

6.4.1 Future Patronage

Future patronage of bus services in the EB3C, EB4i and EB4L project areas were determined from the MSM Auckland Regional Transport Models (EMME). These models forecast demands based on Auckland Council’s Scenario I Modified Version 11.5 demographic and land use data. The outputs of these models include public transport demand and are based on a 2-hour period during the AM and PM Peaks.

Table 20 provides a comparison of bus patronage, predicted by the 2018 Base Model and the 2028 EB2/EB3/EB4 Model, at the proposed Burswood bus station during the AM peak hour⁶⁸. It should be noted that the public transport demand shown below is a combination of both inbound and outbound services at this location.

Table 20: AM peak hour bus patronage – 2018 Base vs 2028 EB2/EB3/EB4

Station	2018 Base			2028 EB2/EB3/EB4		
	Boarding	Alighting	Total	Boarding	Alighting	Total
Burswood	54	27	81	137	123	260

Table 21 provides a comparison of bus patronage, between the 2018 Base Model and the 2028 EB2/EB3/EB4 Model, during the PM peak hour.

Table 21: PM peak hour bus patronage – 2018 Base vs 2028 EB2/EB3/EB4

Station	2018 Base			2028 EB2/EB3/EB4		
	Boarding	Alighting	Total	Boarding	Alighting	Total
Burswood	25	40	65	180	136	316

The intermediate Burswood station is predicted to significantly increase public transport patronage during both the AM and PM peak hours compared to the existing environment where there is currently no bus station present in the Burswood residential area. The closest bus stops are located on Tī Rākau Drive. This trend is expected to continue throughout the day, leading to significant increases in daily public transport use.

Increased public transport patronage will help reduce road congestion, as well as assisting the transport sector to meet climate change mitigation targets by reducing greenhouse gas emissions.

⁶⁸ A factor of 0.6 is used to calculate the peak hour patronage from the 2-hour peak period demand from the model.

6.4.2 Platform Pedestrian Circulation

The level of service for customer circulation at the bus stations was determined based on the peak patronage by 2048⁶⁹, with a target of LOS C (minimum 1.4 m² per person), for the peak 5-minute demand for boarding and peak 1-minute demand for alighting passengers. **Table 22** outlines the forecasted peak patronage by 2048, the resultant platform area required and the platform footprint of the design at the station.

Table 22: Station patronage and platform areas

Station	Direction	AM Peak period		PM Peak Period		Design Platform Footprint [m ²]
		Peak Patronage (By 2048)	Area Required [m ²]	Peak Patronage (By 2048)	Area Required [m ²]	
Burswood	Inbound	22	31	22	31	105
	Outbound	9	13	9	13	

The station platform area will be well provided for to future-proof the station for increases in bus patronage and services.

6.4.3 Bus Station Loading Area

An assessment was undertaken to determine the number of bus bays or loading areas at each of the Project's new bus stations, based on forecast patronage (EMME model) and bus numbers (provided by AT Metro) by 2048⁷⁰. The assessment methodology to determine the number of bus bays and the number of platforms required was determined using guidance from the Transit Capacity and Quality of Service Manual – Part 2 Transit Capacity (TCQSM). This included employing a given set of operating conditions and probability of acceptance of a bus entering a bus bay without delay.

Table 23 summarises the number of platforms and bus bays at the Burswood bus station.

Table 23: Platform and bus bay requirements

Station	No. of Buses per Peak Hour	No. of Platforms (Inbound)	No. of Bus Bays (Inbound)	No. of Platforms (Outbound)	No. of Bus Bays (Outbound)
Burswood	48	1	2	1	2

The intermediate bus station at Burswood will consist of one platform per direction, each providing two bus bays upon completion. Appropriate platforms and number of bus bays have been provided in the proposed design to cater for the predicted patronage and bus services by 2048.

⁶⁹ EB234-2-TE-RP-ZO-0001_A1_Traffic Modelling and Analysis Report

⁷⁰ EB234-2-TE-RP-ZO-0001_A1_Traffic Modelling and Analysis Report

6.4.4 Future Bus Services and Routes

The bus services currently serving the EB3, EB4i and EB4L project areas will continue to do so by 2028 upon project completion, and include the 70, 351, 352, and 353 services^{71,72}.

In addition, two new services will be added to the network within the EB3, EB4i and EB4L extent. These will consist of the 705 service between Meadowlands and Panmure and the 706 service between Flatbush and Panmure⁷³.

The 70 service currently operating along Tī Rākau Drive in the EB3C project area will instead run along the offline busway behind Chinatown, through the Burswood residential area and Burswood Esplanade Reserve, then back alongside Tī Rākau Drive up to Guys Reserve. In the interim, this service will join back into Tī Rākau Drive via EB4i up to the Tī Rākau Drive / Te Irirangi Drive intersection and onwards to the existing Botany Town Centre bus station. Once EB4L is constructed, this service will instead turn onto the offline busway through Guys Reserve, and onwards to the existing Botany bus station. It is worth noting that once EB3C and EB4L is completed, the new route of the 70 service will be roughly the same distance as the existing route through these project areas.

The 351 and 353 services will travel along Harris Road, turning left onto Tī Rākau Drive instead, northbound along Burswood Drive west, then along the offline busway up to Guys Reserve. Again, in the interim these services will join back into Tī Rākau Drive via EB4i and onwards to the existing Botany bus station. Once EB4L is completed, these services will turn onto the offline busway through Guys Reserve instead. The new routes of these services will be roughly 700m longer once EB3C and EB4L is completed, compared to their existing routes.

The 352 service will in future travel along Harris Road, turning right onto Tī Rākau Drive, northbound along Burswood Drive east, then along the offline busway towards the Pakūranga Town Centre bus station. Compared to the existing route of the 352 service, the new route will be approximately 1km longer through the EB3C project area.

The new 705 will travel along Picton Street, Selwyn Road, Granger Road, Litten Road, Sandspit Road, Meadowland Drive, Millhouse Drive, Botany Road towards the Botany bus station, then along the EB4L and EB3C busway, further along Tī Rākau Drive (EB3R and EB2) and then onto Pakūranga Road (EB1) towards the Panmure Train Station.

The new 706 service will travel along Ormiston Road, Murphys Road, Stancombe Road, Chapel Road, Te Irirangi Drive towards the Botany bus station, then along the EB4L and EB3C busway, further along Tī Rākau Drive (EB3R and EB2) and then onto Pakūranga Road (EB1) towards the Panmure Train Station.

It should be noted that the new 705 and 706 services will travel along the same route as the 70 service through the EB3C and EB4 project areas.

Figure 82 shows the future bus services and routes that will be operating in the EB3C, EB4i and EB4L project areas upon completion.

⁷¹ Permanent effects to school bus services are discussed in Section 6.4.7.

⁷² Refer to Appendix A for permanent effects to bus services and routes through the EB2 and EB3R project areas.

⁷³ It should be noted that the existing 35 and 733 services and two additional new services, the 354 and 356 services towards Botany Town Centre bus station, will only be running in the north-south direction on Te Irirangi Drive and not on the new dedicated busway. As such, these services have not been included in this assessment.



Figure 82: Future bus services and routes in the EB3C, EB4i and EB4L project areas

In future, all bus services along Ti Rākau Drive will travel in dedicated bus lanes through the EB3C, EB4i and EB4L areas, as opposed to the general traffic lanes currently. Overall, the new routes and the bus lanes are predicted to lead to significant improvements in bus travel times and support increased patronage levels. The sections below discuss the improvements in bus service headways, as well as the expected improvements in bus travel times.

6.4.5 Service Headways

Table 24 below provides a comparison of the bus service headways, between the existing environment and EB2/EB3/EB4 upon completion by 2028, during the AM, Inter-Peak and PM peak periods. The term ‘headway’ is used in this assessment as the average time interval between buses arriving at a bus stop on a regular service.

Table 24: Service headways - Existing Environment vs EB2/EB3/EB4

Service Description	Direction	Existing Environment			EB2/EB3/EB4 2028		
		AM Headway [min]	IP Headway [min]	PM Headway [min]	AM Headway [min]	IP Headway [min]	PM Headway [min]
70 – Botany to Auckland CBD	Inbound	8	10	10	5	7	7
	Outbound	10	7	7	7	7	5
351 – Botany to Ōtāhuhu Station	Inbound	20	30	20	10	30	10
	Outbound	20	30	20	10	30	10
352 – Manukau to Panmure	Inbound	20	20	20	12	12	12
	Outbound	20	20	20	12	12	12
353 – Manukau to Botany Town Centre	Inbound	30	30	30	30	30	30
	Outbound	30	30	30	30	30	30
705 – Meadowlands to Panmure (new route)	Inbound	-	-	-	15	-	-
	Outbound	-	-	-	-	-	15
706 – Flatbush to Panmure (new route)	Inbound	-	-	-	15	-	-
	Outbound	-	-	-	-	-	15

Service headways of the 70 service and in particular the 352 service will improve significantly during all periods of the day. The benefit of this will be an increase in public transport patronage, especially during the peak periods.

Headways for the 351 service will be halved during the AM and PM peak periods in the future, whereas headways for the 353 are expected to remain the same during all periods, with the capacity to be improved if required.

It is expected that the new 705 and 706 services will at first run at 15-minute intervals, and only in the peak directions (AM = inbound, PM = outbound), and could be improved if required.

As above, the increased bus service frequencies will encourage more road users to use buses as there will be less waiting time in between services, subsequently leading to increased public transport mode share on the network. This will not only reduce congestion but will also reduce greenhouse gas emissions by way of a more sustainable movement of passengers through the network.

6.4.6 Bus Travel Time

Bus route travel times were determined using the AIMSUN model. The same bus routes presented in **Section 5.2.5.1**, with the addition of the new 705 and 706 services, are assessed here for permanent effects to bus travel times in the EB2/EB3/EB4 Scenario. **Table 25** below provides a comparison of the bus route travel times between the 2018 Base, 2028 Do-Minimum and 2028 EB2/EB3/EB4 scenarios.

Table 25: Bus travel times – Base vs Do-Minimum vs EB2/EB3/EB4

AM Peak										
Modelled Route Extent	Westbound					Eastbound				
	Base (1) [min]	Do-Minimum (2) [min]	Diff. (2-1) [min]	EB2/EB3/EB4 (3) [min]	Diff. (3-2) [min]	Base (1) [min]	Do-Minimum (2) [min]	Diff. (2-1) [min]	EB2/EB3/EB4 (3) [min]	Diff. (3-2) [min]
70 – Botany bus station to Ellerslie Panmure Hwy / Clare Pl	35.0	42.3	7.3	25.3	-17.0	35.5	26.9	-8.6	25.5	-1.4
351 – Botany bus station to Ti Rākau Dr / Harris Rd	9.1	16.2	7.1	7.2	-9.0	4.7	5.3	0.6	7.9	2.6
352 – Ti Rākau Dr / Harris Rd to Panmure station	24.2	27.5	3.3	20.0	-7.5	27.1	18.7	-8.4	21.0	2.3
353 – Botany bus station to Ti Rākau Dr / Harris Rd	9.1	16.2	7.1	7.2	-9.0	4.7	5.3	0.6	7.9	2.6
705 – Botany Rd / Golfland Dr to Panmure station	-	-	-	26.8	-	-	-	-	-	-
706 – Botany bus station to Panmure station	-	-	-	21.8	-	-	-	-	-	-
PM Peak										
Modelled Route Extent	Westbound					Eastbound				
	Base (1) [min]	Do-Minimum (2) [min]	Diff. (2-1) [min]	EB2/EB3/EB4 (3) [min]	Diff. (3-2) [min]	Base (1) [min]	Do-Minimum (2) [min]	Diff. (2-1) [min]	EB2/EB3/EB4 (3) [min]	Diff. (3-2) [min]
70 – Botany bus station to Ellerslie Panmure Hwy / Clare Pl	48.7	35.7	-13.0	25.4	-10.3	42.3	38.1	-4.2	27.0	-11.1
351 – Botany bus station to Ti Rākau Dr / Harris Rd	5.9	8.2	2.3	8.5	0.3	15.5	15.3	-0.2	9.0	-6.3
352 – Ti Rākau Dr / Harris Rd to Panmure station	33.2	24.1	-9.1	20.8	-3.3	36.6	20.9	-15.7	28.0	7.1
353 – Botany bus station to Ti Rākau Dr / Harris Rd	5.9	8.2	2.3	8.5	0.3	15.5	15.3	-0.2	9.0	-6.3
705 – Botany Rd / Golfland Dr to Panmure station	-	-	-	-	-	-	-	-	27.5	-
706 – Botany bus station to Panmure station	-	-	-	-	-	-	-	-	23.0	-

When comparing the Do-Minimum to the Base scenario, the travel time for the 70 westbound service increased in the AM peak. Although, some travel time benefits would have been gained by the completion of EB1, these were likely offset by increased congestion on the rest of the route. In the eastbound direction some travel time improvements were still gained as a result of EB1. Improvements were also observed in the PM peak.

In the AM peak, the 70 service is predicted to experience a significant improvement (17 minutes) in travel time in the westbound direction, the peak travel direction, when comparing the Do-Minimum and Project scenarios. The service will travel along the offline busway for the full length of the Tī Rākau Drive corridor, taking full benefit from the Project. The 70 eastbound service is predicted to experience a small improvement, with an overall travel time similar to that of the opposite direction. In the PM peak, the 70 service is also expected to experience a significant improvement in travel times in both directions.

It should be noted that the route extents of the 351 and 353 services within the models are the same, hence similar data is presented in the table above. When comparing the Do-Minimum to the Base scenario, the travel time for both services increased for both directions in the AM peak, and the westbound direction in the PM peak. Roughly similar travel times were produced for the 351 and 353 services for the eastbound direction in the PM peak.

Both services are predicted to experience significant travel time improvements in the peak directions (AM = westbound, PM = eastbound) upon Project completion. In the off-peak directions, both services are predicted to experience moderate to marginal increases in travel times (AM = 2.6 minutes eastbound, and PM = 0.3 minutes westbound, respectively). This is likely due to their longer routes, the four additional intersections these services have to pass through, and particularly the operation of the already congested Tī Rākau Drive / Harris Road intersection.

Travel time increases were observed for the 352 westbound service in the AM peak, when comparing the Base and Do-Minimum scenarios, despite the completion of EB1. However, the travel times for the eastbound direction in the AM peak and both directions in the PM peak were observed to improve.

Once the Project is completed, the 352 service is predicted to experience moderate to significant travel time improvements in the westbound direction during both AM and PM peaks. Conversely, an increase in travel time is expected for the eastbound direction in both peaks, with a more significant increase in the PM peak. These increases are likely due its longer route, the two additional intersections, as well as the operation of the Tī Rākau Drive / Burswood Drive / Greenmount Drive intersection⁷⁴. This intersection will be required to provide more green time to movements along Tī Rākau Drive (less side road green time) as a result of the capacity reduction further east.

The new 705 and 706 services will in future also run on the offline busway for the entire length of Tī Rākau Drive. As such, these services are predicted to experience roughly similar travel times compared to the 70 service in the peak travel directions in which they will operate.

⁷⁴ It is worth noting the Tī Rākau Drive / Burswood Drive (east) / Greenmount Drive traffic signals are operated as a common control group, i.e., as a single set of coordinate signals.

In order to provide buses with a LOS of C or better, as per the TMRs, the following measures were included in the traffic signal design of EB3C and EB4L:

- Some form of priority is provided for buses, to balance the delays to vehicles and pedestrians
- Extending the current bus phase to enable an approaching bus to pass through the intersection
- Allowing the bus phase to interrupt once per cycle when a bus is on approach to the intersection
- Bus priority added in the form of approach and departure loops following review of traffic modelling
- Managing bus priority through SCATS using advance calls and departure loop inputs at each site
- Queue detection loops are provided on an as-needed basis only and in collaboration with AT

The above measures have been designed to adjust bus priority to suit traffic conditions and flow patterns, and to avoid blockage to busway movements and operate intersections efficiently. Therefore, the modelled average delay to buses at intersections within the project areas could potentially be reduced, further improving bus travel times.

Overall, bus travel times are predicted to improve across the network during the AM and PM peaks upon Project completion. The combination of improved travel times and higher service frequencies will lead to faster and more reliable public transport trips. In the rare cases where bus services are not expected to experience improvements in travel times, these services will still be improved in the form of the new bus stations, improved reliability and efficiency, and increased service frequencies.

6.4.7 School Bus Services

Overall, school bus services travelling on the new busway are expected to experience similar travel time improvements as presented in **Section 6.4.6** and services travelling in the general traffic lanes are expected to experience similar travel time improvements as presented in **Section 6.3.3**. The route arrangements for school buses post completion of the project are still undergoing discussion with the schools, Ministry of Education and AT Metro.

Similar to the EB3R project area, the S013 service between Otara and Edgewater College is expected to continue to travel along its current route through the EB3C project area via Harris Road, Burswood Drive and Tī Rākau Drive. Although the school bus service will be required to pass through the two new intersections along Burswood Drive, the permanent effects to this service are considered to be low. As discussed in **Section 6.4.1.3**, Bus Stops 6141 and 6142 are expected to be retained to serve students on the inbound service.

The S416, between Botany and Sacred Heart College, could in future run along the offline busway through EB3C, EB4i and EB4L (as well as EB2 and EB3R⁷⁵) and benefit from the potential travel time savings and bus station catchment. Students would be able to board/alight at the Burswood bus station.

The S421, between Burswood and Farm Cove Intermediate, is also expected to remain on its current route through the EB3C and EB4 project areas via Tī Rākau Drive and Burswood Drive. Again, despite having to pass through two new intersections along Burswood Drive, the permanent effects to this service are expected to be low. As discussed in **Section 6.4.1.3**, Bus Stops 6294 and 6296 are expected to be retained to serve students on the outbound service.

The S440 between Bucklands Beach and Sancta Maria College will not be turning onto the busway at the Tī Rākau Drive / Gossamer Drive intersection in EB3R⁷⁶. Similarly, the service will remain on its current route along Tī Rākau Drive through the EB3C and EB4 project areas. As such, the permanent effects to this service are considered to be low. Bus Stops 6188 and 6142 (inbound service), and Bus Stops 6137 and 6139 (outbound service) are expected to be retained (see **Section 6.4.1.3**).

⁷⁵ Refer to Appendix A

⁷⁶ Refer to Appendix A

6.5 Effects to Pedestrians and Cyclists

The sections below provide an assessment of permanent effects to pedestrians and cyclists in the EB3C, EB4i and EB4L⁷⁷ project areas upon completion of the project.

The Project will provide dedicated footpaths and cycleways, which will improve amenity and safety for active transport users. Further benefits of this infrastructure will be greater connectivity and accessibility not only across the network, but especially in proximity to the bus stations, resulting in increased catchment as well as the potential for mode shift to occur.

A bidirectional cycleway will be provided throughout EB3C and EB4L to the north of Tī Rākau Drive, from the new Bridge A up to Guys Reserve, as well as along the western and southern boundaries of Guys Reserve and Whaka Maumahara. The majority of the existing footpaths will be retained, while new footpaths will be provided at following locations (see **Figure 83**):

- Along Tī Rākau Drive between the existing Tī Rākau Bridge and Burswood Drive west
- Along Burswood Drive west
- Along the busway between Burswood Drive east and west
- A new recreational footpath between Burswood Drive east and the footpath in Burswood Esplanade Reserve
- Between Burswood Drive east and Guys Reserve
- Along the western and southern boundaries of Guys Reserve and Whaka Maumahara.

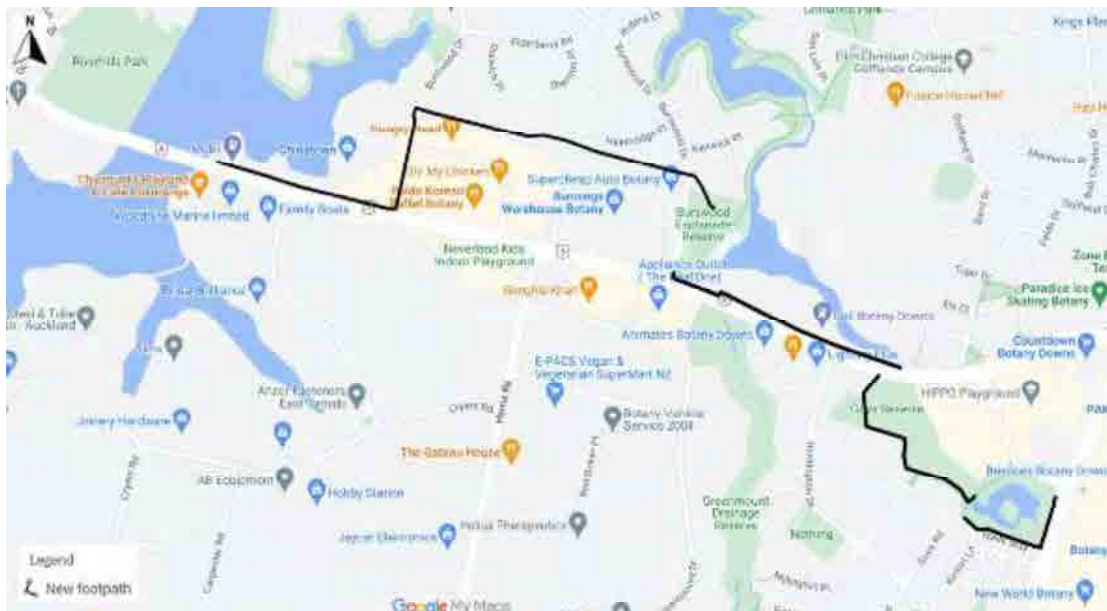


Figure 83: Proposed footpaths throughout EB3C and EB4L

Within the EB4i project area there will be no new facilities provided. In the EB4L area, the existing pedestrian footpath will be realigned and upgraded to a pedestrian footpath adjacent to a new bidirectional cycleway, while access to Cottessmore Place and Kirikiri Lane will be maintained.

⁷⁷ Refer to Appendix A for an assessment of permanent effects to pedestrians and cyclists in the EB2 and EB3R project areas.

6.5.1 Speed Calming Controls

Raised intersections will be implemented at the two Burswood Drive / Busway intersections, shown in **Figure 84**.

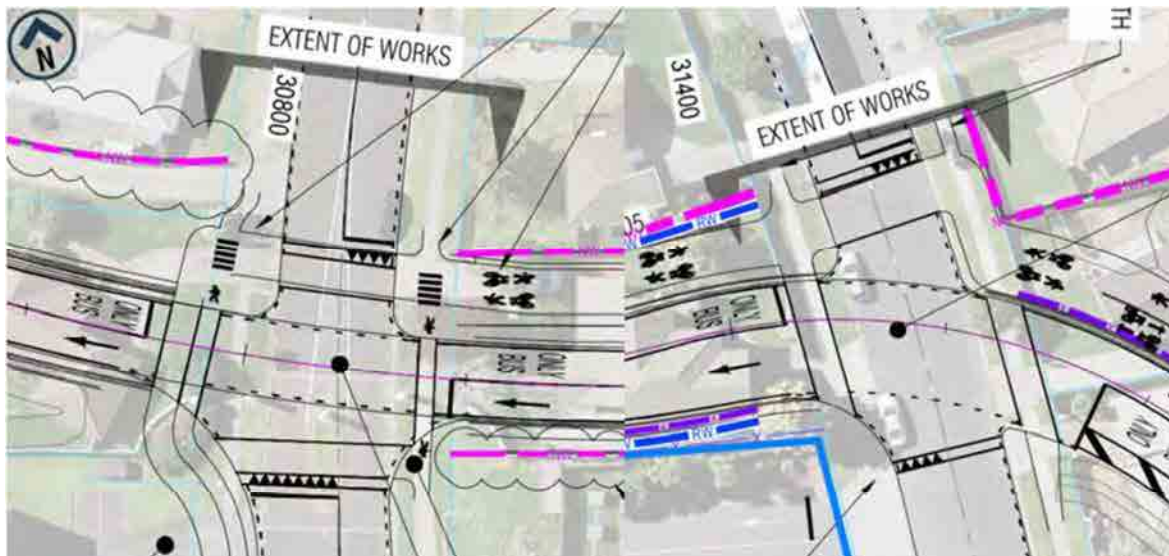


Figure 84: Burswood Drive / Busway raised intersection layouts

The presence of these raised intersections will promote road user safety for pedestrians and cyclists by reducing vehicle speed through Burswood Drive. The signage and markings associated with the raised intersections will increase visibility and serve as a visual cue to drivers to reduce speed as they approach the intersections. This will reduce the risk of potential conflict between vehicles and pedestrians.

6.5.2 Signalised Crossings

New signalised pedestrian crossings will be provided at the following locations (see **Appendix C**):

- Across the offline busway on both sides of the Burswood bus station for safe and direct access to the station
- The western arm of the Ti Rākau Drive / Greenmount Drive intersection
- Across the dedicated busway to the east of Greenmount Drive
- The western and northern arms of the new Ti Rākau Drive / Bus Depot intersection
- The southern arm of the new Ti Rākau Drive / Guys Reserve intersection.

New signalised pedestrian and cycle crossings will be provided at the following locations:

- The new Burswood Drive west / Busway intersection (except the eastern arm)
- The northern arm of the new Burswood Drive east / Busway intersection
- A two-staged crossing across the new Ti Rākau Drive / Guys Reserve intersection.

6.5.3 Cycleways

A bidirectional cycleway will be provided throughout the whole EB3C area along the northern side of Tī Rākau Drive (see **Appendix C**). The cycleway will tie into EB3R (see **Appendix A**) from the new Bridge A western abutment up to Burswood Drive west, then running along the western side of Burswood Drive west. From here the cycleway will run immediately north of the new Burswood bus station, through the Burswood Esplanade Reserve, north of the Howick and Eastern Bus Depot, and then join back into Tī Rākau Drive up to Guys Reserve. From here, the cycleway will connect to a signalised, two-staged pedestrian and cyclist crossing into Guys Reserve (EB4L).

There will be no new facilities provided in EB4i.

Within EB4L, the new cycleway will begin at the new signalised pedestrian and cyclist crossing at Guys Reserve. The cycleway will then continue along the western and southern boundaries of Guys Reserve and Whaka Maumahara, finally connecting to Te Irirangi Drive. From here, the cycleway will run along the western side of Te Irirangi Drive up to the intersection with Town Centre Drive (see **Appendix E**). **Figure 85** shows the location of the proposed cycleways throughout EB3C and EB4L.

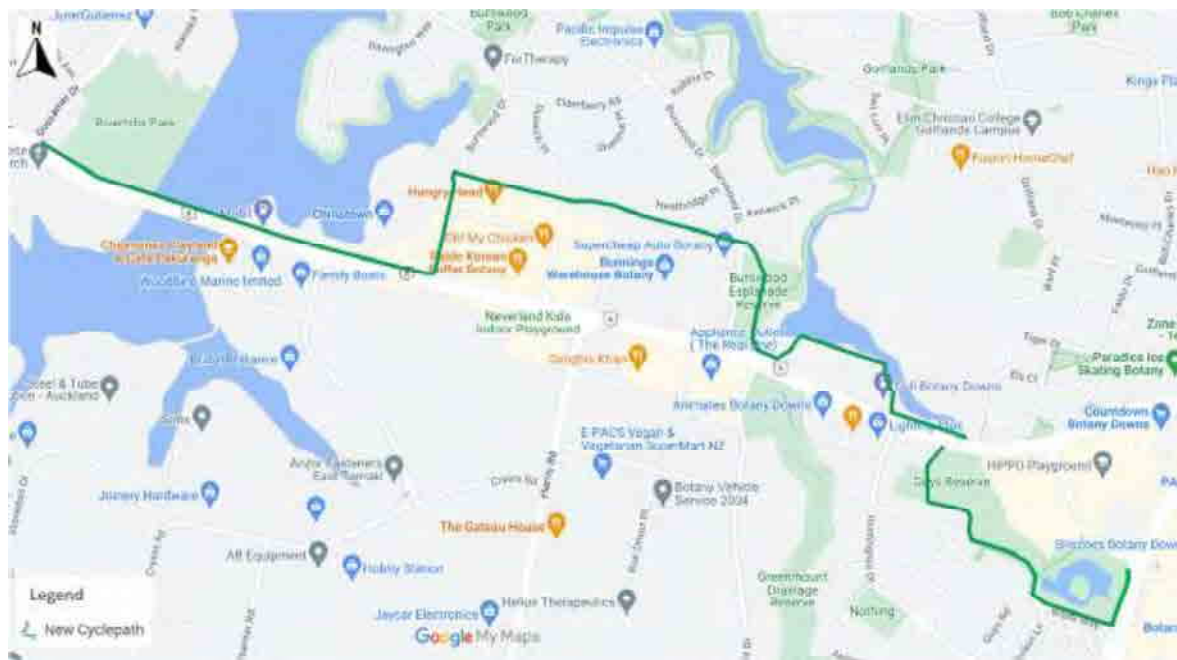


Figure 85: Proposed cycleways throughout EB3C and EB4L

The existing footpaths inside Whaka Maumahara will be realigned to connect the cycleway and footpath to Te Koha Road and Te Irirangi Drive, with access to Cottesmore Place and Kirikiri Lane.

Providing dedicated cycleways creates a physically separated and safe space that facilitates cycle movements throughout the network. This provides users with a more attractive mode of travel and supports modal shift. Furthermore, the cycleways will facilitate improved accessibility to the bus station, supporting bus patronage increases. Overall, pedestrian and cyclist amenity and safety will be improved. The Project will also provide greater accessibility and connectivity to public transport, increasing catchment and mode shift.

6.6 Effects to Property Access and Parking

The sections below provide an assessment of permanent effects to property access and parking in the EB3C, EB4i and EB4L⁷⁸ project areas upon completion of the project.

6.6.1 EB3C – Tī Rākau Drive between Tī Rākau Bridge and Guys Reserve

The Project will not permanently directly affect any on-street parking provision along Tī Rākau Drive between the Tī Rākau Bridge and Burswood Drive east.

6.6.1.1 Tī Rākau Drive (Burswood Drive east to Guys Reserve)

As stated in **Section 3.7.1.3**, on-street parking along this section of Tī Rākau Drive is not strictly prohibited by road markings or signage in the existing environment. In order to provide the necessary space for the new busway and footpaths, the proposed design will not provide any on-street parking along this section of Tī Rākau Drive. However, given the regional route nature of Tī Rākau Drive and with high traffic volumes, it is very unlikely that motorists would leave vehicles parked along this section of Tī Rākau Drive. Therefore, the permanent effects to parking are considered to be negligible.

As per the existing environment, a solid median will be provided to separate the busway, westbound and eastbound traffic along Tī Rākau Drive, with opportunities to turn into properties and side streets at the intersections.

⁷⁸ Refer to Appendix A for an assessment of permanent effects to property access and parking in the EB2 and EB3R project areas.

6.6.1.2 242 Tī Rākau Drive (Mobil service station) and 254 Tī Rākau Drive (PetStop)

As stated in **Section 5.1.1.1**, it is intended that the properties at 242 Tī Rākau Drive (Mobil service station) & 254 Tī Rākau Drive (PetStop) will be permanently acquired by AT and the buildings demolished (see **Figure 86**).

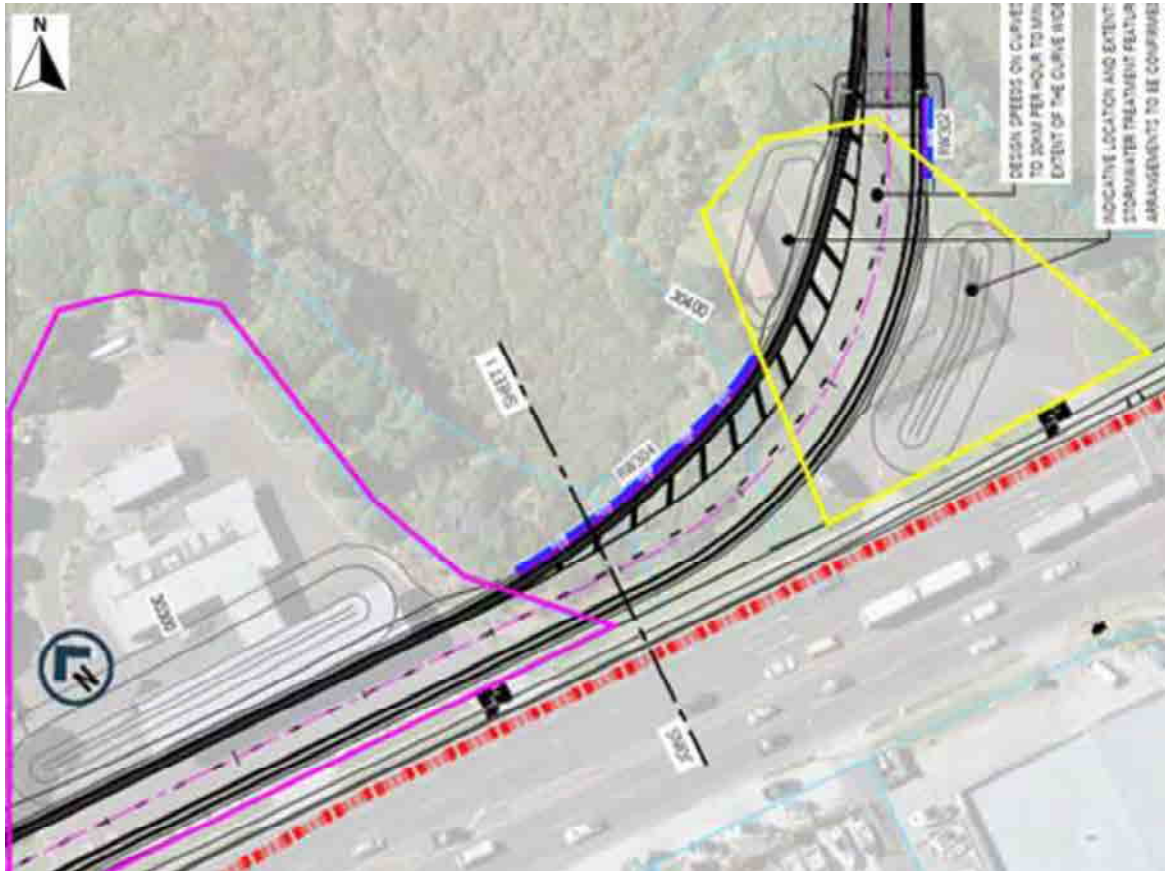


Figure 86: Properties 242 Tī Rākau Drive (pink outline) and 254 Tī Rākau Drive (yellow outline) upon completion

Upon completion, the two properties will be taken up by the new Bridge A and stormwater treatment features. Access to the properties will not be maintained upon completion of the project.

6.6.1.3 262 Tī Rākau Drive (Chinatown)

Bridge B will trim the rear of the Chinatown Retail Centre carpark, affecting parking spaces and loading zones. **Figure 87** shows the location of 262 Tī Rākau Drive and the proposed design of the busway bridge. Upon completion, the accesses to Chinatown from both Tī Rākau Drive and Burswood Drive west will be reinstated with a new bidirectional cycleway placed in front of them.



Figure 87: Chinatown property and Bridge B upon completion

Following careful consideration of the design to minimise the permanent impacts, a parcel of land will be acquired by AT to the rear of the property for the new Bridge B. It is expected that 5 parking spaces would require permanent acquisition by AT. In addition, the current refuse area, which occupies roughly 30m of the property boundary, would require relocation (roughly 14 parking spaces). Consultation with the property owners and tenants are ongoing. A permanent parking layout, including the relocation of the current refuse area will be developed and agreed with the owners/tenants.

6.6.1.4 320 Tī Rākau Drive (Bunnings Warehouse Botany)

The new offline busway intersection with Burswood Drive east will be less than 10m distance from the northern access of Bunnings Warehouse Botany, as shown in **Figure 88**. This is a departure from AUP(OP)⁷⁹. The northern access is currently used by loading vehicles to access the rear end loading area.

As such, the access will be incorporated as a part of the signalised busway intersection as a left-in, right-out only approach for heavy vehicles. The existing vehicle crossing for Bunnings Warehouse loading zone will also be adjusted to tie into the toe of the raised intersection.

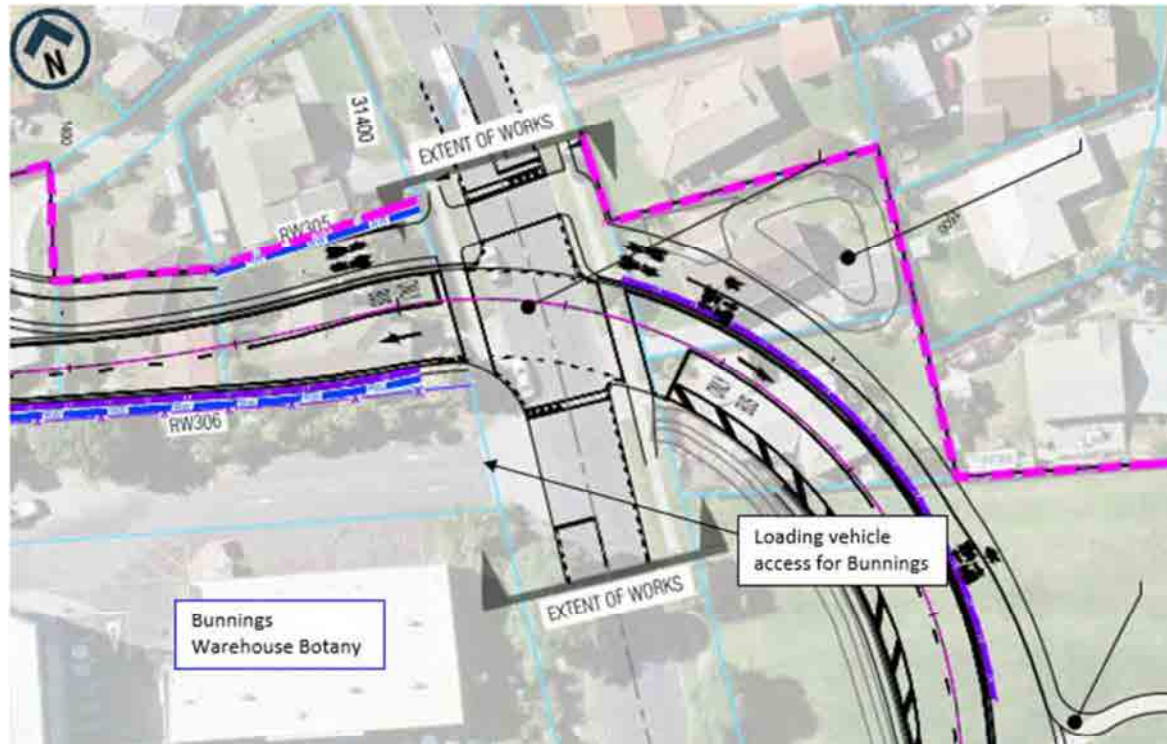


Figure 88: Bunnings Warehouse Botany and its loading vehicle access

As shown in **Section 6.3.2**, the Bunnings loading access can be incorporated into the Burswood Drive east / Busway intersection and is expected to operate with low delays during both peak periods. The permanent effects to property access are considered to be very low and the proposed design is not expected to have any effect on off-street parking. Consultation with the property owners and tenants are ongoing.

⁷⁹ AUP(OP) – Auckland Unitary Plan Operative in Part Section E27.6.4.1 (3)

6.6.1.5 380 and 386 Tī Rākau Drive (Howick & Eastern Bus Depot and Gull Botany Downs)

As stated in **Section 5.4.7**, the Howick and Eastern Bus Depot currently has one signalised vehicle crossing on Tī Rākau Drive that allows for both in/out movements and the 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 89**). This access will also be provided with new pedestrian crossings on the northern and western arms. Therefore, the Project will improve the access to these two properties by providing separate accesses for bus and general traffic and will support pedestrian access via new signalised pedestrian crossings on Tī Rākau Drive.

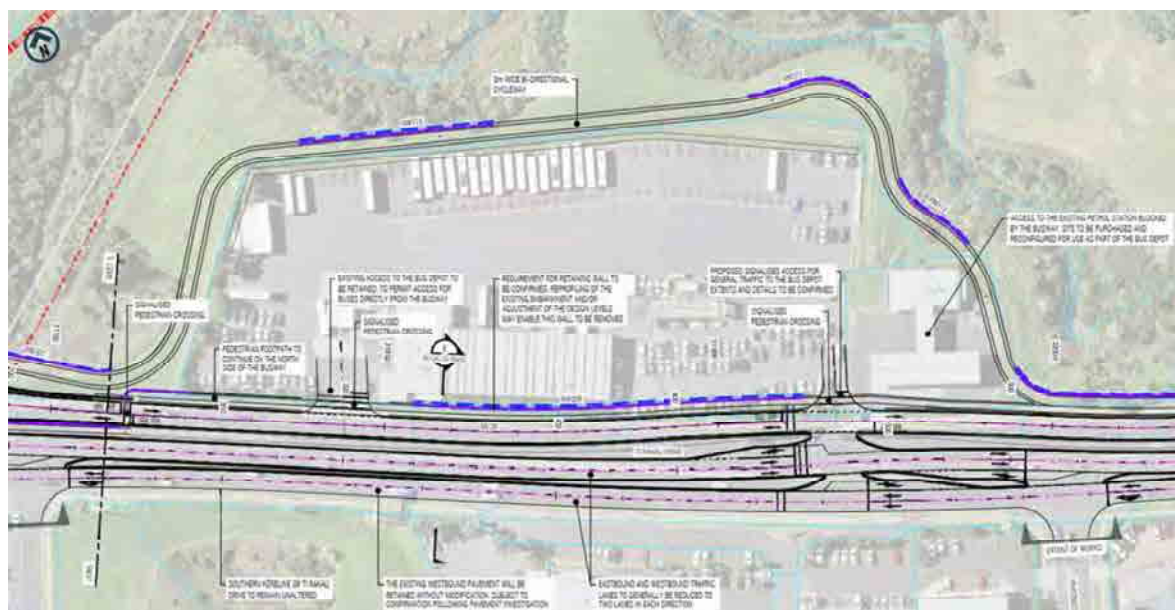


Figure 89: Howick & Eastern Bus Depot and Gull Service Station

As stated in **Section 3.7.5**, the Howick and Eastern Bus Depot currently supports 128 bus parking spaces and 93 car parking spaces. It is expected that approximately 40 car parking spaces will be permanently lost. However, as the adjoining Gull service station will be acquired, the land could serve as an additional parking area.

Consultation with the property owners and tenants are ongoing. A permanent parking layout will be developed and agreed with the owners/tenants to manage the permanent effects to parking on site.

6.6.2 EB3C – Burswood Drive

The proposed design will not affect most of Burswood Drive’s existing on-street parking arrangements. New NSAAT lines are proposed approximately 25m either side of the new intersections. Compared to the existing environment, which has short sections of NSAAT lines within these areas, the proposed design will remove roughly 40m (or seven parking spaces) on Burswood Drive west and roughly 79m (or 14 parking spaces) of on-street parking on Burswood Drive east.

Burswood Drive, where the new intersections will be located, serves mostly the Burswood residential area. Burswood Drive west is a secondary collector and Burswood Drive east is a primary collector⁸⁰, with low traffic volumes and a 50 km/h speed limit. The removal of on-street parking is mostly within the residential areas, where properties are expected to have their own private parking off-street, and on-street parking adjacent to these locations are plentiful.

6.6.2.1 EB3C – 22 and 28 Torrens Road (Commercial Properties)

As part of the EB3C design, a pedestrian accessway is proposed between the Burswood bus station to Torrens Road, improving station access for pedestrians and cyclists. The pedestrian accessway is proposed to sit on the western boundary of 28 Torrens Road as shown in **Figure 90**. Agreement with the landowners is being sought.

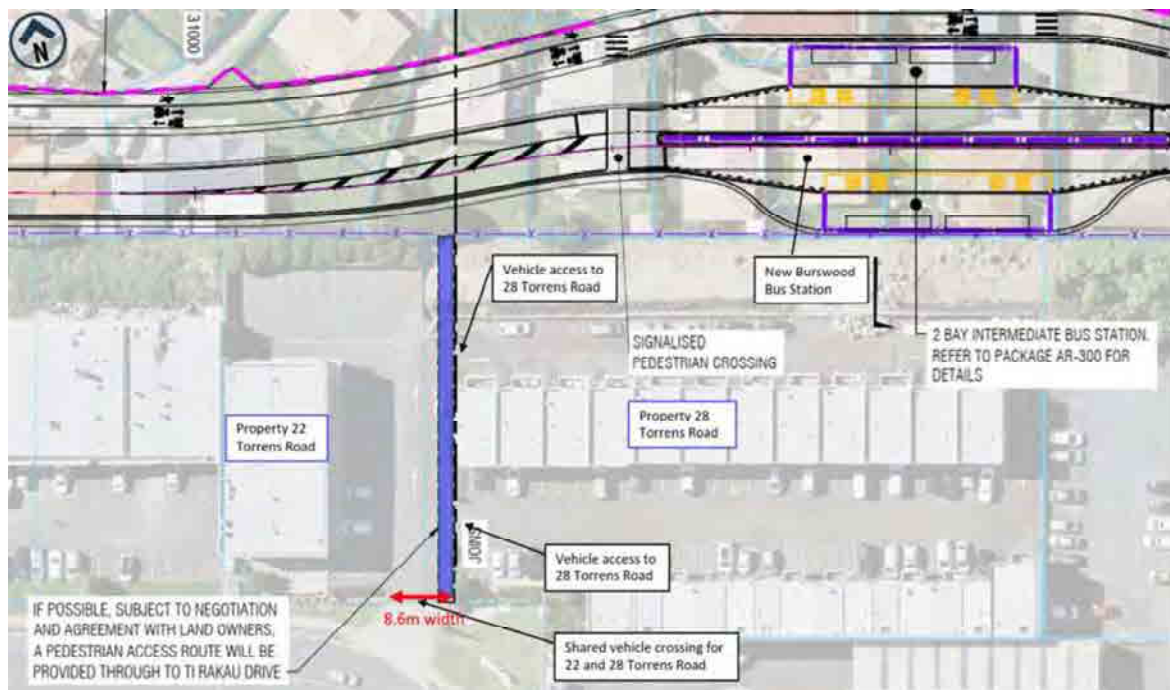


Figure 90: Proposed pedestrian access route (blue) between Burswood Bus Station and Torrens Rd

⁸⁰ Waka Kotahi One Network Road Classification, <https://nzta.maps.arcgis.com/apps/webappviewer/index.html?id=95fad5204ad243c39d84c37701f614b0> , retrieved 1st February, 2023

In the existing environment, the properties at 22 and 28 Torrens Road have an 8.6m wide shared vehicle crossing, which provides for vehicle ingress and egress. The proposed pedestrian access location is along the eastern edge of the shared vehicle crossing, an area that has been used as informal parking space by cars⁸¹.

The two properties are zoned as Business – Light Industrial. Under the AUP(OP)⁸², the minimum crossing width at the property boundary for two-way movements is 6.0m, which means there is an allowable crossing width of 2.6m that can be reconfigured as a pedestrian access route.

The pedestrian access route could be in the form of a footpath or footpath with zebra crossings at the two vehicle access points to 28 Torrens Road. As per the AT TDM, the minimum width required for a pedestrian footpath near a public transport hub is 2.4m, so that 2.6m would be sufficient.

In terms of property access, the potential accessway is not anticipated to impact vehicle ingress and egress from 22 Torrens Road. However, two conflict points will be formed between pedestrians using the access route and vehicles that access/exit the 28 Torrens Road property. Warning signage and markings for the accessway should be included to increase visibility of the accessway and enhance pedestrian safety.

6.6.3 EB4i – Tī Rākau Drive between Guys Reserve and Te Koha Road

Similar to **Section 6.6.1.1**, on-street parking along this section of Tī Rākau Drive is not strictly prohibited by road markings or signage in the existing environment. In order to provide the necessary space for the new busway in EB3C, the new bus lanes in EB4i and the transition between the two project areas, the proposed design will not provide any on-street parking along this section of Tī Rākau Drive.

However, given the regional route nature of Tī Rākau Drive and with high traffic volumes, it is very unlikely that motorists would leave vehicles parked along this section of Tī Rākau Drive. On-street parking restrictions (NSAAT lines) would be appropriate for this section of Tī Rākau Drive and will be confirmed with AT.

6.6.4 EB4L – Te Irirangi Drive / Te Koha Road Intersection

In the proposed design, the intersection of Te Irirangi Drive and Te Koha Road will be converted to a 5-arm intersection. New NSAAT lines are proposed at the Te Irirangi Drive southbound approach and Town Centre Drive approach of the intersection. However, given the regional route nature of Te Irirangi Drive and with high traffic volumes, it is very unlikely that motorists would leave vehicles parked close to the intersection. Therefore, the proposed design will likely have negligible effects to on-street parking.

⁸¹ This observation was found in Google Maps Street View, for a number of different years between 2015 – 2020.

⁸² AUP(OP) Table E27.6.4.3.2 Vehicle crossing and vehicle access widths.

6.7 Effects to Safety Performance

This sections below discuss the permanent effects on safety performance in context of EB3C, EB4i and EB4L⁸³ upon completion.

A Safe Systems Assessment (SSA) was undertaken of the proposed EB3C, EB4i and EB4L design layouts. As stated in **Section 3.8.2**, the SSA was conducted in accordance with the Auckland Transport Safe System Assessment Guidelines which are based on the Austroads 2016, Research Report AP-R509-16, Safe System Assessment Framework. The above-mentioned report section also provides details on the types of crashes assessed as well as the SSA framework. A summary of the findings is presented below.

6.7.1 EB3C

Table 26 provides an assessment summary and comparison of the SSA of the existing environment and the proposed design of EB3C. Each crash type is scored based on exposure, likelihood and severity and a lower score corresponds with a safer system. It should be noted that Location D in EB3C indicates the location of the Burswood bus station upon completion of the Project.

Table 26: EB3C SSA – existing vs future environment

SUMMARY											
EXISTING LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) PAKURANGA CREEK BRIDGE	16	24	0	16	32	0	48	0	36	0	172
B) TI RAKAU DR / TRUGOOD DR	24	16	16	16	32	18	0	36	36	18	212
C) BURSWOOD WEST JUNCTION	2	4	0	6	24	0	24	0	18	0	78
D) BURSWOOD STATION	1	2	0	2	6	0	0	0	3	0	14
E) BURSWOOD EAST JUNCTION	2	4	0	6	24	0	24	0	18	0	78
F) H&E BUS DEPOT	16	16	16	16	32	6	48	0	36	9	195
G) TI RAKAU DR / HUNTINGTON DR	16	16	16	16	32	12	48	0	36	18	210
H) GUYS RESERVE CROSSING	16	16	0	8	16	0	48	0	36	0	140
2023 TOC2 DESIGN	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) PAKURANGA CREEK BRIDGE	12	24	0	12	32	0	64	0	20	0	164
B) TI RAKAU DR / TRUGOOD DR	18	12	12	12	32	24	0	48	20	10	188
C) BURSWOOD WEST JUNCTION	2	4	4	4	16	12	12	12	9	18	93
D) BURSWOOD STATION	1	2	0	3	6	0	36	0	9	0	57
E) BURSWOOD EAST JUNCTION	2	4	4	4	16	12	12	12	9	18	93
F) H&E BUS DEPOT	12	12	0	12	16	24	64	0	24	0	164
G) TI RAKAU DR / HUNTINGTON DR	12	12	18	18	32	16	32	0	24	24	188
H) GUYS RESERVE CROSSING	12	18	12	18	64	12	48	0	48	24	256

The total score for the majority of intersections across EB3C are expected to remain roughly similar or see an improvement, with Guys Reserve Crossing being an exception. However, this score relates to the proposed interim design and interface with EB4i until such time as EB4L is completed. This section of Ti Rākau Drive is expected to have the potential for increased weaving resulting in a higher score for motorcycle crashes in particular.

Location C and E are expected to have a marginally higher score in the proposed design when compared to the existing layout, due to the two new intersections formed on Burswood Drive with the busway, which would be unfamiliar to road users. Location D is expected to have a marginally higher product score in the proposed design due to the new bus station and its adjoining pedestrian crossing and cycleway.

⁸³ Refer to Appendix A for an assessment of permanent effects on safety performance in the EB2 and EB3R project areas.

Apart from location H, the SSA shows that the product score for general traffic and motorcycle type crashes across most locations will be either unchanged or slightly reduced. This is due to a reduction in the posted speed limit from 60km/h to 50km/h, which reduces the severity score.

6.7.2 EB4i and EB4L

Table 27 provides an assessment summary and comparison of the SSA of the existing environment and the proposed design of EB4i and EB4L.

Table 27: EB4i and EB4L SSA – existing vs future environment

SUMMARY											
EXISTING LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) EB3C (midblock to Te Koha Rd)	16	16	8	16	64	12	48	0	36	18	234
B) Ti Rakau Drive/Te Koha Rd	8	8	8	16	64	18	0	36	36	36	230
C) Te Koha Rd to Te Irirangi Rd	16	16	16	16	64	16	64	0	48	24	280
D) Te Rakau Dr/Te Irirangi Dr intersection	24	24	36	24	48	27	0	36	48	48	315
E) Te Irirangi Road to Town Centre Drive	30	10	30	30	64	18	48	0	48	24	302
F) Te Irirangi Road/Town Centre Drive intersection	30	30	30	30	48	18	0	36	48	48	318
G) Botany Station	2	4	4	6	4	12	0	12	18	12	74
TOC2 INTERIM DESIGN	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) EB3C (midblock to Te Koha Rd)	12	18	12	18	64	12	48	0	48	24	256
B) Ti Rakau Drive/Te Koha Rd	6	6	12	12	56	18	0	36	48	48	242
C) Te Koha Rd to Te Irirangi Rd	12	12	12	12	56	6	48	0	48	24	230
D) Te Rakau Dr/Te Irirangi Dr intersection	18	18	24	18	48	48	0	36	48	48	306
E) Te Irirangi Road to Town Centre Drive	30	10	30	30	64	18	48	0	48	24	302
F) Te Irirangi Road/Town Centre Drive intersection	30	30	30	30	48	24	0	36	48	48	324
G) Botany Station	2	4	4	6	4	26.25	0	26.25	22.5	15	110

The total score for location C and D has reduced, location E has stayed the same while the rest of the locations are observed to have a marginally higher product score. This is due to the increase in the number of buses and pedestrians in the areas, increasing the potential exposure and likelihood of crashes occurring. However, the reduction in the speed limit from 60 km/h to 50 km/h will offset some of these marginally higher scores.

Overall, it is predicted that the likelihood of serious injuries resulting from right turns at uncontrolled intersections will reduce. The likelihood and severity of loss of control and rear end crash types is expected to reduce with the lower speed limit, greater separation between carriageways and safer roadsides and medians compared with the current environment. Furthermore, the risk of cyclist crashes is expected to reduce with the provision of dedicated cycle facilities. Pedestrians will be provided with more and safer crossing facilities.

7 Mitigation Summary

The sections below provide a summary of the mitigation measures proposed in this ITA⁸⁴ to mitigate the potential adverse effects of the Project during construction and upon completion.

7.1 Mitigation Measures during Construction

The mitigation measures to be employed during construction will form part of the conditions and the CTMP.

7.1.1 Construction Support Areas

- Within EB3C, the properties at 242 and 254 Ti Rākau Drive, and a part of the Burswood Esplanade Reserve will serve as site offices, carparking, staging area and transfer station. Parking on side streets by construction staff and visitors will be discouraged through regular messaging at inductions and toolbox meetings, and will be monitored to ensure minimal disruption to the surrounding community
- Temporary pavement will be constructed in the existing median to provide a temporary right-turn pocket into the CSA at 242 Ti Rākau Drive
- Within EB4L, it is envisaged that the north-western corner of Guys Reserve (CSA 1), and the eastern frontage of Whaka Maumahara with Te Irirangi Drive (CSA 2) will serve as site offices, carparking and staging area for the Guys Reserve bridge construction. Parking on side streets by construction staff and visitors will be discouraged through regular messaging at inductions and toolbox meetings and will be monitored to ensure minimal disruption to the surrounding community.

7.1.2 Hours of Operation

- It is anticipated that some night works will be undertaken to minimise the disruption to the public, businesses, and traffic. Night works will be intermittent and will not be continuous in a single location or activity for more than one month. These works will be controlled in part by the Project's consent conditions and management plans, including the Construction Noise and Vibration Management Plan (CNVMP). Further detail of related controls can be found in the AEE.

7.1.3 Construction Vehicles and Routes

- Community engagement will be undertaken to raise awareness of the increase in construction vehicles that will pass through Burswood Drive due to the increase in exposure to some vulnerable users (i.e., children) at certain locations within the area. Construction vehicle drivers will also be briefed on these properties so that additional caution is employed when driving through these areas. This will be achieved through the CTMP.

⁸⁴ Refer to Appendix A for the mitigation summary of the EB2 and EB3R project areas.

7.1.4 Road Traffic

- 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 times. 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 the predicted effects to travel times, it is recommended that strategic public communication be undertaken. The purpose will be 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.

7.1.5 Bus Services and Facilities

- During the closure of the Burswood Drive / Busway intersections, school buses S013 and S421 that currently travel through Burswood Drive will be temporarily diverted. 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.

7.1.6 Pedestrians and Cyclists

- Pedestrian crossings and footpaths will be maintained during construction. Should this be unachievable, temporary facilities will be provided to ensure pedestrian connectivity. This will be ensured through the CTMP.

7.1.7 Property Access and Parking

- Access to Chinatown at 262 Ti Rākau Drive will be maintained during construction by constructing the new cycleway in sections. The 29 parking spaces at the rear of Chinatown and the current refuse area is anticipated to be temporarily occupied for construction activities, and a temporary parking layout and the relocation of the refuse area will be developed and agreed with the owners/tenants.

- Similarly, access to the commercial properties at 219, 225, 239 and 245 Burswood Drive will be maintained during construction by constructing the new cycleway in sections.
- During the construction of the Burswood Drive east / Busway intersection, the vehicle crossing at Bunnings Warehouse will be maintained as a left-in, right-out access, until the intersection is operational as a signalised intersection with the Burswood Drive east / Busway connection.
- During the construction of the Burswood Drive / Busway intersections, the intersections are expected to be closed one at a time. Elderberry Road, which connects Burswood Drive west and Burswood Drive east, will provide the option of a short detour route for residents.
- Access to the Howick & Eastern Bus Depot will be maintained during construction. The construction of the busway is expected to be completed in stages to ensure that vehicle ingress and egress can be maintained to the depot, and that at least one access point will be open at any one time.
- It is expected that approximately 40 car parking spaces will be temporarily lost in the Bus Depot. However, it is intended that the adjoining Gull service station will be acquired and could serve as a temporary carpark as mitigation during construction. Consultation with the property owners and tenants are ongoing. A temporary parking layout will be developed and agreed with the owners/tenants to manage the temporary effects to parking.
- Access to the properties at 347 & 371 Ti Rākau Drive, 2 and 12 Amera Place will be maintained during construction through Huntington Drive.
- All affected property owners / tenants will be well notified in advance of the construction works and timeframes.

7.2 Mitigation Measures upon Completion

- In order to manage the heavy westbound demand and reduced capacity along Ti Rākau Drive in the AM peak, it is recommended that signal coordination be implemented, along with fixed time cycles and appropriate offsets at the following intersections:
 - Ti Rākau Drive / Huntington Drive – reference intersection
 - Ti Rākau Drive / H&E Bus Depot eastern entrance
 - Ti Rākau Drive / Greenmount Drive / Burswood Drive east
- Similar to the AM peak, it is also recommended that signal coordination be implemented in the PM peak. To manage the heavy eastbound demand, coupled with the reduced capacity along Ti Rākau Drive, fixed time cycles and appropriate offsets at the following intersections:
 - Ti Rākau Drive / Greenmount Drive / Burswood Drive east – reference intersection
 - Ti Rākau Drive / H&E Bus Depot eastern entrance
 - Ti Rākau Drive / Huntington Drive
 - Ti Rākau Drive / Guys Reserve
 - Ti Rākau Drive / Te Koha Road
- To mitigate the loss of 19 parking spaces at Chinatown, a permanent parking layout including the relocation of the refuse area will be developed and agreed with the owners/tenants. Discussions with the property owners and tenants are ongoing.
- A new pedestrian access route is proposed at the boundary between 22 and 28 Torrens Road subject to negotiation and agreement with the landowners. The pedestrian access route will form two conflict points with vehicles accessing 28 Torrens Road. It is recommended that suitable warning signages and markings for the pedestrian access route be used to alert crossing vehicles for safety purposes.

8 Conclusions

During Construction

The effects during the construction period including those from CSAs and SAPs, construction vehicles, road traffic effects (including buses), effects to pedestrians and cyclists, effects to property access and parking, and safety performance have been assessed. CTMPs will be developed for the Project to avoid, remedy, or mitigate the adverse effects of construction on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of consent and will include management strategies, controls and reporting protocols to achieve this. Hours of operation, especially night works, will be controlled in part by the Project's consent conditions and management plans, including the CNVMP.

Overall, the temporary effects of the CSAs, SAPs and the construction heavy vehicle traffic in the EB3C, EB4i and EB4L project areas will be mitigated appropriately and are considered to be negligible or very low.

For the purposes of this assessment, a conservative assumption was made that the proposed online works along Tī Rākau Drive in EB3C, between Burswood Drive east and Guys Reserve, would be undertaken simultaneously with the closure of Reeves Road in EB2 and the ongoing construction of the Reeves Road Flyover (RRF), i.e., RRF not constructed yet⁸⁵.

Temporary effects to road traffic travel times are considered to range from low, and in a few cases from moderate to relatively large. This is not unexpected due to the additional intersections on the network, the closure of Reeves Road and the subsequent diversion of traffic onto Tī Rākau Drive and Pakūranga Road, and the ongoing construction along Tī Rākau Drive in EB2, EB3R and EB3C.

Tī Rākau Drive is a congested corridor in the existing environment; therefore, it is very likely that a redistribution of traffic and/or a reduction in 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.

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, 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 and a combination of these factors could reduce traffic volumes during construction, leading to more manageable queues and delays overall.

⁸⁵ Construction Scenario 1.3 in Appendix A was determined to be the most critical modelling scenario for the EB2 and EB3R project areas and so was used in the modelling scenario development in this assessment.

Various mitigation options were tested, ranging from traffic signal phasing amendments to delaying specific pieces of the proposed works, in an attempt to improve travel times. 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 cost and programme.

Therefore, as part of the conditions to mitigate the predicted effects to travel times, it is recommended that strategic public communication be undertaken. The purpose will be 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. 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 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 corridor. Also, the completion of the Project is expected to further improve travel times, by means of the new dedicated bus lanes.

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 S412 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.

Temporary effects to pedestrian and cyclists during construction are considered to be negligible overall. Pedestrian crossings and footpaths will be maintained during construction. Should this be unachievable in some locations, temporary facilities and diversions will be provided to ensure pedestrian connectivity.

Overall, as the majority of the new busway is located outside of the current road corridor, the temporary effects during construction on property access and parking will be mitigated appropriately and are considered to be very low. Engagement with property owners or operators will be undertaken during construction to communicate the planned works and duration, the potential disruption and proposed mitigation measures as well as to develop additional measures or improve upon proposed measures if required. Lastly, pedestrian access to properties will be maintained at all times. This will be ensured through the CTMPs.

Safety measures will be in place during construction, ensured by the CTMPs. 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 with and traveling through the project areas.

Upon Completion

In the existing environment, Auckland's eastern suburbs are experiencing a range of transport related problems and challenges. The completion of the Project will improve upon these shortcomings through the following:

- 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 to buses, particularly on Tī Rākau Drive between Gossamer Drive and Burswood Drive east, and between Guys Reserve and Botany Town Centre, through the new offline busway.

The main elements of design in EB3C, EB4i and EB4L include the new offline busway along Tī Rākau Drive and within the Burswood residential area, on-road dedicated bus lanes between Burswood Drive east and Guys Reserve, and a new offline busway starting at Guys Reserve and terminating at the Botany Town Centre intersection on Te Irirangi Drive. Dedicated cycleways will be provided on Tī Rākau Drive, within the Burswood residential area and Guys Reserve.

It is predicted that in the future, the Tī Rākau Drive and Te Irirangi Drive corridors will have more strategic 'Movement' functions. The proposed Burswood bus station will attract more people within the area as the activities served by these bus stations will become local attractions. The modal priority of pedestrians, cyclists and buses will be improved, and there will be a higher 'Place' function around the new bus stations.

The proposed design is expected to lead to acceptable operations overall for general traffic across the network, and importantly, bus movements are predicted to operate at LOS C (or better) and with spare capacity. Significant improvements in general traffic and bus travel times are expected overall, especially from Botany towards Pakūranga and SEART.

The benefits of the new station include the ability to support significantly higher public transport patronage through expanded catchment area, 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.

The Project is predicted to result in a significant increase in public transport patronage in the future. As such, bus station platforms and loading areas have been designed to provide levels of service and capacity that will support the projected uptake in public transport. Along with this, bus service headways, reliability and efficiency will also be improved overall. The combination of these public transport upgrades is expected to significantly increase public transport mode share, which in turn will reduce congestion and reduce greenhouse gas emissions by way of a more sustainable movement of people through the network.

The proposed design is predicted to improve overall bus travel times across the network. The combination of improved travel times and higher service frequencies will lead to faster and more reliable public transport trips.

The Project will provide dedicated footpaths and cycleways to improve pedestrian and cyclist amenity and safety. Providing dedicated cycleways will create a physically separated and safe space that facilitates cycle movements through the network, which will provide users with a more attractive mode of travel and supports the uptake of cycling. Furthermore, the cycleways will facilitate improved accessibility to the bus stations, resulting in increased catchment as well as the potential for mode shift to occur, increasing uptake of public transport across the network.

Lastly, the proposed design will provide an overall safer transport system for all modes of transport through the project areas with the aim to reduce fatal and serious injury crashes. The proposed design will provide an increased number of signalised pedestrian crosswalks at intersections and raised intersections to aid pedestrians and cyclists by simplifying the crossing task. Furthermore, these facilities will increase the visibility of pedestrians by creating a visual cue for drivers to reduce their speed as they approach and encourage courtesy between drivers and pedestrians.

In conclusion, with the proposed mitigation measures in place, the overall potential adverse effects during construction and upon completion of EB3C, EB4i and EB4L are considered to be mitigated as far as is reasonably practicable. Furthermore, the proposed design is predicted to result in significant improvements and a range of benefits overall.

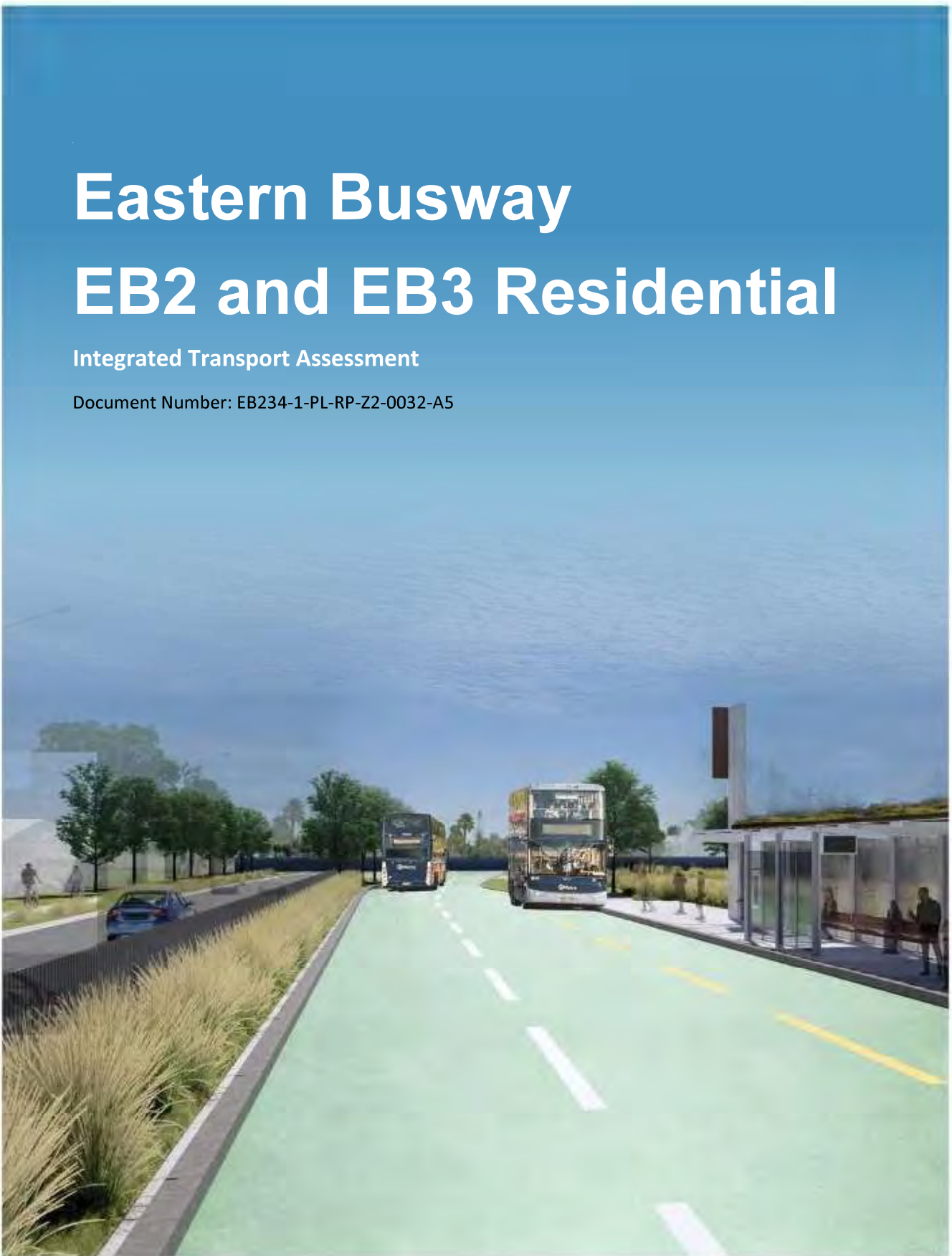
Appendix A

EB2 and EB3R Integrated Transport Assessment

Eastern Busway EB2 and EB3 Residential

Integrated Transport Assessment


Document Number: EB234-1-PL-RP-Z2-0032-A5



Quality Information

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Document Approval				
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Terms and Definitions

Table 1: Terms and definitions

Abbreviation and Definitions	Description
AADT	Average Annual Daily Traffic
ATOC	Auckland Transport Operations Centre
AEE	Assessment of Environmental Effects
AFC	Auckland Forecasting Centre
AMETI	Auckland-Manukau Eastern Transport Initiative
AC	Auckland Council
AT	Auckland Transport
A2B	Airport to Botany
AUP(OP)	Auckland Unitary Plan (Operative in part) 2016
BPO	Best practicable option
CAR	Corridor Access Request
CAS	Crash Analysis System
CEMP	Construction Environmental Management Plan
CMA	Coastal Marine Area
CoPTTM	Code of Practice for Temporary Traffic Management
CTMP	Construction Traffic Management Plan
DOS	Degree of Saturation
EB1	Eastern Busway 1 (Panmure to Pakuranga)
EB2	Eastern Busway 2 (Pakuranga Town Centre)
EB3 Commercial/ EB3C	Eastern Busway 3 (Pakuranga Creek to Botany)
EB3 Residential/ EB3R	Eastern Busway 3 (SEART to Pakuranga Creek)
EB4	Eastern Busway 4 (Botany Town Centre Station)
EBA	Eastern Busway Alliance
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
ITA	Integrated Transport Assessment
km	Kilometre(s)
km/h	Kilometres per hour
KPI	Key Performance Indicator
LILO	Left-in/left-out
LOS	Level of Service
m	Metre(s)
m ²	Square Metre(s)
m ³	Cubic Metre(s)

MCA	Multi Criteria Analysis
MSM	Macro Strategic Model
NES - CS	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NES - FW	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
NPS - FM	National Policy Statement for Freshwater Management 2020
NPS - UD	National Policy Statement for Urban Development 2020
NoR	Notice of Requirement
NSAAT	No Stopping at All Time
NZCPS	New Zealand Coastal Policy Statement 2010
NZGTTM	New Zealand Guide to Temporary Traffic Management
OD and OW	Over-Dimension and Over-Weight
PWA	Public Works Act 1981
RAMM	Road Assessment and Maintenance Management
RASF	Roads and Street Framework
RTN	Rapid Transit Network
RRF	Reeves Road Flyover
RMA	Resource Management Act 1991
SSA	Safe System Assessment
SSTMP	Site Specific Traffic Management Plan
STMS	Site Traffic Management Supervisors
TCQSM	Transit Capacity and Quality Service Manual
tcu	Through car equivalent units or passenger car units
TTM	Temporary Traffic Management
v/c	Volume over capacity ratio
WRRE	William Roberts Road Extension
WTMP	Workforce Travel Management Plan

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Executive Summary

It should be noted that this version of the EB2 and EB3 Residential (EB3R) Integrated Transport Assessment (ITA) has been prepared to reflect an updated proposed design, an updated construction methodology and further technical information to support the Notice of Requirement (NoR) and resource consent applications of EB2 and EB3R.

Changes to the design included the provision of a signalised cross roads intersection at the junction of William Roberts Road, Mattson Street and Ti Rakau Drive. In addition, a signalised all movements intersection at Edgewater Drive (east) joins Ti Rakau Drive has replaced the previously proposed priority controlled left in and left out only intersection.

During the development of the updated construction methodology, based on an updated design, efforts have been made to shorten the overall construction programme where feasible as well as to produce construction staging so as to minimise adverse effects to road traffic. This process has led to a more refined construction staging.

To aid the reader in identifying these amendments, updated text has been highlighted in yellow. **Table 2** provides a summary of the key sections within the report that have been updated as well as a short description of the changes.

Table 2: Key updated sections and description of changes

Updated Section	Description
Section 2.4.4.3	SIDRA model adjustments to simulate the effects of raised tables and raised intersections.
Section 3.8.1	Updated assessment of the existing crash environment in response to council's S92 Request for Further Information. Analysis period included data from 2017 - 2022.
Section 4.2	Updated proposed design and construction methodology in EB2 and EB3R. The updates to the proposed design were largely in response to Road Safety Audit comments and changes to further improve transport network operations. This included provision of a signalised intersection between William Roberts Road / Mattson Street / Ti Rakau Drive. Further changes to the design to address issues raised by stakeholders included modification to the previously proposed Edgewater Drive East / Ti Rakau Drive intersection where a priority controlled left in and left out intersection has been replaced with an all movements signalised intersection. The updates to the construction methodology were in response to the updated design as well as an attempt to shorten the overall construction programme.
Section 5.2	Updated assessment of temporary effects to intersection performance and general traffic travel times as a result of the updated construction methodology, including a more refined construction staging.
Section 5.3.5	Updated assessment of temporary effects to bus travel times as a result of the updated construction methodology.
Section 6.3	Updated assessment of permanent effects to intersection performance and general traffic travel times as a result of the updated proposed design.
Section 6.4.7	Updated assessment of permanent effects to bus travel times as a result of the updated proposed design.

Purpose

The purpose of this ITA is to evaluate the temporary and permanent transport effects of the EB2 and EB3R components of the overall Eastern Busway Project (the Project) and to recommend mitigation measures as appropriate. This report will form part of the Assessment of Environmental Effects (AEE) supporting the NoR and resource consent applications of EB2 and EB3R.

The Need for the Project

Auckland's eastern suburbs have one of the highest levels of journey to work trips by car and lowest use of public transport in Auckland¹. This is due to a combination of lower density land uses and relatively unattractive bus services, lack of cycle facilities and low urban amenity on main roads.

With regard to transport issues in EB2 and EB3R, it has been identified that the area experiences heavy congestion. Recent population growth and a heavy dependence on private vehicles has put significant strain on the existing road network. Furthermore, projected population growth from both established and new suburbs is expected to exacerbate this issue.

Lastly, congestion due to the growth in commercial activity is also anticipated. Ti Rakau Drive and SEART are important for the efficient movement of freight and goods vehicles, connecting the commercial areas of East Tāmaki, Highbrook, Botany, Pakuranga and Highland Park to the wider region.

Without intervention, demand for public transport, walking and cycling will remain low, the heavy reliance on car travel will continue and the road network will experience significantly increased congestion. This will further impede the efficient movement of people and goods within the area, lead to detrimental environmental outcomes and exacerbate the area's limited access to opportunities compared to the rest of the region both in terms of the quality of life for residents and the economic wellbeing of businesses. It will also limit the area's potential to sustainably accommodate further residential and employment growth.

Benefits of the Project

The Eastern Busway programme presents an opportunity to address these problems by extending the rapid transit, high frequency busway between Panmure and Pakuranga, through to Botany Town Centre. The Project will include new walking and cycling connections, placemaking, urban renewal initiatives and improvements for general traffic. The end result will see customers being able to travel between Botany and Britomart by bus and train in less than 40 minutes, which is 20 minutes quicker than the current journey times.

EB2 and EB3R will help alleviate congestion, principally through the diversion of traffic from the Ti Rakau Drive / Pakuranga Road intersection and onto the Reeves Road Flyover (RRF). This diversion will reduce the volumes of through-traffic within the Pakuranga Town Centre and local roads. As such, EB2 and EB3R's contribution to congestion reductions will improve travel times, supporting the rapid movement of freight and people.

The Project will also provide increased transport choices for residents and visitors. The dedicated bus lanes and stations will improve the public transport experience for passengers and make it more attractive to current private vehicle users. Increased uptake of public transport will also ease congestion and reduce greenhouse gas emissions. Similarly, the Project's walking and cycling investments make those transport modes safer and more attractive to users. Lastly, an additional positive effect associated with EB2/EB3R, and the wider Project, is improved accessibility.

¹ SNZ Census 2018

Therefore, reduced congestion, better public transport, safer walking and new cycling infrastructure will improve the ability for both local residents and visitors to access jobs, education, recreation, housing and healthcare. Given the above, EB2 and EB3R will have significant positive effects for Auckland.

Assessment of Effects

Overall, through AIMSUN and SIDRA modelling assessments, EB2 and EB3R are expected to lead to acceptable intersection operations across the network. Importantly, bus movements are predicted to operate at LOS C and with spare capacity. The RRF is expected to relieve congestion around the Pakuranga Town Centre, and significant improvements in travel times are expected overall, especially between Botany in the east and Pakuranga and SEART in the west.

EB2 and EB3R are predicted to significantly increase public transport patronage in the future. As such, bus station platforms and loading areas have been designed to provide appropriate levels of service and capacity to support this uptake. Furthermore, bus service headways will be improved, and travel times are predicted to decrease overall, leading to faster and more reliable public transport trips. The combination of these public transport upgrades and improvements is expected to significantly increase public transport mode share, which in turn will reduce congestion and greenhouse gas emissions.

Dedicated footpaths and cycleways will improve pedestrian and cyclist amenity and safety which will provide users with a more attractive mode of travel and supports the uptake of cycling. Furthermore, the cycleways will improve accessibility to the bus stations, resulting in increased catchment and mode shift to public transport.

Lastly, through a Safe System Assessment (SSA), EB2 and EB3R are expected to provide an overall safer transport system for all modes of transport through the project areas with the aim to reduce fatal and serious injury crashes.

Mitigation

Overall, the temporary effects of construction in the project areas will be mitigated appropriately and are considered to be negligible **to low**. A Workforce Travel Management Plan (WTMP) will be developed to reduce private vehicle trips and to increase worksite accessibility through more travel options. Construction Traffic Management Plans (CTMPs) will be developed to avoid, remedy or mitigate the adverse effects of construction on transport, parking and property access so far as is reasonably practicable, **along with measures to manage travel demand through the provisions of the Site Specific Traffic Management Plans (SSTMPs)**. The CTMPs will be developed in accordance with the conditions of consent and will include management strategies, controls and reporting protocols to achieve this. Hours of operation will be controlled in part by the Project's consent conditions and management plans, including the Construction Noise and Vibration Management Plan (CNVMP).

Conclusions

With the proposed mitigation measures in place, the potential adverse effects during construction and upon completion of EB2 and EB3R are considered to be negligible **to low overall**. Furthermore, the proposed design is predicted to result in significant improvements and a range of benefits overall.