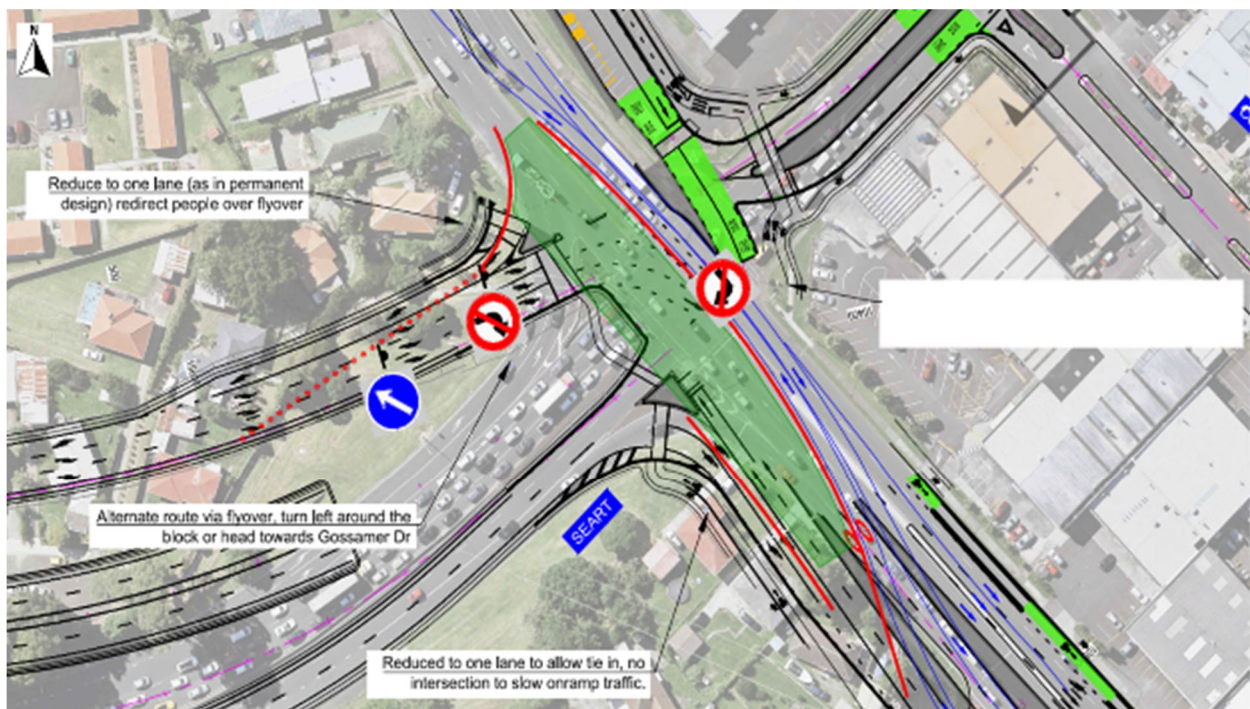


#### 5.2.2.4 Construction Scenario 3

The final major changes to the transport network are the construction of the Ti Rakau Drive / Reeves Road intersection (underneath the RRF) and the Ti Rakau Drive / Gossamer Drive intersection. These works will occur after Reeves Road and the RRF have been constructed and will occur during a low traffic period (December to January) to mitigate the effects of the disruption. These activities are simulated in Construction Scenario 3.

#### Proposed Intersection Layout during Construction – Ti Rakau Drive / Reeves Road:

The intersection will be built in two sub-phases with Ti Rakau Drive being reduced to one lane each way for a short period (approximately one month). Additionally, the right-turn movements from Ti Rakau Drive onto SEART will be closed and detoured via Pakuranga Road and the new RRF. The right-turn movements from SEART will also be closed and will be detoured via the RRF and Pakuranga Road. The left-turn movements from Ti Rakau Drive onto SEART will be reduced to one lane. **Figure 69** shows the proposed temporary layout of the intersection during the works, with the work zone in dark green.



**Figure 69: Ti Rakau Dr / Reeves Rd proposed layout during construction**

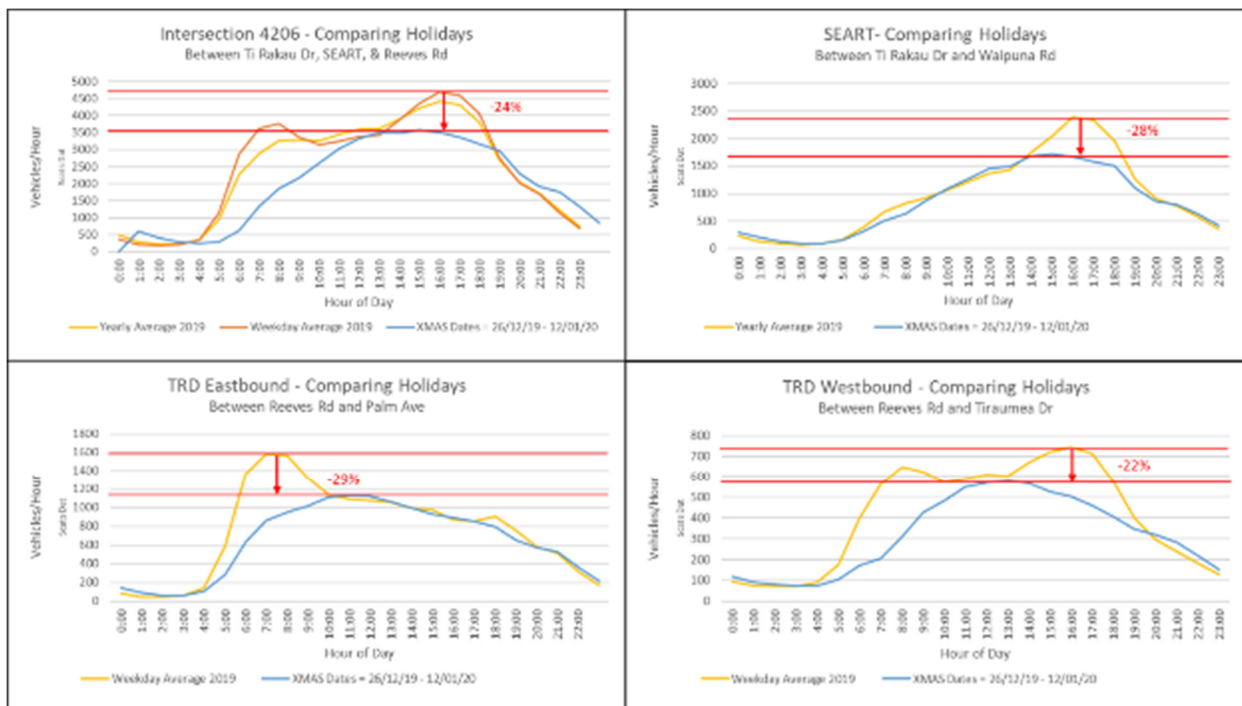
#### Proposed Intersection Layout during Construction – Ti Rakau Drive / Gossamer Drive:

The preferred construction method, without altering the pavement type or compromising on pavement quality, is a 'Blitz' approach. In other words, a relatively short period of time with a higher intensity of works. This approach will consist of temporarily closing access to Gossamer Drive, to enable the majority of the difficult to access areas to be completed. Furthermore, Ti Rakau Drive will be reduced to one lane each way through the intersection. The Freemantle Place approach will remain as per the existing environment and will be completed in the subsequent sub-phases (Phases 3b-c, see **Section 4.2.2.5**). However, this approach has large programming risks and the effects on the traffic environment are dependent on the quality of communication with the public leading up to the closure.

### Traffic Volume Reduction during Holiday Period:

Throughout this ITA, traffic volumes used in the modelling assessments represent an average weekday’s traffic demand. However, in order to model a low traffic period, such as a December to January holiday period, historical traffic data (SCATS) was analysed at various intersections. By comparing traffic data from an average weekday with that of a December holiday period, a suitable reduction factor was determined. This reduction factor was used in the modelling assessments to produce representative traffic volumes.

**Figure 70** provides a comparison of typical weekday traffic volumes and December holiday period traffic volumes at the Ti Rakau Drive / Reeves Road / SEART intersection. On average, the intersection experiences a 24% reduction in peak period traffic volumes across all approaches.



**Figure 70: Ti Rakau Dr / Reeves Rd intersection traffic volume reduction<sup>27</sup>**

**Figure 71** below provides a comparison of typical weekday traffic volumes and December holiday period traffic volumes at Gossamer Drive. On average, Gossamer Drive experiences a 50% reduction in peak period traffic volumes.

<sup>27</sup> Traffic data sourced from 2019 SCATS data for site 4206.

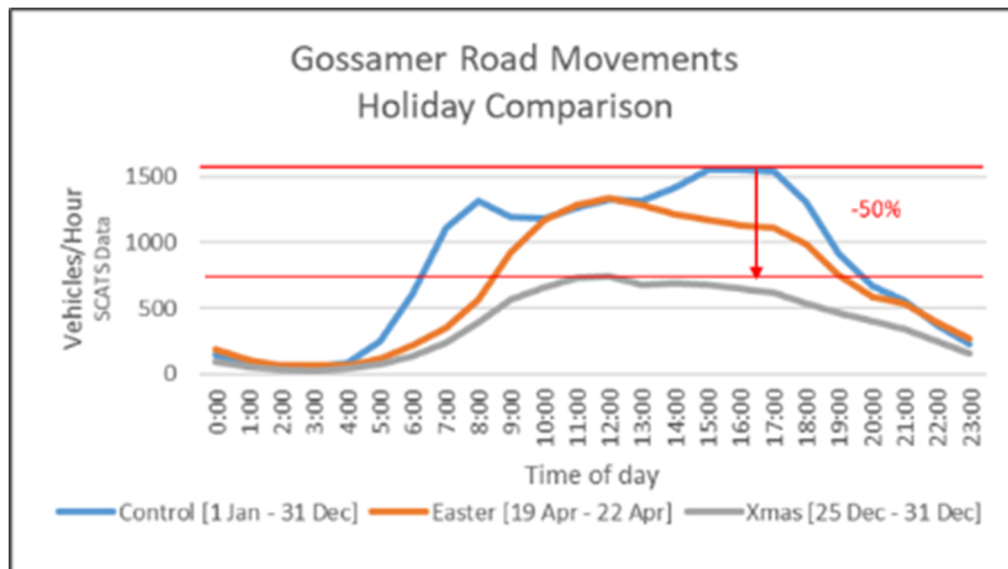


Figure 71: Gossamer Dr traffic volume reduction<sup>28</sup>

It is expected that this behaviour will continue in the future, during the planned construction of the intersections. Furthermore, the graphs show that even greater reductions in traffic volumes could be expected during the AM and PM peak periods.

Extensive community engagement will be undertaken well in advance of the planned works at the Ti Rakau Drive / Reeves Road and Ti Rakau Drive / Gossamer Drive intersections. This will include notices of the planned works, dates of construction, messaging to avoid the areas where disruption is anticipated and alternative routes. This will be achieved through the CTMP. With these mitigation measures, it is anticipated that a 40% reduction in background traffic volumes could be achieved during the planned construction of the intersection.

**Intersection Performance:**

The AM peak hour for intersections assessed in Construction Scenario 3 was between 07:15 – 08:15 and the PM peak hour was between 16:15 – 17:15. The horizon year for all intersection assessments was 2028. A 40% reduction in background traffic volumes was applied for the reasons discussed above. Traffic signal phasing diagrams per intersection are provided in **Appendix H** and lane performance summaries per intersection are provided in **Appendix I**.

<sup>28</sup> Traffic data sourced from 2019 SCATS data for site 4213.

Intersection performance analyses were undertaken at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / Reeves Road / SEART
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility
- Ti Rakau Drive / Gossamer Drive

**Table 25** below provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 3 during the AM peak, with a 2028 horizon year.

**Table 25: Intersection performance – Do-Minimum vs Construction Scenario 3 (AM peak, 2028)**

Intersection	Do-Minimum			Construction Scenario 3		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	C	0.85	33	D	0.83	38
Pakuranga Rd / Brampton Ct	N/A	0.42	1	N/A	0.33	1
Pakuranga Rd / RRF	Built during EB2			C	0.89	30
William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.07	1
Ti Rakau Dr / Aylesbury St / Palm Ave	Built during EB2			C	0.89	29
Ti Rakau Dr / Reeves Rd / SEART	F	0.90	178	B	0.89	17
Ti Rakau Dr / William Roberts Rd	Built during WRRE			B	0.55	10
Ti Rakau Dr / Mattson Rd	B	0.79	16	B	0.77	16
Ti Rakau Dr western U-turn facility	Built during EB3R			A	0.43	4
Ti Rakau Dr eastern U-turn facility	Built during EB3R			A	0.79	7
Ti Rakau Dr / Gossamer Dr	D	1.02	48	C	0.95	31

SIDRA analysis indicates that overall, in the AM peak, Construction Scenario 3 is expected to result in minimal adverse effects to intersection performance along the network. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Ti Rakau Drive / Mattson Road

Once constructed, the following new intersections are expected to operate with spare capacity during the AM peak under Construction Scenario 3, all with acceptable LOS and DOS:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Under a 40% reduction in traffic volumes and the various lane closures at the Ti Rakau Drive / Reeves Road / SEART intersection during its construction, the intersection is predicted to operate at an acceptable LOS B with a DOS of 0.89 and delay of 17s.

Minor improvements in DOS and delay are predicted at the Ti Rakau Drive / Gossamer Drive intersection and is expected to operate with spare capacity (LOS C).

**Table 26** below provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 3 during the PM peak, with a 2028 horizon year.

**Table 26: Intersection performance – Do-Minimum vs Construction Scenario 3 (PM Peak, 2028)**

Intersection	Do-Minimum			Construction Scenario 3		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	D	0.91	47	D	0.87	39
Pakuranga Rd / Brampton Ct	N/A	0.53	1	N/A	0.29	1
Pakuranga Rd / RRF	Built during EB2			E	0.98	62
William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.12	1
Ti Rakau Dr / Aylesbury St / Palm Ave	Built during EB2			D	0.87	41
Ti Rakau Dr/ Reeves Rd / SEART	F	1.13	83	B	0.84	12
Ti Rakau Dr / William Roberts Rd	Built during WRRE			B	0.58	15
Ti Rakau Dr / Mattson Rd	B	0.66	12	B	0.81	17
Ti Rakau Dr western U-turn facility	Built during EB3R			A	0.64	5
Ti Rakau Dr eastern U-turn facility	Built during EB3R			A	0.77	7
Ti Rakau Dr / Gossamer Dr	D	0.90	44	D	0.97	49

SIDRA analysis indicates that in the PM peak, Construction Scenario 3 is also expected to result in minimal adverse effects to intersection performance along the network overall. Compared to the Do-Minimum scenario, similar intersection performance is expected at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive / Gossamer Drive

Once constructed, the following new intersections are expected to operate with spare capacity during the PM peak under Construction Scenario 3, all with acceptable LOS and DOS and low delays:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Similar to the AM peak, under a 40% reduction in traffic volumes and the various lane closure at the Ti Rakau Drive / Reeves Road / SEART intersection, it is predicted to operate at an acceptable LOS B with a DOS of 0.84 and delay of 12s.

### 5.2.2.5 EB2 – Pakuranga Road / William Roberts Road Temporary Signalisation

As stated in **Section 5.1.1.4**, the Pakuranga Road / William Roberts Road intersection will be signalised temporarily to aid construction traffic turning into and out from William Roberts Road. The signalisation will improve the capacity of the right-turn movements and improve safety of turning across three lanes of through traffic.

It is anticipated that the temporary signalisation of the Pakuranga Road / William Roberts Road intersection will occur once the William Roberts Road extension is completed, and construction commences on EB2 and EB3R. This change in the transport network could not be modelled as part of Construction Scenario 1, as William Roberts Road is already closed during this scenario. Therefore, a separate assessment is provided here.

**Table 27** provides an intersection performance summary of the temporary signalisation of the Pakuranga Road / William Roberts Road intersection.

**Table 27: Pakuranga Rd / William Roberts Rd temporary signalisation performance summary<sup>29</sup>**

Scenario	Level-of-Service (LOS)		Degree of Saturation (DOS)		Average Delay [sec]	
	AM	PM	AM	PM	AM	PM
Do-Minimum (Unsignalised)	N/A	N/A	9.43	32.92	386	2,129
EB2 and EB3R (Signalised + construction traffic)	C	C	0.92	0.86	35	25

SIDRA analysis indicates the temporary signalisation of the Pakuranga Road / William Roberts Road intersection is expected to result in a significant improvement in intersection performance during both peak hours.

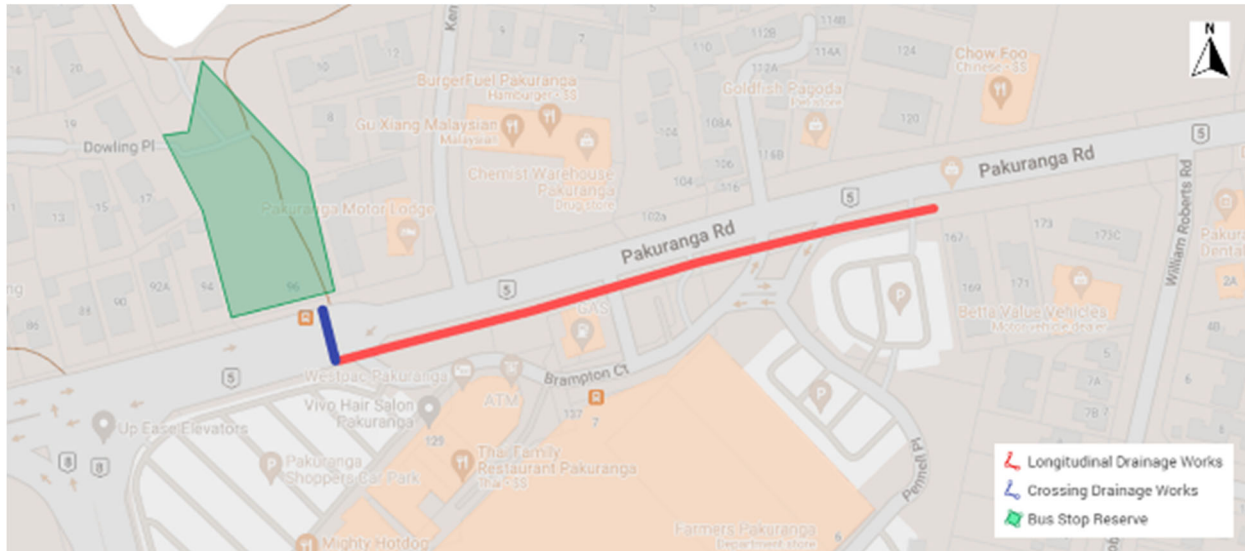
The average DOS for the intersection is predicted to decrease to <1.0 during both peak hours. The average delay is also predicted to experience a significant improvement, compared to the Do-Minimum, during both peak hours.

Once the RRF northern abutment is constructed and the construction yard layout has reduced, construction traffic volumes will reduce, and the temporary signalisation will be removed.

<sup>29</sup> SIDRA analyses carried out with traffic volumes based on a 2028 horizon year.

### 5.2.2.6 EB2 – Pakuranga Road Drainage Works

As stated in **Section 4.2.1.6**, the initial stages of the Pakuranga Road construction will also include longitudinal and crossing drainage works. This phase of work will follow after the Reeves Road and RRF construction, as well as the works on the northern side of Ti Rakau Drive between Pakuranga Road and Reeves Road. **Figure 72** shows an indicative location of the planned drainage works.



**Figure 72: Pakuranga Rd drainage works**

#### Longitudinal Drainage Works:

Longitudinal drainage construction will consist of the temporary closure of a section of the westbound kerbside lane on Pakuranga Road between William Roberts Road and Ti Rakau Drive. The works are anticipated to have a duration of approximately one month.

Pakuranga Road westbound traffic volumes at this location are predicted to be roughly 900 veh/h in the AM peak and 950 veh/h in the PM peak. As such, the remaining two through lanes are expected to have sufficient spare capacity and the effects on general traffic are considered to be negligible.

An assessment of effects on property access associated with these works is provided in **Section 5.5.4.1**.

#### Crossing Drainage Works:

Crossing drainage works are planned on Pakuranga Road near the signalised pedestrian crossing, in the vicinity of the Bus Stop Reserve. The works will consist of temporarily reducing the Pakuranga Road carriageway to three lanes as the large trenching work is completed and is anticipated to have a duration of approximately two weeks.



The centre lane will act tidally, providing two lanes for the critical direction of flow in the AM and PM peaks and one lane for the opposite direction. This will be enabled by a dynamic flow arrangement. **Table 28** provides intersection performance summaries of the Ti Rakau Drive / Pakuranga Road intersection and the signalised pedestrian crossing during the crossing drainage works.

**Table 28: Pakuranga Rd performance summary<sup>30</sup>**

Scenario	Level-of-Service (LOS)		Degree of Saturation (DOS)		Average Delay [sec]	
	AM	PM	AM	PM	AM	PM
<b>Ti Rakau Dr / Pakuranga Rd</b>						
Do-Minimum (All lanes open)	C	D	0.85	0.91	33	47
EB2 and EB3R (Downstream lanes reduced)	E	E	1.07	1.52	68	72
<b>Pakuranga Rd signalised pedestrian crossing</b>						
Do-Minimum (All lanes open)	E	B	1.02	0.85	67	10
EB2 and EB3R (Lanes reduced)	B	E	0.87	1.04	16	64

Although the Pakuranga Road signalised pedestrian crossing is expected to experience poorer performance during the PM peak, acceptable LOS, DOS and delays are predicted at this crossing during both the AM and PM peaks hours.

However, the decrease in roadway capacity on Pakuranga Road near the crossing is predicted to result in large queues extending upstream through the Ti Rakau Drive / Pakuranga Road intersection during the PM peak. As such, a decrease in intersection performance is predicted at the Pakuranga Road / Ti Rakau Drive intersection during the PM peak hour.

The temporary effects to general traffic on Pakuranga Road will be mitigated by temporarily disabling the signalised pedestrian crossing. This will allow vehicles to travel through the work zone, without stopping (subject to downstream congestion), and queues on Pakuranga Road are expected to be manageable.

Temporarily disabling the signalised pedestrian crossing will result in an increase of approximately 140 m in travel distance for pedestrians to the nearest crossing at the Ti Rakau Drive / Pakuranga Road intersection. Given the short duration of disruption and the short increase in travel distance, the temporary effects to pedestrians are expected to be negligible.

<sup>30</sup> SIDRA analyses carried out with traffic volumes based on a 2028 horizon year.

### 5.2.2.7 EB3R – Ti Rakau Drive / Edgewater Drive East Temporary Signalisation

As stated in **Section 4.2.2.3**, Edgewater Drive is a loop with two accesses to Ti Rakau Drive. In the existing environment, Edgewater Drive west is a signalised intersection, while Edgewater Drive east is a priority-controlled intersection.

During Phase 1 of Ti Rakau Drive (Mattson Road to Gossamer Drive) in EB3R, traffic will be detoured to one end of the loop enabling the other end to be closed and rebuilt. As such, a temporary traffic signal will be provided at the Edgewater east intersection while the western intersection is under construction. It is anticipated that the construction of each intersection will have a duration of approximately two weeks.

**Table 29** provides intersection performance summaries of the Ti Rakau Drive / Edgewater Drive east and west intersections during Phase 1 of the EB3R.

**Table 29: Ti Rakau Dr / Edgewater Dr east and west performance summary<sup>31</sup>**

Scenario	Level-of-Service (LOS)		Degree of Saturation (DOS)		Average Delay [sec]	
	AM	PM	AM	PM	AM	PM
<b>Edgewater Drive east</b>						
Do-Minimum (Unsignalised)	N/A	N/A	3.86	3.41	37	27
EB2 and EB3R (Signalised + detoured traffic from Edgewater Dr west)	B	B	0.78	0.75	15	14
<b>Edgewater Drive west</b>						
Do-Minimum	C	C	0.87	0.85	27	26
EB2 and EB3R (Detoured traffic from Edgewater Dr east)	C	C	0.88	0.85	29	26

The temporary signalisation of Edgewater Drive east is predicted to result in improved intersection performance, with lower DOS and delays during both the AM and PM peak hours. The temporary signalisation will also improve the safety of vehicles turning right into and out from Edgewater Drive.

The increase in traffic volumes at the Edgewater Drive west intersection, during construction of the eastern intersection, are expected to lead to negligible increases in DOS and delay during both peak hours. Therefore, the effects to general traffic are considered to be negligible.

<sup>31</sup> SIDRA analyses carried out with traffic volumes based on a 2028 horizon year.

### 5.2.3 General Traffic Travel Times

Route travel times were determined using the AIMSUN model, with a 2028 horizon year. Similar to the assessment of travel times in the existing environment (see **Section 3.4.2**) and to maintain consistency across the different assessments already conducted as well as future ITAs, 4 routes were selected to compare route travel times between the Do-minimum and EB2/EB3R scenarios for general traffic. These routes are outlined below:

- Botany to Pakuranga (Ti Rakau Drive / Chapel Road intersection to Pakuranga Road / Williams Avenue intersection) – both directions
- Botany to SEART (Ti Rakau Drive / Te Irirangi Drive intersection to the western abutment on Waipuna Bridge) – both directions
- Howick to Pakuranga (Pakuranga Road / Glenmore Road intersection to Pakuranga Road / Williams Avenue intersection) – both directions
- Howick to SEART (Pakuranga Road / Glenmore Road intersection to the western abutment on Waipuna Bridge) – both directions

The sections below assess the temporary effects to travel times during the construction scenarios.

#### 5.2.3.1 Construction Scenario 1

**Table 30** provides a comparison of the route travel times between the Do-Minimum and Construction Scenario 1, with a 2028 horizon year.

**Table 30: General traffic travel times – Do-Minimum vs Construction Scenario 1 (2028)**

AM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	Construction 1 [min]	Difference [min]	Do Minimum [min]	Construction 1 [min]	Difference [min]
Botany - Pakuranga	24.7	42.2	17.5	13.9	18.2	4.3
Botany - SEART	20.9	39.9	19.0	13.7	13.7	0.0
Howick - Pakuranga	5.3	4.0	-1.3	4.7	3.9	-0.8
Howick - SEART	11.6	21.1	9.5	8.0	5.9	-2.1
PM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	Construction 1 [min]	Difference [min]	Do Minimum [min]	Construction 1 [min]	Difference [min]
Botany - Pakuranga	18.4	14.1	-3.4	24.6	23.7	-0.9
Botany - SEART	11.6	11.5	-0.1	24.5	28.1	3.6
Howick - Pakuranga	4.7	3.3	-1.4	3.4	3.3	-0.1
Howick - SEART	5.0	4.5	-0.5	7.5	12.0	4.5

Travels times from Botany towards SEART and Pakuranga (westbound) as well as from Howick to SEART (westbound) are predicted to experience relatively large increases during the AM peak period compared to the Do-Minimum. This is not unexpected given the following factors:

- The addition of the new Ti Rakau Drive / William Roberts Road intersection to the network
- The closure of Reeves Road and William Roberts Road north, whereby more vehicles are likely to divert to Ti Rakau Drive
- Ongoing construction of the Pakuranga Road / RRF tie-in
- Ongoing construction of the staggered-T arrangement of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections

Ti Rakau Drive is a congested corridor in the existing environment; therefore, it is likely that a redistribution of traffic or reduction in capacity due to road works will lead to increased queues and delays. It should also be noted that these increases in travel times are temporary. Once constructed the RRF will, in part, alleviate the congestion around the Pakuranga Town Centre and improve travel times for general traffic (see **Section 5.2.3.2**). Also, the completion of EB2 and EB3R is expected to further improve travel times, by means of the new RRF and dedicated bus lanes (see **Section 6.3.3**). Furthermore, increases in travel times through the project area are inherent in the majority of transport projects of this scale, and in light of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

Nevertheless, to mitigate these effects, appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

During the AM peak period, travel times of the eastbound routes are predicted to experience small improvements or in some cases manageable increases.

Route travel times during the PM peak, in all directions, are expected to experience small improvements, or in some cases manageable increases under Construction Scenario 1. Although this level of effects does not require mitigation, public communication and advance warning of the planned works will still be undertaken prior to the works as well as during construction, along with appropriate signage of expected travel times and possible alternative routes.

### 5.2.3.2 Construction Scenario 2

**Table 31** provides a comparison of the route travel times between the Do-Minimum and Construction Scenario 2, with a 2028 horizon year.

**Table 31: General traffic travel times – Do-Minimum vs Construction Scenario 2 (2028)**

AM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	Construction 2 [min]	Difference [min]	Do Minimum [min]	Construction 2 [min]	Difference [min]
Botany - Pakuranga	24.7	22.9	-1.8	13.9	14.4	0.5
Botany - SEART	20.9	19.0	-1.8	13.7	12.5	-1.2
Howick - Pakuranga	5.3	12.5	7.3	4.7	5.4	0.7
Howick - SEART	11.6	8.9	-2.7	8.0	6.2	-1.8
PM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	Construction 2 [min]	Difference [min]	Do Minimum [min]	Construction 2 [min]	Difference [min]
Botany - Pakuranga	18.4	16.1	-2.3	24.6	26.4	1.8
Botany - SEART	11.6	9.3	-2.3	24.5	26.3	1.8
Howick - Pakuranga	4.7	7.3	2.6	3.4	3.9	0.5
Howick - SEART	5.0	3.0	-2.0	7.5	10.6	3.1

The westbound route from Howick to Pakuranga is predicted to experience an increase in travel time during the AM peak period. This is likely due to the operation of the newly completed Pakuranga Road / RRF intersection. The right turn from Pakuranga Road east towards Pakuranga Road west is treated as the minor movement, and the majority of the traffic signal green time is allocated to the through movements between Pakuranga Road east and the RRF.

As the operation of this intersection as well as the wider network is a balance of not only the various movements of traffic flows, but also the competing modes of transport, the trade-off is the improvement of travel times of the other routes. Particularly the improvement in travel times for the major routes from Botany and Howick towards SEART. It should also be noted that this increase in travel time is temporary. Upon completion of EB2 and EB3R, travel time for this route is expected to be improved (see **Section 6.3.3**), compared to Construction Scenario 2. As above, travel time increases are generally inherent in construction projects of this scale, and in context of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

The remaining westbound routes and all of the eastbound routes are predicted to experience small improvements or in some cases negligible increases in travel time during the AM peak period.

During the PM peak period, route travel times under Construction Scenario 2, are predicted to experience negligible increases or small improvements, in all directions.

Again, public communication and advance warning of the planned works will be undertaken prior to the works as well as during construction, along with appropriate signage of expected travel times and possible alternative routes. This will be achieved through the CTMP.

### 5.2.3.3 Construction Scenario 3

**Table 32** provides a comparison of the route travel times between the Do-Minimum and Construction Scenario 3, with a 2028 horizon year.

**Table 32: General traffic travel times – Do-Minimum vs Construction Scenario 3 (2028)**

AM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	Construction 3 [min]	Difference [min]	Do Minimum [min]	Construction 3 [min]	Difference [min]
Botany - Pakuranga	24.7	21.6	-3.1	13.9	10.6	-3.3
Botany - SEART	20.9	18.9	-2.0	13.7	N/A	N/A
Howick - Pakuranga	5.3	3.5	-1.8	4.7	3.4	-1.3
Howick - SEART	11.6	3.0	-8.6	8.0	4.0	-4.0
PM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	Construction 3 [min]	Difference [min]	Do Minimum [min]	Construction 3 [min]	Difference [min]
Botany - Pakuranga	18.4	26.0	7.6	24.6	12.4	-12.2
Botany - SEART	11.6	23.6	12.0	24.5	N/A	N/A
Howick - Pakuranga	4.7	4.2	-0.5	3.4	3.7	0.3
Howick - SEART	5.0	2.8	-2.2	7.5	4.9	-2.6

It should be noted that Construction Scenario 3 is planned to occur during a low traffic period and for a short duration, such as December to January. Therefore, as discussed above background traffic volumes are predicted to be 40% lower, in line with historical seasonal fluctuations.

During Construction Scenario 3, the right turn lanes from SEART onto Ti Rakau Drive (eastbound) will be temporarily closed to enable the construction of the intersection. Therefore, a route travel time for the eastbound route from SEART to Botany could not be determined. Vehicles will head along the RRF and Pakuranga Road towards Cascades Road to travel to Botany.

During the AM peak period, all westbound and eastbound routes are predicted to experience improvements in travel times compared to the Do-Minimum.

The westbound routes from Botany to Pakuranga and SEART are predicted to experience relatively large increases in travel times during the PM peak period. This is not unexpected and is likely due to the ongoing construction, and associated lane closures at the Ti Rakau Drive / Reeves Road intersection.

As noted above, Ti Rakau Drive is a constrained corridor in the existing environment, especially near the Ti Rakau Drive / Reeves Road / SEART intersection. Therefore, it is likely that a reduction in roadway

capacity due to road works will lead to increased queues and delays. However, it should be noted that these increases in travel times are temporary. Again, travel time increases are generally inherent in construction projects of this scale, and in context of the improvements that will be experienced once completed, this level of delay is considered to be acceptable. The completion of EB2 and EB3R is expected to improve travel times (see **Section 6.3.3**), as the roadway is opened to full capacity.

Nevertheless, to mitigate these effects appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

The remaining westbound and eastbound routes are predicted to experience improvements, or in some cases negligible increases, in travel times during the PM peak period under Construction Scenario 3.

#### **5.2.4 Summary of Temporary General Traffic Effects**

Overall, the temporary effects on intersection performance during all construction scenarios across the EB2 and EB3R network are considered to be negligible or very low. The construction of the Ti Rakau Drive / Reeves Road / SEART and Ti Rakau Drive / Gossamer Drive intersections is proposed to be undertaken during a low traffic period (December-January) to mitigate the potential effects of disruption.

Analysis indicated that the temporary signalisation of the Pakuranga Road / William Roberts Road intersection, to support the operation of the construction yard, is expected to lead to improved intersection performance. Also, it was determined that the signalised midblock pedestrian crossing on Pakuranga Road will need to be disabled temporarily to mitigate queues on Pakuranga Road potentially blocking through the Pakuranga Road / Ti Rakau Drive intersection. A temporary traffic signal will be provided at the Ti Rakau Drive / Edgewater Drive east intersection during the construction of the Ti Rakau Drive / Edgewater Drive west intersection. This will ensure that signalised movements for vehicles turning into and out of Edgewater Drive are maintained.

Although the temporary effects to intersection performance during construction are predicted to be negligible or very low, some adverse effects to general traffic travel times are expected, particularly during Construction Scenario 1. These effects are not unexpected due to the number of ongoing construction activities. It should be noted that these effects are temporary, and once constructed, the RRF and EB2/EB3R as a whole will alleviate congestion, particularly around the Pakuranga Town Centre. Increases in travel times through the project area are inherent in the majority of transport projects of this scale, and in light of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

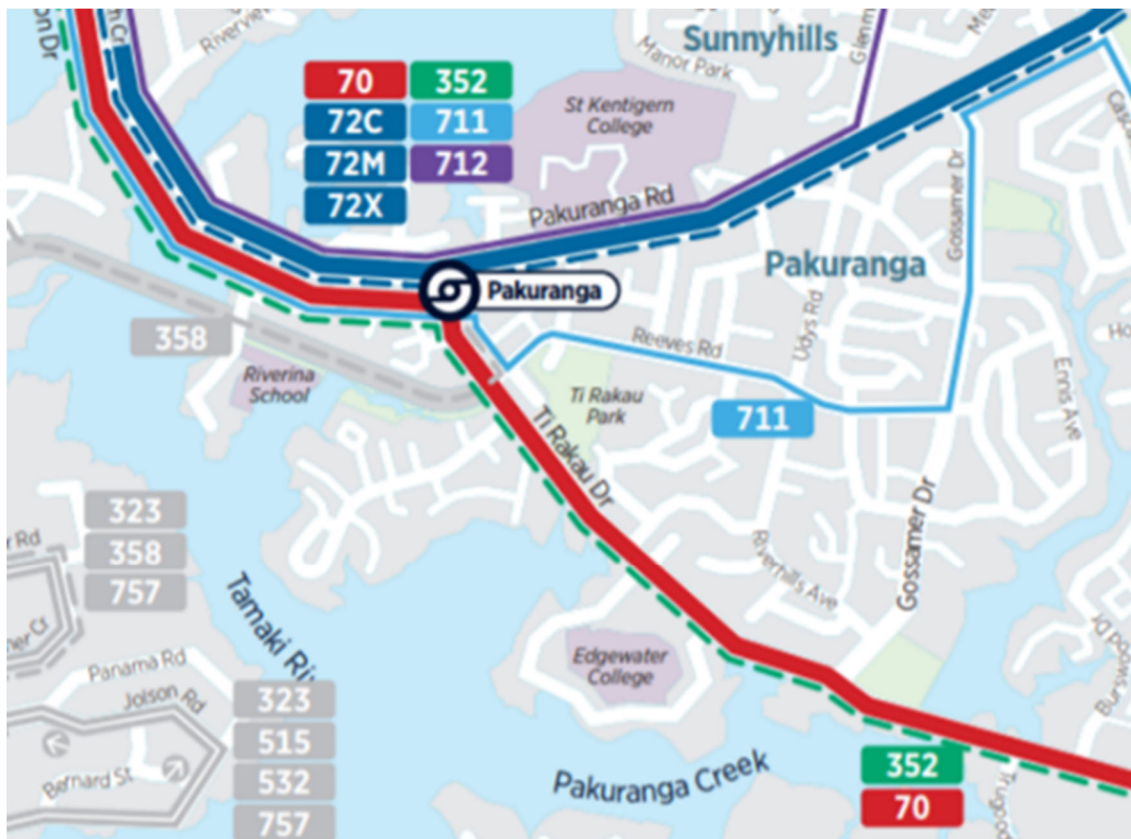
Nevertheless, to mitigate these effects, appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.

### 5.3 Effects to Bus Services and Facilities

The sections below provide details and assessment of the temporary effects during construction to bus services and facilities in the EB2 and EB3R project areas. **Figure 73** shows the existing bus services operating through the project areas. These include the 70, 72C, 72M, 72X, 352, 711 and 712 services.

School bus service operating in the EB2 and EB3R project areas include the following:

- S415 – Pakuranga to Sacred Heart College
- S416 – Botany Downs to Sacred Heart College
- S440 – Bucklands Beach to Sancta Maria College
- S013 – Otara to Edgewater College
- S073 – Otahuhu to Edgewater College



**Figure 73: Existing bus services in the EB2 and EB3R project areas**

#### 5.3.1 EB2 – Reeves Road

At present, the 711 service travels partly along Reeves Road as a connector service between Howick and Panmure. During the Reeves Road closure, the 711 outbound (eastbound) service will be diverted temporarily to the newly completed WRRE (see **Figure 74**).





**Figure 74: 711 outbound service, existing and proposed routes**

The increase in distance of approximately 270 m and the resultant increase in travel time (20s) are considered negligible. It is noted that currently there are no bus stops located along Reeves Road between Ti Rakau Drive and William Roberts Road utilised by the 711 outbound service.

### 5.3.2 EB2 – William Roberts Road North

Currently, the 711 inbound (westbound) service travels partly along William Roberts Road north. Once William Roberts Road north is closed, the 711 inbound service will be diverted temporarily to William Roberts Road south and along Ti Rakau Drive (see **Figure 75**).



**Figure 75: 711 inbound service, existing and proposed routes**

The increase in distance of approximately 290 m and the resultant increase in travel time (21s) are considered to be negligible.

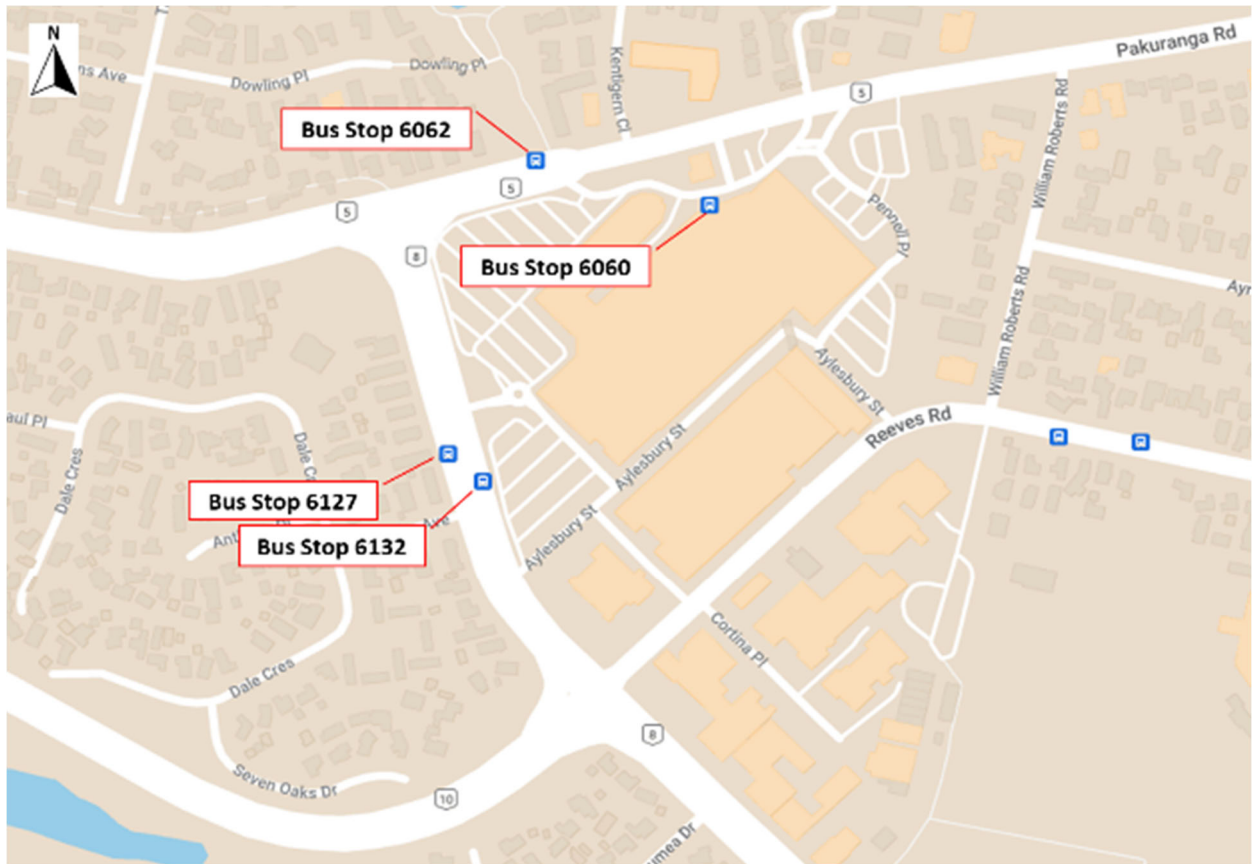
At present, the 711 inbound service utilises bus stop (ID 6060) to pick-up / drop-off passengers at the Pakuranga Plaza. Once William Roberts Road north is closed and until Reeves Road reopens, the 711 inbound service will utilise bus stop (ID 6127) instead.

The Pakuranga Road / Ti Rakau Drive intersection is located approximately 160 m north and the Ti Rakau Drive / Reeves Road intersection is located approximately 188 m south from the bus stop (ID 6127). Therefore, the increase in pedestrian walking distance to the Pakuranga Plaza is considered to be negligible.

Lewis Road was an alternative route considered during this assessment. However, Lewis Road is not well suited to buses given its narrow carriageway and on-street parking on both sides. Therefore, this alternative was discounted.

### 5.3.3 EB2 – Ti Rakau Drive and Pakuranga Road

**Figure 76** shows the existing bus stops near the Pakuranga Town Centre, located on Ti Rakau Drive and Pakuranga Road in the EB2 project area.



**Figure 76: Pakuranga Plaza bus stops**

During construction of the new bus lanes on the northern side of Ti Rakau Drive, as well as the new bus station (Phase 1 of Ti Rakau Drive in EB2, see **Section 4.2.1.5**), it is anticipated that bus stop (ID 6132) will be maintained as existing. Once this phase of work has been completed, the bus stop will be removed permanently, and the new bus station will be utilised.

Currently, this bus stop is located in-lane on Ti Rakau Drive eastbound, whereas in the future the bus station will provide indented bus bays for improved operation and safety. The remaining bus stops will remain at their current locations following this phase of work. This is due to the ongoing Reeves Road works at this stage. Bus services that will benefit from this initial improvement include the 70 outbound, 352 outbound and the 711 outbound.

Following the completion of the RRF and Reeves Road modifications, it is anticipated that the bus stops (ID 6062, 6060 and 6127) will also be removed with bus services utilising the new bus station. The bus services that will benefit from the new bus station include the 70, 72C, 72M, 72X, 352, 711 and 712.

### 5.3.4 EB3R – Ti Rakau Drive

Figure 77 shows the existing bus stops on Ti Rakau Drive in the EB3R project area.



Figure 77: EB3R Ti Rakau Dr bus stops

During construction of Phase 1 of Ti Rakau Drive (between Mattson Road and Gossamer Drive) in EB3R (see **Section 4.2.2.3**), which will consist of the new westbound lanes on Ti Rakau Drive, bus stops (ID 6129, 6131 and 6133) will largely be kept in accordance with the current arrangement. It is expected that the bus stops will need to shift longitudinally as the works progress. However, the effects to bus services and passengers are expected to be negligible. The eastbound bus station at Gossamer Drive will also be constructed during Phase 1, however, it will not be operational until the completion of Phase 3 of EB3R.

Once Phase 1 is completed, these bus stops will be temporarily relocated to the new westbound lanes, in close proximity to their current locations and will operate until the completion of Phase 2 of EB3R.

Phase 2 of Ti Rakau Drive in EB3R (see **Section 4.2.2.4**) will consist of the central running bus lanes, as well as the new bus station at Edgewater Drive and the westbound bus station at Gossamer Drive. As above, the Gossamer Drive bus station will not be operational until completion of Phase 3 of EB3R.

Upon completion of Phase 2, it is anticipated that the bus stops (ID 6134, 6129, 6131, 6136, 6138 and 6133) will be removed permanently. The new Edgewater Drive bus station will provide improved bus services and facilities, as well as greater pedestrian safety and amenity.

In Phase 3 of Ti Rakau Drive in EB3R (see **Section 4.2.2.5**), the Ti Rakau Drive / Gossamer Drive intersection will be constructed, which will provide a link between the western and eastern bus stations at Gossamer Drive. It is expected that following Phase 3, bus stops (ID 6140 and 6135) will be removed permanently. The new bus station will provide improved bus services and facilities, as well as greater pedestrian safety and amenity.

### 5.3.5 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 routes:

- 70 – Botany to Auckland CBD
- 72C – Botany and Howick to Panmure
- 72M – Botany and Howick to Panmure
- 72X – Botany and Howick to Auckland CBD
- 352 – Manukau to Panmure
- 711 – Howick to Panmure
- 712 – Bucklands Beach to Panmure

The sections below assess the temporary effects on bus travel times during the construction scenarios.

#### 5.3.5.1 Construction Scenario 1

**Table 33** below provides a comparison of the bus route travel times between the Do-Minimum and Construction Scenario 1, with a 2028 horizon year.

**Table 33: Bus travel times – Do-Minimum vs Construction Scenario 1 (2028)**

AM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	Construction 1 [min]	Difference [min]	Do Minimum [min]	Construction 1 [min]	Difference [min]
70 – Botany to Auckland CBD	42.3	59.6	17.3	26.9	31.3	4.4
72C – Botany and Howick to Panmure	20.6	42.7	22.1	16.0	15.7	-0.3
72M – Botany and Howick to Panmure	-	-	-	15.8	15.9	0.1
72X – Botany and Howick to Auckland CBD	24.6	48.9	24.3	-	-	-
352 – Manukau to Panmure	36.8	46.2	9.4	29.1	29.0	-0.1
711 – Howick to Panmure	29.1	35.2	6.1	22.7	24.0	1.3
712 – Bucklands Beach to Panmure	22.6	30.6	8.0	16.6	15.5	-1.1

PM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	Construction 1 [min]	Difference [min]	Do Minimum [min]	Construction 1 [min]	Difference [min]
70 – Botany to Auckland CBD	35.7	31.7	-4.0	38.1	37.5	-0.6
72C – Botany and Howick to Panmure	14.6	14.4	-0.2	14.8	14.4	-0.4
72M – Botany and Howick to Panmure	15.0	14.3	-0.7	-	-	-
72X – Botany and Howick to Auckland CBD	-	-	-	16.8	19.4	2.6
352 – Manukau to Panmure	33.4	29.6	-3.8	27.9	27.3	-0.6
711 – Howick to Panmure	23.8	26.1	2.3	24.5	24.8	0.3
712 – Bucklands Beach to Panmure	19.7	18.5	-1.2	18.1	18.3	0.2

Bus travel times of the 70 and 352 services (westbound), along Ti Rakau Drive, are predicted to experience relatively large increases during the AM peak period under Construction Scenario 1. This is not unexpected given the following factors:

- The addition of the new Ti Rakau Drive / William Roberts Road intersection to the network
- The closure of Reeves Road and William Roberts Road north, whereby more vehicles are likely to divert to Ti Rakau Drive
- Ongoing construction of the Pakuranga Road / RRF tie-in, whereby more vehicles are likely to divert to Ti Rakau Drive
- Ongoing construction of the staggered-T arrangement of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections

Furthermore, with the closure of Reeves Road and with the RRF not completed at this stage, large queues are predicted in the westbound kerbside lane on Ti Rakau Drive as vehicles attempt to turn onto SEART. As the existing bus stops along Ti Rakau Drive are located along the kerbside lane, buses are likely to travel in this congested lane, resulting in increased travel times. Therefore, the effects to bus travel times are considered to be moderate.

However, Ti Rakau Drive is a congested corridor in the existing environment; therefore, it is expected that a redistribution of traffic or reduction in capacity due to road works will lead to increased queues and delays. It should also be noted that these increases in travel times are temporary. Once constructed the RRF will, in part, alleviate the congestion around the Pakuranga Town and improve travel times (see **Section 5.3.5.2**). Furthermore, the completion of EB2 and EB3R is expected to further improve travel times, by means of the new dedicated bus lanes (see **Section 6.4.7**). As discussed in **Section 5.2.3**, travel time increases are generally inherent in construction projects of this scale, and in context of the improvements that will be experienced once completed, this level of delay is considered to be acceptable.

Opportunities to improve bus travel times will be explored in the development of the CTMPs, such as the provision of temporary bus priority where feasible. Appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works

and potential delays, which could lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes.

Bus travel times of the 72C and 72X services (westbound), along Pakuranga Road, are also predicted to experience increases during the AM peak period. This likely due to the closure of Reeves Road and the RRF not being constructed yet. Large queues are also predicted in the westbound kerbside lane on Pakuranga Road as vehicles attempt to turn left onto Ti Rakau Drive towards SEART. Again, buses are likely to travel in this congested lane, resulting in increased travel times.

As above, opportunities to improve bus travel times will be explored in the development of the CTMPs, such as the provision of temporary bus priority or temporary bus lanes where feasible.

It should be noted that the 72M (westbound) and 72X (eastbound) services do not operate during the AM peak period.

The 711 and 712 services (westbound) and all of the eastbound services are predicted to experience manageable increases, or in some cases small improvements, in travel times during the AM peak period under Construction Scenario 1.

All services in both directions are predicted to experience manageable increases, or in some cases small improvements, in travel time during the PM peak period under Construction Scenario 1.

#### 5.3.5.2 Construction Scenario 2

**Table 34** provides a comparison of the bus route travel times between the Do-Minimum and Construction Scenario 2, with a 2028 horizon year.

**Table 34: Bus travel times – Do-Minimum vs Construction Scenario 2 (2028)**

AM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	Construction 2 [min]	Difference [min]	Do Minimum [min]	Construction 2 [min]	Difference [min]
70 – Botany to Auckland CBD	42.3	30.6	-11.7	26.9	22.8	-4.1
72C – Botany and Howick to Panmure	20.6	25.6	5.0	16.0	16.1	0.1
72M – Botany and Howick to Panmure	-	-	-	15.8	15.9	0.1
72X – Botany and Howick to Auckland CBD	24.6	30.2	5.6	-	-	-
352 – Manukau to Panmure	36.8	25.7	-11.1	29.1	22.5	-6.6
711 – Howick to Panmure	29.1	32.7	3.6	22.7	25.7	3.0
712 – Bucklands Beach to Panmure	22.6	27.3	4.7	16.6	15.8	-0.8

PM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	Construction 2 [min]	Difference [min]	Do Minimum [min]	Construction 2 [min]	Difference [min]
70 – Botany to Auckland CBD	35.7	29.2	-6.5	38.1	36.2	-1.9
72C – Botany and Howick to Panmure	14.6	18.6	4.0	14.8	14.8	0.0
72M – Botany and Howick to Panmure	15.0	19.8	4.8	-	-	-
72X – Botany and Howick to Auckland CBD	-	-	-	16.8	17.7	0.9
352 – Manukau to Panmure	33.4	27.1	-6.3	27.9	25.1	-2.8
711 – Howick to Panmure	23.8	25.7	1.9	24.5	24.0	-0.5
712 – Bucklands Beach to Panmure	19.7	24.8	5.1	18.1	18.7	0.6

The completion of the RRF is predicted to result in improved travel times of bus routes under Construction Scenario 2, compared to Construction Scenario 1. This is due to a significant redistribution of general traffic from Ti Rakau Drive to the RRF.

Significant improvements in bus travel times of the 70 and 352 (westbound) services are predicted during the AM peak. The 70 and 352 (eastbound) services are predicted to experience more modest travel time improvements.

The remaining westbound and eastbound services are predicted to experience manageable increases, or in some cases small improvements, in travel times during the AM peak under Construction Scenario 2.

Similar to the AM peak, travel times of the 70 and 352 services along Ti Rakau Drive are expected to experience improvements, in both directions, during the PM peak.

Again, travel times of the remaining westbound and eastbound services are expected to experience manageable increases or small improvements during the PM peak under Construction Scenario 2.



### 5.3.5.3 Construction Scenario 3

**Table 35** provides a comparison of the bus route travel times between the Do-Minimum and Construction Scenario 3, with a 2028 horizon year.

**Table 35: Bus travel times – Do-Minimum vs Construction Scenario 3 (2028)**

AM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	Construction 3 [min]	Difference [min]	Do Minimum [min]	Construction 3 [min]	Difference [min]
70 – Botany to Auckland CBD	42.3	35.7	-6.6	26.9	20.4	-6.5
72C – Botany and Howick to Panmure	20.6	15.8	-4.8	16.0	14.2	-1.8
72M – Botany and Howick to Panmure	-	-	-	15.8	14.5	-1.3
72X – Botany and Howick to Auckland CBD	24.6	20.2	-4.4	-	-	-
352 – Manukau to Panmure	36.8	30.0	-6.8	29.1	18.7	-10.4
711 – Howick to Panmure	29.1	30.0	0.9	22.7	19.5	-3.2
712 – Bucklands Beach to Panmure	22.6	16.5	-6.1	16.6	13.4	-3.2
PM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	Construction 3 [min]	Difference [min]	Do Minimum [min]	Construction 3 [min]	Difference [min]
70 – Botany to Auckland CBD	35.7	39.3	3.6	38.1	22.1	-16.0
72C – Botany and Howick to Panmure	14.6	17.4	2.8	14.8	14.4	-0.4
72M – Botany and Howick to Panmure	15.0	19.1	4.1	-	-	-
72X – Botany and Howick to Auckland CBD	-	-	-	16.8	16.5	-0.3
352 – Manukau to Panmure	33.4	34.9	1.5	27.9	18.5	-9.4
711 – Howick to Panmure	23.8	29.1	5.3	24.5	19.6	-4.5
712 – Bucklands Beach to Panmure	19.7	18.8	-0.9	18.1	14.4	-3.7

As Construction Scenario 3 simulates a lower traffic period, compared to Construction Scenario 1 and 2, bus travel times are naturally expected to be lower even with the ongoing construction activities at the Ti Rakau Drive / Reeves Road / SEART and Ti Rakau Drive / Gossamer Drive.

Improvements in travel times of all bus services in both directions are predicted in the AM peak under Construction Scenario 3, except for the 711 (westbound) service. Travel time increases predicted for this service are considered to be negligible.

Travel time improvements, or in some cases manageable increases, are expected for the bus services running through the EB2 and EB3R project areas during the PM peak under Construction Scenario 3.

### 5.3.6 School Bus Services

The S415 school bus service between Pakuranga and Sacred Heart College will continue to depart from bus stop (ID 6060) outside Farmers in the AM peak and will continue to terminate at bus stop (ID 6062) on the return journey in the afternoon during construction. Furthermore, the service will also continue to travel in the general traffic lanes on Pakuranga Road during construction. As stated in **Section 5.3.3**, it is anticipated that the bus stops (ID 6062 and 6060) will only be removed following the completion of the RRF and Reeves Road underneath.

The S416 school bus service between Botany and Sacred Heart College will continue to use the general traffic lanes along Ti Rakau Drive as well as the existing bus stops in the EB2 and EB3R projects areas during construction. As stated in **Section 5.3.3**, it is anticipated that the bus stop (ID 6127) in the Pakuranga Town Centre will only be removed after the RRF, and Reeves Road have been completed. Also, as stated in **Section 5.3.4**, it is anticipated that bus stops (ID 6134, 6129, 6131, 6136, 6138 and 6133) along Ti Rakau Drive will only be removed following Phase 2 of Ti Rakau Drive in EB3R (Mattson Road to Gossamer Drive) and bus stops (ID 6140 and 6135) following Phase 3 of EB3R.

During construction, the S440 school bus services between Bucklands Beach and Sancta Maria College and Primary will remain on its current route and students will board and alight at the existing bus stops. The service is unlikely to be affected by Phase 3a of Ti Rakau Drive in EB3R (Mattson Road to Gossamer Drive), as the works are planned to occur during a December – January holiday period.

Effects to the S013 and S073 school bus services between Otara and Otahuhu to Edgewater College during construction are discussed in **Section 5.5.6.5**. School bus services are expected to experience similar effects to travel times compared to general bus services (see **Section 5.3.5.1** and **Section 5.2.3.2**) as the buses are generally expected to travel in the same lanes through the network.

### 5.3.7 Summary of Temporary Effects to Bus Services and Facilities

Overall, the temporary effects during construction to bus services and facilities in the EB2 and EB3R project areas are considered to be moderate during Construction Scenario 1, and negligible or very low during Construction Scenario 2 and 3. The 711 service will undergo minor route changes as construction progresses through the closure of Reeves Road and William Roberts Road north. Existing bus stops along Pakuranga Road and Ti Rakau Drive will also experience minor changes during construction, undergoing minor relocation as the works progress.

As with general traffic, although the temporary effects to intersection performance during construction are predicted to be negligible or very low, some adverse effects to bus travel times are expected, particularly during Construction Scenario 1. Again, these effects are not unexpected due to the number of ongoing construction activities. It should be noted that these effects are temporary, and once constructed, the RRF and EB2/EB3R as a whole will alleviate the congestion around the Pakuranga Town Centre.

Nevertheless, opportunities to improve bus travel times will be explored in the development of the CTMPs. The effects of construction will be mitigated through public communication and advance warning prior to the works. Community engagement and signage will also be provided during construction to inform motorists of the works and potential delays, which would lead to changes in travel patterns.

## 5.4 Effects to Pedestrians and Cyclists

Currently, pedestrian footpaths are provided along both sides of Ti Rakau Drive, between Pakuranga Road and Gossamer Drive. Signalised pedestrian facilities for crossing Ti Rakau Drive are provided at the following intersections:

- Ti Rakau Drive / Pakuranga Road southern and eastern approaches
- Ti Rakau Drive / Reeves Road all approaches
- Ti Rakau Drive / Mattson Road Western and southern approaches
- Ti Rakau Drive / Edgewater Drive west / Chevis Place western and southern approaches
- Ti Rakau Drive / Gossamer Drive northern, eastern and southern approaches

Pedestrian footpaths are also provided along both sides of Pakuranga Road, between Ti Rakau Drive and William Roberts Road. A midblock signalised pedestrian crossing is provided near the Pepler Street exit.

In the residential area to the north of SEART, pedestrian footpaths are provided along both sides of Dale Crescent. At the southern end of the street, the footpath continues along the northern side of Seven Oaks Drive.

In the commercial area south of the Pakuranga Plaza, pedestrian footpaths are provided along both sides of Reeves Road and Cortina Place. A midblock pedestrian crossing is also provided on Reeves Road. Footpaths are provided along both sides of William Roberts Road north, to the east of the Pakuranga Plaza. Once the WRRE is completed, footpaths will be provided along both sides of William Roberts Road south, from Ti Rakau Drive up to Ti Rakau Park.

Provision of footpaths with the same width as existing footpaths will be provided during construction.

As stated in **Section 3.6.2**, no cycle facilities are provided in the existing environment, except at the Ti Rakau Drive / Gossamer Drive intersection.

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

### 5.4.1 EB2 – Reeves Road

Footpaths along both sides of Reeves Road as well as the midblock pedestrian crossing will be maintained during construction. When beam-landing activities are required for construction of the RRF, pedestrians may need to be diverted around these areas for safety purposes. CTMPs will be employed to achieve this.

### 5.4.2 EB2 – William Roberts Road North

Although construction is required to form the cul-de-sacs at each end, the existing footpaths along both sides of William Roberts Road north will be maintained. Once the RRF northern abutment is under construction, it is anticipated that the pedestrian footpath on the western side of William Roberts Road north will be closed. The effects of this closure are considered to be negligible as the footpath on the opposite side of the road will be maintained.

### **5.4.3 EB2 – Pakuranga Road Tie-In**

The footpath along the northern side of the Pakuranga Road / RRF intersection will be maintained at all times. While the Pakuranga Road tie-in is under construction, pedestrians will be unable to utilise the existing refuge island on the southern side of the intersection. A temporary pedestrian crossing will be provided in a similar location to limit the effects to pedestrian walking time and distance.

### **5.4.4 EB2 – SEART**

There are no footpaths along SEART provided at present.

Once the new SEART off-ramp has been completed and Seven Oaks Drive has been reinstated further north, it is anticipated that the footpath along the northern side of the Seven Oaks Drive will also be reinstated, similar to the existing environment.

### **5.4.5 EB2 – Ti Rakau Drive from Pakuranga Road to Reeves Road**

Footpaths along both sides of the carriageway will be maintained. During the construction of the bus lanes on this section of Ti Rakau Drive as well as the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection, pedestrians may need to be diverted around these areas for safety purposes. CTMPs will be employed to achieve this.

During construction of the Ti Rakau Drive / Reeves Road intersection, pedestrian crossings will be maintained. Temporary crossings will be provided as necessary to avoid the construction areas.

### **5.4.6 EB2 – Pakuranga Road**

The existing footpaths along both sides of Pakuranga Road will be maintained during construction. The existing signalised midblock pedestrian crossing on Pakuranga Road, constructed as part of EB1, will be maintained for the vast majority of the construction programme. It will be disabled temporarily during the crossing drainage works.

### **5.4.7 EB2 – Side Roads**

The existing footpaths along both sides of Palm Avenue, Aylesbury Street north, Cortina Place and William Roberts Road will be maintained. In the case of Aylesbury Street, the footpaths will be maintained until the completion of the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection. Following which the existing footpaths will be removed. CTMPs will be employed to divert pedestrians around work zones as necessary.

### **5.4.8 EB3R – Ti Rakau Drive from Reeves Road to Mattson Road**

Footpaths along both sides of the carriageway will be maintained. During construction of the Ti Rakau Drive / William Roberts Road and Ti Rakau Drive / Mattson Road intersections, temporary crossing facilities will be provided as per the CTMPs to avoid the work zones.

#### **5.4.9 EB3R – Ti Rakau Drive from Mattson Road to Gossamer Drive (Phase 1)**

Pedestrian footpaths on both sides of Ti Rakau Drive will be maintained. A new three-stage pedestrian crossing will be constructed, between Marriot Road and Edgewater Drive west, during the construction of the new westbound lanes. However, this crossing will not be in use until the completion of the bus lanes and the Edgewater bus station in the centre of Ti Rakau Drive. Pedestrians will continue to use the existing pedestrian crossing at the Ti Rakau Drive / Edgewater Drive west intersection.

#### **5.4.10 EB3R – Ti Rakau Drive from Mattson Road to Gossamer Drive (Phase 2)**

The footpath along the northern side of Ti Rakau Drive will be maintained, and pedestrians will be able to utilise the new footpath along the southern side during Phase 2. As above, the new staged pedestrian crossing towards the Edgewater bus station will not be in use until completion of the bus lanes and the bus station. A temporary signalised pedestrian crossing will be provided at the Ti Rakau Drive / Edgewater Drive west intersection.

#### **5.4.11 EB3R – Ti Rakau Drive from Mattson Road to Gossamer Drive (Phase 3)**

During Phase 3, the staged pedestrian crossing at the Edgewater Drive bus station will be completed and will be opened for use. During construction of Ti Rakau Drive / Gossamer Drive intersection, pedestrian crossings will be maintained. Temporary crossings will be provided as necessary to avoid the construction areas, and will form part of the CTMP.

#### **5.4.12 EB3R – Side Roads**

The existing footpaths along both sides of Tiraumea Drive, Mattson Road, Roseburn Place, Edgewater Drive west, Chevis Place, Wheatley Avenue, Edgewater Drive east, Freemantle Place and Gossamer Drive will be maintained during construction. CTMPs will be employed to divert pedestrians around work zones as necessary.

#### **5.4.13 Summary of Temporary Effects to Pedestrians and Cyclists**

Temporary effects to pedestrians and cyclists during construction are considered to be negligible overall. Pedestrian crossings and footpaths will be maintained at all times during construction. Should this be unachievable, temporary facilities and diversions will be provided to ensure pedestrian connectivity. Furthermore, pedestrian access to properties will be maintained at all times. This will be ensured through the CTMPs.

## 5.5 Effects to Property Access and Parking

The sections below provide assessment of the temporary effects of EB2 and EB3R on property access, as well as on-street and off-street parking during construction, split between the EB2 and EB3R project areas.

### 5.5.1 EB2 – Reeves Road

The construction of Reeves Road will have no effect on on-street parking along this section of road as none is provided currently.

An assessment of temporary effects to property access and off-street parking at specific properties along Reeves Road in the EB2 project area is provided below.

#### 5.5.1.1 3 Reeves Road – Gull Service Station

**Figure 78** shows the location and property boundary of 3 Reeves Road, as well as the Gull service station (red outline) developed on the site. Access to the property from Reeves Road will not be maintained during the Reeves Road closure. Discussions regarding compensation are ongoing with the owner regarding loss of direct road access onto Reeves Road as part of the Public Works Act process.



**Figure 78: 3 Reeves Rd and Gull service station (red outline)**

5.5.1.2 11 Reeves Road – Eastside Pups Dog Grooming and Daycare

Access to the property at 11 Reeves Road will not be maintained during the closure of Reeves Road. A temporary two-way access will be provided from Cortina Place via the property at 2 Cortina Place (see **Figure 79**), which is owned by AT. The manoeuvring width between parking spaces to the rear of the property is approximately 8.4m and will be sufficient to accommodate a two-way temporary access, while having no effect on on-site parking. Therefore, the temporary effects to property access and parking are considered to be negligible.

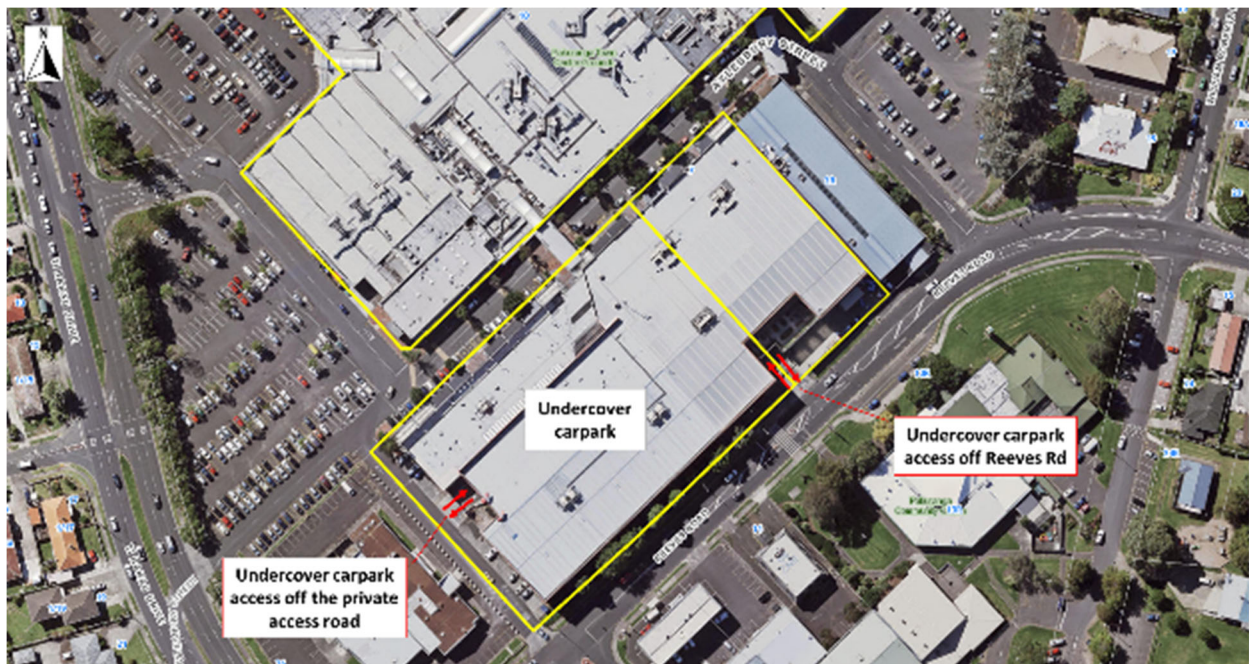


**Figure 79: 11 Reeves Rd temporary access during construction**

### 5.5.1.3 7 Aylesbury Street and 2R Ti Rakau Drive – The Warehouse and Pakuranga Library

Currently, access is provided to The Warehouse’s goods access and the associated undercover carpark at 7 Aylesbury Street from Reeves Road. Similarly, the service entrance of the Pakuranga Library and Citizens Advice Bureau at 2R Ti Rakau Drive is also accessed from Reeves Road.

During the initial stages of the Reeves Road closure, from June 2023 to April 2024<sup>32</sup>, access will be maintained through the work site to the goods access and the service entrance of the library. Access to the undercover carpark from Reeves Road will not be maintained during this period. However, the existing secondary access to the undercover carpark off the private access road in the Pakuranga Plaza will remain open (see **Figure 80**). The main access to the Library on Aylesbury Street east will also remain open. Therefore, effects to property access during this period at these properties, as well as during events such as the Pakuranga Night Market, are expected to be very low.



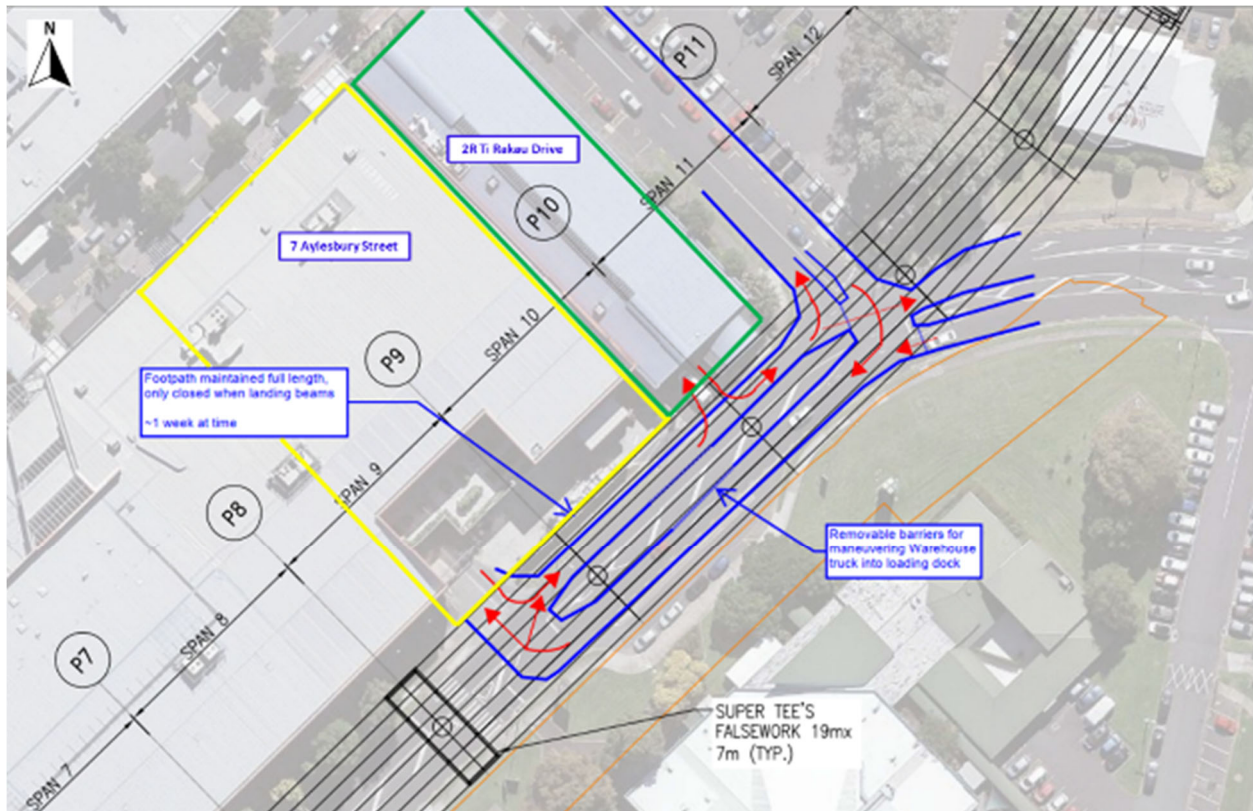
**Figure 80: Pakuranga Plaza undercover carpark accesses**

It should be noted that during this period, access to the Pakuranga Plaza at the Reeves Road / Aylesbury Street east intersection will also not be maintained. A full assessment of effects to property access at the Pakuranga Plaza is presented in **Section 5.5.5.3**.

Following this initial period, and in addition to the accesses being maintained to The Warehouse and the Library, access will also be reinstated to the undercover carpark. These access arrangements are shown in **Figure 81** below.

<sup>32</sup> These periods are indicative, and the EBA is reviewing the design and construction methodology to accelerate construction.





**Figure 81: 7 Aylesbury St and 2R Ti Rakau Dr temporary access during construction**

At present, The Warehouse’s goods access is left-in left-out only, with trucks accessing the site via Reeves Road from the south and exiting to the north. Trucks will access the site from the north on Reeves Road, execute a U-turn and return northbound on Reeves Road towards William Roberts Road during construction.

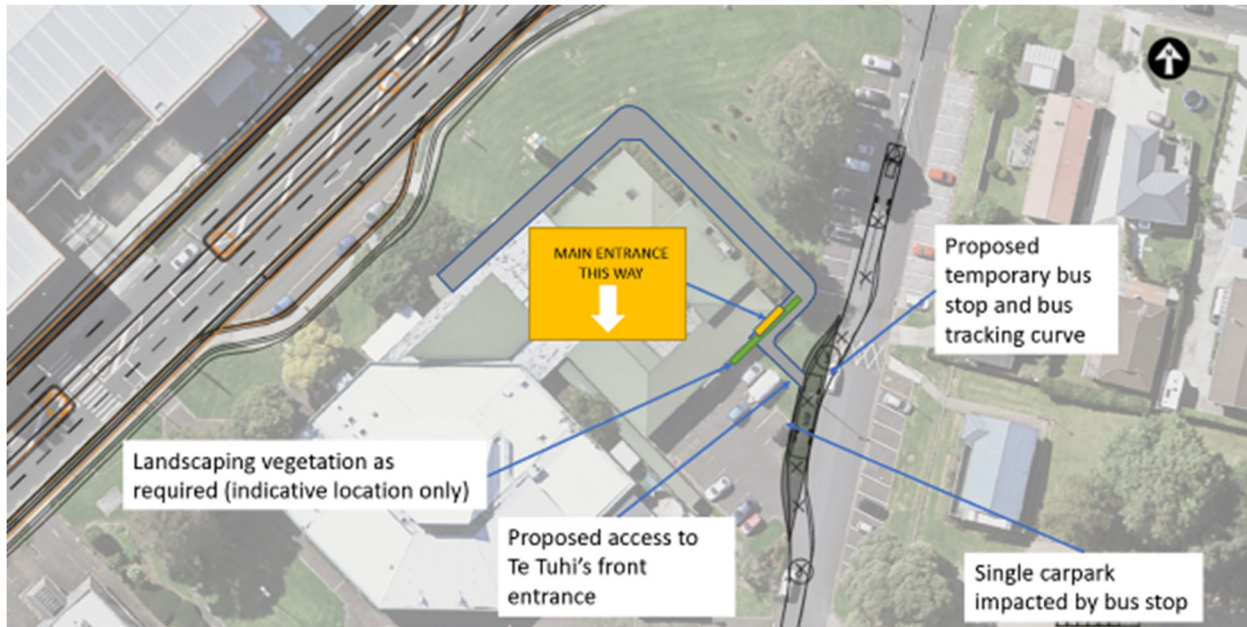
Removeable barriers will be installed in the median and the existing masonry wall on the property boundary will be removed, if required, to accommodate this manoeuvre. The wall will be reinstated after construction of Reeves Road. Deliveries to the property are currently limited to one semi-trailer per day (as per the terms of the existing resource consent for the property) and background traffic volumes on Reeves Road will be significantly reduced.

Access to the undercover carpark will also be from the north on Reeves Road, turning right into the carpark. Left-out only movements will be provided at this access for vehicles exiting from the carpark.

Access to the service entrance of the Library will be from the north on Reeves Road, executing a U-turn manoeuvre at the undercover carpark access. During construction, this access will provide for left-in left-out movements only. Given the nature of the service access and its size, it is expected that a low number of vehicles would require access to this entrance during construction. Effects to property access are expected to be negligible as the existing background traffic on the road will be redistributed elsewhere during the Reeves Road closure.

#### 5.5.1.4 13R Reeves Road – Te Tuhi

The main access to the property off Reeves Road will not be maintained during the Reeves Road closure. A temporary indented drop-off area will be provided on the western side of William Roberts Road, with a temporary walkway leading around the property to the main entrance (see **Figure 82**).



**Figure 82: 13R Reeves Rd temporary access during construction**

The drop-off will result in the temporary loss of one off-street parking space to the rear of the property. It is expected that the remaining 12 off-street parking spaces on the property would be sufficient during construction. Temporary effects on property access and off-street parking during construction are expected to be very low.

Once the WRRE is completed, on-street parking fronting this property will be removed via No Stopping at All Time (NSAAT) line markings. Therefore, the proposed temporary drop-off will have no additional effects on on-street parking along William Roberts Road.

#### 5.5.2 EB2 – William Roberts Road North

As stated in **Section 5.1.1.4**, the construction yard will be located on the south-western quadrant of the Pakuranga Road / William Roberts Road intersection. The properties at 169, 171, 173 Pakuranga Road and 3 William Roberts Road have been acquired by AT and will provide the necessary space for this CSA. Again, it should be noted that this CSA is subject to a separate resource consent application and associated transport assessment. As such, no further comment on the construction yard is provided in this ITA.

AT have also acquired the remaining properties on the western side of William Roberts Road north, including 5, 7, 9, 11, 13, 15, 17 and 19 William Roberts Road. These properties will provide the necessary space for the northern RRF abutment. The removal of these residential properties will further reduce the need for on-street parking along William Roberts Road north.

Lastly, AT have also acquired the properties at 177, 179, 181, 187 Pakuranga Road and 2 William Roberts Road on the southern side of the carriageway to allow for the Pakuranga Road / RRF tie-in.

Accesses to the remaining properties on the eastern side of the road will be maintained as per the existing environment.

Overall, the need for on-street parking along William Roberts Road north will be significantly reduced during construction. Therefore, the temporary effects to property access and parking are considered to be negligible.

### 5.5.3 EB2 – SEART

To enable the proposed design of the new SEART off-ramp and the southern RRF abutment, AT have acquired the following properties on the northern side of SEART:

- 25 and 27 Ti Rakau Drive
- 2, 4, 6, 8, 10, 12, 14, and 18 Seven Oaks Drive
- 1R and 19 Dale Crescent

The properties have been earmarked for demolition, thereby removing the current use of these properties.

### 5.5.4 EB2 – Pakuranga Road

In the existing environment, clearways are provided in the kerbside lanes on Pakuranga Road in the EB2 project area. The westbound clearway is enforced during the AM peak period (07:00 – 09:00) and the eastbound clearway during the PM peak period (16:00 – 18:00). In the off-peak periods, on-street parking is permitted along these sections of Pakuranga Road. **Figure 83** shows the location and extent of the clearways (blue outline) along Pakuranga Road in the EB2 project area.



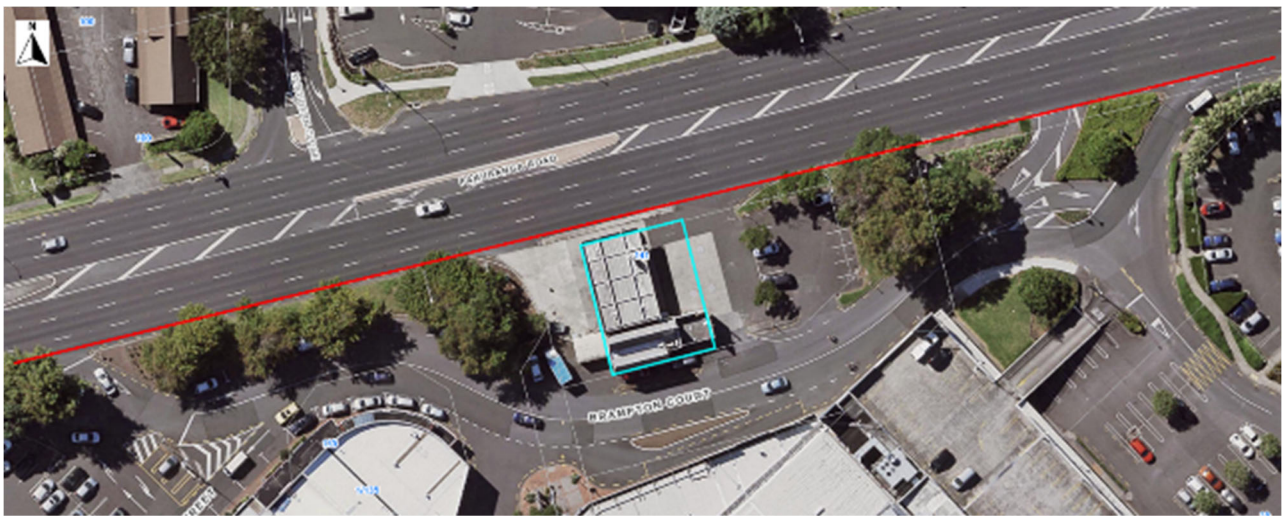
**Figure 83: Pakuranga Rd clearways and on-street parking (blue outline)**

During construction of the Pakuranga Road / RRF tie-in, these clearways and on-street parking sections will be removed to provide the necessary workspace. As Pakuranga Road is largely similar to Ti Rakau Drive in the EB3R project area, in terms of traffic volumes and operating speeds, it is not unreasonable to assume that Pakuranga Road experiences the same low level of parking utilisation in the existing environment during weekdays and weekends. Based on this assumption, the temporary effects on on-street parking are expected to be negligible.

As stated in **Section 4.2.1.6**, the initial stages of the Pakuranga Road construction will also include longitudinal and crossing drainage works. Only the longitudinal drainage works are assessed here for effects to property access. A full assessment of effects to general traffic is presented in **Section 5.2.2.6**.

#### 5.5.4.1 141 Pakuranga Road – GAS Service Station

**Figure 84** shows the general location of the proposed longitudinal drainage works along Pakuranga Road and the property boundary of the GAS service station located at 141 Pakuranga Road.



**Figure 84: Pakuranga Rd longitudinal drainage works and GAS service station (blue outline)**

Longitudinal drainage construction will consist of the temporary closure of a section of the westbound kerbside lane on Pakuranga Road between William Roberts Road and Ti Rakau Drive. During this phase of work, access to the Pakuranga Plaza via Brampton Court, access to the GAS service station and the Pepler Street exit will be maintained at all times via steel plating across the trench.

The drainage works will be completed in sections to ensure this. It is envisaged that lateral shifts of the access points may be required. The construction team will also liaise with the operators of the GAS service station to ensure sufficient access widths are provided, as and when required, for fuel delivery tankers. Therefore, the effects to property access are expected to be negligible.

## 5.5.5 EB2 – Ti Rakau Drive, Side Roads and Pakuranga Plaza

### 5.5.5.1 *Ti Rakau Drive*

Ti Rakau Drive in the EB2 project area, between Pakuranga Road and Reeves Road, provides no on-street parking in the existing environment. Therefore, the construction phase will have no effects on on-street parking.

As per the existing environment, left-in/left-out access to the residential properties on the western side of the carriageway will be maintained throughout the construction programme. These properties include 3-27 Ti Rakau Drive. This will be achieved through the CTMP. Once the works commence in the centre of the carriageway (Phase 2 of Ti Rakau Drive in EB2, see **Section 4.2.1.5**), residents of these properties will no longer be able to use the existing U-turn facility on Ti Rakau Drive to head east. However, vehicles will still be able to turn right into Pakuranga Road and Brampton Court to execute a U-turn manoeuvre if required to head east along Ti Rakau Drive. Therefore, the effects to these residential properties are considered to be very low.

Effects on property access with regards to the Pakuranga Plaza are discussed below.

### 5.5.5.2 *Side Roads*

Construction works on Palm Avenue will be limited to the approach of the intersection with Ti Rakau Drive. Works on Aylesbury Street will be more extensive; however, no on-street parking is provided in the existing environment and property access will be maintained during these works. Therefore, the construction phase will have no effects on on-street parking or property access along these side roads.

### 5.5.5.3 *Pakuranga Plaza*

The works in the EB2 project area around Pakuranga Plaza will be constantly evolving as works transition from one phase to the next. This in turn will require multiple changes to the accesses and parking currently serving the Pakuranga Plaza until the completion of the Project. The sections below provide an assessment of the temporary effects, in chronological order, to property access and parking.

It should be noted that for the purposes of this ITA, the term 'Pakuranga Plaza' is used here to refer to the entire area encompassed in the yellow outline in **Figure 85** below and includes the following properties:

- 7 and 10 Aylesbury Street
- 2R Ti Rakau Drive
- 1 Pepler Street
- 121, 123, 125, 127, 129, 131, 135, 141 and 167 Pakuranga Road

The assessment presented here excludes the property located at 26 Ti Rakau Drive (red outline).



Figure 85: Pakuranga Plaza

**Property Access:**

The Pakuranga Plaza currently has six access points allowing for both in and out movements, with a seventh allowing for movements out onto Pakuranga Road only. All accesses are currently priority-controlled. **Figure 86** below shows the traffic volumes for both the AM and PM peak hours at these access points (PM traffic volumes in brackets).

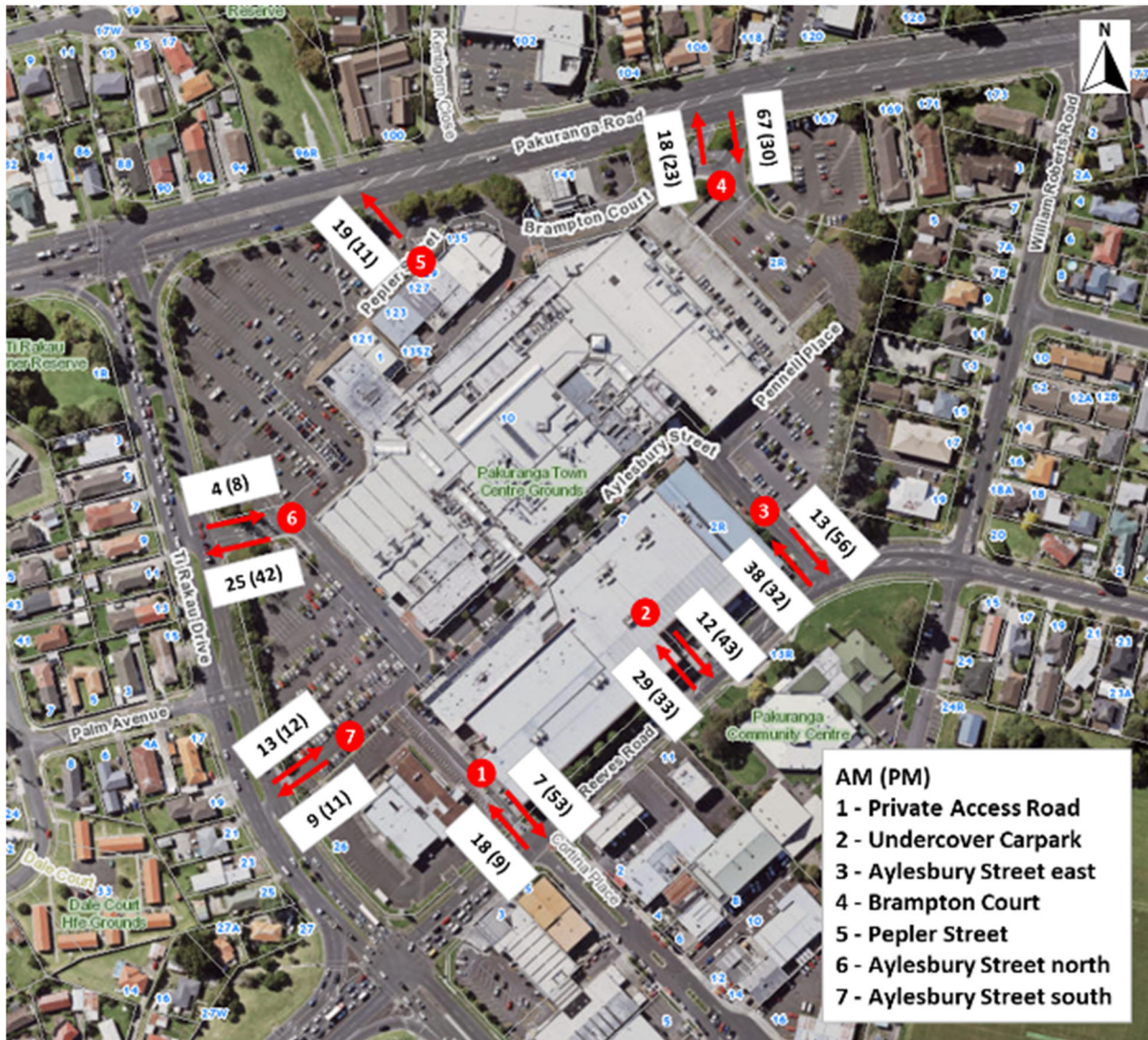


Figure 86: Pakuranga Plaza access volumes<sup>33</sup>

As stated in **Section 5.5.1.3**, Reeves Road will be closed during the initial stages of the construction programme, from June 2023 to April 2024<sup>34</sup>. Access to the Plaza via the private access road (Access 1), the undercover carpark (Access 2), and Aylesbury Street east (Access 3) will not be maintained.

<sup>33</sup> Traffic volumes sourced from the AIMSUN Do-Minimum model, with a 2028 horizon year.

<sup>34</sup> These periods are indicative, and the Alliance is reviewing the design and construction methodology to accelerate construction.

However, access will be maintained through the work site to The Warehouse's goods access and the Library service entrance. Furthermore, the existing secondary access to the undercover carpark off the private access road in the Pakuranga Plaza will remain open. The main access to the Library on Aylesbury Street east will also remain open.

It is expected that vehicles would divert to the four remaining accesses on Ti Rakau Drive and Pakuranga Road, which would have sufficient spare capacity due to the low background traffic volumes at those accesses. Therefore, the effects of the temporary closure of these accesses are expected to be very low.

Following this initial period, access to the Plaza via Access 2 and Access 3 will be reinstated (as stated in **Section 5.5.1.3**). However, Access 1 will remain closed. Background traffic volumes on Reeves Road will also be significantly reduced. Again, it is expected that vehicles would divert to the remaining accesses on Ti Rakau Drive, Pakuranga Road and the reopened accesses on Reeves Road, which would have sufficient spare capacity. The effects of the temporary closure of this access are expected to be negligible.

Thereafter, construction will commence on the new Ti Rakau Drive bus lanes between Pakuranga Road and Reeves Road as well as the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection (Phase 1 of Ti Rakau Drive in EB2, see **Section 4.2.1.5**). During this phase of work the existing priority-controlled Aylesbury Street accesses (Access 6 and 7) will be maintained until completion of the new signalised crossroads intersection. Once completed, the accesses will be removed. An improved access will be provided with increased capacity and will allow for all movements in and out.

Construction of the traffic signals at the Reeves Road / Aylesbury Street intersection (Access 3) is anticipated to occur after the RRF construction. This will provide an improved access to the Plaza with increased capacity.

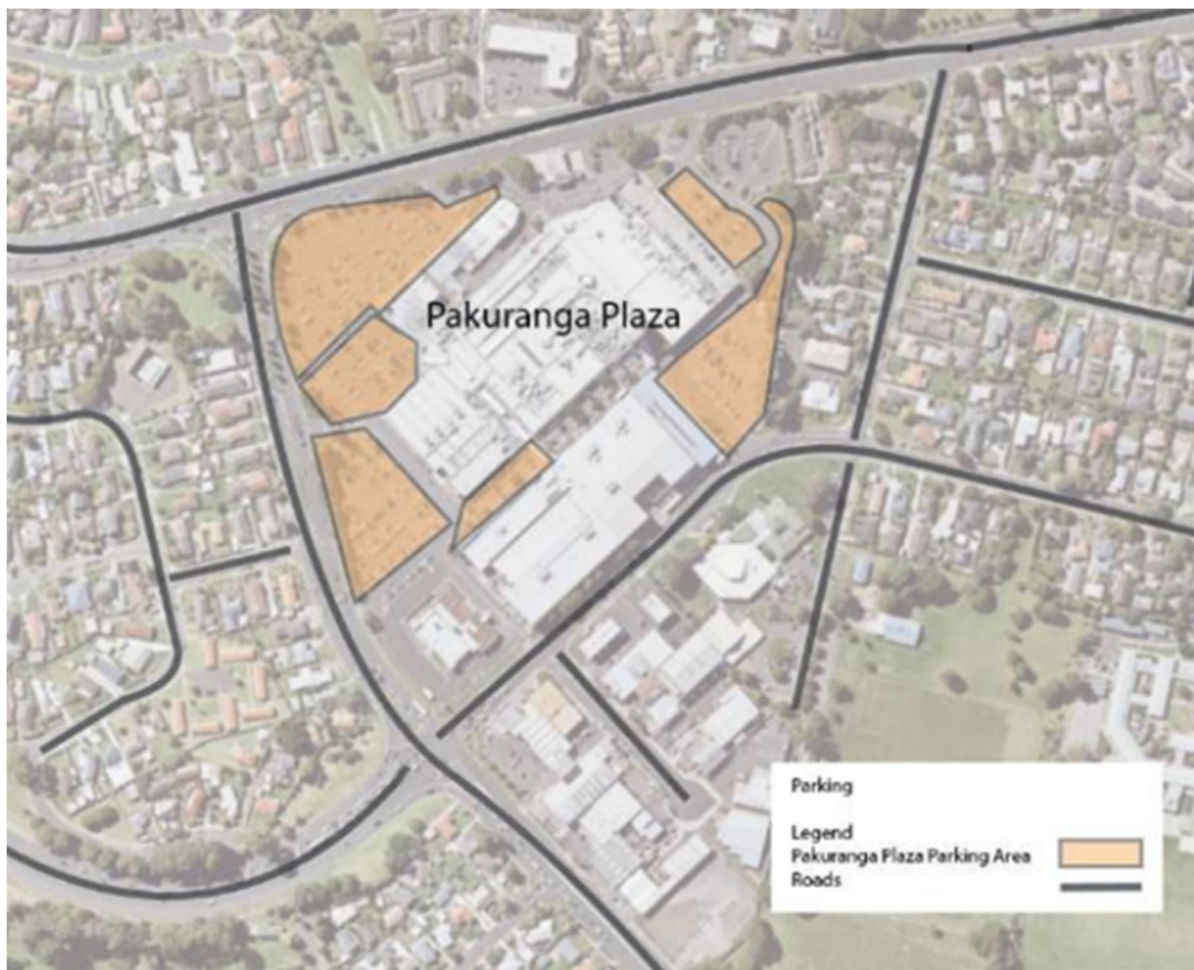
During the final stages of the programme, after the Reeves Road and RRF construction, longitudinal drainage works will commence on Pakuranga Road. However, as stated in **Section 5.5.4.1**, access to the Plaza via Brampton Court (Access 4) and the Pepler Street exit (Access 5) will be maintained at all times via steel plating across the trenches. The drainage works will be completed in sections to ensure this. It is envisaged that lateral shifts of the access points may be required. The temporary effects to property access are expected to be negligible.



## Parking:

As stated in **Section 3.7.1**, the Pakuranga Plaza currently supports 1,355 parking spaces on site. The utilisation of 840 of these parks was captured during the parking survey, shown in **Figure 87**. The utilisation of the surveyed parking spaces was determined to not exceed 60% capacity on a typical weekday or weekend.

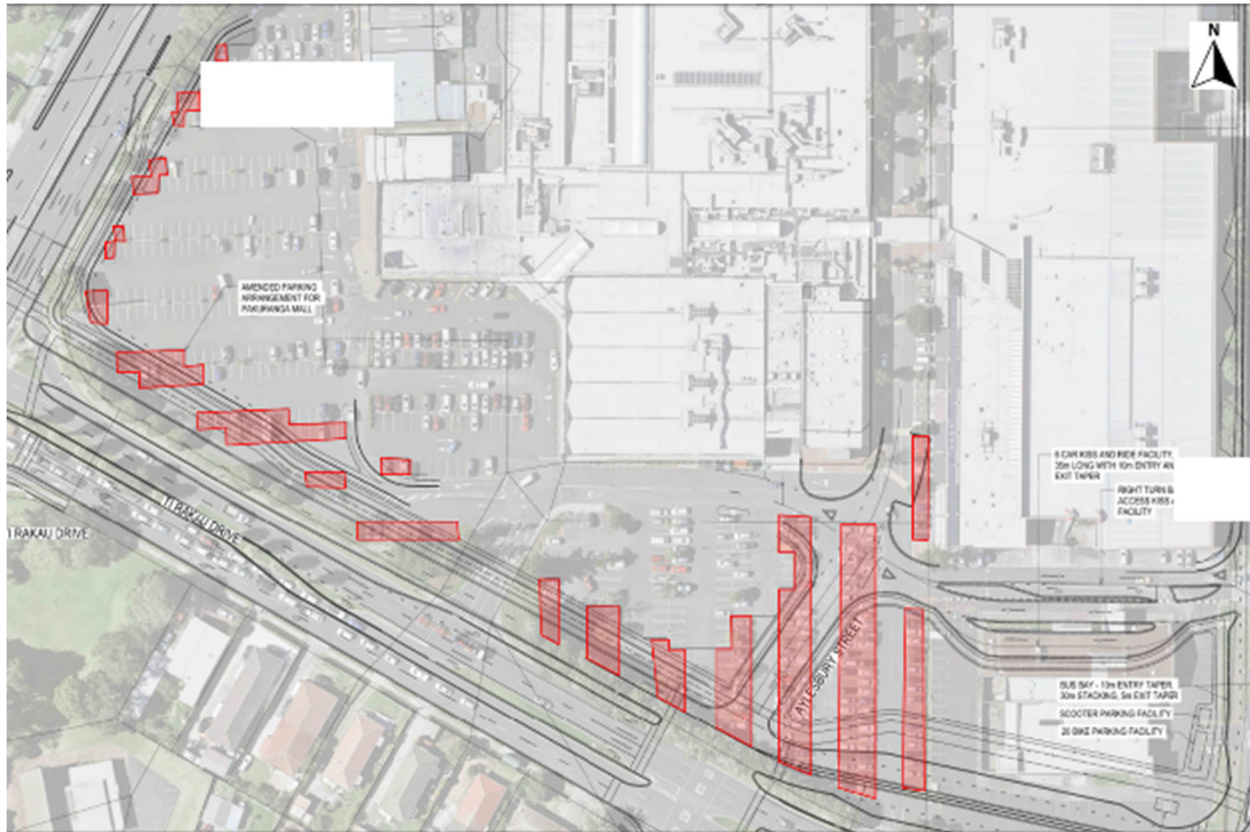
It is not unreasonable to assume that the remaining 495 un-surveyed parking spaces experience a similar utilisation profile. Therefore, based on this assumption, it is expected that the Pakuranga Plaza has at least 542 unoccupied parking spaces on an average weekday and weekend. It should be noted that AT owns all of parking areas shown in **Figure 87**, except for those parking spaces located on Aylesbury Street.



**Figure 87: Pakuranga Plaza surveyed parking areas**

As stated in **Section 5.1.1.3**, the parking area off Pennell Place in the Pakuranga Plaza will be temporarily occupied and established as a CSA. This carpark in its current form provides 108 parking spaces and will be occupied for approximately two years and two months. Taking the spare capacity of parking spaces at the Plaza into account, it is expected that there would still be 434 unoccupied parking spaces on site during the period where this parking area is occupied by the CSA. Therefore, in light of the existing spare capacity, the temporary effects of the use of the carpark as a CSA on parking at the Plaza are expected to be negligible.

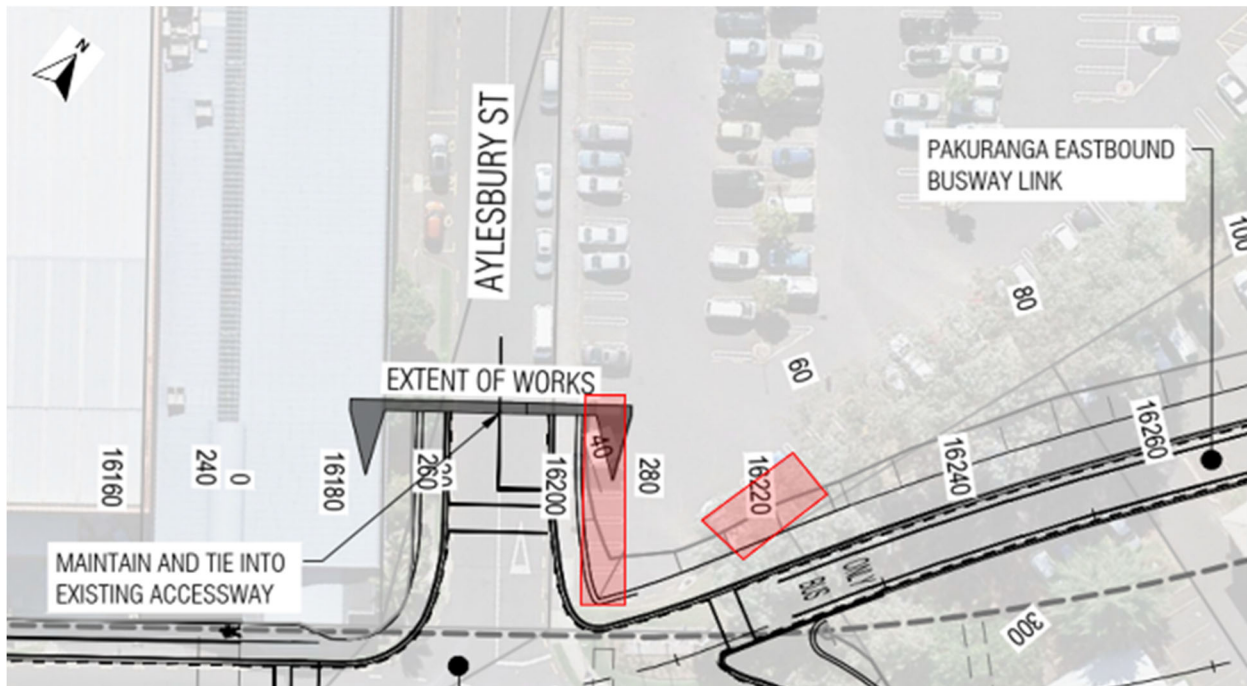
During the Reeves Road closure and the RRF construction, works will commence on the new offline bus lanes on the northern side of Ti Rakau Drive between Pakuranga Road and Reeves Road. These works will also include the new bus station, the Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection and the 'Kiss-and-Ride' facility (see **Section 4.2.1.5**). **Figure 88** shows the layout of the proposed works and the effects on parking at the Plaza.



**Figure 88: EB2 Ti Rakau Drive effects on parking at Pakuranga Plaza**

For the purposes of this ITA it was assumed that all of the required land area will be under construction simultaneously, in other words the full effects of the proposed works on parking. Based on this assumption, the works will result in the permanent loss of 245 parking spaces at Pakuranga Plaza. Taking the spare capacity of parking at the Plaza into account, it is expected that there would still be 189 unoccupied parking spaces on site. Therefore, the effects of these works on parking at the Plaza are expected to be negligible.

Following construction of the RRF, late in the construction programme, the Reeves Road / Aylesbury Street and the Reeves Road / William Roberts Road intersections will be signalised. This will include the realignment of Reeves Road and Aylesbury Street east. **Figure 89** shows the proposed alignment of Reeves Road and Aylesbury Street east, as well as the effects on parking at the Plaza.



**Figure 89: Reeves Rd / Aylesbury St signalisation effects on parking at Pakuranga Plaza**

The proposed works will result in an additional and permanent loss of 12 parking spaces at the Pakuranga Plaza. However, these proposed works will occur after the CSA at Pennell Place has been disestablished and the parking area re-established. Taking the spare capacity of the remaining 297 parking spaces into account, it is expected that there would still be 285 unoccupied parking spaces on site. Therefore, the effects of this signalisation on parking at the Plaza are expected to be negligible.

### 5.5.6 EB3R – Ti Rakau Drive, Side Roads and Properties

The sections below provide assessment of the temporary effects during construction on property access and parking in the EB3R project area.

To enable the EB3R construction, AT have acquired the vast majority of properties along the southern frontage of Ti Rakau Drive including:

- 37 – 69, 73-105, 121-143, 147-207 Ti Rakau Drive
- 3 Tiraumea Drive
- 1, 3, 4 and 5 Mattson Road as well as small parcels of 7 and 9 Mattson Road
- 1 Roseburn Place
- 1 Snell Place
- 2 and 167 Edgewater Drive
- 1-2 Wheatley Avenue

Properties acquired on the northern side of the carriageway include:

- 216-222 Ti Rakau Drive
- 170, 174 and 178 Gossamer Drive
- A parcel of 168R Gossamer Drive

The majority of these properties are scheduled for demolition to facilitate the busway, thereby removing the current use of these properties.

#### 5.5.6.1 *Ti Rakau Drive*

Ti Rakau Drive in the EB3R project area, between Reeves Road and Gossamer Drive, provides on-street parking along both sides for the majority of the corridor in the existing environment. The on-street parking will be removed during construction to provide the necessary space for the work zones. However, as stated in **Section 3.7.4**, the average utilization is poor with only 3% occupancy on weekdays and 8% on Saturdays. This is not unexpected as this high-volume road does not create an appealing location to park vehicles and is likely leading to a high perceived risk of crashes. It is also not unreasonable to assume that the surrounding residential properties have sufficient off-street parking.

Furthermore, the acquisition of the majority of the residential properties on the southern frontage of Ti Rakau Drive will remove the need for on-street parking along this section. Lastly, the current left-in/left-out access arrangements to the properties on the northern side of Ti Rakau Drive will be maintained during construction. Therefore, the temporary effects on on-street parking and property access along Ti Rakau Drive are considered to be negligible.

#### 5.5.6.2 *Side Roads*

##### **Tiraumea Drive, Roseburn Place, Edgewater Drive and Wheatley Avenue:**

Construction works along the side roads of Tiraumea Drive, Roseburn Place, Edgewater Drive west, Wheatley Avenue and Edgewater Drive east will be limited to the approaches of the intersections with Ti Rakau Drive. Therefore, the construction phase will have negligible effects on on-street parking and property access along these side roads.

**Marriot Road and Chevis Place:**

No works are planned along Marriott Road and Chevis Place. Therefore, construction will have no temporary effects on on-street parking and property access along these side roads.

**Mattson Road:**

Construction works along Mattson Road will be relatively more extensive. The Mattson Road approach will be set back approximately 40 m south and 25 m east of its current location where it intersects with Ti Rakau Drive. This will provide space for the new westbound lanes on Ti Rakau Drive and will provide sufficient midblock stacking space between the intersections at Mattson Road and William Roberts Road.

However, the properties on the southern side of Ti Rakau Drive have been acquired, removing the need for on-street parking. Accesses to properties along Mattson Road not acquired by AT will be maintained and will interface with the new alignment of Mattson Road similar to the existing environment. Therefore, the temporary effects on on-street parking and property access along Mattson Road are considered to be negligible.

**Gossamer Drive:**

The Gossamer Drive approach limit line will be set back approximately 15 m from its current location and the kerbside exit lane will be extended to 100 m. NSAAT line markings are currently provided on the eastern side of the road up to the bus stop near the intersection with Riverhills Avenue. These markings will be replicated on the western side of the road. This will result in the loss of on-street parking in front of 169, 171, 173 and 175 Gossamer Drive. It is likely that these properties have sufficient off-street parking, and that on-street parking is not occupied on a regular basis. Accesses to properties along Gossamer Drive not acquired by AT will be maintained and will interface with the roadway similar to the existing environment. Therefore, the effects on on-street parking and property access along Gossamer Drive are considered to be negligible.

**Freemantle Place:**

The Freemantle Place approach will be set back approximately 11 m. NSAAT line markings are provided on the western side of the road for approximately 31 m from the limit line. The line markings will be reinstated upon completion and will result in the loss of one parking space in front of 3 Freemantle Place. It is expected that the remaining on-street parking space in front of the property will be sufficient. The existing line markings on the eastern side of the road will be retained. Property access along Freemantle Place will be maintained as per the existing environment. Therefore, the effects on on-street parking and property access along Freemantle Place are considered to be negligible.

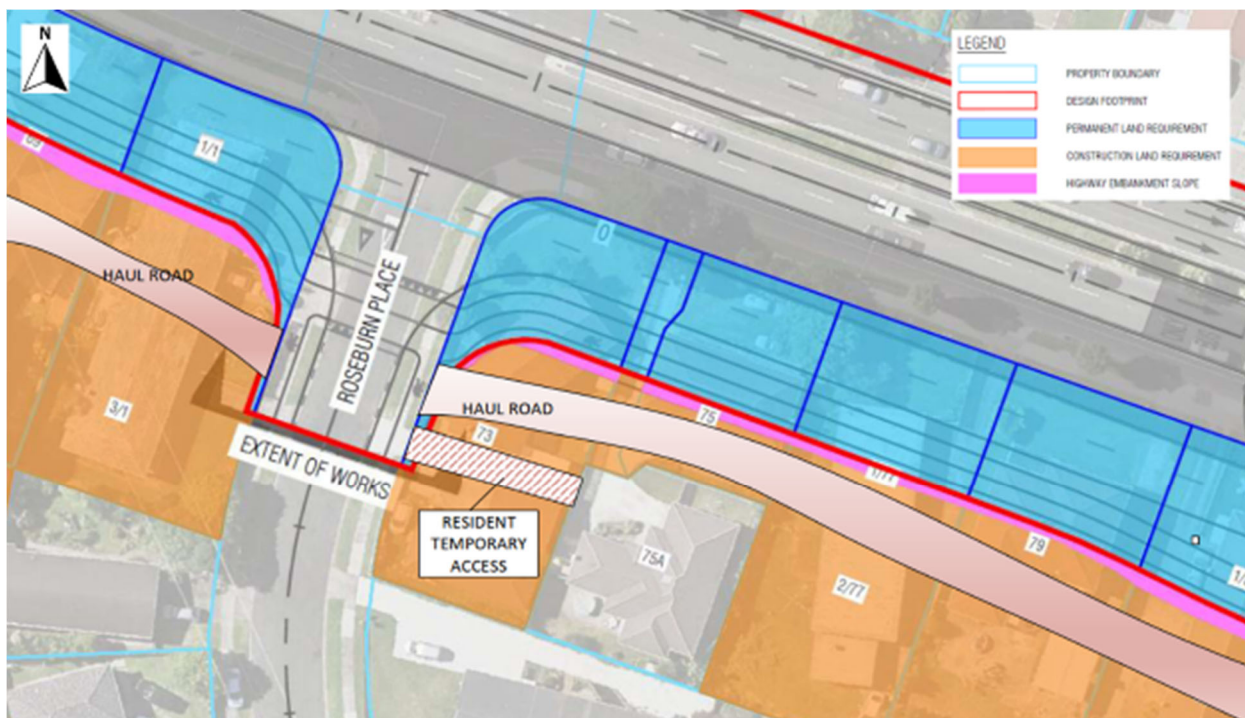
### 5.5.6.3 Residential Properties on Southern Frontage of Ti Rakau Drive

During Phase 1 of EB3R, there will be 10 long driveways or ‘strip accessways’ to residential properties not being acquired by AT on the southern side of Ti Rakau Drive. As the new westbound lanes are constructed, access via Ti Rakau Drive will not be possible. Access to these properties will be provided via temporary residential access tracks along the back of the acquired properties as mitigation.

The temporary access tracks will run alongside a haul road to be used by site traffic, meaning construction and residential traffic will be separated. The tracks will be constructed with Chip Seal as the surface and in cases where the access tracks are greater than 50 m in length, these tracks will be wide enough for two-way traffic flow. The effect on each individual property is assessed below, however, overall the effects to property access are considered to be very low or negligible. As stated in **Section 4.2.2.3**, Phase 1 of EB3R is anticipated to have a duration of approximately one year and three months.

#### 75A Ti Rakau Drive:

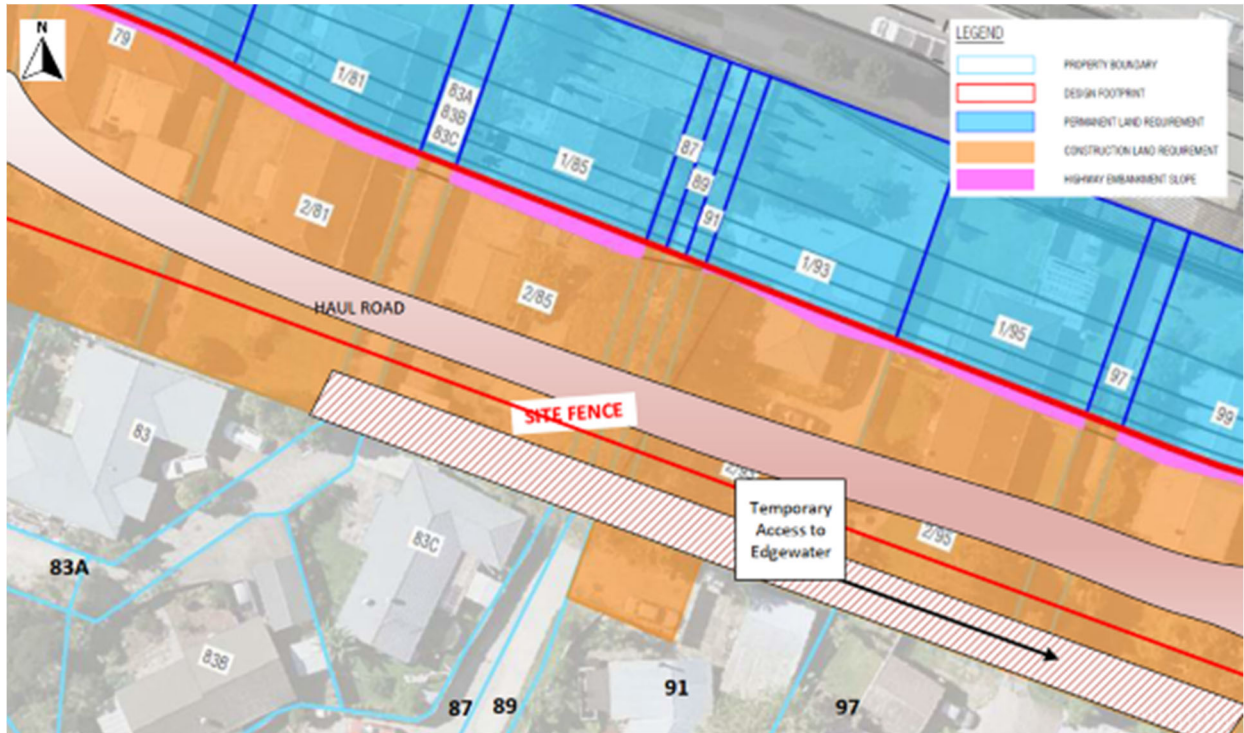
A temporary access point will be provided for 75A Ti Rakau Drive on the eastern side of Roseburn Place. The driveway will effectively line up with the existing access of 73 Ti Rakau Drive and will be separated from the haul road. Therefore, the effects to property access are considered to be negligible. **Figure 90** shows the location of the proposed temporary access.



**Figure 90: 75A Ti Rakau Dr temporary access**

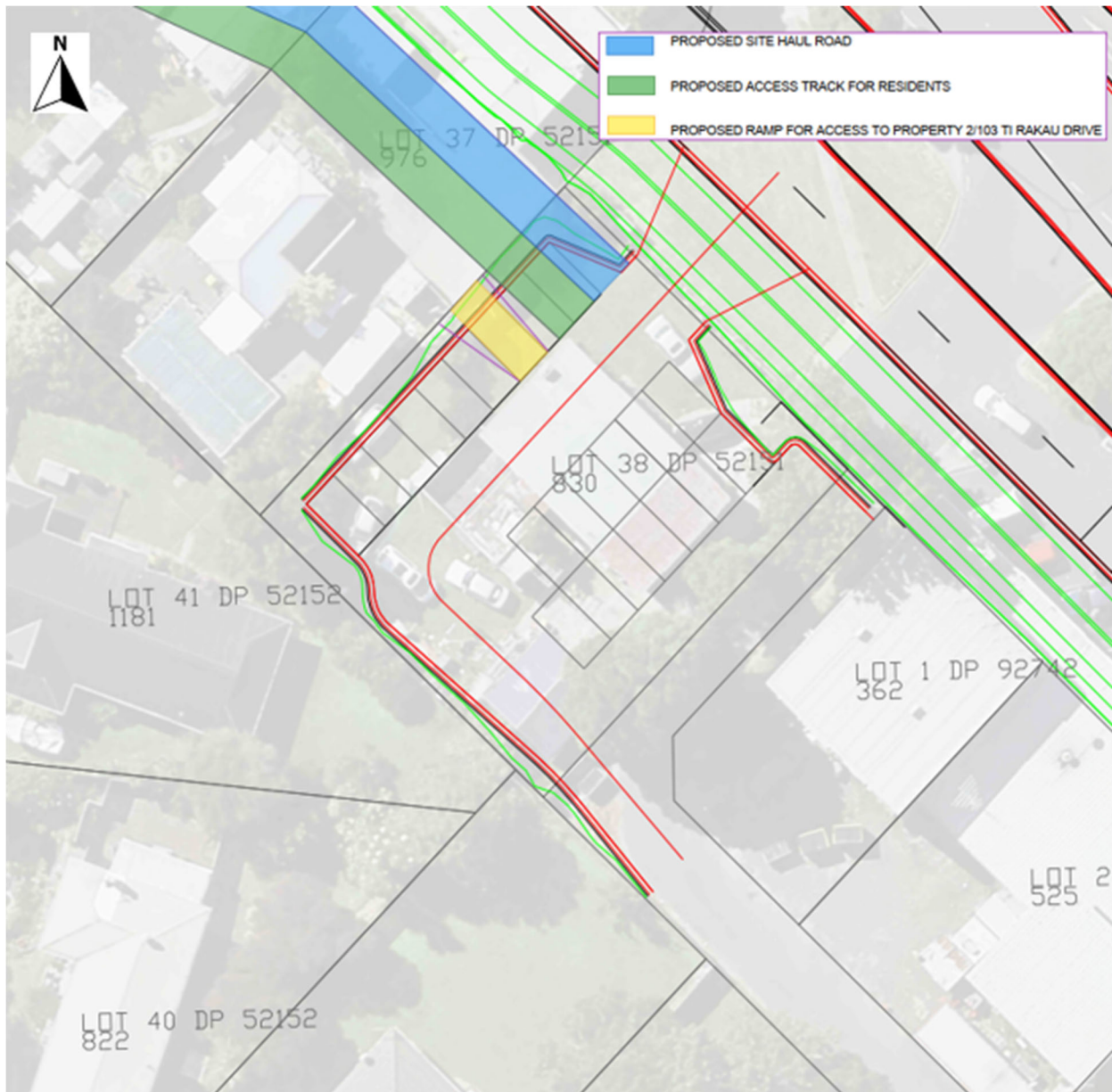
**83, 83A-C, 87, 89, 91, 97 and 103A Ti Rakau Drive:**

A temporary access road will be provided for 83, 83A-C, 87, 89, 91 and 97 Ti Rakau Drive at the back of the acquired properties. The temporary access road will head east towards Edgewater Drive. **Figure 91** shows the location of the proposed temporary access road.



**Figure 91: 83, 83A-C, 87, 89, 91 and 97 Ti Rakau Dr temporary access road**

At the eastern end, the proposed temporary access road will terminate in the temporary parking area to be provided for the Edgewater Shops, located at 105 Ti Rakau Drive. A temporary access point for 103A Ti Rakau will also be provided here. **Figure 92** below shows the location of the proposed temporary accesses.



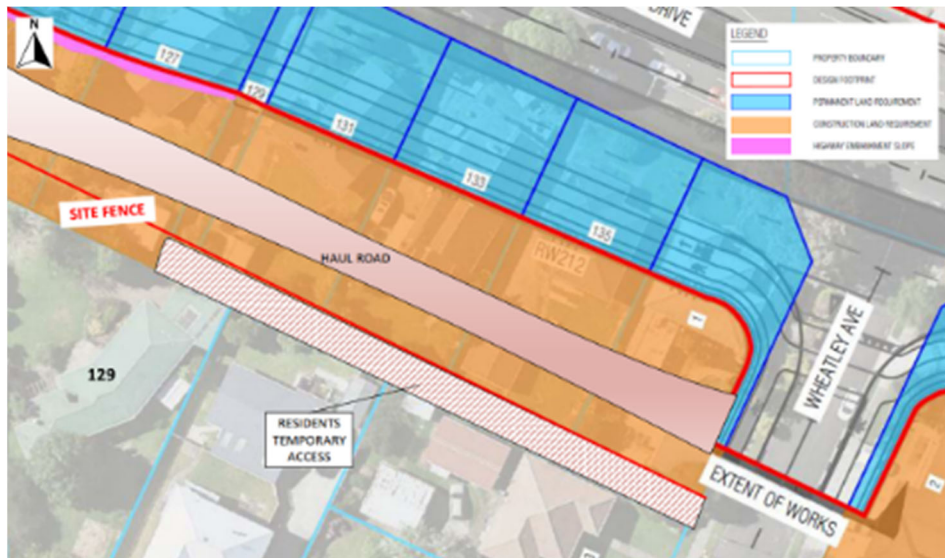
**Figure 92: 103A Ti Rakau Dr temporary access**

Residents will access the temporary access roads via Edgewater Drive west and the access road to the rear of the Edgewater Shops. The site haul road will also intersect the temporary parking area, but will be accessed by site traffic via Ti Rakau Drive. Therefore, the temporary effects to property access are considered to be very low.



**129 Ti Rakau Drive:**

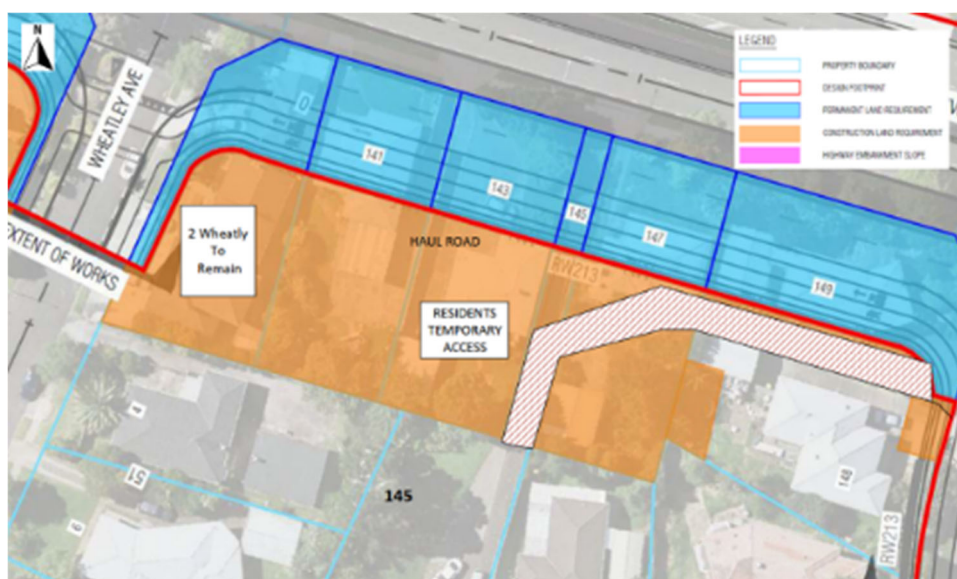
A temporary access point will be provided for 129 Ti Rakau Drive on the western side of Wheatley Avenue. The driveway will intersect with Wheatley Avenue close to the existing access of 1 Wheatley Avenue and will be separated from the haul road. Therefore, the effects to property access are considered to be negligible. **Figure 93** shows the location of the proposed temporary access.



**Figure 93: 129 Ti Rakau Dr temporary access**

**145 Ti Rakau Drive:**

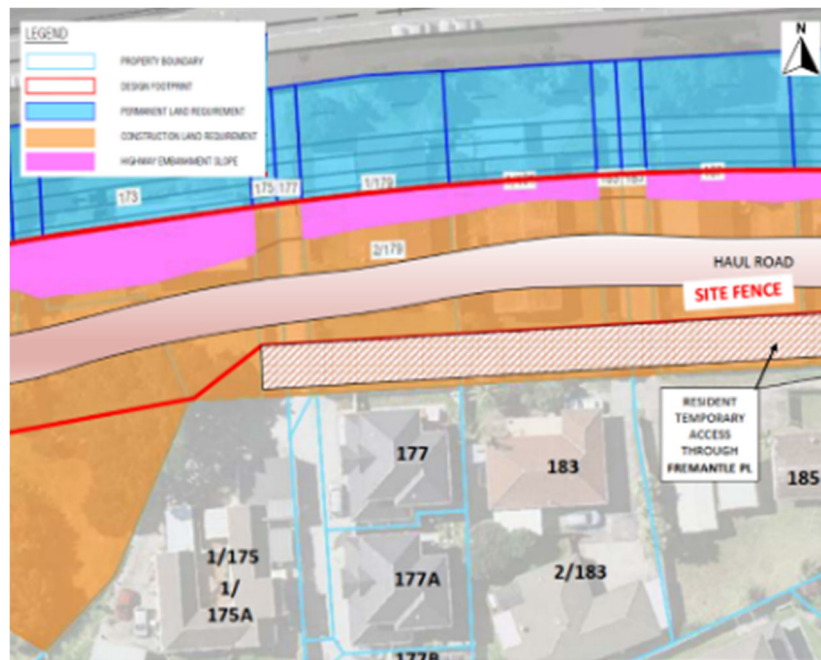
A temporary access point will be provided for 145 Ti Rakau Drive on the western side of Edgewater Drive east. The access road will intersect with Edgewater Drive at the existing access of 149 Ti Rakau Drive. A haul road is not proposed between Wheatley Avenue and Edgewater Drive east. Therefore, the effects to property access are considered to be negligible. **Figure 94** below shows the location of the proposed temporary access.



**Figure 94: 145 Ti Rakau Dr temporary access**

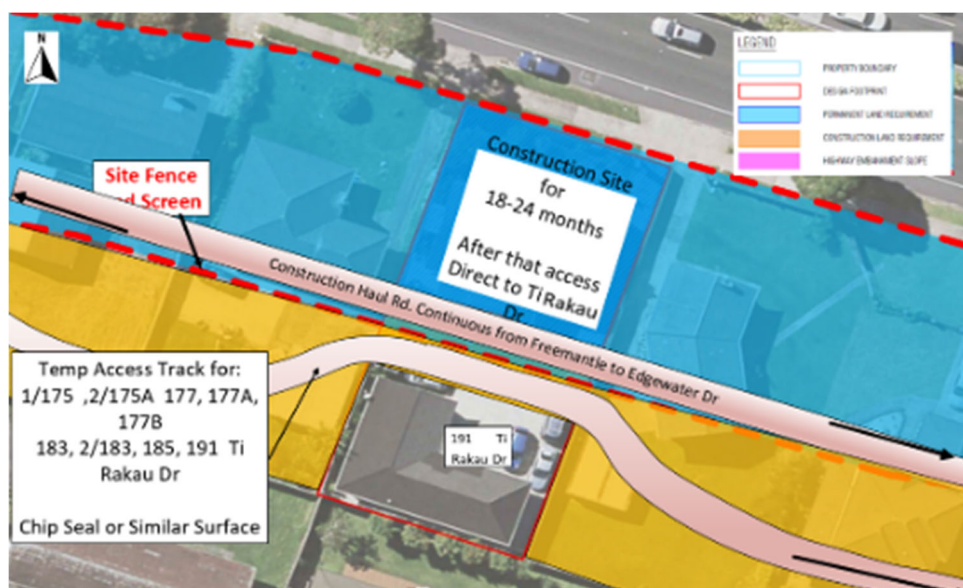
**175A, 177, 183, 185 and 191 Ti Rakau Drive:**

A temporary access road will be provided for 175A, 177, 183 and 185 Ti Rakau Drive at the back of the acquired properties. The temporary access road will head east towards Freemantle Place. **Figure 95** shows the location of the proposed temporary access road.



**Figure 95: 175, 177, 183 and 185 Ti Rakau Dr temporary access**

Near the eastern edge of 185 Ti Rakau Drive, the proposed haul road and temporary access road will curve northward, which will allow for access to also be provided to 191 Ti Rakau Drive. The temporary access road will continue eastwards and intersect Freemantle Place at the existing access to 201 Freemantle Place. Therefore, the effects to property access are considered to be negligible. **Figure 96** shows the location of the proposed temporary access road.



**Figure 96: 191 Ti Rakau Dr temporary access**

#### 5.5.6.4 107 and 109 Ti Rakau Drive – Edgewater Shops

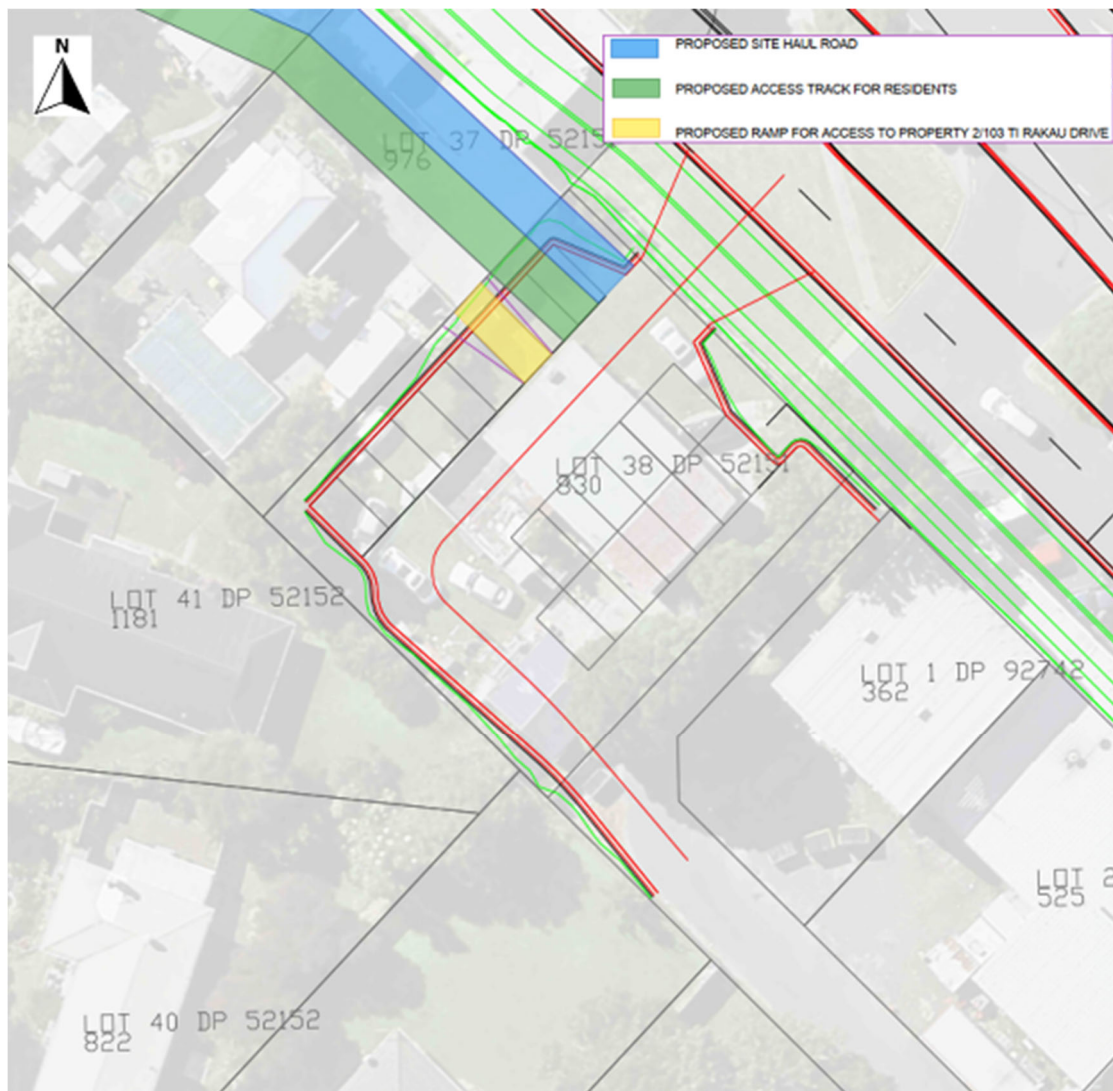
The Edgewater Shops, located at 107 and 109 Ti Rakau Drive, is a block of local shops. The parking area currently provides 26 parking spaces on the northern side of the property and an additional four parking spaces on the eastern side, for a total of 30 parking spaces (see **Figure 97**). It should be noted that these parking spaces are within the road reserve.



**Figure 97: Edgewater Shops parking area**

During construction, the new westbound lanes on Ti Rakau Drive as well as the redesigned Edgewater Drive west approach will result in the loss of all of the parking spaces at the shops.

As stated in **Section 5.5.6.3** above, the property at 105 Ti Rakau Drive (immediately west of the Edgewater Shops) has been acquired by AT and will provide a temporary parking area for customers of the shops (see **Figure 98**).



**Figure 98: Edgewater Shops temporary parking area during construction**

As stated in **Section 3.7.5**, utilization of the existing carpark is not expected to exceed 60% or 18 occupied spaces during a typical weekday or weekend. The temporary carpark will provide 18 parking spaces and access to the parking area will be from Edgewater Drive west via the access road at the back of the commercial properties. Access to the refuse collection area to the rear of the property will be maintained. Temporary signage will be provided to direct customers to the temporary parking area during construction. Therefore, temporary effects to property access and parking at the Edgewater Shops are considered to be very low.

As stated in **Section 5.5.6.3**, the temporary site haul road (blue polygon) will intersect the temporary carpark, but will be accessed by site traffic from Ti Rakau Drive. The proposed temporary access roads to 83, 83A-C, 87, 89, 91, 97 Ti Rakau Drive (green polygon) and 103A Ti Rakau Drive (yellow polygon) will also intersect the temporary carpark and will be accessed via Edgewater Drive west.

#### 5.5.6.5 32 Edgewater Drive – Edgewater College

As stated in **Section 4.2.2.3**, Phase 1 of Ti Rakau Drive in EB3R will include the construction of the Edgewater Drive east and west intersections. This will require the closure of one intersection while diverting all traffic along Edgewater Drive to the other in an alternating fashion.

Edgewater College is located near the Ti Rakau Drive / Edgewater Drive west intersection. In the existing environment, the S013 school bus service proceeds down Edgewater Drive east and the S073 proceeds down Edgewater Drive west. The closure of either Edgewater Drive east or west intersections would have an effect on this arrangement.

In the existing environment school buses are unable to perform a U-turn from the current bus stop facility. Two mitigation measures are proposed to be consulted on with the Ministry of Education and the school itself, these being the temporary rearrangement of the current off-street parking area and utilising the existing bus stops on Ti Rakau Drive. From a transport perspective, either option would be manageable.

#### **Parking Area Rearrangement:**

A temporary rearrangement of the off-street parking area will allow for the buses to enter the parking area from both the south and the north, drop off students and then perform a U-turn to proceed back to whichever intersection on Edgewater Drive is open.

**Figure 99** shows the vehicle tracking curves of school buses approaching the parking area from both directions on Edgewater Drive. This option could result in the temporary loss of 19 parking spaces in the off-street parking area for approximately two weeks (a one-week closure of each intersection).



**Figure 99: Edgewater College parking area U-turn**

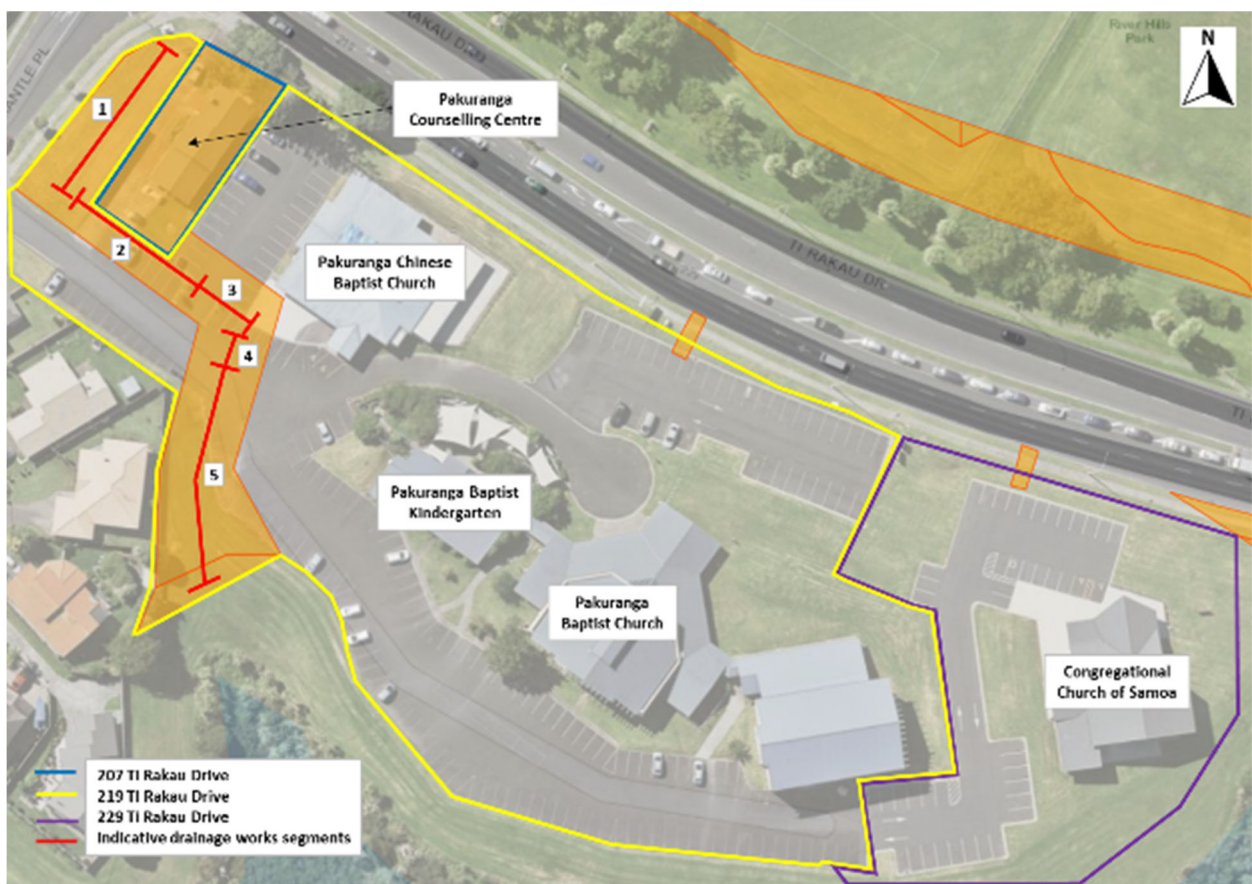
#### **Utilizing Ti Rakau Drive Bus Stops:**

An alternative could be to utilise the existing bus stops on Ti Rakau Drive, ID 6131 and 6136 near the Ti Rakau Drive / Edgewater Drive west intersection. This will require students to walk from these bus stops to the school, which is a travel distance of approximately 460m and travel time of just over five minutes.

5.5.6.6 207, 219 and 229 Ti Rakau Drive – Pakuranga Baptist Church

**Figure 100** shows the location of the Pakuranga Counselling Centre located at 207 Ti Rakau Drive (blue outline). The figure also shows the location of the Pakuranga Chinese Baptist Church, Pakuranga Baptist Kindergarten and the Pakuranga Baptist Church located at 219 Ti Rakau Drive (yellow outline) and the Congregational Church of Samoa located at 229 Ti Rakau Drive (purple outline). Lastly, the figure also shows the areas that will be occupied temporarily for drainage works (orange polygons), and the indicative drainage works segments (red outline).

It should be noted there is no intention to occupy the building at 207 Ti Rakau Drive and no demolition is planned.



**Figure 100: 207, 219 and 229 Ti Rakau Dr drainage works**

Drainage works will be undertaken on these properties over a period of approximately one month. It is envisaged that the works will be completed in sections to maintain vehicle access to all the properties at all times. Furthermore, the drainage works will be undertaken during weekdays, with the possibility of works being undertaken on Saturdays as well.

At the end of each work week, the work zone will be reduced in size, while maintaining the safety of the work zone, to free up as many occupied parking spaces as possible. The Pakuranga Chinese Baptist Church currently offer one Saturday evening service, one Sunday morning service and one Sunday evening service. The Pakuranga Baptist Church currently offer one Sunday morning service.

#### **Property Access:**

In the existing environment, the Pakuranga Counselling Centre has one access off Ti Rakau Drive and one access off the private internal road to the off-street parking on the property. At least one of these accesses will be maintained at all times. Pedestrian access will be maintained at all times, and CTMPs will be employed to ensure this. Therefore, temporary effects to property access at 207 Ti Rakau Drive are considered negligible.

To avoid lateral shifts of the access and loss of parking as a result, the internal access to the Pakuranga Chinese Baptist Church will be reduced to a one-way system for a short period and will be managed through the CTMP. Appropriate liaison and advanced notice will be provided of the planned works.

Two-way access will be maintained for circulation on the internal roads of the property at 219 Ti Rakau Drive by using steel plating across trenches where necessary. Therefore, the temporary effects to property access at 207, 219 and 229 Ti Rakau Drive are considered to be very low.

#### **Parking:**

In the existing environment, the Counselling Centre at 207 Ti Rakau Drive has five parking spaces on site. The proposed drainage works will not have any effect on these parking spaces.

In the existing environment, 219 Ti Rakau Drive has a total of 220 parking spaces on site. The proposed drainage works in front of the Pakuranga Chinese Baptist Church are expected to affect 19 of these parking spaces. However, as stated above, the planned works will be staggered and is not expected to result in the loss of more than 10 parking spaces at any one time. Each segment of works will require roughly one week to complete.

To maintain two-way circulation on the internal roads, parking spaces will be removed temporarily. The planned works will result in the temporary loss of 15 parking spaces on the southern side of 219 Ti Rakau Drive during the work week. However, as stated above, the work zone size will be reduced at the end of the work week to free up as many parking spaces as possible. Therefore, it is expected that the temporary effects on parking will be very low.

#### 5.5.6.7 168R Gossamer Drive – River Hills Park

A parcel of land along the southern boundary of 168R Ti Rakau Drive River Hills Park has been acquired by AT to allow for the eastbound Gossamer Drive bus station. Discussions are ongoing with the River Hills Park as well as the Fencibles United Football Club on the rearrangement of the fields on the property as a result of the Project.

However, from a transport perspective, the Project will have no temporary effects to property access and parking on-site.

### 5.5.7 Summary of Temporary Effects to Property Access and Parking

Overall, the temporary effects during construction on property access and parking will be mitigated appropriately and are considered to be negligible or very low. Where existing vehicle access arrangements and parking provisions cannot be maintained, appropriate mitigation measures have been proposed to provide levels of access and parking commensurate with the existing environment as far as is reasonably practicable.

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. This will be a requirement of the CTMP.

Lastly, pedestrian access to properties will be maintained at all times. This will be ensured through the CTMPs.

## 5.6 Effects to Safety Performance

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 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.



## 5.7 Construction Traffic Management Plan

Construction Traffic Management Plans (CTMPs) will be employed for both EB2 and EB3R. 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 Notice of Requirement (NoR) / resource consent 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 through drawing on:

- The Code of Practice for Temporary Traffic Management prepared by the New Zealand Transport Agency, 4<sup>th</sup> 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

## 6 Assessment of Permanent Effects upon Completion

The sections below provide an assessment of the permanent effects of EB2 and EB3R 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 EB2 and EB3R sections of the Project and to reaffirm the benefits of the Project as a whole, the main elements of **Section 1.1.3** 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 Pakuranga 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 Pakuranga Town Centre
- Encourage and support development of a more sustainable urban form and improve urban amenity
- Accommodates electric buses, a key part of AT's low-emission vehicle fleet by 2040

Although EB2 and EB3R are only two components of the Project as a whole, these sections will nevertheless provide:

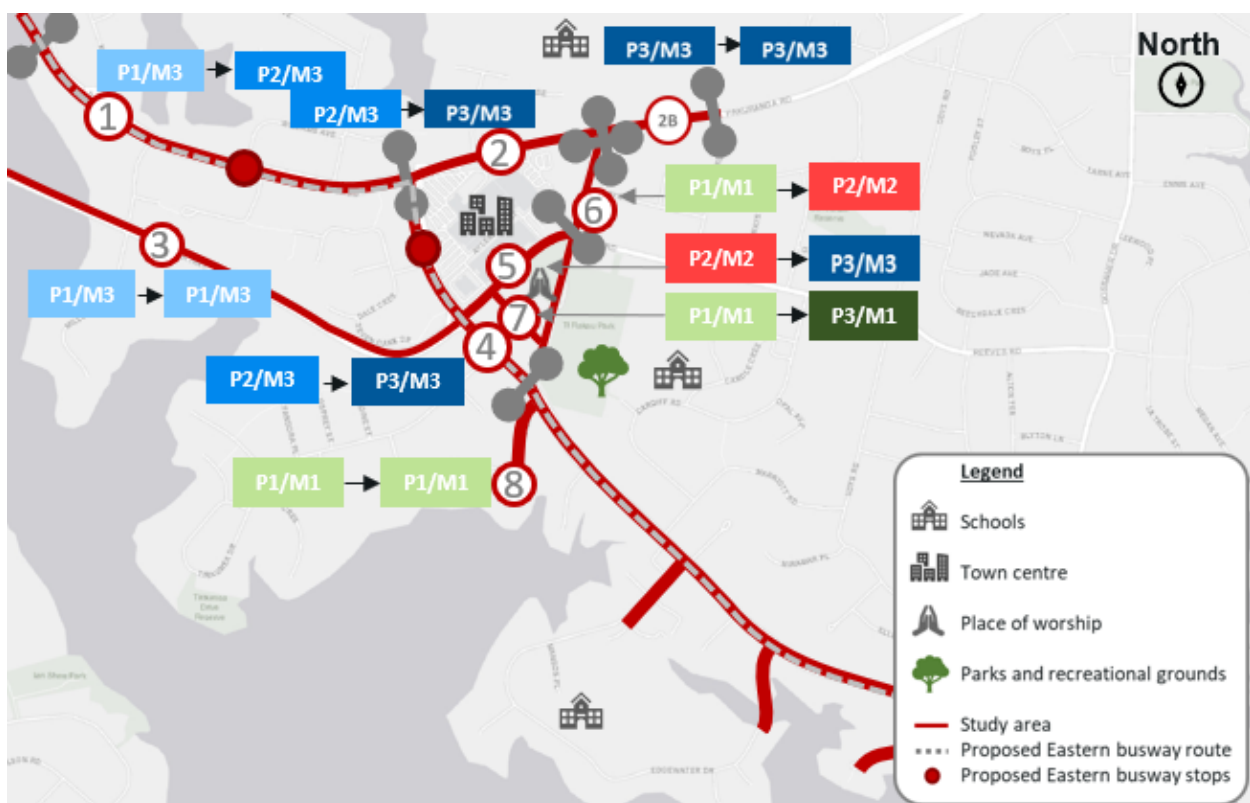
- Significantly improved travel options for all modes of transport
- Increased public transport patronage and mode share through increased catchment and dedicated bus lanes
- Reduced carbon emissions
- Improved walking and cycling amenity and safety through dedicated infrastructure
- Reduced congestion, particularly around the Pakuranga Town Centre, through the new Reeves Road flyover

## 6.2 Future Transport Network

As stated in **Section 3.3**, a full RASF assessment was completed for the Project<sup>35</sup> and the section below summarises the key aspects of the future transport network and modal priority in the EB2 and EB3R project areas. 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.

In the future, the primary function of the Ti Rakau Drive and Pakuranga Road corridors will remain as Movement, but with more strategic functions. The Pakuranga Town Centre Masterplan promotes mixed-use retail zones along Ti Rakau Drive between Pakuranga Road and William Roberts Road. The primary function of the RRF will be Movement between Pakuranga Road and SEART. The proposed Eastern Busway bus stations will also attract more people within the area as the activities served by these bus stations will become local attractions.

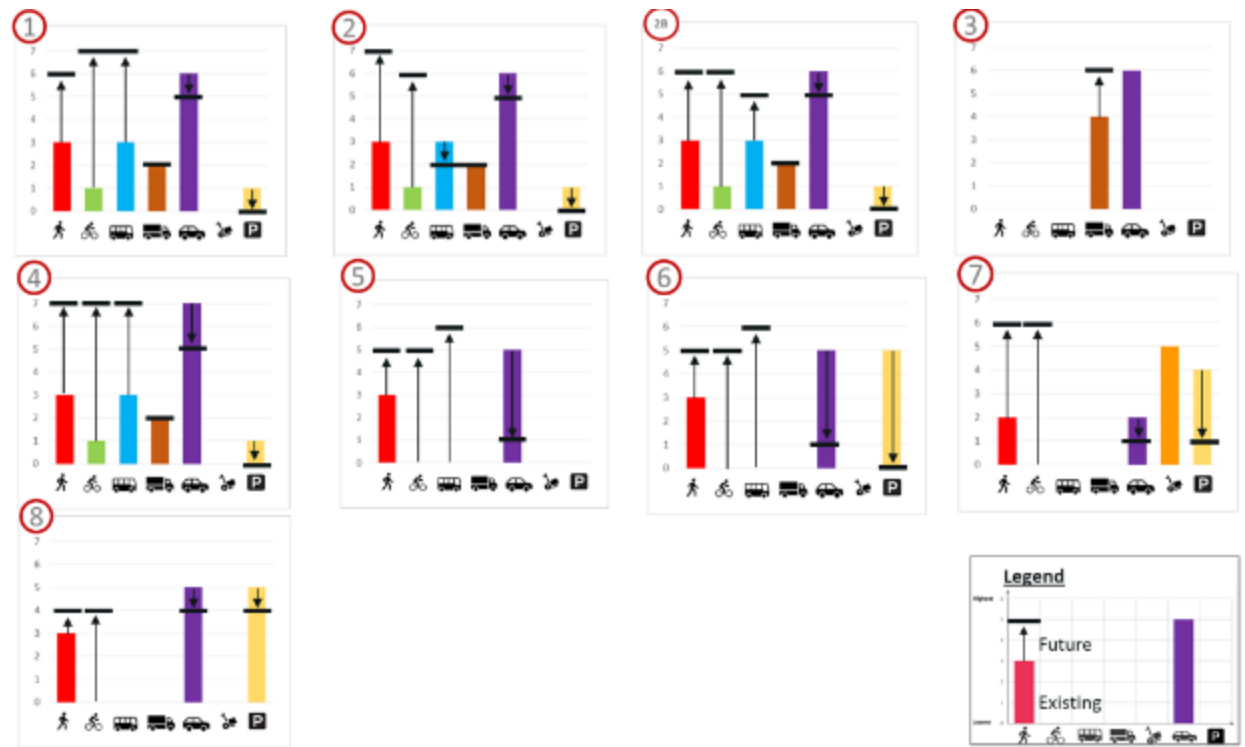
**Figure 101** outlines the future typology of the EB2 area.



**Figure 101: EB2 future typology**

**Figure 102** below outlines the future model priorities of the EB2 area.

<sup>35</sup> EB234-1-TE-RP-Z0-A2-Roads and Street Framework



**Figure 102: EB2 future modal priorities**

While the corridors of Pakuranga Road and Ti Rakau Drive will carry more movements in future, Place function around the proposed bus stations in EB2 will become more important as these will attract more people. For this reason, the future Place typologies around the bus stations are marked as P2' as the stations will become more accessible with increased catchment and footfall.

The RRF will accommodate traffic from SEART and will largely prioritise active modes and public transport movements on the ground level. Reeves Road and William Roberts Road, which are currently town centre adjacent streets, will also be better integrated with the wider Town Centre. As a result, Place function on these streets will increase to 'P3'.

A general trend of improved pedestrian, cycling and bus modal priority is observed throughout the EB2 project area, as shown in **Figure 102**. As a result, the modal priority of general traffic as well as parking will decrease.

**Figure 103** below outlines the future typology of the EB3R area.



Figure 103: EB3R future typology

Similar to EB2, the Place function around the proposed bus stations in EB3R are also marked as ‘P2’ (compared to the existing ‘P1’) as the stations will become more accessible, have increased catchments and higher footfall. The Movement and Place functions of the surrounding side roads will remain as per the existing environment.

Figure 104 outlines the future modal priorities of the EB3R area.

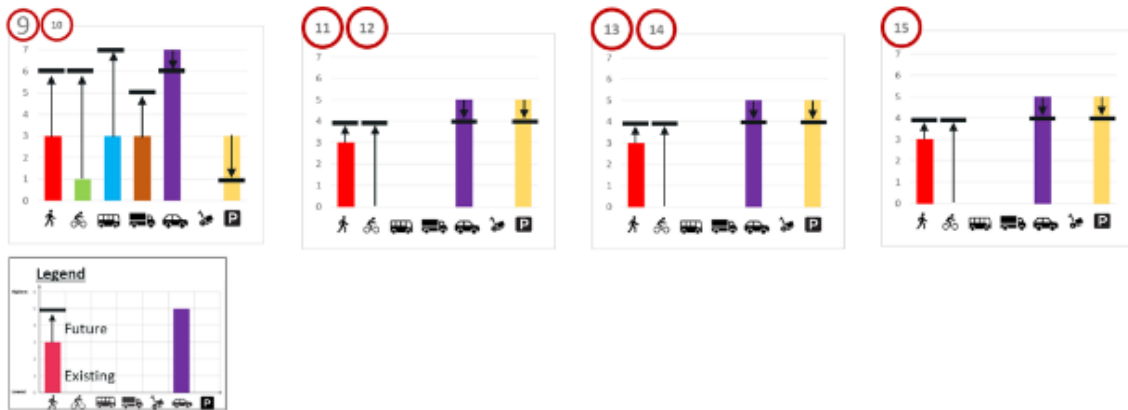


Figure 104: EB3R future modal priorities

Again, the modal priority of pedestrians, cyclists and buses will be improved throughout the EB3R project area, with a resultant decrease in modal priority of general traffic and parking.

## 6.3 General Traffic Effects

The sections below provide an assessment of permanent effects to general traffic upon completion of EB2 and EB3R. As stated in **Section 5.2.2**, general traffic effects refer to the movement of traffic across the road network as a whole. Similar to the assessments of the traffic environment during construction, the AIMSUN and SIDRA traffic modelling assessments were undertaken as per the methodology set out in **Section 2.4**.

### 6.3.1 Traffic Volumes

**Table 36** outlines the expected AM and PM peak hour traffic volumes of the Do-Minimum and EB2/EB3R scenarios upon completion along key sections of the network, with a 2028 horizon year.

**Table 36: Do-Minimum and EB2/EB3R (post construction) traffic volumes (2028)**

Location	Direction	AM Peak		PM Peak	
		Do-Minimum [veh/h]	EB2/EB3R [veh/h]	Do-Minimum [veh/h]	EB2/EB3R [veh/h]
Pakuranga Rd (West of the RRF) <sup>36</sup>	Westbound	2,552	964	1,429	960
	Eastbound	1,100	848	2,702	977
Pakuranga Rd (East of the RRF) <sup>37</sup>	Westbound	2,687	3,041	1,427	1,992
	Eastbound	1,102	1,448	2,767	2,461
William Roberts Rd (Ti Rakau Dr – Reeves Rd) <sup>38</sup>	Northbound	39	445	46	567
	Southbound	31	332	70	372
Reeves Rd (West of William Roberts Rd)	Westbound	519	133	396	49
	Eastbound	231	107	762	283
Reeves Rd (East of William Roberts Rd)	Westbound	478	411	193	149
	Eastbound	241	393	550	633
RRF	Northbound	-	931	-	1,638
	Southbound	-	2,445	-	1,141
SEART (West of ramps)	Westbound	3,387	3,352	1,740	2,072
	Eastbound	1,133	1,830	3,054	2,915
Ti Rakau Dr (Pakuranga Rd – Reeves Rd)	Westbound	1,097	1,200	2,129	584
	Eastbound	1,387	754	1,003	848
Ti Rakau Dr (Reeves Rd – William Roberts Rd)	Westbound	2,270	1,779	1,635	1,407
	Eastbound	711	1,320	1,433	1,605
Ti Rakau Dr (William Roberts Rd – Edgewater Dr west)	Westbound	2,167	1,609	1,635	1,455
	Eastbound	741	1,133	1,433	1,454
Ti Rakau Dr (Edgewater Dr west – Gossamer Dr)	Westbound	1,828	1,544	1,665	1,588
	Eastbound	852	1,062	1,159	1,401

<sup>36</sup> Relates to the section of Pakuranga Road west of William Roberts Road in the Do-Minimum scenario.

<sup>37</sup> The section of Pakuranga Road east of William Roberts Road in the Do-Minimum scenario.

<sup>38</sup> 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/EB3R [veh/h]	Do-Minimum [veh/h]	EB2/EB3R [veh/h]
Gossamer Dr (At Ti Rakau Drive)	Northbound	282	423	678	701
	Southbound	1,153	758	516	394

A benefit of the RRF upon completion will be that less traffic is expected to travel on Pakuranga Road west, between Ti Rakau Drive and the RRF, as this is treated as the minor movement at the intersection. Instead, this traffic will travel along the RRF directly towards SEART. This trend is expected to occur in both the AM and PM peaks. Conversely, more traffic is expected to travel on Pakuranga Road east, to and from Howick, as this is treated as the major movement at the intersection.

The RRF is expected to experience somewhat cyclical traffic volumes with the majority of traffic heading southbound during the AM peak and returning northbound during the PM peak. A further benefit of the RRF is that Ti Rakau Drive in EB2, between Pakuranga Road and Reeves Road, is also expected to experience less traffic volumes in both directions during the AM and PM peaks.

Ti Rakau Drive in EB3R, from Reeves Road to Gossamer Drive, is predicted to experience decreased traffic volumes in the westbound direction only and increased traffic volumes in the eastbound direction 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.

As expected with the completion of the William Roberts Road extension, more traffic is predicted to travel along William Roberts Road between Ti Rakau Drive and Reeves Road in both directions during the AM and PM peaks.

Since general traffic will not be able to access Reeves Road from Ti Rakau Drive in the future and with the William Roberts Road link completed, traffic volumes are expected to be lower on Reeves Road west between William Roberts Road and Cortina Place. This section of Reeves Road will provide access to the Pakuranga Plaza. Reeves Road east, from William Roberts Road towards Pakuranga Heights, is expected to carry roughly the same traffic volumes westbound and higher traffic volumes eastbound in the future.

SEART is also expected to experience cyclical traffic volumes (similar to the existing environment), with the majority of traffic heading westbound during the AM peak and returning eastbound during the PM peak.

Gossamer Drive is expected to experience lower traffic volumes in the southbound direction during both AM and PM peaks. This is likely due to the removal of the left-turn slip lane on the northern approach at the intersection. However, Gossamer Drive is expected to experience marginally higher traffic volumes in the northbound direction. This is likely due to the increased length of the northbound kerbside exit lane.

### 6.3.2 Intersection Performance upon Completion

Intersection performance analyses of the transport network comprised of selected intersections in the EB2 and EB3R project areas was undertaken using SIDRA. Again, the analyses consisted of a comparison between the Do-Minimum and EB2/EB3R 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.

Permanent effects upon completion of EB2 and EB3R were assessed in a final scenario. The EB2/EB3R Final scenario simulates the completion of all EB2 works (see **Section 4.2.1**) and all EB3R works (see **Section 4.2.2**).

The AM peak hour for intersections assessed in the EB2/EB3R Final scenario was between 08:00 – 09:00 and the PM peak hour was between 16:30 – 17:30. Traffic signal phasing diagrams per intersection are provided in **Appendix J** and lane performance summaries per intersection are provided in **Appendix K**.

Intersection performance analyses were undertaken at the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Pakuranga Road / Brampton Court
- Pakuranga Road / RRF
- Reeves Road / Aylesbury Street
- William Roberts Road / Reeves Road
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / Reeves Road / SEART
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive / Mattson Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility
- Ti Rakau Drive / Gossamer Drive

**Table 37** below provides a comparison of the intersection performance between the Do-Minimum and EB2/EB3R Final scenarios during the AM peak, with a 2028 horizon year.

**Table 37: Intersection performance – Do-Minimum vs EB2/EB3R Final (AM peak, 2028)**

Intersection	Do-Minimum			EB2/EB3R Final		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	C	0.85	33	D	0.81	41
Pakuranga Rd / Brampton Ct	N/A	0.42	1	N/A	0.53	1
Pakuranga Rd / RRF	Built during EB2			F	1.14	87
Reeves Rd / Aylesbury St	N/A	0.27	1	C	0.60	34
William Roberts Rd / Reeves Rd	N/A	0.68	7	E	0.95	68
William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.27	2
Ti Rakau Dr / Aylesbury St / Palm Ave	Built during EB2			E	0.92	60
Ti Rakau Dr/ Reeves Rd / SEART	F	0.90	178	E	1.02	66
Ti Rakau Dr / William Roberts Rd	Built during WRRE			B	0.91	17



Intersection	Do-Minimum			EB2/EB3R Final		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Ti Rakau Dr / Mattson Rd	B	0.79	16	C	0.90	29
Ti Rakau Dr western U-turn facility	Built during EB3R			A	0.75	5
Ti Rakau Dr eastern U-turn facility	Built during EB3R			A	0.77	7
Ti Rakau Dr / Gossamer Dr	D	1.02	48	E	0.98	80

SIDRA analysis indicates that, overall, in the AM peak the EB2/EB3R Final scenario is expected to result in minimal adverse effects on intersection performance along the network.

Minor increases in delay are expected at the Pakuranga Road / Ti Rakau Drive intersection, however the intersection is still expected to operate at an acceptable LOS D.

Compared to the Do-Minimum scenario, similar intersection performance is expected at the Pakuranga Road / Brampton Court intersection during the AM peak.

The Pakuranga Road / RRF intersection is expected to operate at LOS F during the AM peak under the EB2/EB3R Final scenario. The failing movement is the right-turn on the eastern Pakuranga Road approach, which is treated as the minor movement at the intersection. Travel time of the Howick to Pakuranga route is however predicted to experience only a marginal increase of 1 min in the AM peak period (see **Section 6.3.3**).

The trade-off of decreased general traffic performance in the right-turn lane is that buses are expected to operate at LOS C as a result of having higher priority, and the major movement from Howick towards SEART is expected to experience significant travel time improvements (see **Section 6.3.3**). Furthermore, the RRF is expected to relieve congestion around the Ti Rakau Drive / Reeves Road / SEART intersection by improving intersection performance and improving travel times from Botany to Pakuranga and SEART.

The performance of the Pakuranga Road / RRF intersection is a balance between competing priorities of bus, general traffic and freight, and pedestrians in a very congested network and constrained corridor. The only alternatives to improving LOS would be to provide additional lanes which would significantly increase the cost and footprint of the Project. Different intersection layouts, phasing and cycle times have been investigated to balance the competing modes. The intersection DOS < 1.2 is within the Transport Minimum Requirements (TMRs) for the overall intersection performance guiding the design of the Project.

The signalisation of the Reeves Road / Aylesbury Street and William Roberts Road / Reeves Road intersections is expected to result in acceptable levels of service and midblock queues blocking the bus lanes are predicted to be unlikely.

Once constructed, the following new intersections are expected to operate with spare capacity during the AM peak under the EB2/EB3R Final scenario, all with acceptable LOS and DOS:

- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Improved intersection performance is expected at the Ti Rakau Drive / Reeves Road / SEART intersection under the EB2/EB3R Final scenario during the AM peak. The intersection is predicted to operate at an acceptable LOS E.

Minor increases in DOS and delay are also predicted at the Ti Rakau Drive / Mattson Road intersection, however the intersection is still expected to operate with spare capacity (LOS C).

The Ti Rakau Drive / Gossamer Drive intersection is expected to operate near capacity. The failing movements are the left-turn on the southern Freemantle Place approach, one right-turn lane on the eastern Ti Rakau Drive approach and the Gossamer Drive approach. Again, 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 Pakuranga and SEART routes (see **Section 6.3.3**).

As above, the performance of this intersection is a balance between all the competing modes in a constrained corridor. The only alternative to improve LOS would be to provide additional lanes. Different intersection layouts, phasing and cycle times have been investigated and assessed to balance the competing modes. The intersection  $DOS < 1.2$  is within the TMRs for the overall intersection performance guiding the design of the Project.

Lastly, it should be noted that the proposed design of the Ti Rakau Drive / Gossamer Drive intersection under this assessment (EB2/EB3R only), is not identical to the proposed design of the intersection under the full Project (EB2, 3 and 4). Under the full Project, the intersection would have a more efficient geometric layout, and as a result would also have a more efficient traffic signal phasing.

Overall, the proposed design of EB2/EB3R is expected to lead to improved operations and reduced congestion for general traffic across the network, and importantly, bus movements are predicted to operate at LOS C and with spare capacity. Furthermore, despite the poor performance at some of the intersections, significant improvements in travel time are expected overall. Lastly, further improvements are expected to be achieved once the full Project (EB2, 3, and 4) has been implemented.

**Table 38** below provides a comparison of the intersection performance between the Do-Minimum and EB2/EB3R Final scenarios during the PM peak, with a 2028 horizon year.

**Table 38: Intersection performance – Do-Minimum vs EB2/EB3R Final (PM Peak, 2028)**

Intersection	Do-Minimum			EB2/EB3R Final		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	D	0.91	47	D	0.82	41
Pakuranga Rd / Brampton Ct	N/A	0.53	1	N/A	0.33	1
Pakuranga Rd / RRF	Built during EB2			E	1.08	75
Reeves Rd / Aylesbury St	N/A	0.38	1	D	0.75	45
William Roberts Rd / Reeves Rd	N/A	0.87	11	D	0.81	43
William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.31	2
Ti Rakau Dr / Aylesbury St / Palm Ave	Built during EB2			E	0.88	63
Ti Rakau Dr/ Reeves Rd / SEART	F	1.13	83	D	0.92	45
Ti Rakau Dr / William Roberts Rd	Built during WRRE			D	1.10	36
Ti Rakau Dr / Mattson Rd	B	0.66	12	C	0.95	29
Ti Rakau Dr western U-turn facility	Built during EB3R			A	0.69	4
Ti Rakau Dr eastern U-turn facility	Built during EB3R			A	0.78	7
Ti Rakau Dr / Gossamer Dr	D	0.90	44	F	1.21	112

SIDRA analysis indicates that in the PM peak the EB2/EB3R Final scenario is expected to result in minimal adverse effects on intersection performance at the majority of intersections along the network.

Minor improvements in DOS and delay are expected at the Pakuranga Road / Ti Rakau Drive intersection, and the intersection is expected to operate at an acceptable LOS D.

Compared to the Do-Minimum scenario, similar intersection performance is expected at the Pakuranga Road / Brampton Court intersection during PM peak.

Once constructed, the following new intersections are expected to operate with spare capacity during the PM peak under the EB2/EB3R Final Scenario, all with acceptable LOS and DOS:

- Pakuranga Road / RRF
- William Roberts Road / Cortina Place
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / William Roberts Road
- Ti Rakau Drive western U-turn facility
- Ti Rakau Drive eastern U-turn facility

Similar to the AM peak hour, the signalisation of the Reeves Road / Aylesbury Street and William Roberts Road / Reeves Road intersections is expected to result in acceptable levels of service during the PM peak hour. Midblock queues blocking the bus lanes are predicted to be unlikely.

Improved intersection performance is expected at the Ti Rakau Drive / Reeves Road / SEART intersection under the EB2/EB3R Final Scenario in the PM peak. The intersection is predicted to operate at an acceptable LOS D.

Minor increases in DOS and delay are also predicted at the Ti Rakau Drive / Mattson Road intersection, however the intersection is still expected to operate with spare capacity (LOS C).

The Ti Rakau Drive / Gossamer Drive intersection is expected to operate at LOS F during the PM peak. The failing movements are the through lanes on the western Ti Rakau Drive approach, the right-turn lanes on the eastern Ti Rakau Drive approach, the shared through and right-turn lane on the Gossamer Drive approach and the Freemantle Place approach. Similar to the AM peak hour, the trade-off is that all bus movements are expected to operate at LOS C and significant travel time improvements are predicted for the Pakuranga and SEART to Botany routes (see **Section 6.3.3**).

As discussed above, the performance of the intersection is a balance between all the competing modes in a constrained corridor. The only alternative to improve LOS would be to provide additional lanes. Different intersection layouts, phasing and cycle times have been investigated to balance the competing modes. Also, the proposed design of the Ti Rakau Drive / Gossamer Drive intersection under this assessment (EB2/EB3R only), is different to the proposed design of the intersection under the full Project (EB2, 3 and 4). Under the full Project, the intersection would have a more efficient geometric layout and traffic signal phasing.

Again, the proposed design of EB2/EB3R is expected to lead to overall improved operations for general traffic across the network, and importantly, bus movements are predicted to operate at LOS C and with spare capacity. Furthermore, despite the poor performance at some of the intersections, significant improvements in travel time are expected overall as a result of EB2 and EB3R, and will further improve once the full Project has been implemented.

### 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/EB3R Final Scenario.

**Table 39** provides a comparison of the route travel times between the Do-Minimum and EB2/EB3R Final scenarios, with a 2028 horizon year.

**Table 39: General traffic travel times – Do-Minimum vs EB2/EB3R Final (2028)**

AM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]
Botany - Pakuranga	24.7	15.1	-9.6	13.9	19.3	5.4
Botany - SEART	20.9	14.9	-6.0	13.7	18.6	4.9
Howick - Pakuranga	5.3	6.3	1.0	4.7	6.6	1.9
Howick - SEART	11.6	5.7	-5.9	8.0	6.4	-1.6
PM Peak						
Route	Westbound			Eastbound		
	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]
Botany - Pakuranga	18.4	17.9	0.1	24.6	17.0	-9.9
Botany - SEART	11.6	10.0	-1.1	24.5	19.4	-6.2
Howick - Pakuranga	4.7	4.7	0.4	3.4	4.7	1.4
Howick - SEART	5.0	2.9	-2.0	7.5	10.3	2.7

During the AM peak period, westbound (citybound) movements are prioritised along the transport network upon completion of EB2 and EB3R. Along with the completion of the RRF, this is predicted to lead to significant improvements in travel times from Botany to SEART and Pakuranga as well as from Howick to SEART. The route from Howick to Pakuranga is predicted to experience a negligible increase, as it is treated as a minor movement at the Pakuranga Road / RRF intersection. The prioritisation of westbound movements is however predicted to lead to manageable increases in travel times of some of the eastbound routes.

Similarly, in the PM peak eastbound movements are prioritised. This is predicted to lead to significant improvements in travel times from Pakuranga and SEART towards Botany. The eastbound routes from Pakuranga and SEART towards Howick are predicted to experience negligible increases in travel time. Westbound routes are predicted to experience small improvements, or in some cases negligible increases in travel time during the PM peak period upon completion of EB2 and EB3R.

## 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 EB2 and EB3R project areas. **Figure 105** shows the existing bus services operating through project areas. These include the 70, 72C, 72M, 72X, 352, 711 and 712 services.

As noted above, school bus service operating in the EB2 and EB3R project areas include the following:

- S415 – Pakuranga to Sacred Heart College
- S416 – Botany Downs to Sacred Heart College
- S440 – Bucklands Beach to Sancta Maria College
- S013 – Otara to Edgewater College
- S073 – Otahuhu to Edgewater College

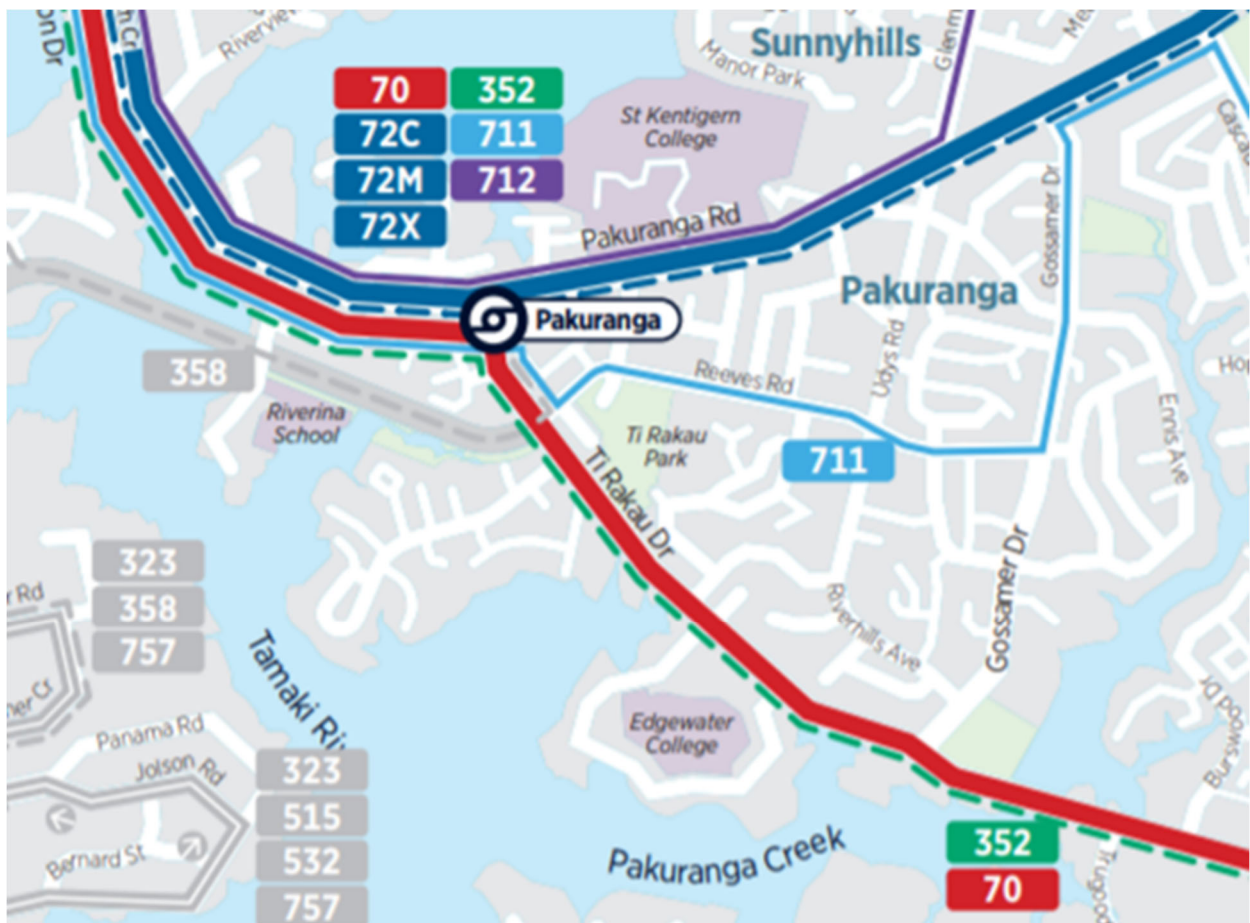


Figure 105: Existing bus services in the EB2 and EB3R project areas

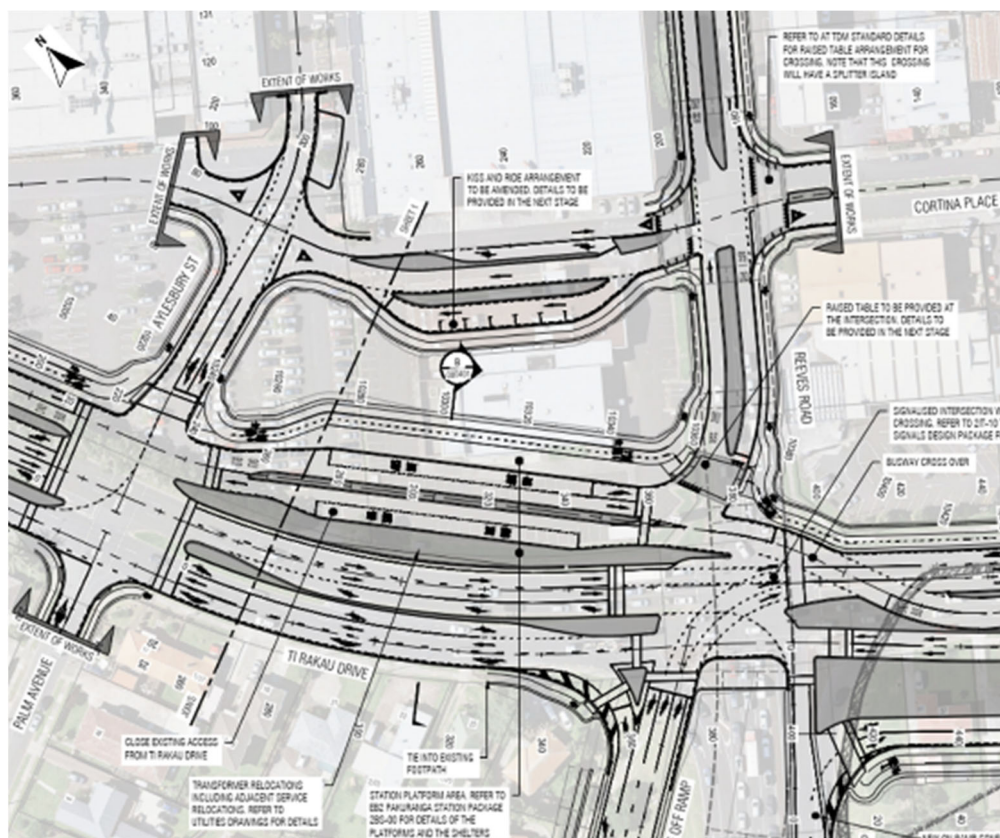
### 6.4.1 Bus Station Overview

The sections below provide an overview of the bus stations that will be provided upon completion of EB2 and EB3R.

The benefits of the new stations will be the ability to support significantly higher public transport patronage through increased catchment and higher service frequencies through increased capacity. These benefits, in combination with improved customer accessibility, amenity and safety, will lead to an increase in mode share of public transport. A particular benefit of the Pakuranga Town Centre bus station will be the integration of all bus services in the EB2 and EB3R project areas, which will provide an improved transfer experience for passengers. Another benefit of the stations will be improved safety for buses.

#### 6.4.1.1 Pakuranga Town Centre

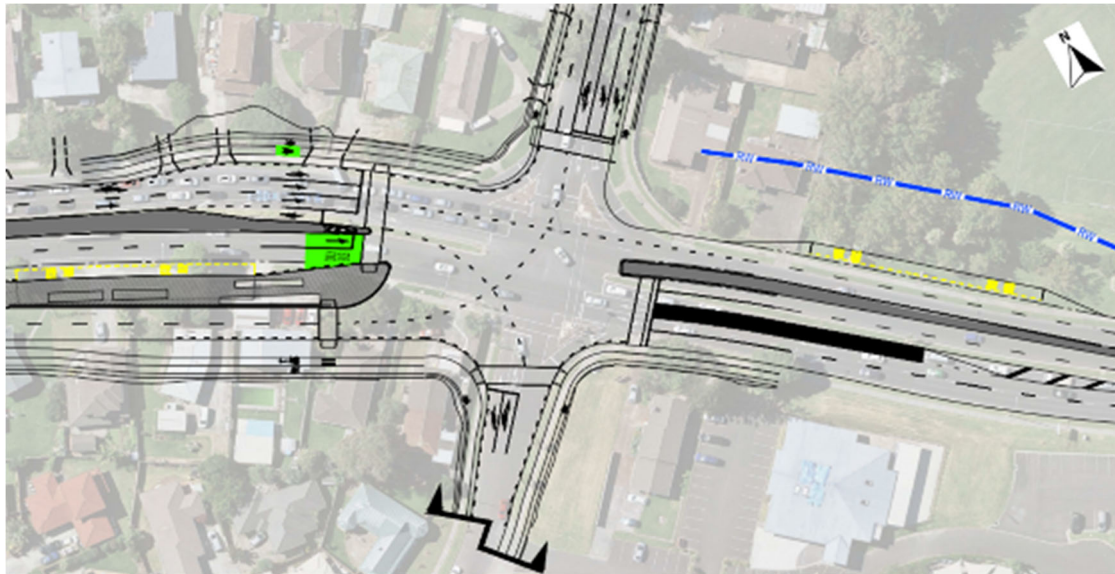
A major interchange station will be provided in the Pakuranga Town Centre, on the northern side of Ti Rakau Drive, between Aylesbury Street and Reeves Road. The bus station will provide seating and sheltered cover for passengers boarding and alighting here. Furthermore, real-time information on service’s estimated arrival times will be displayed on variable message boards along the platforms. Bicycle, scooter and e-bike storage will also be provided at this station. The bus station will be accessible to pedestrians and cyclists from all directions along all of the surrounding roads via separated footpaths, cycleways and signalised crossings. General vehicle access will be provided through a Kiss-and-Ride facility providing six drop-off spaces. **Figure 106** shows the layout of the proposed bus station in the Pakuranga Town Centre.



**Figure 106: Proposed Pakuranga Town Centre major interchange station layout**







**Figure 108: Proposed Gossamer Dr intermediate station layout**

#### 6.4.2 Future Patronage

Future patronage of bus services in the EB2 and EB3R 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 40** provides a comparison of bus patronage, predicted by the 2018 Base Model and the 2028 EB2/EB3R Model, at each of the proposed bus station locations during the AM peak period. It should be noted that the public transport demand shown below is a combination of both inbound and outbound services at these locations.

**Table 40: AM peak period bus patronage – 2018 Base Model vs 2028 EB2/EB3R Model**

Station	2018 Base Model			2028 EB2/EB3R Model		
	Boarding	Alighting	Total	Boarding	Alighting	Total
Pakuranga Town Centre	37	8	<b>45</b>	708	760	<b>1,468</b>
Edgewater Dr	72	0	<b>72</b>	378	85	<b>463</b>
Gossamer Dr	7	2	<b>9</b>	126	28	<b>154</b>

**Table 41** provides a comparison of bus patronage, between the 2018 Base Model and the 2028 EB2/EB3R Model, during the PM peak period.

**Table 41: PM peak period bus patronage – 2018 Base Model vs 2028 EB2/EB3R Model**

Station	2018 Base Model			2028 EB2/EB3R Model		
	Boarding	Alighting	Total	Boarding	Alighting	Total
Pakuranga Town Centre	13	4	<b>17</b>	725	589	<b>1,314</b>
Edgewater Dr	50	0	<b>50</b>	77	223	<b>299</b>
Gossamer Dr	5	5	<b>10</b>	26	74	<b>100</b>

The proposed bus stations in the EB2 and EB3R project areas, as well as the proposed busway, are predicted to significantly increase public transport patronage during both the AM and PM peak periods. This trend is expected to continue throughout the day, leading to significant increases in daily public transport uptake.

As expected, the largest increase in bus patronage is predicted to occur at the major interchange station in the Pakuranga Town Centre. Nevertheless, the intermediate stations are also predicted to experience large increases in patronage, compared to the existing environment.

The benefit of increased public transport patronage is that it will lead to increased public transport mode share on the network. This will not only reduce congestion on the network, but will also reduce greenhouse gas emissions via a more sustainable movement of passengers through the network.

### 6.4.3 Platform Pedestrian Circulation

The level of service for customer circulation at the bus stations was determined based on the peak patronage at each location<sup>39</sup>, with a target of LOS C (minimum 1.4 m<sup>2</sup> per person), for the peak 5-minute demand for boarding and peak 1-minute demand for alighting passengers. **Table 42** outlines the forecasted peak patronage by 2048, the resultant platform area required and the platform footprint of the design at each of the stations.

**Table 42: Station patronage and platform area**

Station	Direction	AM Peak period		PM Peak Period		Design Platform Footprint [m <sup>2</sup> ]
		Peak Patronage	Area Required [m <sup>2</sup> ]	Peak Patronage	Area Required [m <sup>2</sup> ]	
Pakuranga Town Centre	Inbound	73	102	60	84	165
	Outbound	41	57	45	63	
Edgewater Dr	Inbound	18	25	24	34	105
	Outbound	18	25	9	13	
Gossamer Dr	Inbound	18	25	24	34	105
	Outbound	18	25	9	13	

All station platform areas are being well provided for, with all stations requiring less area compared to provided platform footprint in the proposed design.

<sup>39</sup> EB234-2-TE-RP-Z0-0001\_A1\_Traffic Modelling and Analysis Report

#### 6.4.4 Bus Station Loading Areas

An assessment was undertaken to determine the number of bus bays or loading areas at each of the bus stations, based on forecast patronage (EMME model) and bus numbers (provided by AT Metro) by 2048<sup>40</sup>. The assessment methodology to determine the number of bus bays and therefore 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 43** summarises the number of platforms and bus bays at each of the bus stations.

**Table 43: 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)
Pakuranga Town Centre	74	1	3	1	3
Edgewater Dr	38	1	2	1	2
Gossamer Dr	38	1	2	1	2

The major interchange station in the Pakuranga Town Centre will consist of one platform per direction with three bus bays upon completion. The intermediate bus stations at Edgewater Drive and Gossamer Drive will consist of one platform per direction, each providing two bus bays upon completion, with the capability of providing a third bus bay in the future. 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.

#### 6.4.5 Future Bus Services and Routes

The majority of bus services currently serving the EB2 and EB3R project areas will continue to do so by 2028, once EB2 and Eb3R are operational. These include the 70, 72X, 352, 711 and 712 services. It is anticipated by AT that the 72C and the 72M services will be combined into one new 72 service. In addition, two new services will be added to the network; the 705 service between Meadowlands and Panmure, and the 706 service between Flatbush and Panmure.

The new 705 service will travel along Picton Street, Selwyn Road, Granger Road, Litten Road, Sandspit Road, Meadowland Drive, Millhouse Drive, Botany Road, along Ti Rakau Drive through the EB2 and EB3R project areas, on Pakuranga Road and will terminate at the Panmure Train Station.

The new 706 service will travel along Ormiston Road, Murphys Road, Stancombe Road, Chapel Road, along Ti Rakau Drive through the EB2 and EB3R project areas, on Pakuranga Road and will terminate at the Panmure Train Station.

The route of the 35 service will be extended northwards from Botany Town Centre, along Chapel Road, Whitford Road, Cook Street, and Picton Street to replace the 72C service along these roads. The new 72 service will cover the same route as the 72M service from Botany to Howick, but with higher frequencies. From Picton Street, the new 72 service will replace both the 72C and 72M services as it heads along Ridge Road and Pakuranga Road towards Panmure.

<sup>40</sup> EB234-2-TE-RP-Z0-0001\_A1\_Traffic Modelling and Analysis Report

Services currently operating along Ti Rakau Drive, such as the 70 and 352 services, will continue to do so with no changes to their routes. The 711 service will experience a minor route change, specifically the 711 inbound service. The route of the 711 inbound service will in future proceed along Reeves Road towards Ti Rakau Drive and the new bus station in the Pakuranga Town Centre.

The services operating along Pakuranga Road will also experience a minor route change. The 72X, 712 and the new 72 services will turn off Pakuranga Road, at the intersection with the RRF, and onto the new bus lanes towards Reeves Road. These services will continue along Reeves Road towards Ti Rakau Drive and the new Pakuranga Town Centre bus station. **Figure 109** below shows the future bus services and routes that will be operating in the EB2 and EB3R project areas upon completion.



**Figure 109: Future bus services and routes in the EB2 and EB3R project areas**

In future, all bus services along Ti Rakau Drive will travel in dedicated bus lanes through the EB2 and EB3R project areas, as opposed to the general traffic lanes in the existing environment. All bus services travelling along Pakuranga Road will turn onto the new dedicated bus lanes alongside the RRF towards Reeves Road and Ti Rakau Drive. Overall, the new routes and the bus lanes are predicted to lead to significant improvements in bus travel times and patronage levels. The sections below discuss the improvements in bus service headways as well as the expected improvements in bus travel times.

#### 6.4.6 Service Headways

**Table 44** below provides a comparison of the bus service headways, between the existing environment and EB2/EB3R upon completion by 2028, during the AM, IP and PM peak periods. These include the 70, 72C, 72M, 72, 72X, 352, 705, 706, 711 and 712 services.

**Table 44: Service headways – Existing Environment vs EB2/EB3R (2028)**

Service Description	Direction	Existing Environment			EB2/EB3R 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
72C – Botany and Howick to Panmure	Inbound	20	30	30	-	-	-
	Outbound	30	30	20	-	-	-
72M – Botany and Howick to Panmure	Inbound	-	30	30	-	-	-
	Outbound	30	30	-	-	-	-
72 – Botany and Howick to Panmure (replacement for 72C and 72M)	Inbound	-	-	-	5	12	15
	Outbound	-	-	-	15	12	5
72X – Botany and Howick to Auckland CBD	Inbound	10	-	-	10	-	-
	Outbound	-	-	10	-	-	10
352 – Manukau to Panmure	Inbound	20	20	20	12	12	12
	Outbound	20	20	20	12	12	12
705 – Meadowlands to Panmure (new route)	Inbound	-	-	-	15	-	-
	Outbound	-	-	-	-	-	15
706 – Flatbush to Panmure (new route)	Inbound	-	-	-	15	-	-
	Outbound	-	-	-	-	-	15
711 – Howick to Panmure	Inbound	20	60	60	15	30	30
	Outbound	60	60	20	30	30	15
712 – Bucklands Beach to Panmure	Inbound	23	30	30	10	20	20
	Outbound	30	30	20	20	20	10

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

Again, it is anticipated that the 72C and 72M services will be combined into one new 72 service. The new 72 service will provide improved headways compared to the services it is replacing. The 72 service headways will be 5 mins in the peak direction (AM = inbound, PM = outbound), 12 mins during the IP periods, and 15 mins in the off-peak direction.

It is expected that the service headways for the 72X service will remain the same upon completion of EB2 and EB3R. The frequencies are expected to be sufficient to service the predicted patronage by 2028 along this route.

Service headways of the 352 service will improve significantly, compared to the existing environment. It is expected that 12 min headways will be provided for this service across all of the periods.

Initially, the new 705 and 706 services are expected to run at 15 min headways in the peak directions only (AM = inbound, PM = outbound), with the capacity to expand the timetable if required in the future.

The 711 service headways will improve to 15 min in the peak directions, while service headways will be halved during the IP periods and the off-peak directions.

The 712 service headways will be halved for the peak directions, to 10 minutes, while the IP period and off-peak service headways will be improved to 20 minutes.

As above, these improved service headways will significantly increase public transport patronage and as a result lead 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.

## 6.4.7 Bus Travel Time

Bus route travel times were determined using the AIMSUN model, with a 2028 horizon year. The same bus routes presented in **Section 5.3.5**, with the addition of the new 72, 705 and 706 services, are assessed here for permanent effects to bus travel times in the EB2/EB3R Final Scenario. **Table 45** below provides a comparison of the bus route travel times between the Do-Minimum and EB2/EB3R Final scenarios, with a 2028 horizon year.

**Table 45: Bus travel times – Do-Minimum vs EB2/EB3R Final (2028)**

AM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]
70 – Botany to Auckland CBD	42.3	29.3	-13.0	26.9	30.3	3.4
72C – Botany and Howick to Panmure	20.6	-	-	16.0	-	-
72M – Botany and Howick to Panmure	-	-	-	15.8	-	-
72 – Botany and Howick to Panmure	-	21.0	-	-	20.1	-
72X – Botany and Howick to Auckland CBD	24.6	25.6	1.0	-	-	-
352 – Manukau to Panmure	36.8	25.1	-11.7	29.1	28.2	-0.9
705 – Meadowlands to Panmure	-	29.7	-	-	-	-
706 – Flatbush to Panmure	-	25.9	-	-	-	-
711 – Howick to Panmure	29.1	27.8	-1.3	22.7	25.5	2.8
712 – Bucklands Beach to Panmure	22.6	24.1	1.5	16.6	17.9	1.3
PM Peak						
Route Description	Westbound			Eastbound		
	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]	Do Minimum [min]	EB2/EB3R Final [min]	Difference [min]
70 – Botany to Auckland CBD	35.7	29.9	-5.8	38.1	31.1	-7.0
72C – Botany and Howick to Panmure	14.6	-	-	14.8	-	-
72M – Botany and Howick to Panmure	15.0	-	-	-	-	-
72 – Botany and Howick to Panmure	-	16.9	-	-	20.0	-
72X – Botany and Howick to Auckland CBD	-	-	-	16.8	24.7	7.9
352 – Manukau to Panmure	33.4	32.3	-1.1	27.9	32.4	5.5
705 – Meadowlands to Panmure	-	-	-	-	-	-
706 – Flatbush to Panmure	-	-	-	-	-	-
711 – Howick to Panmure	23.8	24.6	0.8	24.5	32.2	7.7
712 – Bucklands Beach to Panmure	19.7	22.0	2.3	18.1	25.9	7.8

The 70 and 352 services, which travel along Ti Rakau Drive in the EB2 and EB3R project areas, are predicted to experience significant improvements in travel times during the AM peak in the westbound (inbound) direction. In the eastbound (outbound) direction, the 70 service is predicted to experience a negligible increase in travel times, while a small improvement is predicted for the 352 service. Both of these services will be running at higher frequencies during all periods of the day.

The new 72 route is predicted to have marginally longer travel times, in both directions during the AM peak, compared to the 72C and 72M routes it is replacing. However, the new 72 service will be running at higher frequencies in both directions.

The 72X, 711 and 712 routes are predicted to experience negligible increases, or in some cases small improvements, in both directions during the AM peak. Again, while service headways for the 72X service are expected to remain the same, headways for the 711 and 712 service will be significantly improved in the future.

The 70 service is predicted to experience improvements in travel times during the PM peak in both directions upon completion of EB2 and EB3R. The combination of improved travel times and higher service frequencies will lead to a faster and more reliable public transport trip between Botany and the Auckland CBD.

Similar to the AM peak, the new 72 service is predicted to have marginally longer travel times, in both directions, during the PM peak compared to the routes it is replacing. However, the new 72 will be running at higher frequencies.

Travel times for the 72X, 711 and 712 services are predicted to increase in the outbound (eastbound) direction during the PM peak. This is likely due to the route changes of these services, particularly the additional number of intersections these services have to pass through. Again, while service frequencies for the 72X are expected to remain the same, service headways for the 711 and 712 services however will be significantly improved. Furthermore, the integration of all services at the Pakuranga Town Centre station will provide for an improved transfer experience between services. Passengers will not be required to walk across the Pakuranga Plaza to transfer between services on Pakuranga Road and Ti Rakau Drive.

The 352 service is predicted to experience an increase in travel times in the outbound (eastbound) direction during the PM peak. This is likely due to the operation of the Ti Rakau Drive / Gossamer Drive intersection. As stated in **Section 6.3.2**, the proposed design of the Ti Rakau Drive / Gossamer Drive intersection under this assessment (EB2/EB3R only), is not identical to the proposed design of the intersection under the full Project (EB2, 3 and 4). Under the full Project, the intersection would have a more efficient geometric layout, and as a result would also have a more efficient traffic signal phasing. Therefore, additional travel time savings would be likely upon completion of the whole Project.

Overall, bus travel times are predicted to improve across the network during the AM and PM peaks. The combination of improved travel times and higher service frequencies will lead to faster and more reliable public transport trips. In some 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.



#### 6.4.8 School Bus Services

The S415 school bus service between Pakuranga and Sacred Heart College will in future also benefit from EB2. The S415 will depart from the Pakuranga Town Centre bus station, in the AM peak, and head westbound along the new Ti Rakau Drive bus lanes. At the intersection with Pakuranga Road, the S415 will join onto the EB1 bus lanes. In the afternoon, the S415 will return down Pakuranga Road, turning right onto the new Ti Rakau Drive bus lanes and terminate at the Pakuranga Town Centre bus station.

The S416 school bus service between Botany and Sacred Heart College will in future also benefit from EB2 as well as EB3R. In the AM peak, students will be able to board the S416 at the Gossamer Drive, Edgewater Drive and Pakuranga Town Centre bus stations as the service travels westbound along the new bus lanes on Ti Rakau Drive. As above, the S416 will turn left onto the EB1 Pakuranga Road bus lanes. In the afternoon, the S416 will return down the new Ti Rakau Drive bus lanes and students will be able to alight at the new EB2 and EB3R bus stations.

In the future, the S440 school bus service between Bucklands Beach and Sancta Maria College and Primary will remain on its current route and students will board and alight at the existing bus stops. The S440 will continue to proceed southbound on Gossamer Drive and turn left at the Ti Rakau Drive / Gossamer Drive intersection into the general traffic lanes and will not stop at the new Gossamer eastbound station in the AM peak. In the afternoon, the S440 will continue to turn right from Ti Rakau Drive onto Gossamer Drive from the general traffic lanes, and will not be able to stop at the Gossamer Drive westbound station.

The S013 school bus service between Otara and Edgewater College will in future continue to travel westbound along Ti Rakau Drive in the general traffic lanes during the AM peak, and will turn left into Edgewater Drive east. It will not stop on Ti Rakau Drive in the EB3R project area. In the afternoon, the S013 will experience a small change to its route. As the S013 departs from Edgewater College, the service will turn left at the Ti Rakau Drive / Edgewater Drive west intersection into the westbound general traffic lanes. The service will execute a U-turn manoeuvre at the western U-turn facility on Ti Rakau Drive and proceed as normal along the eastbound general traffic lanes. Again, the S013 will not stop along Ti Rakau Drive. The permanent effects to this school bus service are considered to be negligible.

In the future, the S073 school bus service between Otahuhu and Edgewater College will continue to turn right from SEART onto the eastbound general traffic lanes on Ti Rakau Drive, during the AM peak. The service will not be able to use the EB2 and EB3R bus lanes nor the Pakuranga Town Centre and Edgewater bus stations. The service will not stop along Ti Rakau Drive. As the Edgewater Drive west intersection is left-in left-out only in the proposed design, the S073 will experience a small change to its route. The service will proceed eastbound along Ti Rakau Drive and execute a U-turn manoeuvre at the eastern U-turn facility, to be able to turn left into Edgewater Drive west. In the afternoon, the S073 will continue to turn left onto the westbound Ti Rakau Drive general traffic lanes at Edgewater Drive west and head towards SEART. Again, the service will not be able to use the new bus lanes nor the new bus stations and will not stop along Ti Rakau Drive. The permanent effects to this school bus service are considered to be negligible.

Overall, school bus services travelling in the bus lanes are expected to experience similar travel time improvements as presented in **Section 6.4.7** and services travelling in the general traffic lanes are expected to experience similar travel time improvements as presented in **Section 6.3.3**.

## 6.5 Effects to Pedestrians and Cyclists

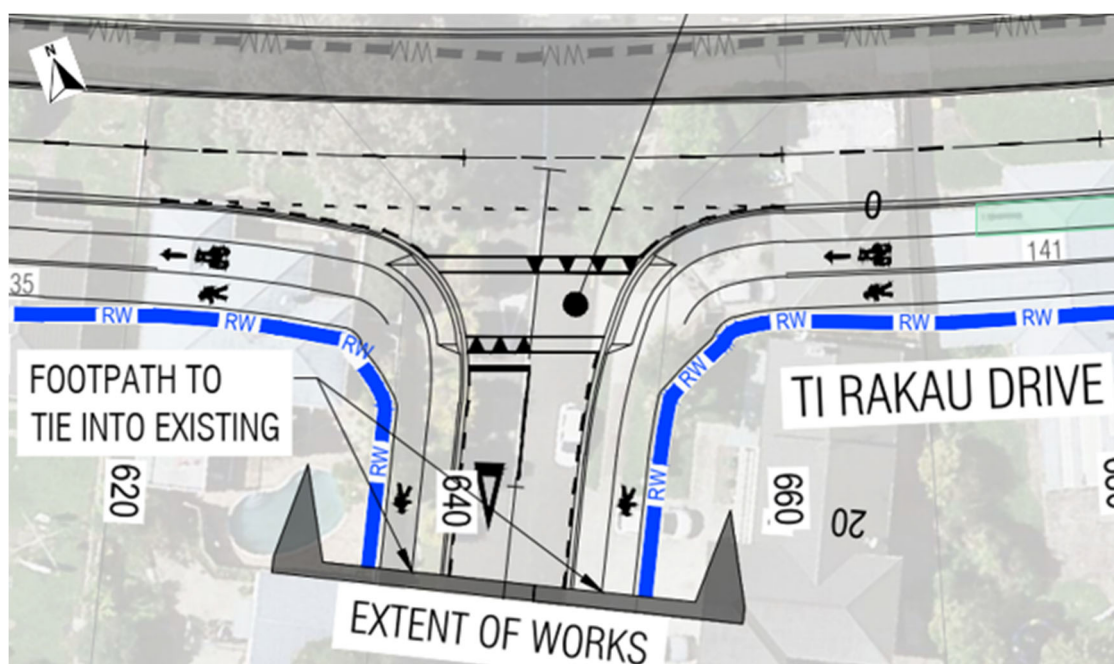
The Project will provide dedicated footpaths and cycleways to improve pedestrian and cyclist amenity and safety. Further benefits of this infrastructure will be greater connectivity and accessibility not only across the network, but especially in proximity to the bus stations, resulting in increased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

In the EB2 and EB3R project areas, a combination of bidirectional and unidirectional cycleways will be provided along Ti Rakau Drive between Pakuranga Road and Gossamer Drive. Unidirectional cycleways will also be provided on Pakuranga Road between Ti Rakau Drive and the RRF. The majority of the existing footpaths will be retained while new footpaths will be provided along sections of Ti Rakau Drive, William Roberts Road, Cortina Place and Mattson Road.

In the future, raised tables (raised pedestrian platforms) will be implemented across all priority-controlled side streets along the southern side of Ti Rakau Drive in the EB2 and EB3R project areas. These include:

- Palm Avenue
- Tiraumea Drive
- Roseburn Place
- Edgewater Drive west
- Wheatley Avenue
- Edgewater Drive east

Raised tables will also be implemented in Pakuranga Town Centre area, across both the western and eastern approaches at the Reeves Road / Cortina Place intersection and the northern approach at the Ti Rakau Drive / Reeves Road / SEART intersection. **Figure 110** shows an example of a raised table in the proposed design at the Ti Rakau Drive / Edgewater west intersection.



**Figure 110: Example of raised tables in the proposed design**

The presence of these crossing facilities will aid pedestrians and cyclists by simplifying the crossing task, increasing visibility by creating a visual cue for drivers to reduce their speed as they approach the intersections, and encourage courtesy between drivers and pedestrians. This will reduce the risk of potential conflict between vehicles and pedestrians. It should be noted that these raised tables will not be marked as formal pedestrian crossings.

Compared to the existing environment, signalised pedestrian and/or cycle crossings will be provided more frequently along Ti Rakau Drive. Users will have safe and more direct travel routes, which will provide a connected network that encourages active modes. Signalised pedestrian crossings will be provided across all approaches of the following intersections:

- Pakuranga Road / Ti Rakau Drive
- Ti Rakau Drive / Aylesbury Street / Palm Avenue
- Ti Rakau Drive / Reeves Road / SEART
- William Roberts Road / Reeves Road
- Ti Rakau Drive / Gossamer Drive

Signalised pedestrian crossings will be provided across the southern, western and northern approaches at the Reeves Road / Aylesbury Street intersection. Signalised pedestrian crossings will also be provided on the western and northern approaches at the Ti Rakau Drive / William Roberts Road intersection and the eastern and southern approaches at the Ti Rakau Drive / Mattson Road intersection. Additionally, a pedestrian crossing will also be provided at the Edgewater bus station. Lastly, the existing signalised pedestrian crossing on Pakuranga Road, constructed as part of EB1, will remain. The existing midblock pedestrian crossing on Reeves Road will be removed to avoid potential sightline issues. This is because the columns of the RRF will be located along the centre of Reeves Road, which may obstruct the view of pedestrians to vehicles.

Bidirectional cycleways will be provided along the northern side of Ti Rakau Drive, between Pakuranga Road and Reeves Road, while unidirectional cycleways will be provided along both sides of Ti Rakau Drive between Reeves Road and Gossamer Drive. Unidirectional cycleways will also be provided on both sides of Pakuranga Road between Ti Rakau Drive and the RRF. Together, these cycleways will tie into the existing cycleways provided on Pakuranga Road west of Ti Rakau Drive, as part of EB1.

Providing dedicated cycleways creates a physically separated and safe space that facilitates cycle movements through the network. This provides 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, increasing uptake of public transport across the network. Signalised shared pedestrian and cyclist crossings will be provided at the following intersections:

- Northern approach of Pakuranga Road / Ti Rakau Drive
- Northern approach of Ti Rakau Drive / Aylesbury Street / Pam Avenue
- Eastern approach of Ti Rakau Drive / Reeves Road / SEART
- Northern approach of Ti Rakau Drive / William Roberts Road
- Southern approach of Ti Rakau Drive / Mattson Road
- Western approach of Ti Rakau Drive / Gossamer Drive

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.

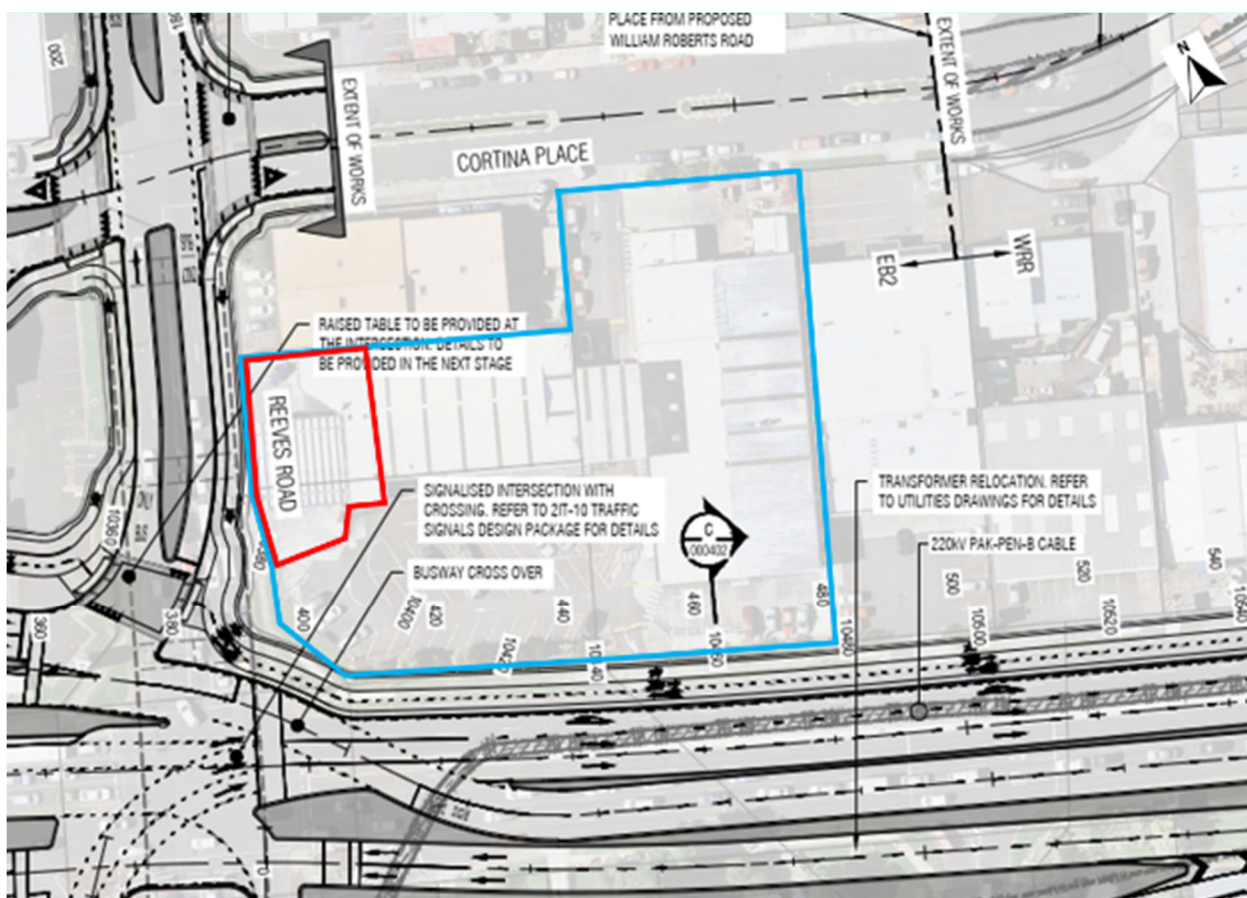
## 6.6 Effects to Property Access and Parking

### 6.6.1 EB2 – Reeves Road

The proposed design of Reeves Road in the EB2 project area does not provide any on-street parking. However, no on-street parking is provided in the existing environment. Therefore, the proposed design will have no effects on on-street parking.

#### 6.6.1.1 3 Reeves Road (Gull Service Station)

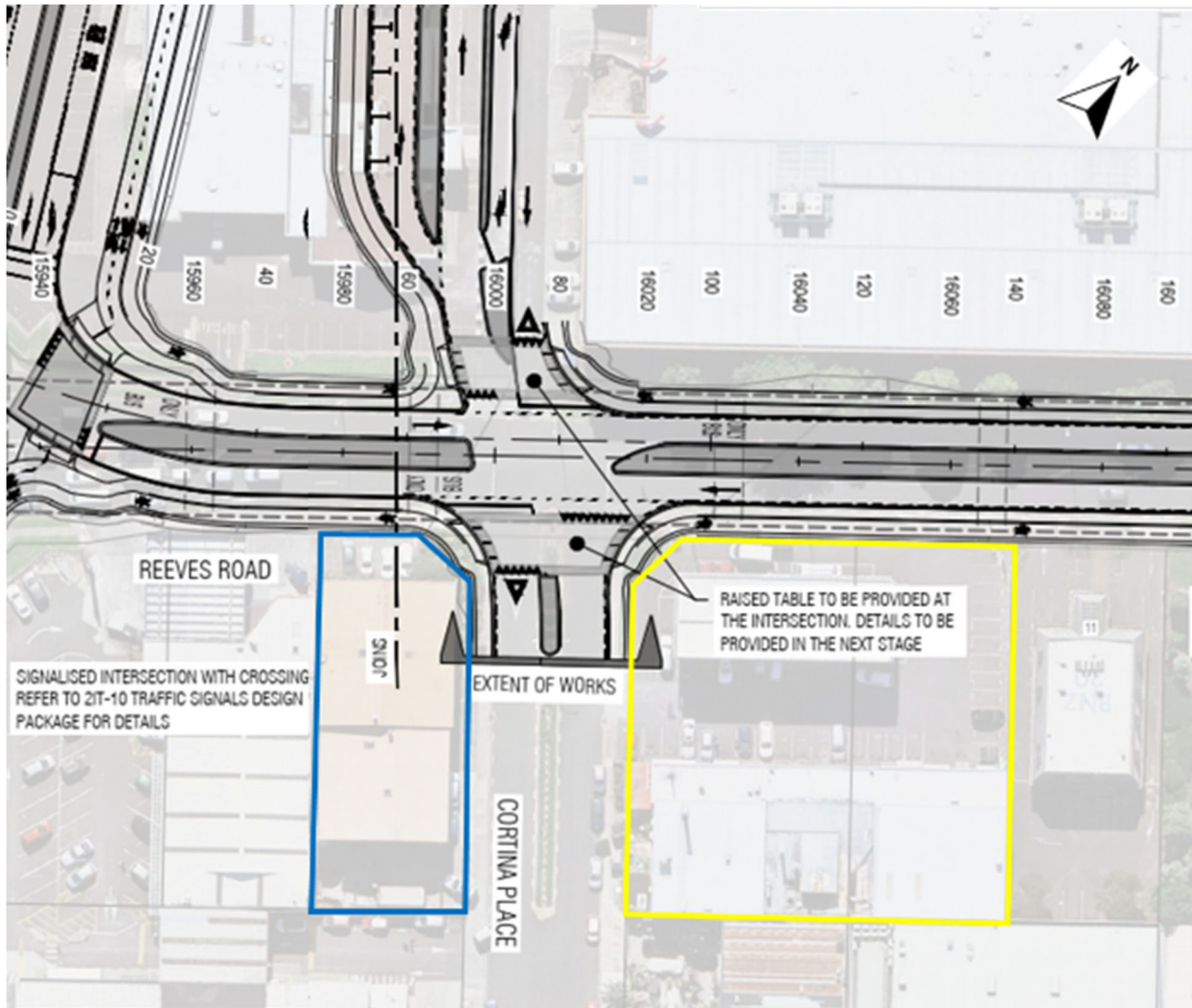
**Figure 111** shows the location and property boundary of 3 Reeves Road, as well as the Gull service station (red outline) developed on the site. Access to the property from Reeves Road will not be maintained in the proposed design as the section of Reeves Road between TI Rakau Drive and Cortina Place will be bus only. Discussions regarding compensation are ongoing with the owner regarding loss of direct road access onto Reeves Road as part of the Public Works Act process.



**Figure 111:** 3 Reeves Rd and Gull service station (red outline) upon completion

### 6.6.1.2 2 Cortina Place and 5 Reeves Road

As stated in **Section 5.1.1.1**, the properties at 2 Cortina Place and 5 Reeves Road have been acquired by AT and will be used as site offices during construction. Upon completion, these properties will be handed back or will be demolished for redevelopment in the future. **Figure 112** shows the location of 2 Cortina Place (yellow outline), 5 Reeves Road (blue outline) and the proposed design of the adjacent roads.



**Figure 112: 2 Cortina Pl (yellow outline) and 5 Reeves Rd (blue outline) upon completion**

The property at 5 Reeves Road will in future have no vehicle access from Reeves Road as the section of Reeves Road between Ti Rakau Drive and Cortina Place will be bus only. The property will however still be accessible via Cortina Place.

Upon completion, vehicle access from Reeves Road to the property at 2 Cortina Place will be reinstated. In future, the access from Reeves Road will be left-in/left-out only. However, this access will be in addition to the existing access off Cortina Place. Permanent effects to property access and parking at these properties are considered to be negligible.

6.6.1.3 11 Reeves Road (Eastside Pups Dog Grooming and Daycare)

Vehicle access from Reeves Road to the property at 11 Reeves Road will be reinstated once construction of the RRF and ground level works have been completed. The access will be left-in/left-out only due to the location of the columns of the RRF and potential sightline issues of opposing traffic. Although the access will be somewhat different compared to the existing environment, the permanent effects to property access are expected to be very low. **Figure 113** shows the location of 11 Reeves Road (blue outline) and the proposed design of Reeves Road.

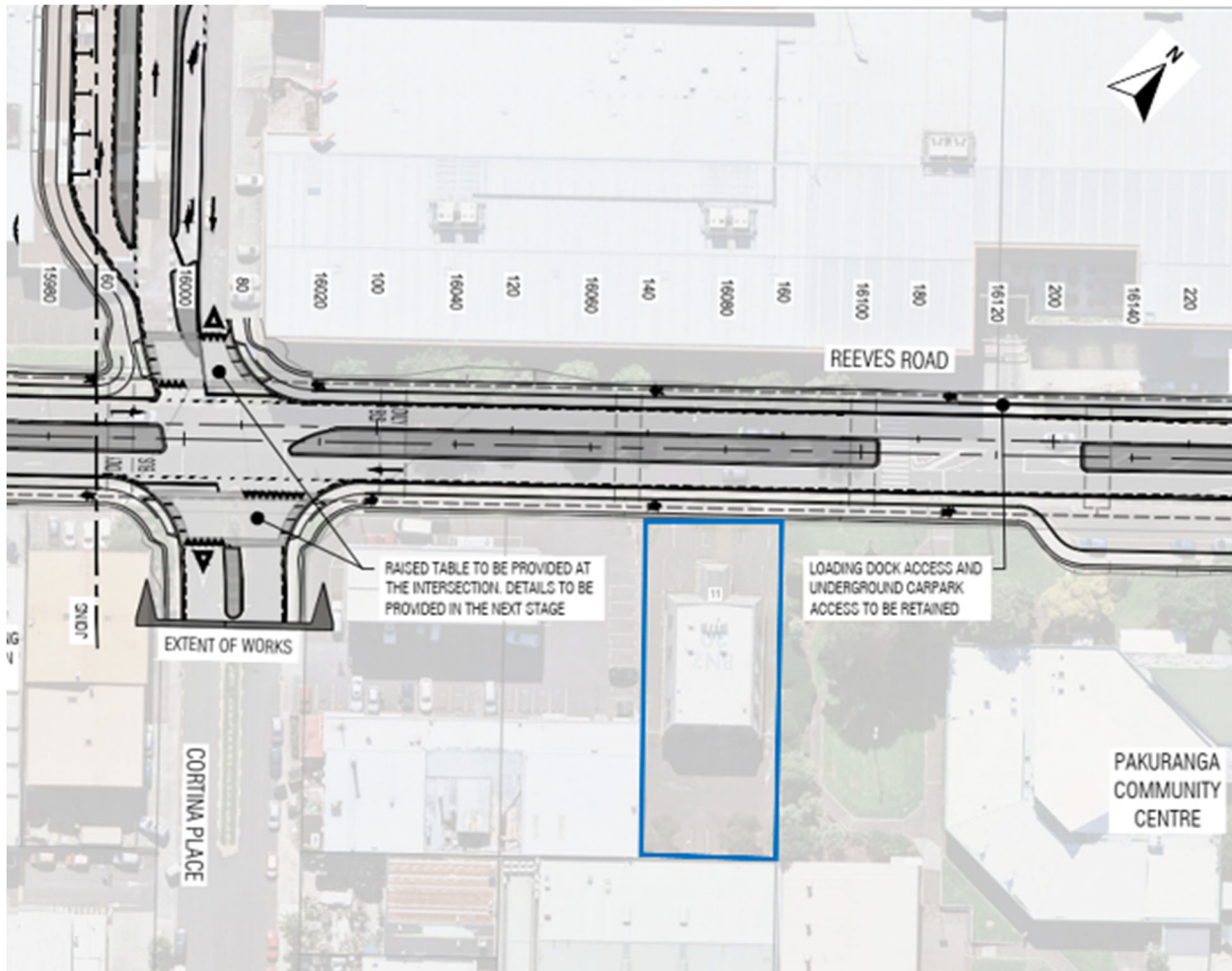


Figure 113: 11 Reeves Rd (blue outline) upon completion

6.6.1.4 13R Reeves Road (Te Tuhi)

Upon completion of the Reeves Road, access to the property at 13R Reeves Road (Pakuranga Community Centre) will be reinstated largely similar to the existing environment, and the temporary drop-off along William Roberts Road will be removed. Permanent effects to property access are expected to be negligible. **Figure 114** shows the location of the Te Tuhi development on 13R Reeves Road (blue outline) and the permanent access arrangement at the property.

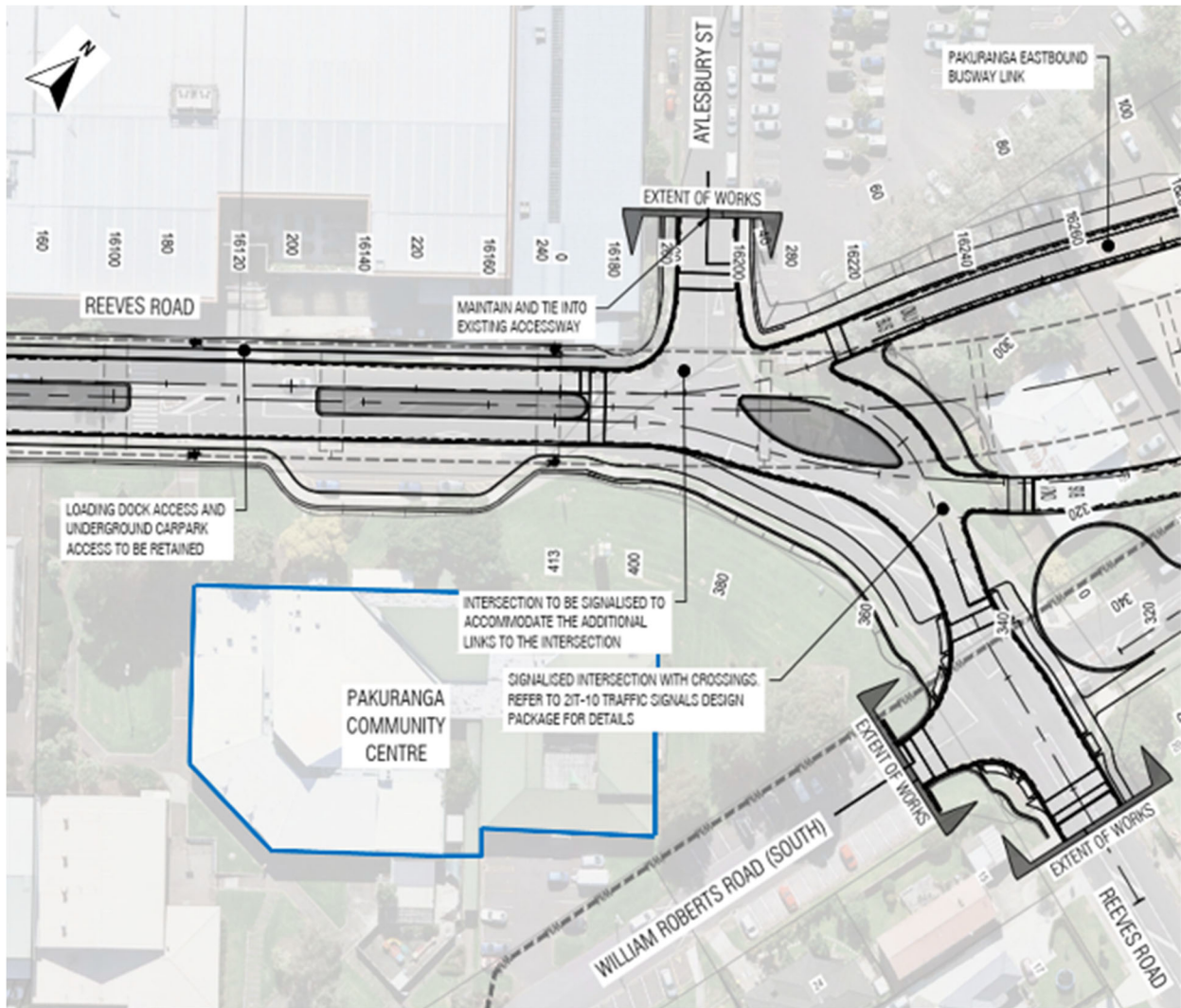
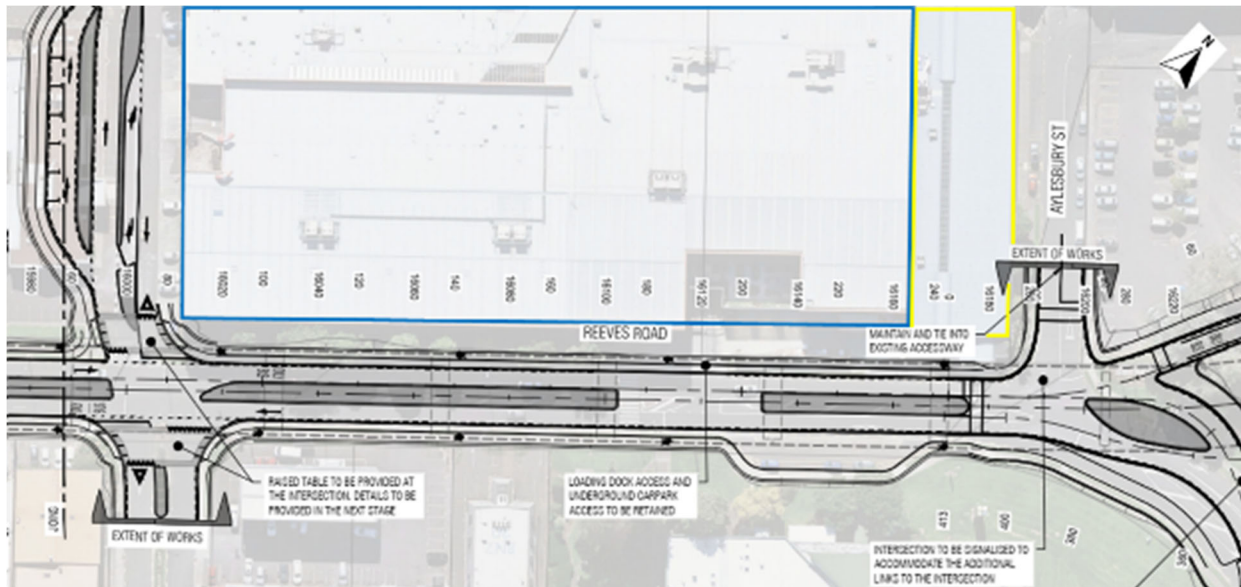


Figure 114: 13R Reeves Rd upon completion

### 6.6.1.5 7 Aylesbury Street and 2R Ti Rakau Drive (The Warehouse and Pakuranga Library)

Upon completion of Reeves Road, access to The Warehouse’s goods access will be reinstated as per the existing environment (left-in left-out) with delivery vehicles approaching from the south via Cortina Place and exiting to the north on Reeves Road. A similar access arrangement will be provided to the Library service entrance. Access to the undercover carpark will be provided via Cortina Place to the south and Reeves Road to the north. **Figure 115** shows the permanent access arrangements at 7 Aylesbury Street (blue outline) and 2R Ti Rakau Drive (yellow outline) upon completion.



**Figure 115: 7 Aylesbury St (blue outline) and 2R Ti Rakau Dr (yellow outline) upon completion**

Permanent effects to property access, upon the completion of construction, are expected to be negligible as these access arrangements are largely similar to the existing environment and background traffic volumes on Reeves Road will be significantly reduced.



## 6.6.2 EB2 – William Roberts Road

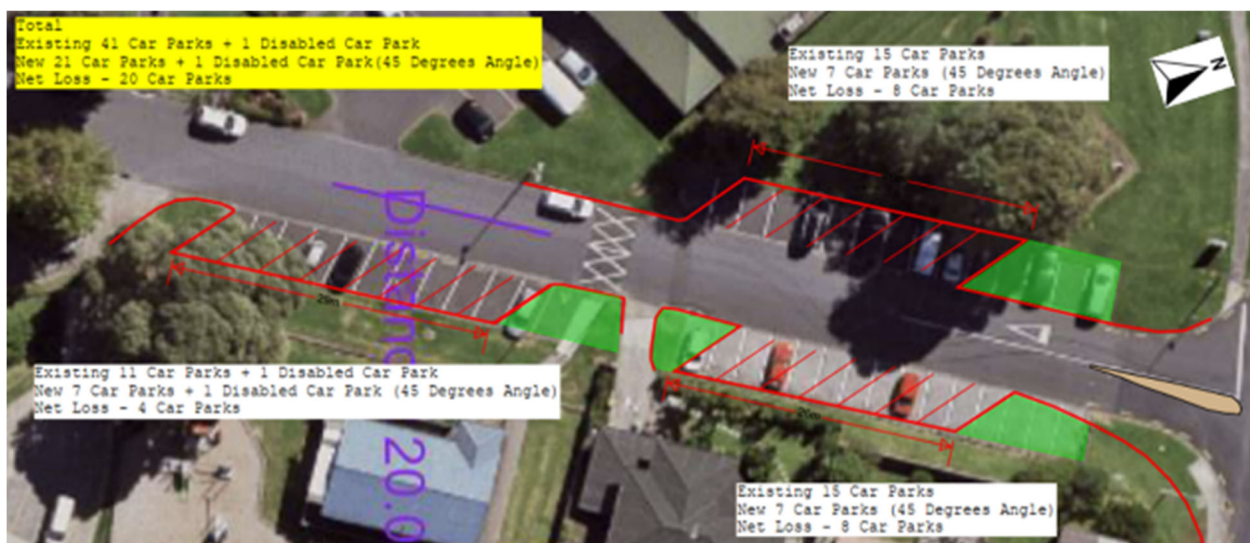
### 6.6.2.1 William Roberts Road North

Upon completion, William Roberts Road north will no longer function as a through route between Reeves Road and Pakuranga Road, but rather as a local road to the surrounding residential properties. Each end of William Roberts Road north will be converted to a cul-de-sac with access off Ayr Road, and will provide ample on-street parking to the surrounding properties. Accesses to the remaining properties on the eastern side of the road will be maintained as per the existing environment. Overall, less through traffic will travel on William Roberts Road north, improving safety and the increased travel distance via Ayr Road to Lewis Road of roughly 300 m is considered to be negligible. Therefore, permanent effects to property access and parking are considered to be negligible.

### 6.6.2.2 William Roberts Road South

As stated in the WRRE ITA, the proposed WRRE design will result in the permanent loss of 12 parking spaces on William Roberts Road south, near the Pakuranga Leisure Centre and Ti Rakau Park.

Further north on William Roberts Road south, a total of 42 on-street parking spaces are provided at a 90° angle to the carriageway. To improve the safety of vehicles turning out from these parking spaces, and to avoid tracking curves passing over the road centre line, the angle of these parking spaces will be adjusted (see **Figure 116**). The proposed EB2 design will provide 20 fewer on-street parking spaces.



**Figure 116: William Roberts Rd south parking adjustments**

Therefore, the combined loss of on-street parking along William Roberts Road south due to the proposed design of WRRE and EB2, is 32 parking spaces.

Of the 32 parking spaces lost along William Roberts Road south, 16 parking spaces are located within Open Space zoned land (blue outline, see **Figure 117** below) and will require mitigation which is outlined below. The remaining 16 parking spaces are located within the road reserve (red outline below). As stated in **Section 3.7.3**, the average parking utilisation on William Roberts Road is not expected to exceed 49% on weekdays and 33% on weekends based on observations of current utilisation. Therefore, the permanent effects of the loss of these 16 parking spaces are considered to be very low.



Figure 117: William Roberts Rd south zoning and on-street parking

It is proposed that a new off-street parking area will be constructed in Ti Rakau Park with access off William Roberts Road. The parking area will provide 21 additional parking spaces (24 in total, however three spaces are displaced). The proposed layout is shown in **Figure 118**.



Figure 118: William Roberts Rd south parking loss mitigation

The proposed parking area will be located near the new raised pedestrian crossing on William Roberts Road, connecting the proposed parking area with the existing footpaths on the western side of the carriageway. The proposed parking area will mitigate the effects on parking in Open Spaced zoned land along William Roberts Road south.

Stakeholder engagement is ongoing with Auckland Council to develop this option as well as relocating the existing playground to provide the necessary space for the proposed carpark.

### 6.6.3 EB2 – Pakuranga Road

In the proposed design, the kerbside lanes along Pakuranga Road between Ti Rakau Drive and the RRF will be converted to unidirectional cycleways. As such, no on-street parking will be provided along this section of Pakuranga Road in the future. Intermittent gaps will be provided in the buffer islands to allow for drainage to catchpits, but also to allow vehicular access to all properties with access off Pakuranga Road, similar to the existing environment (see **Figure 119** below).

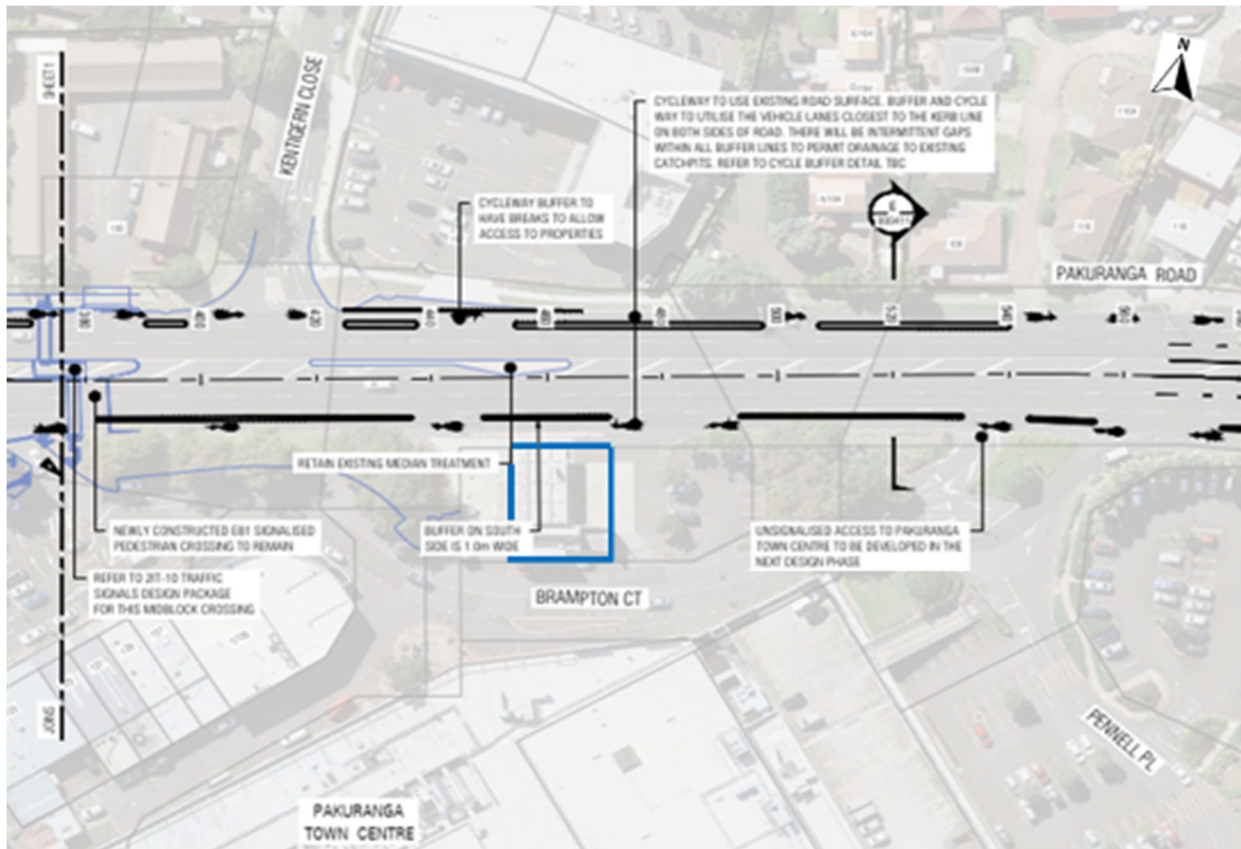
As noted above, Pakuranga Road is largely similar to Ti Rakau Drive in the EB3R project area, in terms of traffic volumes and operating speeds, and so it is not unreasonable to assume that Pakuranga Road experiences the same low level of parking utilisation in the existing environment during weekdays and weekends. Based on this assumption, the permanent effects on on-street parking are expected to be negligible.

The majority of the clearway sections along Pakuranga Road, east of the existing William Roberts Road intersection (see **Section 5.5.4**), will be retained upon completion of the Pakuranga Road / RRF tie-in.

#### 6.6.3.1 141 Pakuranga Road (GAS Service Station)

In the future, access from Pakuranga Road to the property at 141 Pakuranga Road will be largely similar to the existing environment. The proposed design will provide unidirectional cycleways in the kerbside lanes on Pakuranga Road, as well as buffer islands to separate the cycleways and the general traffic running lanes.

As above, intermittent gaps will be provided in the buffer islands to allow for drainage to catchpits, but also to allow vehicular access to this property, similar to the existing environment. **Figure 119** below shows the location of 141 Pakuranga Road (blue outline) and the proposed design along Pakuranga Road.



**Figure 119: 141 Pakuranga Road (blue outline) upon completion**

## 6.6.4 EB2 – Ti Rakau Drive, Side Roads and Properties

### 6.6.4.1 *Ti Rakau Drive*

The proposed design of Ti Rakau Drive in the EB2 project area, between Pakuranga Road and Reeves Road does not provide any on-street parking. However, no on-street parking is provided in the existing environment. Therefore, the proposed design will have no effects on on-street parking.

As per the existing environment, left-in/left-out access to the residential properties (3-27 Ti Rakau Drive) on the western side of the carriageway will be maintained. Upon completion, residents of these properties will no longer be able to use the existing U-turn facility on Ti Rakau Drive to head east. However, vehicles will still be able to turn right into Pakuranga Road and Brampton Court to execute a U-turn manoeuvre if required to head east along Ti Rakau Drive. Therefore, the permanent effects to these residential properties are considered to be very low.

### 6.6.4.2 *Side Roads*

Upon completion of the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection, a raised table will be provided on the Palm Avenue approach, with no effect on property access. No on-street parking is allowed on this section of Palm Avenue in the existing environment. Therefore, the final design will have no effects on on-street parking and property access along Palm Avenue.

### 6.6.4.3 Pakuranga Plaza

#### **Property Access:**

Upon completion of construction, the Plaza will be served by six access points in total including:

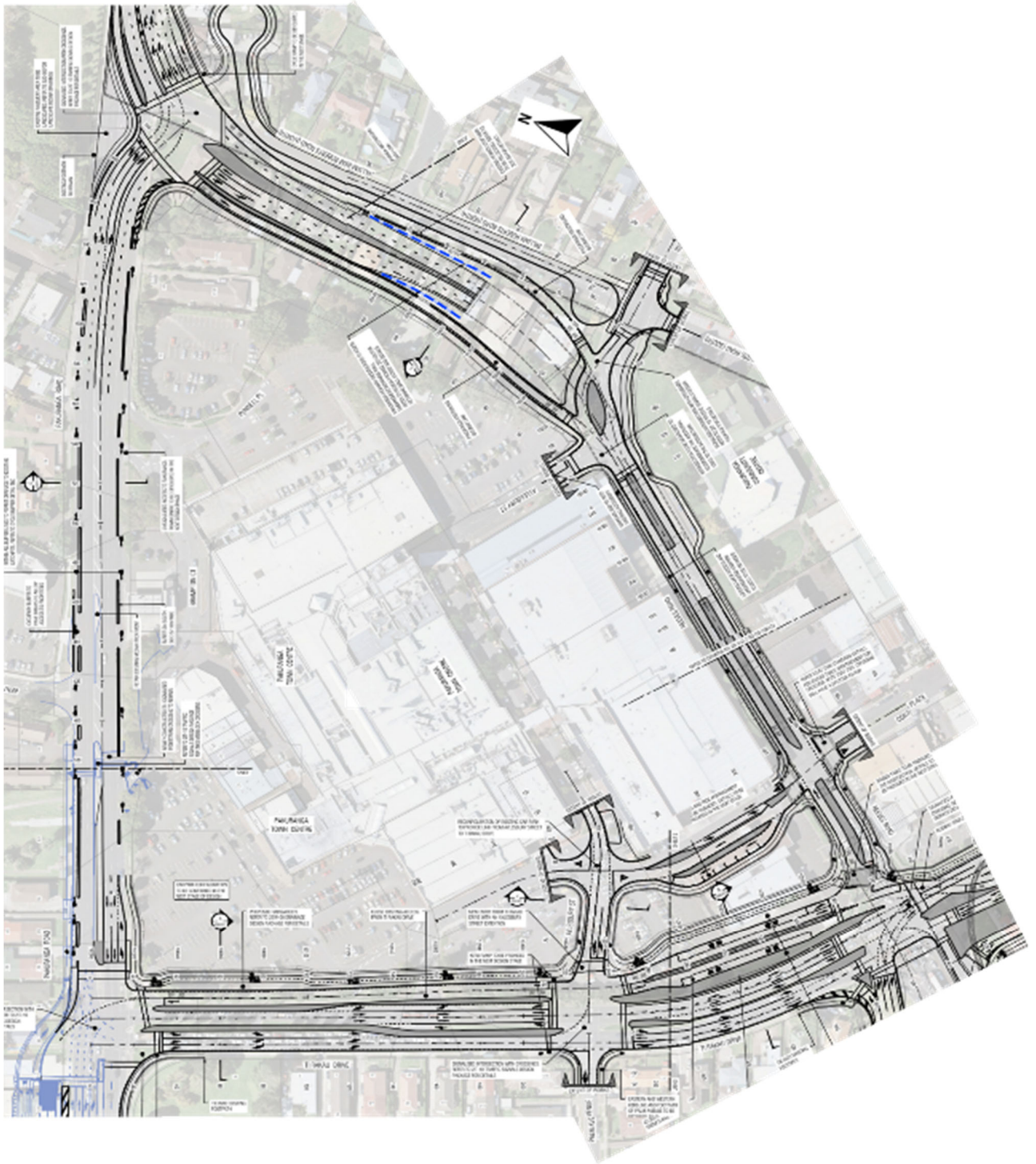
- Reeves Road / Cortina Place / Private Access Road intersection (unsignalised)
- The undercover carpark access off Reeves Road
- Reeves Road / Aylesbury Street intersection (signalised)
- Ti Rakau Drive / Aylesbury Street / Palm Avenue intersection (signalised)
- Pakuranga Road / Brampton Court intersection (unsignalised)
- The Pepler Street exit onto Pakuranga Road

The two existing Aylesbury Street accesses off Ti Rakau Drive will be combined into one crossroads intersection with Palm Avenue and will be signalised. Although the total number of access points to the Plaza will be reduced by one compared to the existing environment, it is expected that the signalisation of two accesses will lead to an overall improvement in capacity and vehicle access to Pakuranga Plaza.

#### **Parking:**

Overall, the proposed design will result in the permanent loss of 257 of the 1,355 parking spaces at the Pakuranga Plaza. However, parking survey data showed that utilisation does not exceed 60% on an average weekday or weekend. As such, it is expected that the Plaza would still have 285 unoccupied parking spaces upon completion of construction. Therefore, the permanent effects of the proposed design on parking at the Pakuranga Plaza are considered to be negligible.

**Figure 120** below shows the Pakuranga Plaza and the proposed design of the surrounding roads.



**Figure 120: Pakuranga Plaza upon completion**

#### 6.6.4.4 26 Ti Rakau Drive

Upon completion of construction, 26 Ti Rakau Drive will be significantly redeveloped. A bus station will be provided between Aylesbury Street and Reeves Road, and a ‘Kiss-and-Ride’ facility will be provided on the private access road off Aylesbury Street that will consist of six parking spaces. Scooter and bike parking facilities will also be provided near the bus station. The remainder of 26 Ti Rakau Drive will be developed into open space, to improve amenity around the bus station (see **Figure 121**).



**Figure 121: 26 Ti Rakau Dr artistic representation upon completion**

## 6.6.5 EB3R – Ti Rakau Drive, Side Roads and Properties

### 6.6.5.1 *Ti Rakau Drive*

The proposed design of Ti Rakau Drive in the EB3R project area will provide online bus lanes along the centre of the carriageway, from Reeves Road to Gossamer Drive. In addition, unidirectional cycleways will be provided on both sides of Ti Rakau Drive. The cycleway on the northern side of the carriageway will be provided in the existing eastbound kerbside / parking lane and will be separated from the adjacent general traffic lanes by a buffer island. The cycleway on the southern side of Ti Rakau Drive will be separated from the general traffic running lanes by a grass berm. The proposed EB3R design of Ti Rakau Drive will provide no on-street parking between Reeves Road and Gossamer Drive.

However, as stated in **Section 3.7.4**, the average utilization of the existing on-street parking is poor with only 3% occupancy on weekdays and 8% on Saturdays. This is not unexpected as this high-volume road does not create an appealing location to park vehicles and is likely leading to a high perceived risk of crashes. Furthermore, the acquisition of the majority of the residential properties on the southern frontage of Ti Rakau Drive will remove the need for on-street parking along this section.

The current left-in/left-out access arrangements to the remaining properties on both sides of Ti Rakau Drive will be maintained upon completion. Access to these properties from the opposite side of Ti Rakau Drive will be facilitated by the new U-turn facilities along the corridor as well as the U-turn manoeuvre provide at the Ti Rakau Drive / Gossamer Drive intersection. Therefore, the permanent effects on property access and on-street parking are considered to be negligible.

### 6.6.5.2 *Side Roads*

#### **Tiraumea Drive, Roseburn Place, Edgewater Drive and Wheatley Avenue:**

Changes along the side roads of Tiraumea Drive, Roseburn Place, Edgewater Drive west, Wheatley Avenue and Edgewater Drive east as a result of the proposed design will be limited to the approaches of the intersections with Ti Rakau Drive. As such, permanent effects on on-street parking and property access along these side roads are considered to be negligible.

#### **Marriott Road and Chevis Place:**

No changes are proposed along Marriott Road and Chevis Place. Therefore, the proposed design will have no permanent effects on on-street parking and property access along these side roads.

#### **Mattson Road:**

The proposed design along Mattson Road is relatively more extensive. The Mattson Road approach will be set back approximately 40 m south and 25 m east of its current location where it intersects Ti Rakau Drive. This will provide space for the new westbound lanes on Ti Rakau Drive and will provide sufficient midblock stacking space between the intersections at Mattson Road and William Roberts Road.

However, the properties on the southern side of Ti Rakau Drive have been acquired, removing the need for on-street parking. Accesses to properties along Mattson Road not acquired by AT will be maintained and will interface with the new alignment of Mattson Road similar to the existing environment. Therefore, the permanent effects on on-street parking and property access along Mattson Road are considered to be negligible.



### **Gossamer Drive:**

In the proposed design, the Gossamer Drive approach limit line will be set back approximately 15 m from its current location and the kerbside exit lane will be extended to 100 m. NSAAT line markings are currently provided on the eastern side of the road up to the bus stop near the intersection with Riverhills Avenue. These markings will be replicated on the western side of the road. This will result in the loss of on-street parking in front of 169, 171, 173 and 175 Gossamer Drive. It is likely that these properties have sufficient off-street parking, and that on-street parking is not occupied on a regular basis. Accesses to properties along Gossamer Drive not acquired by AT will be maintained and will interface with the roadway similar to the existing environment. Therefore, the permanent effects on on-street parking and property access along Gossamer Drive are considered to be negligible.

### **Freemantle Place:**

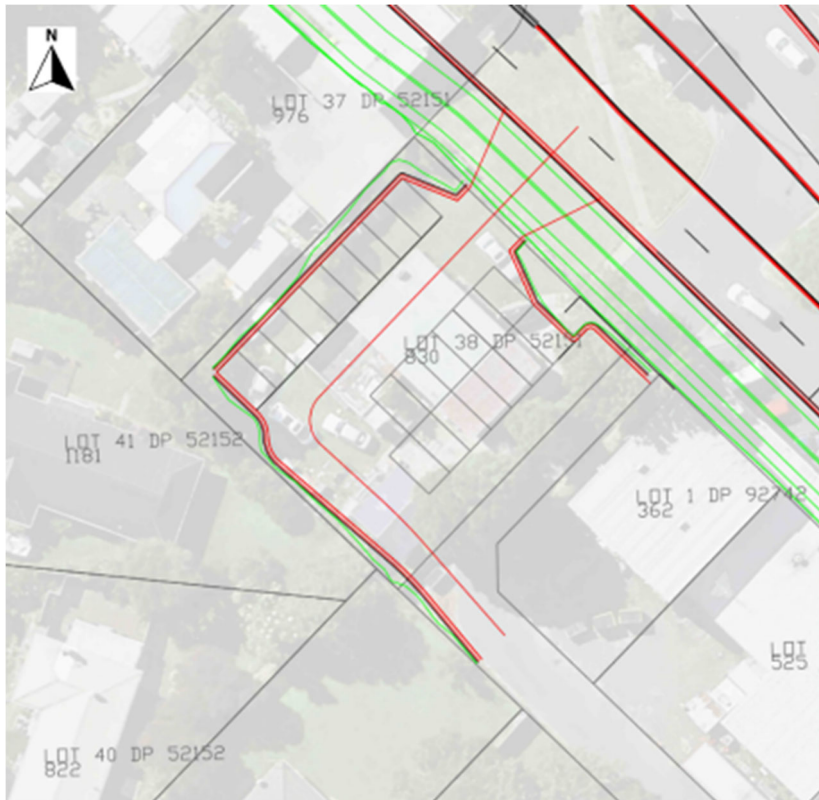
The Freemantle Place approach will be set back approximately 11 m. NSAAT line markings are provided on the western side of the road for approximately 31 m from the limit line. The line markings will be reinstated upon completion and will result in the loss of one parking space in front of 3 Freemantle Place. The existing line markings on the eastern side of the road will be retained. Property access along Freemantle Place will be maintained as per the existing environment. Therefore, the permanent effects on on-street parking and property access along Freemantle Place are considered to be negligible.

#### *6.6.5.3 Residential Properties on Southern Frontage of Ti Rakau Drive*

Upon completion of the new westbound lanes on Ti Rakau Drive in EB3R, the temporary residential access tracks at 75A, 83, 83A-C, 87-91, 97, 103A, 129, 145, 175A, 177, 183-185 and 191 Ti Rakau Drive will be disestablished. Residents will be able to use their existing driveways off the new Ti Rakau Drive westbound lanes. The accesses will be left-in/left-out only, similar to the existing environment. Therefore, permanent effects to property access at these properties are considered to be negligible.

#### *6.6.5.4 107 and 109 Ti Rakau Drive – Edgewater Shops*

Upon completion, the temporary carpark at 105 Ti Rakau Drive will be made permanent. The carpark will provide 22 parking spaces. Access to and from the proposed carpark will be via Ti Rakau Drive, similar to the existing environment (see **Figure 122** below). Access to the refuse collection area to the rear of the property will be largely similar to the existing environment. Therefore, the effects of the proposed carpark on property access and parking are considered to be negligible.



**Figure 122: Edgewater Shops proposed parking area upon completion**

#### 6.6.5.5 32 Edgewater Drive – Edgewater College

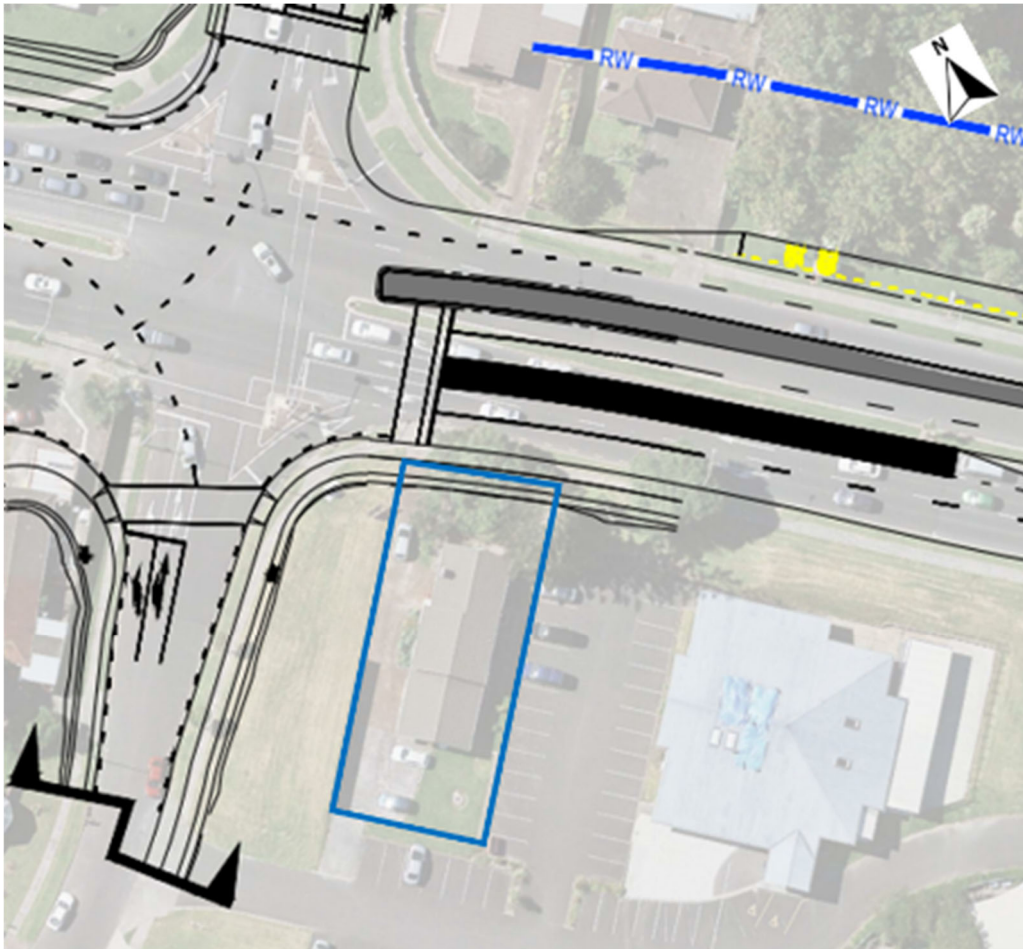
In the existing environment, Edgewater College is accessed from both the Edgewater Drive west and east intersections with Ti Rakau Drive, which provide for all movements in and out. The proposed design of the Ti Rakau Drive / Edgewater Drive west and east intersections is left-in left-out only.

As stated in **Section 4.2.2.2**, a U-turn facility will be provided between Edgewater Drive west and Wheatley Avenue which will enable eastbound traffic on Ti Rakau Drive to execute a U-turn manoeuvre and turn into Edgewater Drive west. Furthermore, a U-turn manoeuvre will also be provided on the western approach at the Ti Rakau Drive / Gossamer Drive intersection. This will enable eastbound traffic on Ti Rakau Drive to execute a U-turn and turn into Edgewater Drive east.

Overall, permanent effects to property access at Edgewater College are considered to be negligible. Permanent effects to school bus services to and from Edgewater College are assessed in **Section 6.4.8**.

#### 6.6.5.6 207, 219 and 229 Ti Rakau Drive – Pakuranga Baptist Church

Access from Ti Rakau to the property at 207 Ti Rakau Drive (Pakuranga Counselling Centre) will not be maintained in the future. However, the property will still be accessible from Freemantle Place. Therefore, permanent effects to property access are considered to be very low. **Figure 123** below shows the location of 207 Ti Rakau Drive (blue outline) and the proposed design of the adjacent roads.



**Figure 123: 207 Ti Rakau Drive (blue outline) upon completion**

No changes to property access or parking are proposed at 209 and 229 Ti Rakau Drive in the proposed design. Access to these properties will be maintained as per the existing environment.

#### 6.6.5.7 168R Gossamer Drive – River Hills Park

As stated in **Section 5.5.6.7**, a parcel of land along the southern boundary of 168R Ti Rakau Drive River Hills Park has been acquired to allow for the eastbound Gossamer Drive bus station. Discussions are ongoing with the Council as well as the Fencibles United Football Club on the rearrangement of the fields on the property as a result of the Project. **Figure 124** below shows the proposed field rearrangements at the River Hills Park.



**Figure 124: 168R Gossamer Drive upon completion**

However, from a transport perspective, the Project will have no permanent effects to property access and parking on-site.

## 6.7 Effects to Safety Performance

The sections below discuss the potential effects on safety performance in the context of EB2 and EB3R upon completion.

A Safe Systems Assessment (SSA) was undertaken of the proposed EB2 and EB3R 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 EB2

**Table 46** provides an assessment summary and comparison of the SSA of the existing environment and the proposed design of EB2. Again, 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 A in EB2 indicates the location of the bus station upon completion of the Project.

**Table 46: EB2 SSA – existing vs future environment**

ZONE EB2 ASSESSMENT SUMMARY											
EXISTING LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) PAKURANGA EB STATION	16	16	32	16	64	24	48	0	36	36	288
B) TI RAKAU DR / PALM AVE	16	16	32	16	48	24	0	48	36	36	272
C) TI RAKAU DR / REEVES RD	16	16	24	16	48	18	0	24	36	27	225
D) TI RAKAU DR / TIRAUMEA DR	8	16	16	24	48	24	48	0	31.5	27	242.5
E) TI RAKAU DR / MATTSON RD	16	16	24	24	48	18	48	36	31.5	27	288.5
F) PAKURANGA RD / TI RAKAU DR	16	16	24	16	48	12	0	24	36	36	228
G) PAKURANGA RD / REEVES RD	16	24	32	16	64	18	0	48	36	36	290
H) REEVES RD FLYOVER	0	0	0	0	0	0	0	0	0	0	0
DESIGN LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) PAKURANGA EB STATION	12	12	0	12	32	0	64	0	30	0	162
B) TI RAKAU DR / PALM AVE	12	12	18	12	48	24	0	48	30	20	224
C) TI RAKAU DR / REEVES RD	12	12	24	12	48	24	0	48	30	30	240
D) TI RAKAU DR / TIRAUMEA DR	6	6	12	18	48	16	64	0	20	30	220
E) TI RAKAU DR / MATTSON RD	12	6	18	24	48	16	48	48	20	30	270
F) PAKURANGA RD / TI RAKAU DR	12	12	18	12	48	16	0	32	20	20	190
G) PAKURANGA RD / REEVES RD	18	12	12	12	32	16	0	32	48	48	230
H) REEVES RD FLYOVER	0	0	0	0	0	0	0	0	0	0	0

Although the product score for P2 type crashes (midblock crossings) is slightly increased, the total score of Location A is significantly reduced. The score increase for P2 type crashes is due to the expected increase in pedestrian movements to and from the bus station, therefore having a slightly higher exposure.

The total score of Location C is slightly higher in the proposed design, compared to the existing environment. The product score of pedestrian crashes (P1 and P3) is slightly increased due to the higher number of pedestrian crossings. The product score for P2 type crashes is slightly increased at Location D. This is due to the increase in the number of pedestrian crossings (higher exposure). However, the total score is reduced.

Overall, the proposed design of EB2 is a balance between the competing modes of travel. The proposed design will provide staged crossings at various locations in order to reduce pedestrian delay, improve safety and discourage jaywalking. Overall, the product score of the proposed design is lower throughout EB2 compared to the existing environment.

## 6.7.2 EB3R

**Table 47** below provides an assessment summary and comparison of the SSA of the existing environment and the proposed design of EB3R. It should be noted that Location F and H in EB3R indicate the locations of the bus stations upon completion of the Project.

**Table 47: EB3R SSA – existing vs future environment**

ZONE EB3R ASSESSMENT SUMMARY											
EXISTING LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) ROSEBURN PL	8	16	32	24	64	24	48	0	27	36	279
B) MARRIOTT RD	8	16	32	24	64	24	48	0	27	36	279
C) EDGEWATER DR / CHEVIS PL	8	16	16	24	48	24	48	24	27	27	262
D) WHEATLY AVE	8	16	32	24	64	24	36	0	27	36	267
E) EDGEWATER DR	8	0	32	24	64	24	0	0	27	36	215
F) GOSSAMER STATION WB	8	0	0	24	32	0	0	0	27	18	109
G) GOSSAMER DR INTERSECTION	24	24	24	24	48	18	0	36	36	18	252
H) GOSSAMER STATION EB	8	16	0	8	16	0	32	0	36	0	116
DESIGN LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) ROSEBURN PL	6	6	12	18	48	8	64	0	20	30	212
B) MARRIOTT RD	6	6	12	24	48	8	64	0	20	30	218
C) EDGEWATER DR / CHEVIS PL	6	6	12	24	48	8	64	0	20	30	218
D) WHEATLY AVE	6	6	12	18	48	8	48	0	20	30	196
E) EDGEWATER DR	6	0	12	18	48	8	0	0	20	30	142
F) GOSSAMER STATION WB	6	6	0	24	32	0	64	0	20	20	172
G) GOSSAMER DR INTERSECTION	18	24	24	24	64	24	0	64	30	40	312
H) GOSSAMER STATION EB	6	12	0	6	16	0	48	0	20	0	108

Although the total scores for Locations A, B and C are significantly reduced, the product score for P2 type crashes is slightly increased. This is due to the expected increase in pedestrian movements and slight increase in likelihood of pedestrians rushing to the bus station.

The total score of Location F is slightly increased, compared to the existing environment. Similar to the above, this is due to the expected increase in pedestrian movements and slight increase in likelihood of pedestrians rushing to the bus station.

The proposed design of the Ti Rakau Drive / Gossamer Drive intersection has a higher total score. This is due to the complexity and unfamiliarity of the intersection compared to the existing environment. However, the intersection design will be in line with all relevant TDM design provisions and guidance to ensure safety.

As above, the proposed design will provide staged crossings at various locations in order to reduce pedestrian delay, improve safety and discourage jaywalking. Overall, the product score of the proposed design is lower throughout EB3R compared to the existing environment.

## 7 Mitigation Summary

The sections below provide a summary of the mitigation measures proposed in this ITA to mitigate the potential adverse effects of the Project both 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 of the CTMP.

#### 7.1.1 Construction Support Areas

- The properties at 2 Cortina Place and 5 Reeves Road will serve as site offices for the Project. It is envisaged that, at least for the initial year of construction, site office staff will use public transport for commuter trips and will access the site offices on foot. Workforce Travel Management Plans will be developed to reduce the number of private vehicles travelling to the worksites and to increase the accessibility of the worksites through more travel options. Following the initial year and as construction activities ramp up, a staff carpark will be provided at 26 Ti Rakau Drive.
- The operation and movement of the Gantry at the Pennell Place CSA will be under strict construction traffic management control. Advance notice and appropriate public communication of such infrequent activities will be undertaken prior to these being initiated. This will be achieved through the Construction Traffic Management Plan (CTMP).
- During the operation of the William Roberts Road north construction yard, it is proposed that the Pakuranga Road / William Roberts Road intersection will be signalised temporarily. This will improve the capacity of the right-turn movements into and out of William Roberts Road and improve the safety of turning across three lanes of through traffic.

#### 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. 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).

#### 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 William Roberts Road south and Reeves Road due to the increase in exposure to some vulnerable users in 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.

#### 7.1.4 General Traffic

- To mitigate the potential adverse effects to travel times during Construction Scenario 1 and 2, appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes. This will be achieved through the CTMP.
- The construction of the Ti Rakau Drive / Reeves Road / SEART intersection (underneath the RRF) and the Ti Rakau Drive / Gossamer Drive intersection are considered the final major changes to the transport network (Construction Scenario 3). To mitigate the adverse effects, these activities will be undertaken during a low traffic period, such as December-January. Extensive community engagement will be undertaken well in advance of the planned works and will include notices of the planned works, dates of construction, messaging to avoid the areas where disruption is anticipated and alternative routes. This will be achieved through the CTMP.
- To mitigate the temporary effects to general traffic on Pakuranga Road during the crossing draining works east of the Pakuranga Road / Ti Rakau Drive intersection, the signalised midblock pedestrian crossing will be disabled temporarily. This will mitigate upstream queues through the Pakuranga Road / Ti Rakau Drive intersection during the lane closures.
- A temporary traffic signal will be provided at the Ti Rakau Drive / Edgewater Drive east intersection during the construction of the Ti Rakau Drive / Edgewater Drive west intersection. This will ensure that signalised movements for vehicles turning into and out of Edgewater Drive are maintained.

#### 7.1.5 Bus Services and Facilities

- During the closure of Reeves Road, the 711 outbound (eastbound) service will be diverted temporarily to the newly completed WRRE.
- Once William Roberts Road north is closed, the 711 inbound (westbound) service will also be diverted to the WRRE and will utilise bus stop (ID 6127) to pick-up/drop-off passengers at the Pakuranga Plaza.
- Opportunities will be explored during the development of the CTMP to improve bus travel times during Construction Scenario 1. Appropriate public communication and advance warning of the planned works will be undertaken prior to the works being initiated. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which could lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes.



### 7.1.6 Pedestrians and Cyclists

- Pedestrian crossings and footpaths will be maintained at all times 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 from Reeves Road to the Gull Service Station at 3 Reeves Road will not be maintained during the Reeves Road closure. Discussions regarding compensation are ongoing with the owner regarding loss of direct road access onto Reeves Road as part of the Public Works Act process.
- During the Reeves Road closure, a temporary two-way access will be provided from Cortina Place to the Eastside Pups Dog Grooming and Daycare at 11 Reeves Road.
- Access to The Warehouse's goods entrance at 7 Aylesbury Street and the service entrance to the Pakuranga Library and Citizens Advice Bureau at 2R Ti Rakau Drive will be maintained through the work site. Removable barriers will be installed in the median and the existing masonry wall on the property boundary will be removed, if required, and will be re-installed following construction.
- During the Reeves Road closure, the main access to Te Tuhi at 13R Reeves Road will be closed and a temporary drop-off area with a temporary walkway leading to the main entrance will be provided on William Roberts Road.
- Access to the GAS Service Station at 141 Pakuranga Road and the Pakuranga Plaza via Brampton Court will be maintained during the longitudinal drainage works on Pakuranga Road by completing the works in sections and via steel plating across the trenches. The construction team will also liaise with the operators of the service station to ensure sufficient access widths are provided, as and when required, for fuel delivery tankers.
- During Phase 1 of Ti Rakau Drive in EB3R, the remaining properties on the southern frontage will not have access to Ti Rakau Drive while the westbound lanes are constructed. Temporary residential access will therefore be provided during this phase via chip seal access tracks along the back of the acquired properties accessed through side streets. Properties that would use these access tracks include 75, 83, 83A-C, 87, 98, 91, 97, 103A, 129, 145, 175A, 177, 183, 185 and 191 Ti Rakau Drive.
- A temporary parking area, with 18 parking spaces, will be provided at 105 Ti Rakau Drive for the Edgewater Shops located at 107 and 109 Ti Rakau Drive during construction. The temporary carpark will be accessed via Edgewater Drive west and the access road to the rear of the commercial buildings. Temporary signage will be provided to direct customers.
- To mitigate the effects on the school bus services serving Edgewater College, two mitigation measures are proposed to be consulted on with the Ministry of Education and the school. The first option would be a temporary rearrangement of the off-street parking area to enable buses to perform a U-turn manoeuvre. The second option would be to utilise the existing bus stops on Ti Rakau Drive. From a transport perspective, either option would be manageable.

- Drainage works at 207, 219 and 229 Ti Rakau Drive will be undertaken in sections to maintain vehicle access to all properties at all times. Furthermore, at the end of the work week, the work zone will be reduced in size, while maintaining safety, to free up as many occupied parking spaces as possible.

## 7.2 Mitigation Measures upon Completion

- Access to the Gull Service Station at 3 Reeves Road will not be maintained from Reeves Road. Discussions regarding compensation are ongoing with the owner regarding the loss of direct road access from Reeves Road as part of the Public Works Act process.
- To mitigate the loss of 16 parking spaces located within the Open Space zoned land along William Roberts Road south an off-street parking area will be provided in Ti Rakau Park providing 21 additional parking spaces. Stakeholder engagement is ongoing with Auckland Council to develop this option as well as relocating the existing playground to provide the necessary space for the proposed carpark.
- To mitigate the removal of the parking spaces at the Edgewater Shops (107 and 109 Ti Rakau Drive), the temporary carpark at 105 Ti Rakau Drive will be made permanent and will provide 22 parking spaces.
- Discussions are ongoing with Council and Fencibles United Football Club to rearrange the fields on River Hills Park as a result of the parcel of land that has been acquired along the southern boundary of 168R Ti Rakau Drive to facilitate the eastbound Gossamer Drive bus station.

## 8 Conclusions

Overall, the temporary effects of the various CSAs as well as the construction traffic in the project areas will be mitigated appropriately and are considered to be negligible or very low. Workforce Travel Management Plans will be developed to reduce private vehicle trips and to increase worksite accessibility through more travel options. 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. 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 on intersection performance during all construction scenarios across the network are considered to be negligible or very low. Some works are proposed to be undertaken during a low traffic period (December-January) to mitigate the potential effects of disruption. Appropriate measures have been proposed to support the operation of the construction yard, as well as during drainage works on Pakuranga Road and works on the Edgewater Drive loop.

Although the temporary effects to intersection performance during construction are predicted to be negligible or very low, some adverse effects to general traffic and bus travel times are expected, particularly during Construction Scenario 1<sup>41</sup>. These effects are not unexpected due to the number of ongoing construction activities. It should be noted that these effects are temporary, and once constructed, the RRF and EB2/EB3R as a whole will alleviate congestion, particularly around the Pakuranga Town Centre. Nevertheless, to mitigate these effects, appropriate public communication and advanced warning of the planned works will be undertaken prior to the works being initiated. Also, opportunities to improve bus travel times will be explored in the development of the CTMPs. Public communication and signage will also be provided during construction informing motorists of the works and potential delays, which would lead to changes in travel behaviour such as travelling outside the peak periods or using alternative routes.

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

Overall, the temporary effects during construction on property access and parking will be mitigated appropriately and are considered to be negligible or very low. Where existing vehicle access arrangements and parking provisions cannot be maintained, appropriate mitigation measures have been proposed to provide levels of access and parking commensurate with the existing environment as far as is reasonably practicable.

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.

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<sup>41</sup> Construction Scenario 1 simulates the closure of Reeves Road as well as the ongoing construction of the RRF (i.e., not constructed yet).

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.

In the existing environment, Auckland's eastern suburbs are experiencing a range of transport related problems and challenges. The completion of EB2 and EB3R 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, particularly around the Pakuranga Town Centre, through the new Reeves Road flyover

The main elements of the proposed design of EB2 and EB3R include dedicated bus lanes along Ti Rakau Drive, connecting to the EB1 bus lanes at Pakuranga Road and terminating at Gossamer Drive, as well as three new bus stations along the corridor. A new link between Pakuranga Road and SEART in the form of the Reeves Road Flyover (RRF). Dedicated cycleways on Pakuranga Road, between Ti Rakau Drive and the RRF, and along Ti Rakau Drive from Pakuranga Road to Gossamer Drive.

In the future, the Ti Rakau Drive and Pakuranga Road corridors will have more strategic Place functions, in addition to the Movement of people and goods. The proposed Eastern Busway bus stations will also attract more people within the area as the activities served by these bus stations will become local attractions. Modal priority of pedestrians, cyclists and buses will be improved, and as a result modal priority of general traffic and parking will decrease across the project areas.

Overall, the proposed design of EB2 and EB3R is expected to lead to acceptable operations for general traffic across the network, and 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 by removing traffic from Ti Rakau Drive and providing a direct and faster link between Pakuranga Road and SEART. Furthermore, significant improvements in travel times are expected overall, especially from Botany towards Pakuranga and SEART.

Benefits of the new stations will be the ability to support significantly higher public transport patronage through increased catchment and higher service frequencies through increased capacity. These benefits, in combination with improved customer accessibility, amenity and safety, will lead to an increase in mode share of public transport. A particular benefit of the Pakuranga Town Centre bus station will be the integration of all bus services in the EB2 and EB3R project areas, which will provide an improved transfer experience for passengers. Another benefit of the stations will be improved safety for buses.

EB2 and EB3R are 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 appropriate levels of service and capacity to support this 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. Overall, the proposed design is predicted to improve 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 of EB2 and EB3R 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 staged crossings at various locations in order to reduce pedestrian delay, improve safety and discourage jaywalking. Raised pedestrian platforms will also be provided to create a low-speed environment, and to aid pedestrians and cyclists by simplifying the crossing task. Furthermore, these facilities will increase visibility 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 potential adverse effects during construction and upon completion of EB2 and EB3R are considered to be negligible or very low. Furthermore, the proposed design is predicted to result in significant improvements and a range of benefits overall.