes are referred to as Trip 1 for the Burswood Drive west closure, and Trip 2 for the Burswood Drive east closure. The journey time increases for these properties are shown in **Table 14**.



Figure 69: Detour routes during the closures of the Burswood Drive / Busway intersections

Table 14: Journey time increases during Burswood Dr closures

Intersection closure	Trip no.	Properties with the longest detour route during construction	Journey time increase (min.)
Burswood Drive west	1	198 and 203 Burswood Drive	2.1
Burswood Drive east	2	25 Burswood Drive	2.1

During construction, the longest journey time increases is expected to be 2.1 minutes. Therefore, the temporary effects to property access are considered to be low.

5.4.6 EB3C – Tī Rākau Drive (Burswood Drive east to Guys Reserve)

The construction of the new Tī Rākau Drive road layout between Burswood Drive east and Guys Reserve will be undertaken in several phases. The relevant work zones of each construction phase will remove on street parking along this section of Tī Rākau Drive.

However, given the arterial nature and high traffic volumes, it is considered very unlikely that motorists would leave vehicles parked along this section of Tī Rākau Drive. Therefore, the temporary effects to on-street parking on Tī Rākau Drive are considered to be negligible.

5.4.7 EB3C – 380 and 386 Tī Rākau Drive (Howick & Eastern Bus Depot and Gull Botany Downs)

5.4.7.1 Property Access

The Howick and Eastern Bus Depot currently has one signalised vehicle crossing on Tī Rākau Drive that allows for both in/out movements⁵⁶.

The existing Gull Botany Downs service station adjoining the Bus Depot currently has two vehicle crossings on Tī Rākau Drive. It is intended that the service station will be acquired by AT and will be incorporated into the Bus Depot for future use.

Upon completion of Tī Rākau Drive, the existing western access to the Bus Depot will be changed to bus access only and reinstated to permit access for buses directly from the new busway. A new eastern access will be constructed as a signalised intersection with full movements available for general traffic access (see **Figure 70**).

The new busway will cross both the existing western and the new eastern access points. The construction of the busway is expected to be completed in stages to ensure that vehicle ingress and egress can be maintained, and at least one access point will be open at any one time. The construction duration of the new bus lanes is expected to be approximately eight months. Therefore, the temporary effects to property access are expected to be low.

5.4.7.2 Parking

As stated in **Section 3.7.5**, the Howick and Eastern Bus Depot currently supports 128 bus parks and 93 car parking spaces.

It is intended that the parcels of land in Burswood Esplanade Reserve around the outside of the Bus Depot will be used for the construction of the new bidirectional cycleway. In addition, temporary and permanent occupation of land inside the Bus Depot will be required for construction of the new accesses. **Figure 70** shows the temporary (orange) and permanent (blue) occupation in and around the Bus Depot.

⁵⁶ It should be noted that the westbound through movements on Tī Rākau Drive at this intersection are not signalised.



Figure 70: Howick and Eastern Bus Depot temporary (orange) and permanent (blue) occupation

It is expected that approximately 40 car parking spaces will be temporarily occupied for construction purposes during construction. However, as stated above, it is intended that the adjoining Gull service station will be acquired and could serve as a temporary carpark to mitigate the loss of parking during construction.

Consultation with the property owners and tenants are ongoing and will be notified in advance of the construction works and timeframes. A temporary parking layout will be developed and agreed with the owners/tenants to manage the temporary effects to parking. Therefore, the temporary effects to parking are expected to be low.

5.4.8 EB3C – 347 and 371 Tī Rākau Drive, 2 and 12 Amera Place (Commercial areas)

The construction of the Tī Rākau Drive westbound lanes, between Burswood Drive east and Te Koha Road, is expected to require the temporary closure of the accesses between the Amera Place service lane and Tī Rākau Drive.

Although the service lane provides access to and from the four properties facing Tī Rākau Drive to the west of Huntington Drive, there are two direct access points to two of these properties (371 Tī Rākau Drive and 2 Amera Place) on Huntington Drive and a rear service lane which provides access to all four properties (see **Figure 71**). These alternative access points off Huntington Drive will be maintained during construction. The increase in travel distance to these access points is considered to be negligible for the majority of demand to and from these properties.

The Tī Rākau Drive westbound lane works are expected to take approximately four months starting in mid-2024⁵⁷. The property owners will be notified in advance of the construction works and timeframes. The temporary effects to property access are therefore considered to be low.



Figure 71: 347 Tī Rākau Drive, 2 and 12 Amera Place, 371 Tī Rākau Drive vehicle access points during construction

⁵⁷ The construction start dates and duration are indicative.

5.4.9 EB4L – 451 Tī Rākau Drive (Huntington Park Shops and VTNZ Botany)

The new Guys Reserve busway bridge will run along the western and southern edge of the Huntington Park shops and the VTNZ Botany in particular, shown in **Figure 72**. The construction of the bridge will require permanent land acquisition within Guys Reserve and Whaka Maumahara, while construction work zones will be set up for temporary land occupation around the proposed structure.

A parcel of land (grassed area only) to the rear of the VTNZ Botany will need to be temporarily occupied for construction and crantage for approximately two years. However, the proposed works are not expected to affect property access and parking on site. Vehicles will still be able to access the property from both ends of Te Koha Road to the east of the property, as well as the service lane to the northwest, as per the existing environment. The property owners will be notified well in advance of the construction works and timeframes.

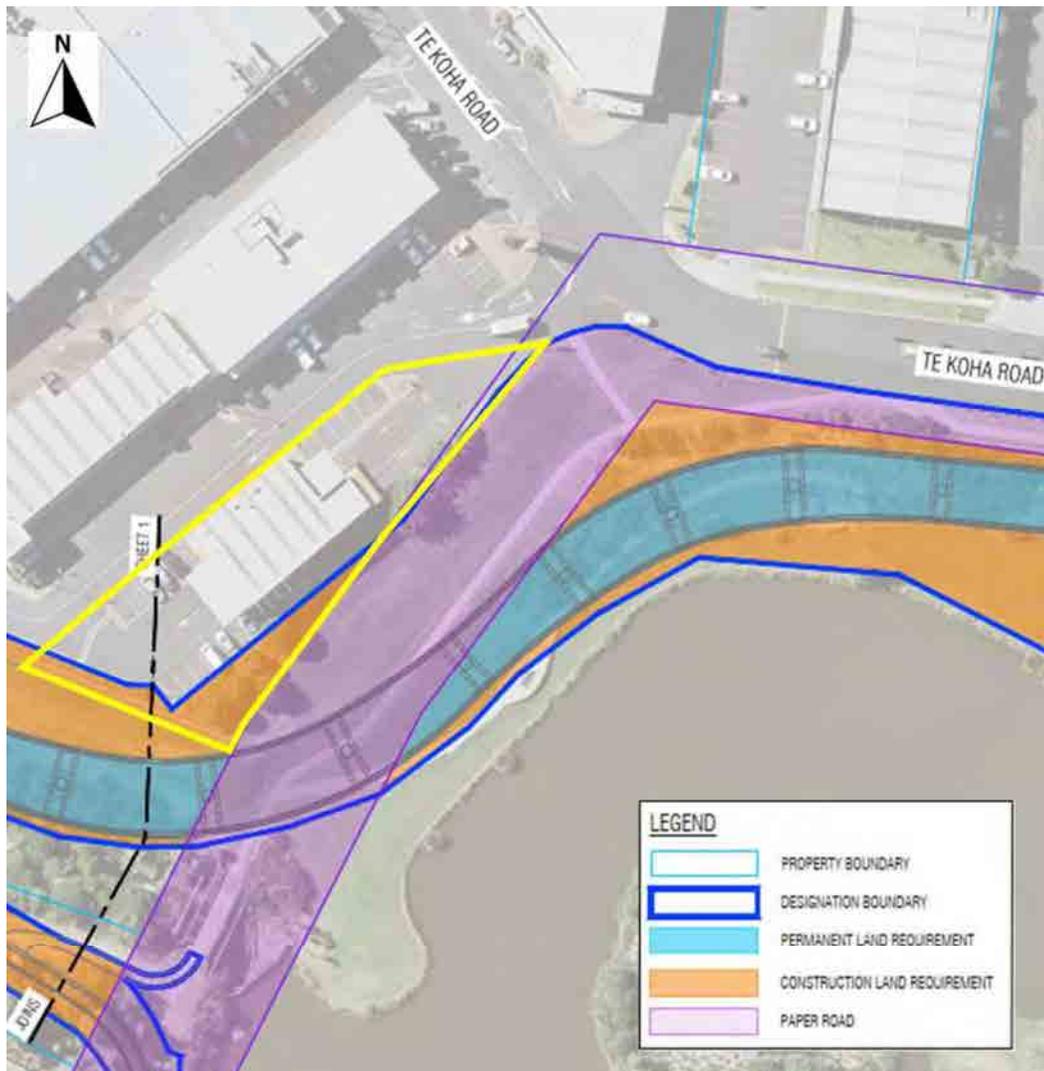


Figure 72: VTNZ Botany property boundary (yellow outline), temporary (orange) and permanent (blue) occupation

5.4.10 Summary of Temporary Effects to Property Access and Parking

As a first approach, the proposed construction methodology has sought to avoid or minimise effects to property access and parking. Overall, the temporary effects during construction to property access and parking will be mitigated and managed appropriately, and are considered to be negligible to low. Where existing vehicle access arrangements and parking provisions will be impacted during stages of construction, appropriate mitigation measures have been proposed to ensure alternative access and parking commensurate with the existing environment is maintained as far as is reasonably practicable. These will be managed through the CTMP.

Engagement with affected property owners/tenants will be undertaken before and during construction to communicate the planned works and duration, the potential disruption and proposed mitigation measures as well as to develop additional measure or improve upon proposed measures if required. This is set out in the conditions and will be a requirement of the CTMP. Lastly, pedestrian access to properties, including open spaces, businesses, and community facilities will be maintained at all times. This will be ensured through the CTMP.

5.5 Temporary Effects to Safety Performance

The safety and protection of the public, traffic and construction team is paramount, and all site operations will be focused on zero harm to all involved, associated and traveling through the project areas. This will be achieved through the following:

- Traffic management that separates the public / traffic operations as well as managing and maintaining public and traffic flow entering and exiting the construction operations within the project areas
- Active communications with the local community and public travelling through the construction work zones to ensure they will be regularly updated on temporary traffic management operations
- Before each work zone is ready to be opened following construction, an independent safety audit will be completed, and public notifications of the opening and new layouts will be made available.

Safety measures will be in place during construction, ensured by the conditions and the CTMPs.

5.6 Construction Traffic Management Plan

Construction Traffic Management Plans (CTMPs) will be developed and implemented for both EB3C and EB4L. The purpose of the CTMPs will be to avoid, remedy or mitigate the adverse effects of construction of the Project on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of the NoRs / resource consents associated with the Project and will include management methods, controls and reporting to manage the potential effects on transport, parking and property access associated with the Project.

The CTMPs will be informed by practical experience with traffic management during construction and will reflect best practice in accordance with:

- The Code of Practice for Temporary Traffic Management prepared by the New Zealand Transport Agency, 4th Edition 2018 (CoPTTM)
- NZ Guide to Temporary Traffic Management (NZGTTM) which is currently in pre-consultation draft and will supersede the CoPTTM in due course.

The CTMPs will set out the traffic management strategies that will be employed to manage the temporary effects during construction, including, but not limited to:

- Design standards
- Hours of operation
- Public transport
- Property access and parking
- Pedestrian and cyclists
- Emergency services
- Impacts on heavy haulage
- Impacts on taxi users
- Construction access and laydown
- Staff parking
- Site offices and satellite compounds
- Construction vehicle movements
- Transport network management
- Communicating traffic management impacts
- Temporary traffic management auditing
- Monitoring and reporting.

The Project will be acting in and impacting on the network over the whole length of the construction period and over that time the construction's impacts will be monitored. The EBA will agree upon certain Key Performance Indicators (KPIs) to assess how well the EBA is performing at minimising community disruption. These KPIs will be reported to AT at an agreed interval.

The EBA will use the monitoring system SMATS iNode to track travel time through defined routes and compare these travel times to the normal travel time for that road at that time of day. This allows impacts of works to be identified without false-triggering of the system which may arise through normal congestion on busy routes. Additionally, Site Traffic Management Supervisors (STMSs) will monitor as part of their regular site checks and take action where possible to address the congestion.

Where disruption is identified as exceeding the trigger levels agreed with AT, the STMS will take action to reduce the impact of the works. This may include uplifting the closure or re-opening traffic lanes if this can be achieved quickly and safely.

Where disruption is occurring as a result of long-term Temporary Traffic Management (TTM), the Traffic Manager or Traffic Engineer will review the TTM measures and consider options to reduce the impact. The specific review process will depend on the nature and magnitude of each issue but will typically involve consultation with Auckland Transport Operations Centre (ATOC) and the Corridor Access Request (CAR) team from AT, and AT within the EBA to determine the acceptable level of disruption.

The review process may include reviewing staging of the construction activities, ability to provide further bus prioritisation at the expense of the general traffic, providing additional bus services as focus will be directed to provide prioritisation to bus service, or revised bus servicing. It is acknowledged that the retention of current public transport users is important for the busway utilisation after the project is completed.

6 Assessment of Permanent Effects upon Completion

The sections below provide an assessment of the permanent effects of EB3C, EB4i and EB4L including:

- Future transport network
- General traffic effects
- Effects to bus services and facilities
- Effects to pedestrians and cyclists
- Effects to property access and parking
- Effects to safety performance

6.1 Project Benefits

In order to provide context to the benefits of the EB3C, EB4i and EB4L sections of the Project and to reaffirm the benefits of the Project as a whole, the main elements of **Section 1** are reiterated here. Once delivered, the Project (EB2, 3 and 4) will provide:

- Better connections and sustainable travel options for pedestrians, cyclists, motorists, bus and train customers
- A reliable 40-minute bus and train trip between Botany Town Centre and Britomart (saving 20-minutes)
- Increase in public transport trips from 3,700 to 18,000 per day by 2028
- Increase in public transport mode share from 7% to 25% by 2028
- Reduce carbon emissions by 9,292 kg per day by 2028
- 24,000 more people with access to a rapid transit bus station within 1 km from home
- 5 km of busway between Pakūranga and Botany fully separated from other traffic
- 5 new bus stations with quality facilities
- 12 km of safe and separated walking and cycling infrastructure
- Reeves Road flyover to reduce vehicle congestion around Pakūranga Town Centre
- Encourage and support development of a more sustainable urban form and improve urban amenity
- Accommodate electric buses, a key part of AT's low-emission vehicle fleet by 2040.

Although EB3C, EB4i and EB4L are only three components of the Project as a whole, these sections will nevertheless provide:

- Significantly improved travel options for all modes of transport
- Increased public transport patronage and mode share through increased catchment and dedicated bus lanes
- Reduced carbon emissions
- Improved walking and cycling amenity, and safety through dedicated infrastructure
- Reduced congestion
- Reduced travel time for buses

6.2 Future Transport Network

As stated in **Section 3.3**, a full RASF assessment was completed for the Project⁵⁸ and the section below summarises the key aspects of the future transport network and modal priority in the EB3C, EB4i and EB4L project areas⁵⁹. Again, the RASF provides a systematic and consistent methodology for identifying the ‘Place’ and ‘Movement’ functions of roads and streets. In so doing, it reflects the needs and catchment of the adjoining land use as well as the movement of people, goods, and services. Refer to **Figure 4** in **Section 3.3** which shows the RASF typology matrix, which is a function of ‘Movement’ and ‘Place’ significance.

Figure 73 outlines the future typology of the EB3C project area.

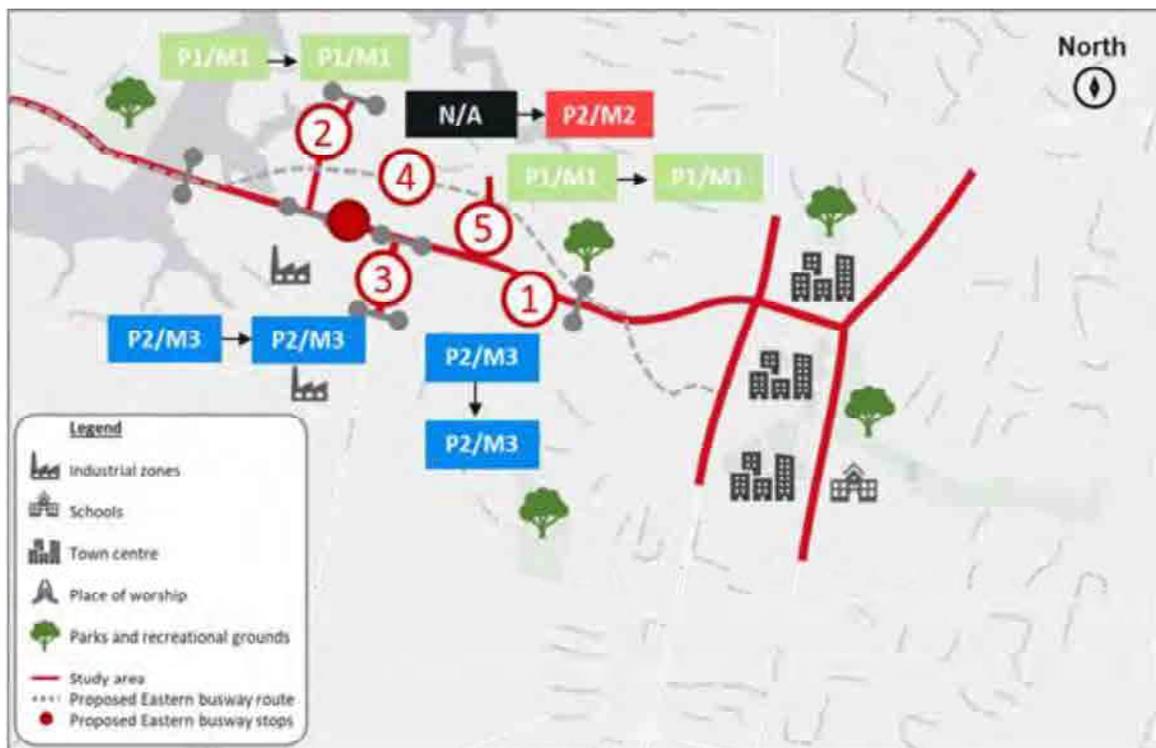


Figure 73: EB3C future typology

In the future, even greater emphasis will be placed on ‘Movement’ as the Ti Rākau Drive corridor carries an increased number of bus passengers due to the proposed Eastern Busway. The Network classification of Ti Rākau Drive will be upgraded to a Rapid Transit Network (RTN).

⁵⁸ EB234-1-TE-RP-Z0-0001-A3-Roads and Street Framework

⁵⁹ Refer to Appendix A for a description of the key aspects of the future transport network and modal priority of the EB2 and EB3R project areas.

The proposed bus stops in the area will attract more people within the local area. As such, a stronger emphasis will be placed on the ‘Place’ function in the areas around these bus stops. Under the National Policy Statement on Urban Development (NPS-UD, July 2020), there is expected to be higher density developments along the proposed Eastern Busway route which will result in increased pedestrian activities in the future⁶⁰.

Figure 74 outlines the future modal priorities of the EB3C project area.

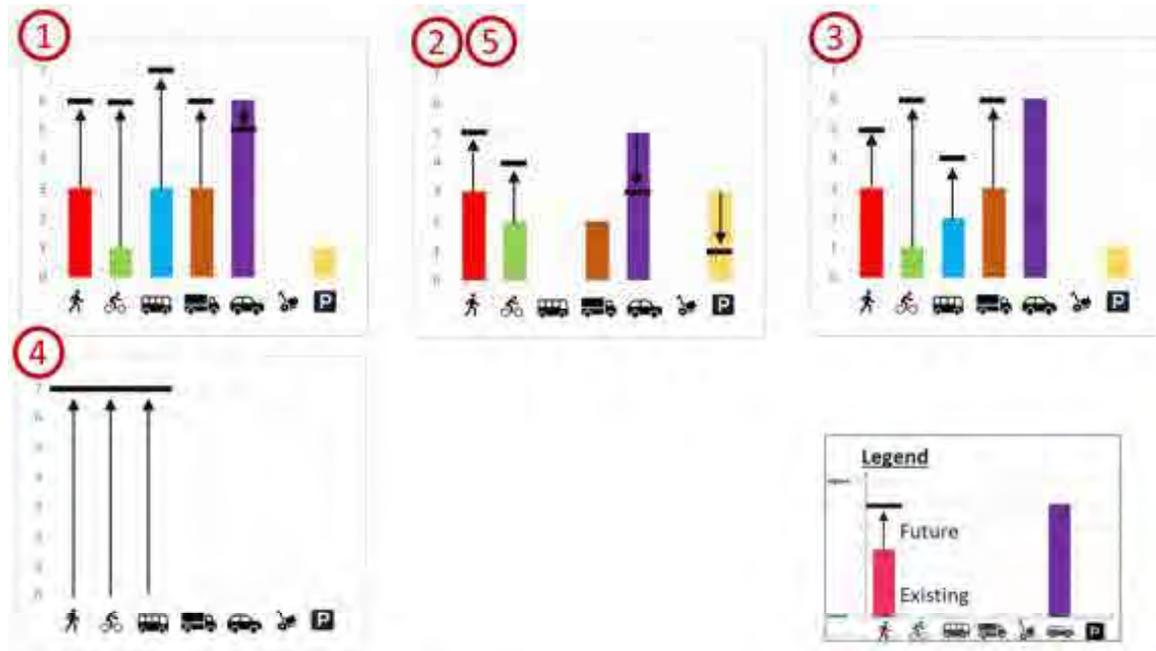


Figure 74: EB3C future modal priorities

While the corridor will carry more movements in future, the ‘Place’ function around the proposed bus stops will also become more important as these will attract more people. For this reason, the future place typologies around the proposed stops are marked as ‘P2’ as these stops themselves will become an attraction. Modal priorities for pedestrians, cycling, buses and freight is observed to generally increase, while the modal priority for general traffic and parking is expected to decrease.

Figure 75 outlines the future typology of the EB4 project area.

⁶⁰ It should be noted that it is anticipated that future growth will occur and has been factored into the modelling assessments as per the methodology and assumptions in Section 2.4, and that this assessment has not relied on the implementation of the NPS-UD through Plan Change 78.



Figure 75: EB4 future typology

In future, there will also be a stronger emphasis on ‘Movement’ along Ti Rākau Drive as well as Te Irirangi Drive due to the proposed Eastern Busway and Airport to Botany (A2B) services. However, it is considered likely that the major attraction of the area will continue to be the Botany Town Centre. As a result, the ‘Place’ function along these corridors will remain the same (P2).

Similar to the EB3C project area, higher density developments are expected along the proposed Eastern Busway route under the NPS-UD because adequate public transport infrastructure is identified as a precursor to enabling intensification in a way that supports a well-functioning urban environment, which is likely to result in associated increases in pedestrian activity in the future.

Figure 76 outlines the future modal priorities of the EB4 area project.

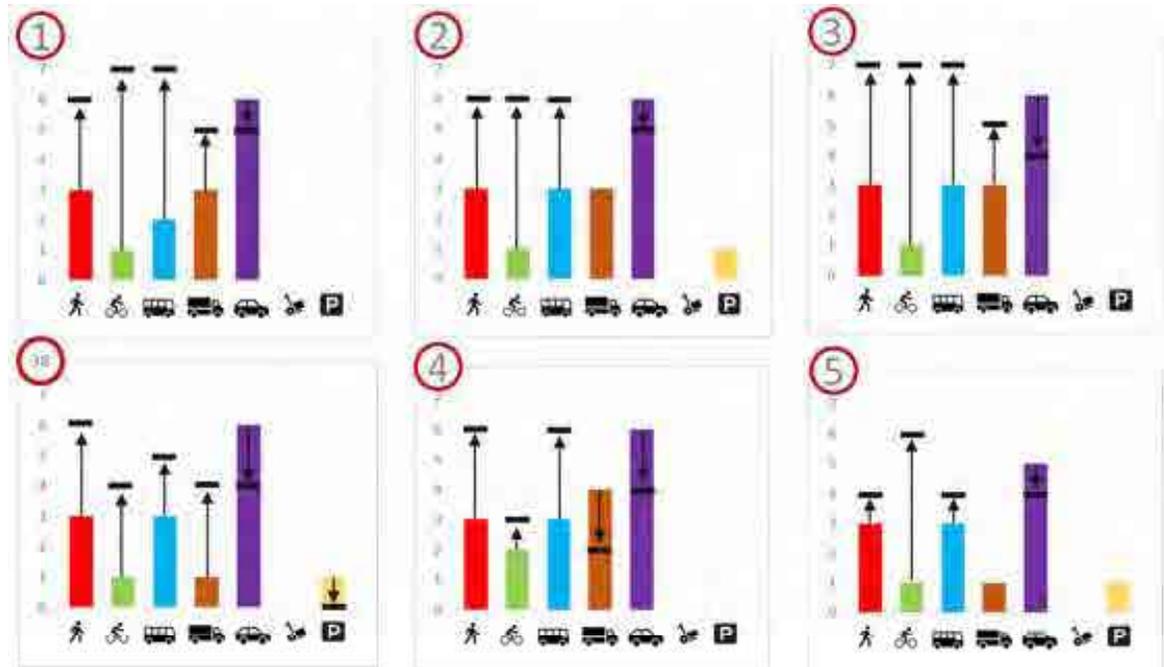


Figure 76: EB4 future modal priorities

Again, while the corridors will carry more movements in future the 'Place' function around the proposed stops will also become more important as these will attract more people due to improved accessibility, increased catchment, and higher footfall. Therefore, the future place typologies around the proposed stops are marked as 'P2' as these stops themselves will become an attraction. Significant increases in modal priority are expected for active modes and public transport overall, whereas the modal priority for general traffic is expected to decrease.

6.3 General Traffic Effects

An assessment of the cumulative permanent effects to general traffic upon completion of all EB2, EB3 and EB4 sections has been carried out. As stated in **Section 5.2.2**, general traffic effects refer to the movement of traffic across the road network as a whole.

6.3.1 Traffic Volumes

Table 15 outlines the expected AM and PM peak hour traffic volumes of the Do-Minimum and EB2/EB3/EB4 scenarios upon completion along key sections of the network, with a 2028 horizon year.

Table 15: Do-Minimum and EB2/EB3/EB4 (post construction) traffic volumes

Location	Direction	AM Peak		PM Peak	
		Do-Minimum [veh/h]	EB2/EB3/EB4 [veh/h]	Do-Minimum [veh/h]	EB2/EB3/EB4 [veh/h]
Pakūranga Rd (West of the RRF) ⁶¹	Westbound	2,246	968	1,337	1,093
	Eastbound	1,548	907	2,725	1,169
Pakūranga Rd (East of the RRF) ⁶²	Westbound	2,304	2,915	1,331	1,494
	Eastbound	1,491	1,352	2,794	2,643
William Roberts Rd (Tī Rākau Dr – Reeves Rd) ⁶³	Northbound	35	318	42	354
	Southbound	35	220	75	244
Reeves Rd (West of William Roberts Rd)	Westbound	526	259	256	77
	Eastbound	240	84	791	211
Reeves Rd (East of William Roberts Rd)	Westbound	348	394	175	119
	Eastbound	310	247	607	500
RRF	Northbound	-	848	-	1,696
	Southbound	-	2,349	-	1,069
SEART (West of ramps)	Westbound	2,934	3,364	1,622	1,930
	Eastbound	1,387	1,868	3,135	3,183
Tī Rākau Dr (Pakūranga Rd – Reeves Rd)	Westbound	1,261	1,093	2,094	1,131
	Eastbound	1,319	689	958	804
Tī Rākau Dr (Reeves Rd – William Roberts Rd)	Westbound	2,062	1,724	1,524	1,628
	Eastbound	738	1,471	1,447	1,662
Tī Rākau Dr (William Roberts Rd – Edgewater Dr west)	Westbound	1,962	1,554	1,582	1,693
	Eastbound	740	1,323	1,446	1,551

⁶¹ Relates to the section of Pakūranga Road west of William Roberts Road in the Do-Minimum scenario.

⁶² The section of Pakūranga Road east of William Roberts Road in the Do-Minimum scenario.

⁶³ The section of William Roberts Road south of Reeves Road, prior to the completion of the extension, in the Do-Minimum scenario.

Location	Direction	AM Peak		PM Peak	
		Do-Minimum [veh/h]	EB2/EB3/EB4 [veh/h]	Do-Minimum [veh/h]	EB2/EB3/EB4 [veh/h]
Ti Rākau Dr (Edgewater Dr west – Gossamer Dr)	Westbound	1,600	1,644	1,652	1,832
	Eastbound	920	1,516	1,178	1,565
Gossamer Dr (At Ti Rākau Dr)	Northbound	359	434	697	483
	Southbound	1,224	753	499	314
Ti Rākau Dr (Gossamer D – Burswood Dr west)	Westbound	1,786	1,858	2,238	2,064
	Eastbound	1,613	2,038	1,565	1,647
Ti Rākau Dr (Burswood Dr west – Harris Rd)	Westbound	1,246	1,515	1,662	1,606
	Eastbound	1,547	1,722	1,468	1,633
Harris Rd (At Ti Rākau Dr)	Northbound	688	810	1,442	1,321
	Southbound	1,720	1,695	570	899
Ti Rākau Dr (Harris Rd – Burswood Dr east)	Westbound	1,514	1,326	952	995
	Eastbound	730	631	1,624	1601
Ti Rākau Dr (Burswood Dr east – Huntington Dr)	Westbound	1,614	1,288	1,020	953
	Eastbound	850	685	2,245	1,721
Huntington Dr (At Ti Rākau Dr)	Northbound	351	208	113	62
	Southbound	90	68	404	120
Ti Rākau Dr (Huntington Dr – Te Koha Rd)	Westbound	1,597	1,437	953	823
	Eastbound	849	684	1,920	2,103
Ti Rākau Dr (Te Koha Rd – Te Irirangi Dr)	Westbound	1,450	1,363	801	626
	Eastbound	826	853	1,758	2,203
Te Irirangi Dr (Ti Rākau Dr – Te Koha Rd)	Northbound	1,094	799	2,317	1,073
	Southbound	1,261	1,267	1,024	1,320

When compared to the data presented in **Appendix A**, traffic volumes are expected to remain roughly similar for all sections once the Project as a whole is completed, with the exception being the eastbound direction along Ti Rākau Drive between SEART and Gossamer Drive. It is likely that Trugood Drive, in addition to Harris Road is drawing more demand southbound. This trend is observed in both the AM and PM peaks.

In EB3C, traffic volumes are predicted to increase in the eastbound direction on Ti Rākau Drive, between Gossamer Drive and Harris Road during both the AM and PM peaks. This is likely due to the increased capacity of the SEART off-ramp as a result of the additional right-turn lane further west. The westbound direction is predicted to experience small variations in traffic volumes.

Ti Rākau Drive between Harris Road and Huntington Drive is predicted to experience a reduction in traffic volumes overall in both directions during the AM and PM peaks. This is due to Ti Rākau Drive

section reducing from three lanes to two lanes in both directions and the operation of the Huntington Drive intersection.

Ti Rākau Drive between Huntington Drive and Te Irirangi Drive is expected to experience reduced traffic volumes in the westbound direction during the AM and PM peaks. However, the eastbound traffic volumes are predicted to increase during the PM peak. This is likely due to Ti Rākau Drive expanding back to three lanes at Guys Reserve, and cyclical traffic patterns heading outbound from Panmure in the PM peak.

In terms of the side roads off Ti Rākau Drive, Harris Road is expected to experience an increase in traffic volumes northbound in the AM peak, and southbound in the PM peak. This is likely due to the construction of the new Flyover, where some traffic entering/exiting from SH1 is rerouted from the Highbrook and East Tamaki onramps/offramps to the new Flyover.

Huntington Drive is expected to experience a reduction in traffic volumes in all directions during the peak periods. This is likely due to the capacity reduction of Ti Rākau Drive between Burswood Drive east and Guys Reserve, hence reducing the traffic volumes accessing/exiting from Huntington Drive.

6.3.2 Intersection Performance upon Completion

Intersection performance analyses of the transport network comprised of selected intersections in the EB2, EB3 and EB4 project areas was undertaken using SIDRA. As stated above, an assessment of the cumulative permanent effects to general traffic has been carried out.

The analyses consisted of a comparison between the Do-Minimum and EB2/EB3/EB4 scenarios, with a 2028 horizon year, for both the AM and PM peak hours. The performance criteria for the assessment were based on the Level of Service (LOS), degree of Saturation (DOS) or v/c ratio and delay in seconds.

The LOS is a measure of the average delay at an intersection and is a function of the intersection control (see **Table 16**).

Table 16: Level of Service for intersections

Level of Service	Control Delay (d) for Buses, Freight and General Traffic
	Signalised intersections
A	$d < 10 \text{ sec}$
B	$10 < d \leq 20 \text{ sec}$
C	$20 < d \leq 35 \text{ sec}$
D	$35 < d \leq 55 \text{ sec}$
E	$55 < d \leq 80 \text{ sec}$
F	$d > 80 \text{ sec}$

It should be noted that SIDRA cannot produce an overall intersection performance LOS for priority-controlled intersections. This is due to some approaches at priority-controlled intersections being uncontrolled, i.e., free flow, hence no control delay. As per the Transport Minimum Requirements guiding the design of the Project, overall intersection performance of LOS E or better for signalised intersections, with regards to general traffic, was considered acceptable throughout this ITA.

The DOS is a measure of utilisation of the capacity of the intersection between 0 and 1, based on the traffic load forecast for the intersection. In SIDRA, the DOS is reported by turn movements based on the traffic load divided by the calculated capacity. At signalised intersections, the calculated capacity considers the signal phase times and the effective green time for any particular turn movement. The overall intersection DOS metric is based on the maximum reported DOS for any movement within the intersection.

Permanent effects upon completion were assessed in an operational scenario, referred to as the 'EB2/EB3/EB4' scenario. The EB2/EB3/EB4 scenario simulates the completion of all EB2 and EB3R works⁶⁴, all EB3C works (see **Section 4.2.1** to **Section 4.2.3**), all EB4i works (see **Section 4.2.4**) and all EB4L works (see **Section 4.2.5**).

Traffic signal phasing diagrams per intersection are provided in **Appendix G** and lane performance summaries per intersection are provided in **Appendix H**.

⁶⁴ See Appendix A

Figure 77 shows the location of the intersections assessed for permanent effects upon completion of the Project.

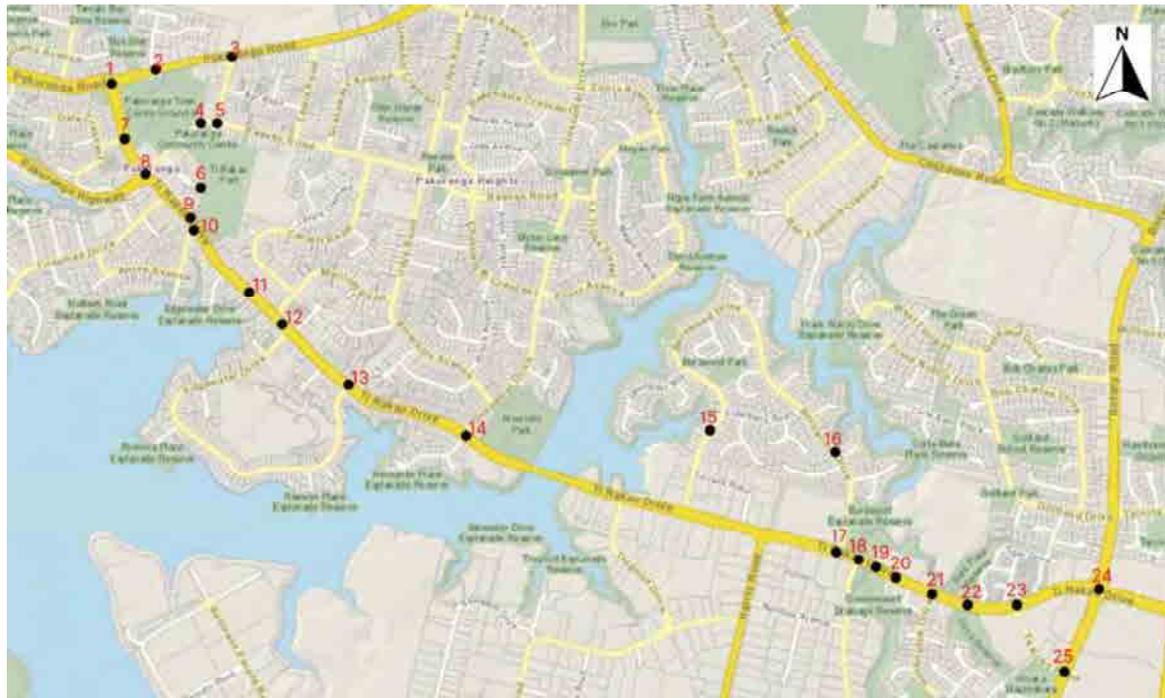


Figure 77: Location of intersections assessed

Table 17 below provides a comparison of the intersection performance between the Do-Minimum and EB2/EB3/EB4 scenarios during the AM peak.

Table 17: Intersection performance – Do-Minimum vs EB2/EB3/EB4 (AM peak)

#	Intersection	Do-Minimum			EB2/EB3/EB4		
		LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
EB2							
1	Pakūranga Rd / Tī Rākau Dr	C	0.90	32	C	0.90	35
2	Pakūranga Rd / Brampton Ct	N/A	2.40	10	N/A	1.04	7
3	Pakūranga Rd / RRF	Built during EB2			D	0.93	43
4	Reeves Rd / Aylesbury St	N/A	0.23	1	C	0.68	29
5	William Roberts Rd / Reeves Rd	N/A	0.62	7	E	0.82	57
6	William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.21	2
7	Tī Rākau Dr / Aylesbury St / Palm Ave	Built during EB2			D	0.95	50
8	Tī Rākau Dr / Reeves Rd / SEART	D	0.83	51	D	0.91	49
EB3R							
9	Tī Rākau Dr / William Roberts Rd	Built during WRRE			D	0.89	36
10	Tī Rākau Dr / Mattson Rd	B	0.78	15			
11	Tī Rākau Dr western U-turn facility	Built during EB3R			A	0.87	8
12	Edgewater 3-Stage Pedestrian Crossing	Built during EB3R			C	0.88	24
13	Tī Rākau Dr / Edgewater Dr east	N/A	2.00	17	C	0.91	25

#	Intersection	Do-Minimum			EB2/EB3/EB4		
		LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
14	Ti Rākau Dr / Gossamer Dr	F	1.08	93	F	1.07	103
EB3C							
15	Burswood Drive west / Busway	Built during EB3C			B	0.49	12
16	Burswood Drive east / Busway	Built during EB3C			B	0.43	18
17	Ti Rākau Dr / Burswood Dr east	A	0.50	9	B	1.04	19
18	Ti Rākau Dr / Greenmount Dr	B	0.72	15	B	0.61	12
19	Ti Rākau Dr / H&E Bus Depot western entrance	B	0.86	13	N/A	0.51	1
20	Ti Rākau Dr / H&E Bus Depot eastern entrance	Built during EB3C			A	0.62	8
21	Ti Rākau Dr / Huntington Dr	D	0.91	42	B	0.92	20
22	Ti Rākau Dr / Guys Reserve	Built during EB3C			E	1.01	58
EB4i							
23	Ti Rākau Dr / Te Koha Rd	C	0.88	23	B	0.88	19
24	Ti Rākau Dr / Te Irirangi Dr / Botany Rd	F	1.11	96	C	0.87	34
EB4L							
25	Te Irirangi Dr / Te Koha Rd / Busway	E	0.98	56	D	0.91	48

It is worth noting that the objective of the proposed design is to build a busway to promote the uptake of public transport. As the busway will be running on dedicated bus lanes, these movements will require mostly dedicated signal phases at signalised intersections. To accommodate this, some of the available signal green time will be reallocated away from general traffic movements. In so doing the proposed design has increased the queuing and delay of some general traffic movements, hence decreasing the average performance of some intersections. Furthermore, some general traffic roadway space in EB3C will be reallocated to the busway. This has also increased queuing and delays of some general traffic movements.

All existing and new intersections in the EB2 and EB3R project areas are expected to operate with acceptable LOS, DOS and delay, with the exception of the Pakūranga Road / Brampton Court and Ti Rākau Drive / Gossamer Drive intersections.

The southern approach at the Pakūranga Road / Brampton Court intersection is expected to be saturated in the AM peak. However, the approach is already saturated in the Do-Minimum scenario and traffic volumes on Pakūranga Road will be reduced in the future.

The Ti Rākau Drive / Gossamer Drive intersection is expected to operate at capacity, similar to the existing environment. The eastbound approach is the critical approach at the intersection. The trade-off is that all bus movements are expected to operate at LOS C and significant travel time improvements are predicted for the Botany to Pakūranga and SEART routes (see **Section 6.3.3**).

The performance of this intersection is a balance between all the competing modes in a constrained corridor. Different intersection layouts, phasing and cycle times have been investigated and assessed to balance the competing modes. The only alternative to improve LOS would be to provide additional

lanes. The intersection DOS < 1.2 is however still within the Transport Minimum Requirements (TMR) for the overall intersection performance guiding the design of the Project.

All of the new and existing intersections in the EB3C project area are expected to operate with acceptable LOS and delays. Slight increases in delay are expected at the Tī Rākau Drive / Burswood Drive east intersection, however, the intersection is still expected to operate with spare capacity. It is also anticipated that the Bunnings loading access can be incorporated into Burswood Drive east / Busway intersection and to operate with low delay.

Improved intersection performance is expected at the intersections along the EB4i project area in the AM peak due to a predicted reduction in traffic volumes.

However, in order to manage the heavy westbound demand (1,500 veh/h on average at the intersections listed below) coupled with the reduced capacity along Tī Rākau Drive in the AM peak, it is recommended that signal coordination be implemented. Fixed time cycles and appropriate offsets are recommended at the following intersections:

- Tī Rākau Drive / Huntington Drive – reference intersection
- Tī Rākau Drive / H&E Bus Depot eastern entrance
- Tī Rākau Drive / Greenmount Drive / Burswood Drive east

The Te Irirangi Drive / Town Centre Drive intersection in EB4L is expected to experience improved intersection performance.

Overall, the proposed design and recommended measures of EB2/EB3/EB4 is expected to lead to acceptable operations for general traffic across the network, and importantly, bus movements on the busway are predicted to operate at LOS C (or better) and with spare capacity.

Table 18 below provides a comparison of the intersection performance between the Do-Minimum and EB2/EB3/EB4 scenarios during the PM peak, with a 2028 horizon year.

Table 18: Intersection performance – Do-Minimum vs EB2/EB3/EB4 (PM peak)

#	Intersection	Do-Minimum			EB2/EB3/EB4		
		LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
EB2							
1	Pakūranga Rd / Ti Rākau Dr	D	0.92	53	D	0.89	38
2	Pakūranga Rd / Brampton Ct	N/A	1.70	9	N/A	1.27	19
3	Pakūranga Rd / RRF	Built during EB2			C	0.90	30
4	Reeves Rd / Aylesbury St	N/A	0.40	1	E	0.92	58
5	William Roberts Rd / Reeves Rd	N/A	1.02	23	D	0.90	51
6	William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.28	2
7	Ti Rākau Dr / Aylesbury St / Palm Ave	Built during EB2			E	0.99	71
8	Ti Rākau Dr / Reeves Rd / SEART	F	1.20	95	D	0.93	55
EB3R							
9	Ti Rākau Dr / William Roberts Rd	Built during WRRE			D	0.78	36
10	Ti Rākau Dr / Mattson Rd	B	0.68	13			
11	Ti Rākau Dr western U-turn facility	Built during EB3R			A	0.87	8
12	Edgewater 3-Stage Pedestrian Crossing	Built during EB3R			C	0.88	24
13	Ti Rākau Dr / Edgewater Dr east	N/A	3.41	28	C	0.94	33
14	Ti Rākau Dr / Gossamer Dr	D	0.91	45	F	1.07	103
EB3C							
15	Burswood Dr west / Busway	Built during EB3C			B	0.81	16
16	Burswood Dr east / Busway	Built during EB3C			B	0.85	25
17	Ti Rākau Dr / Burswood Dr east	C	0.89	21	D	0.90	38
18	Ti Rākau Dr / Greenmount Dr	F	1.34	262	D	1.03	43
19	Ti Rākau Dr / H&E Bus Depot western entrance	E	1.00	60	N/A	0.53	1
20	Ti Rākau Dr / H&E Bus Depot eastern entrance	Built during EB3C			B	0.77	11
21	Ti Rākau Dr / Huntington Dr	B	0.82	13	A	0.86	7
22	Ti Rākau Dr / Guys Reserve	Built during EB3C			A	0.60	7
EB4i							
23	Ti Rākau Dr / Te Koha Rd	B	0.63	13	B	0.70	19
24	Ti Rākau Dr / Te Irirangi Dr / Botany Rd	D	0.94	46	D	1.02	52
EB4L							
25	Te Irirangi Dr / Te Koha Rd / Busway	F	1.21	121	E	0.96	61

Again, all of the new and existing intersections in EB2 and EB3R are expected to operate with acceptable LOS and delay in the PM peak, except for the Pakūranga Road / Brampton Court and Tī Rākau Drive / Gossamer Drive intersections.

Although the DOS at the Pakūranga Road / Brampton Court intersection is expected to improve, a slight increase in the average delay is expected. Again, the southern approach is the critical approach. However, traffic volumes on Pakūranga Road will be reduced compared to the Do-Minimum scenario and this level of average delay is considered acceptable.

As above, The Tī Rākau Drive / Gossamer Drive intersection is expected to operate at capacity in the PM peak. Again, the eastbound approach is the critical approach, with the trade-off being that buses are expected to operate at LOS C. The performance of this intersection is a balance between all the competing modes. The only alternative to improve LOS would be to provide additional lanes. The intersection DOS < 1.2 is however still within the TMRs for the overall intersection performance guiding the design of the Project.

All of the new intersections in EB3C are expected to operate with acceptable LOS and delay in the PM peak as well. Also, the Bunnings loading access can be incorporated into Burswood Drive east / Busway intersection and operate with low delay (25 sec).

The Tī Rākau Drive / Burswood Drive east intersection is expected to experience some increase in delay, however, it is still expected to operate at an acceptable LOS and average delay.

Roughly similar intersection performance is expected at the intersections along the EB4i project area in the PM peak, when compared to the Do-Minimum scenario.

Similar to the AM peak, it is recommended that signal coordination be implemented to manage the heavy eastbound demand (1,997 veh/h on average) and capacity reduction along Tī Rākau Drive in the PM peak. Fixed time cycles and appropriate offsets are recommended at the following intersections:

- Tī Rākau Drive / Greenmount Drive / Burswood Drive east – reference intersection
- Tī Rākau Drive / H&E Bus Depot eastern entrance
- Tī Rākau Drive / Huntington Drive
- Tī Rākau Drive / Guys Reserve
- Tī Rākau Drive / Te Koha Road

A significant improvement in performance is expected at the Tī Rākau Drive / Town Centre Drive intersection in EB4L.

6.3.3 General Traffic Travel Times

Route travel times were determined using the AIMSUN model, with a 2028 horizon year. The same four routes presented in **Section 5.2.3** are assessed here for permanent effects to general traffic travel times in the EB2/EB3/EB4 scenario.

Table 19 provides a comparison of the route travel times between the Do-Minimum and EB2/EB3/EB4 scenarios, with a 2028 horizon year.

Table 19: General traffic travel times - Do-Minimum vs EB2/EB3/EB4

AM Peak						
Route	Westbound			Eastbound		
	Do-Minimum [min]	EB2/EB3/EB4 [min]	Difference [min]	Do-Minimum [min]	EB2/EB3/EB4 [min]	Difference [min]
Botany - Pakūranga	24.7	14.7	-10.0	13.9	13.6	-0.3
Botany - SEART	20.9	15.0	-5.9	13.7	12.8	-0.9
Howick - Pakūranga	5.3	6.6	1.3	4.7	4.4	-0.3
Howick - SEART	11.6	6.6	-5.0	8.0	5.4	-2.6
PM Peak						
Route	Westbound			Eastbound		
	Do-Minimum [min]	EB2/EB3/EB4 [min]	Difference [min]	Do-Minimum [min]	EB2/EB3/EB4 [min]	Difference [min]
Botany - Pakūranga	18.4	12.7	-5.7	24.6	16.4	-8.2
Botany - SEART	11.6	10.2	-1.4	24.5	17.4	-7.1
Howick - Pakūranga	4.7	3.8	-0.9	3.4	4.0	0.6
Howick - SEART	5.0	2.8	-2.2	7.5	8.1	0.6

Compared to the data presented in **Appendix A**, further travel time improvements are expected in nearly all of the routes, particularly in the eastbound direction, as a result of the completion of EB3C, EB4i and EB4L.

During the AM peak period westbound (citybound) movements are prioritised along the transport network upon completion of the full project (EB2, EB3 and EB4). Along with the completion of the RRF, this is predicted to lead to significant improvements in travel times from Botany to SEART and Pakūranga as well as from Howick to SEART. The route from Howick to Pakūranga is predicted to experience a negligible increase, as it is treated as a minor movement at the Pakūranga Road / RRF intersection. All eastbound routes are predicted to experience small improvements in the AM peak.

Similarly, in the PM peak eastbound movements are prioritised. This is predicted to lead to significant improvements in travel times from Pakūranga and SEART towards Botany. The eastbound routes from Pakūranga and SEART towards Howick are predicted to experience negligible increases in travel time. All westbound routes are also predicted to experience improvements in the PM peak.

6.4 Effects to Bus Services and Facilities

The sections below provide details and assessment of the permanent effects upon completion to bus services and facilities in the EB3C, EB4i and EB4L⁶⁵ project areas. **Figure 78** shows the existing bus services operating through the project areas. These include the:

- **70** – Botany to City
- **351** – Botany to Ōtāhuhu Station
- **352** – Panmure to Manukau
- **353** – Manukau to Botany Town Centre

School bus services operating in the EB3C, EB4i and EB4L project areas include the following:

- **S013** – Otara to Edgewater College
- **S416** – Botany Downs to Sacred Heart College
- **S421** – Burswood to Farm Cove Intermediate, St Marks School and Wakaaranga School
- **S440** – Bucklands Beach to Sancta Maria College

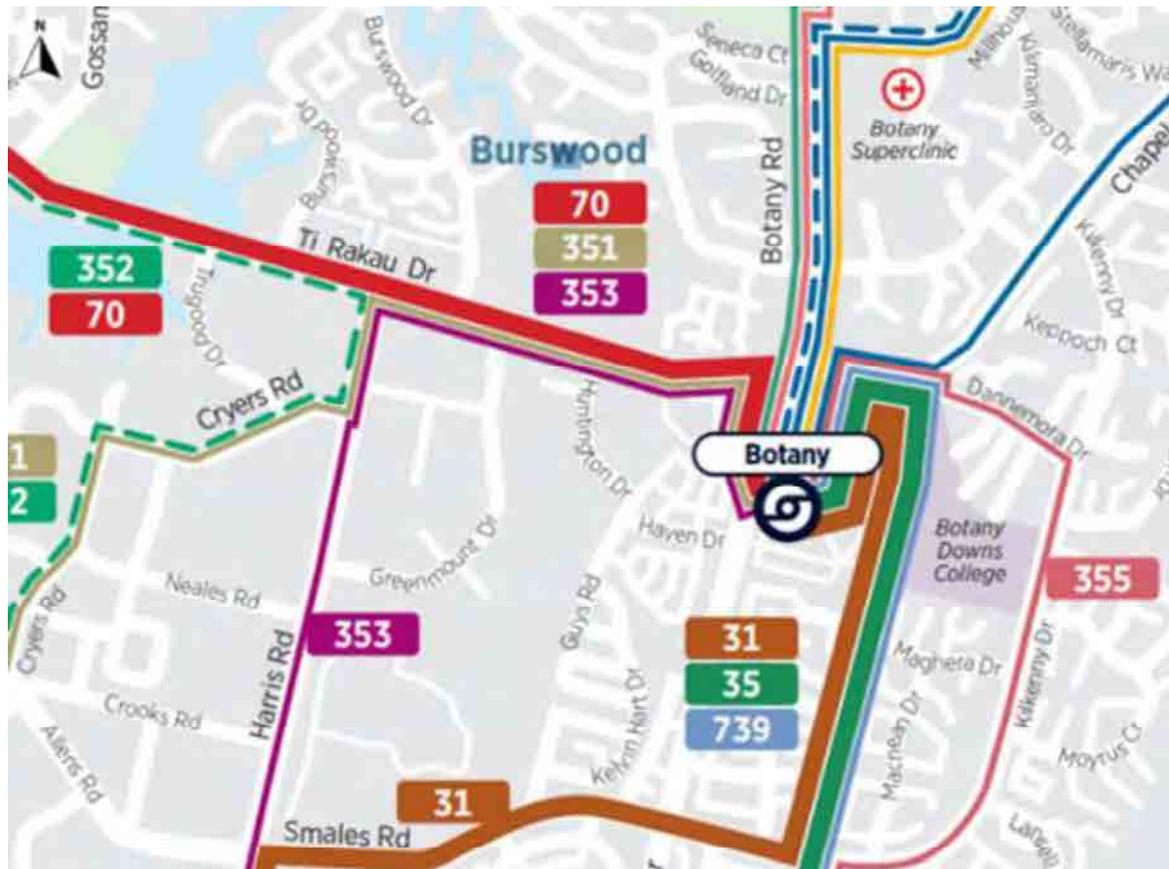


Figure 78: Existing bus services in the EB3C, EB4i and EB4L project areas

⁶⁵ Refer to Appendix A for an assessment of the permanent effects to the bus services and facilities in the EB2 and EB3R project areas upon completion of the project.

6.4.1 Bus Stations and Bus Stops

The sections below give an overview of bus station provisions of the EB3C, EB4i and EB4L⁶⁶ packages.

The benefits of the new station include the ability to support significantly higher public transport patronage through expanded catchment areas, and higher service frequencies from increased station capacity. These benefits, in combination with improved customer accessibility, amenity and safety, will lead to an increase in public transport mode share. Another benefit of the station will be the improved safety of bus operations.

6.4.1.1 Burswood Bus Station Overview

An intermediate bus station will be provided to the north of Torrens Road, between the commercial area to the south and the Burswood residential area to the north. The bus station will provide seating and sheltered cover for passengers as well as real-time service information. Bicycle and scooter storage will also be provided.

The bus station will be accessible to pedestrians and cyclists from the residential roads of Dulwich Place and Heathridge Place to the north via footpaths and signalised crossings across the bus lanes at both of the new Burswood Drive intersections to the east and west. In addition, a pedestrian access route is planned to be provided via Torrens Road and the property at 28 Torrens Road to the south subject to negotiation and agreement with the landowner. A bidirectional cycleway and footpath will run adjacent to the station. **Figure 79** shows the layout of the proposed bus station in Burswood.

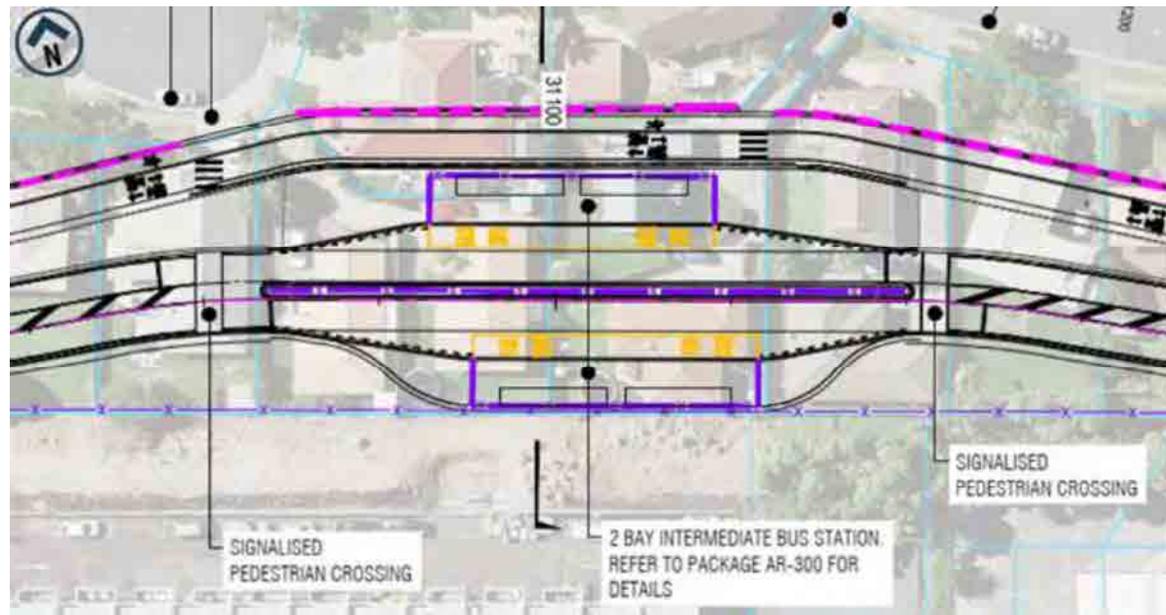


Figure 79: Proposed Burswood intermediate station layout

⁶⁶ Refer to Appendix A for an overview of the bus stations that will be provided within EB2 and EB3R upon completion of the project.

6.4.1.2 Botany Town Centre Bus Station

As stated in **Section 1.2**, the proposed Botany Town Centre major interchange bus station will be assessed in a separate report and application and is outside the scope of this ITA.

6.4.1.3 Bus Stop Removal and Retention

Figure 80 shows the existing bus stops in the EB3C project area, while **Figure 81** shows the existing bus stops in the EB4i and EB4L project areas. It should be noted that bus route arrangements as well as location of bus stops to be used by school buses post completion of the Project are still undergoing discussion with the schools, Ministry of Education and AT Metro.



Figure 80: EB3C bus stops in the existing environment

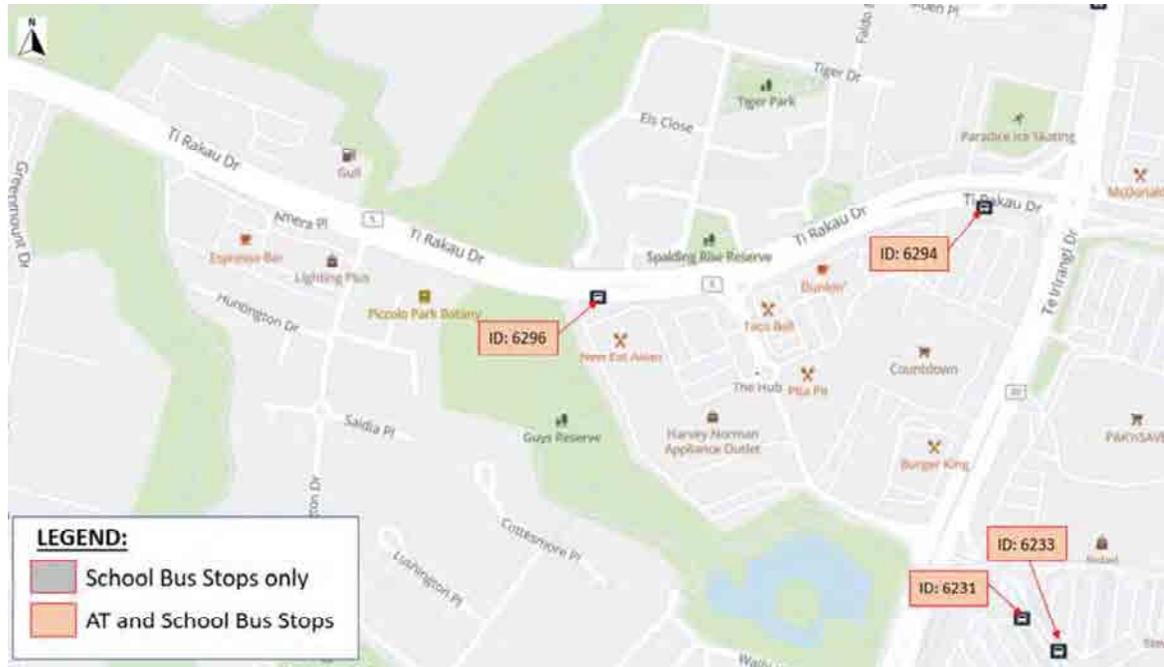


Figure 81: EB4i and EB4L bus stops in the existing environment

As the majority of the regular AT bus services along Ti Rākau Drive will in future be travelling on the dedicated busway and will be picking up/dropping off passengers at the new bus stations, most of the existing bus stops along Ti Rākau Drive will no longer be used by these services. However, various school bus services also use these bus stops in the existing environment⁶⁷.

As discussed in **Section 6.4.7** below, it is expected that the majority of the school bus services currently travelling through the EB3C and EB4 project areas will remain on their current routes. As such, it is expected that all of the current bus stops on Ti Rākau Drive and Burswood Drive will be retained to serve these school bus services.

⁶⁷ Refer to Section 6.4.7 for an assessment of the permanent effects to school bus services through the EB3C, EB4i and EB4L project areas.