

#### 4.2.1.2 William Roberts Road North

In the future, 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. William Roberts Road north will be closed off once works are completed at the new Ti Rakau Drive / William Roberts Road / Mattson Road crossroads intersection further south.

During this phase of construction, each end of William Roberts Road will be converted to a cul-de-sac with access off Ayr Road only. This in turn will remove the southern approach at the Pakuranga Road / William Roberts Road intersection, resulting in a no stop intersection until the RRF is built. The northern approach at the William Roberts Road / Reeves Road intersection will also be removed, resulting in a T-junction arrangement.

The majority of the existing footpath on the eastern side of William Roberts Road will be retained. **Figure 30** below shows the proposed layout of William Roberts Road north.



**Figure 30: William Roberts Rd north**

**Figure 31** shows the indicative work zone of William Roberts Road north. The construction of William Roberts Road north is anticipated to have a duration of approximately six months.

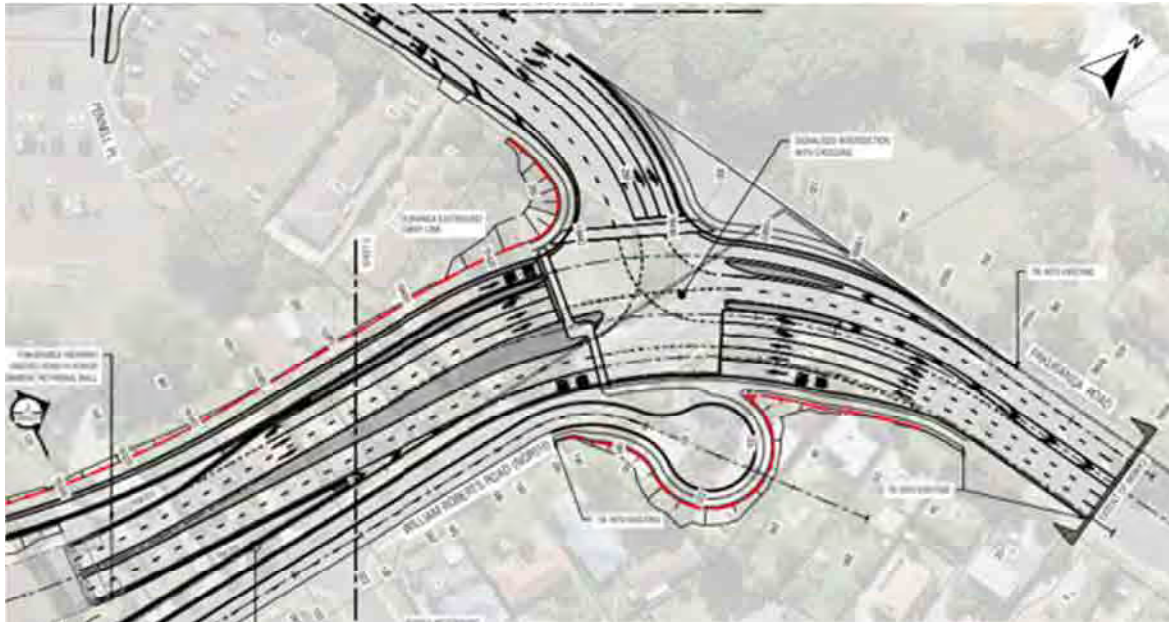


Figure 31: Indicative work zones – William Roberts Rd north

#### 4.2.1.3 Pakuranga Road Tie-In

The RRF will tie into Pakuranga Road with two through lanes per direction in addition to the dedicated bus lanes from Reeves Road. The Pakuranga Road western approach will tie into the intersection in a T-arrangement, providing two full length left-turn lanes for this **minor approach** and one short right-turn lane onto the RRF.

The eastern approach will consist of a short bus lane, two full length through lanes, one full length right-turn lane and an additional short right-turn lane. The southern RRF approach will consist of a bus lane from Reeves Road, a short left-turn lane, and two full length through lanes. **Signalised pedestrian crossings will be provided across the southern and western approaches.** **Figure 32** shows the proposed layout of the Pakuranga Road / RRF tie-in.



**Figure 32: Pakuranga Rd / RRF tie-in**

**The tie-in of the RRF with Pakuranga Road will occur over four phases, generally maintaining five lanes of the Pakuranga Road carriageway. Three lanes will be provided for the westbound traffic and two lanes for the eastbound traffic. These works will be undertaken as soon as the new Ti Rakau Drive / William Roberts Road / Mattson Road crossroads intersection has been constructed.**

**Figure 33** shows the indicative work zone of the Pakuranga Road tie-in works. The construction of the tie-in is anticipated to have a duration of approximately six months.



**Figure 33: Indicative work zone – Pakuranga Rd tie-in**

#### 4.2.1.4 SEART

In the future, the SEART off-ramp will consist of one short left-turn lane onto Ti Rakau Drive westbound, one short right-turn lane and two full length right-turn lanes onto Ti Rakau Drive eastbound. The SEART on-ramp will consist of two lanes to cater for the single left-turn from Ti Rakau Drive westbound and the single right-turn from Ti Rakau Drive eastbound.

**Figure 34** below shows the proposed layout of the SEART on-ramp and off-ramp at Ti Rakau Drive. The works along SEART will be divided into three phases.



**Figure 34: SEART on-ramp and off-ramp at Ti Rakau Dr**

**Phase 1 – Eastbound Carriageway:**

The work associated with the eastbound carriageway will be offline between Ti Rakau Drive and Dale Crescent, on the northern side of SEART. Barrier protection will be installed along the existing shoulder up to the intersection with Ti Rakau Drive. To maintain the two left-turn lanes on the off-ramp, removal of the traffic island and temporary pavement will be required. Seven Oaks Drive will be reinstated further north of its current alignment.

**Phase 2 – Westbound Carriageway:**

During this phase the eastbound traffic will be moved to the new off-ramp. Westbound traffic will be transitioned to the existing eastbound lanes at the Ti Rakau Drive / Reeves Road intersection. This will allow for drainage works, permanent barrier removal and pavement construction on the existing westbound lanes. This phase of works will also consist of drainage works further west on SEART, which will be completed over night works with discrete closures.

**Phase 3 – Centre of Carriageway:**

Eastbound traffic will remain on the new off-ramp lanes from the preceding phases. Westbound traffic will be pushed to the southern edge of seal, maintaining the number of lanes as per the existing environment. A mixture of permanent and temporary barriers will protect the workspace.

A key component of this phase is construction of the falsework for the pier head above the Ti Rakau Drive right-turn lanes into SEART. Removal of the existing traffic island, including a streetlight and traffic signal pole, and construction of temporary pavement will be required to maintain the number of lanes as per the existing environment.

**Figure 35** below shows the indicative work zones for SEART. The works along SEART are anticipated to have a duration of approximately three years.



**Figure 35: Indicative work zones – SEART**

#### 4.2.1.5 Ti Rakau Drive

The works along Ti Rakau Drive in the EB2 project area have been divided into two sections to provide a clear and concise description of the proposed design and construction methodology.

##### **Pakuranga Road to Reeves Road Section:**

Ti Rakau Drive between Pakuranga Road and Reeves Road will in future consist of two through lanes per direction and offline bus lanes on the northern side of the carriageway. The eastern approach of Ti Rakau Drive at the intersection with Pakuranga Road will consist of **one full length left-turn slip lane and one full length right-turn lane.**

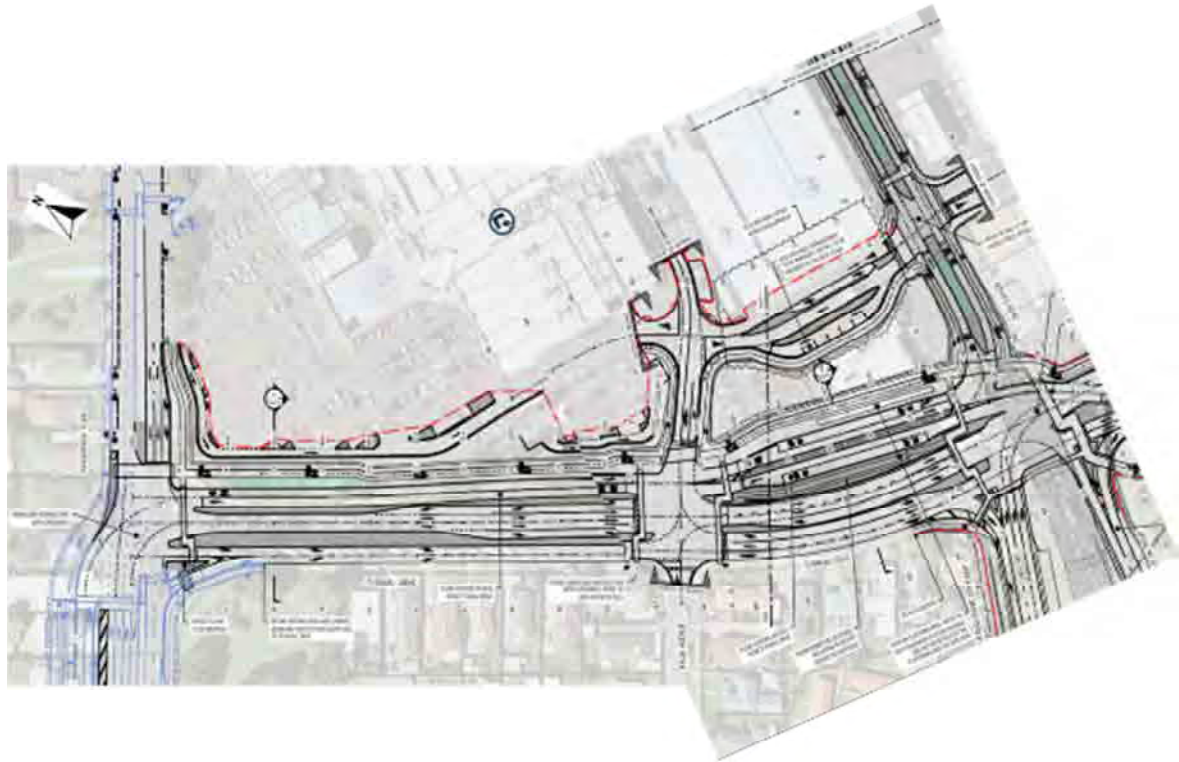
The two intersections with Aylesbury Street will be combined into one crossroads intersection with Palm Avenue, providing for all movements in and out of the side roads and will be signalised. The western approach on Ti Rakau Drive will consist of a short left-turn lane, two full length through lanes and a short right-turn lane, while the eastern approach will consist of full length shared through and left-turn lane, a full length through lane and a short right-turn lane. The northern approach on Aylesbury Street will consist of left-turn lane and a shared through and right-turn lane. The southern Palm Avenue approach will remain as per the existing environment.

A bus station will be provided between Aylesbury Street and Reeves Road, while a 'Kiss-and-Ride' facility will be provided on the private access road off Aylesbury Street that will consist of **five** parking spaces. A bidirectional cycleway will also be provided on the northern side of Ti Rakau Drive which will tie into the existing bidirectional cycleway on Pakuranga Road west (part of EB1) and the new unidirectional cycleways on Pakuranga Road east.

A signalised shared crossing will be provided across the northern approach at the Pakuranga Road / Ti Rakau Drive intersection, **with a raised zebra crossing on the left-turn slip lane and signalised pedestrian crossings on all other approaches.**

**A raised intersection will be provided at the Ti Rakau Drive / Aylesbury Street / Palm Avenue intersection,** a signalised shared crossing on the **Aylesbury Street** approach and signalised pedestrian crossings on all other approaches.

**At the Ti Rakau Drive / Reeves Road / SEART intersection, a signalised shared crossing will be provided on the northern and eastern approaches, and signalised pedestrian crossings on the southern and western approaches.** **Figure 36** below shows the proposed layout of Ti Rakau Drive between Pakuranga Road and Reeves Road.



**Figure 36: Ti Rakau Dr from Pakuranga Rd to Reeves Rd**

The construction of Ti Rakau Drive between Pakuranga Road and Reeves Road will be divided into three sub-phases.

In Phase 1, the new bus lanes are to be built largely offline concurrent with the RRF abutment construction, and will include removal of the median island and shifting vehicle lanes. Construction of the new Ti Rakau Drive / Palm Avenue / Aylesbury Street crossroads intersection will be brought forward, and will be undertaken during this phase and is expected to have a duration of approximately eight months. The early completion of this intersection will provide improved access to the Pakuranga Plaza during the subsequent construction phases. It is anticipated that the intersection will be completed before the closure of Reeves Road.

Phase 2, which will consist of works in the centre of Ti Rakau Drive to construct the new eastbound lanes, will be undertaken after the completion of the RRF to maintain the capacity of this section of Ti Rakau Drive. In Phase 2, the eastbound traffic will be temporarily transferred to the new bus lanes, reducing the available eastbound lanes to two lanes.

Once the centre lane work is completed, Phase 3 will be able to commence and will consist of less extensive works in the westbound kerbside lane. The westbound carriageway will also be reduced to two lanes in this phase.

**Figure 37** below shows the indicative work zones for Ti Rakau Drive from Pakuranga Road to Reeves Road. Construction of this section of Ti Rakau Drive is anticipated to have a duration of approximately three years.



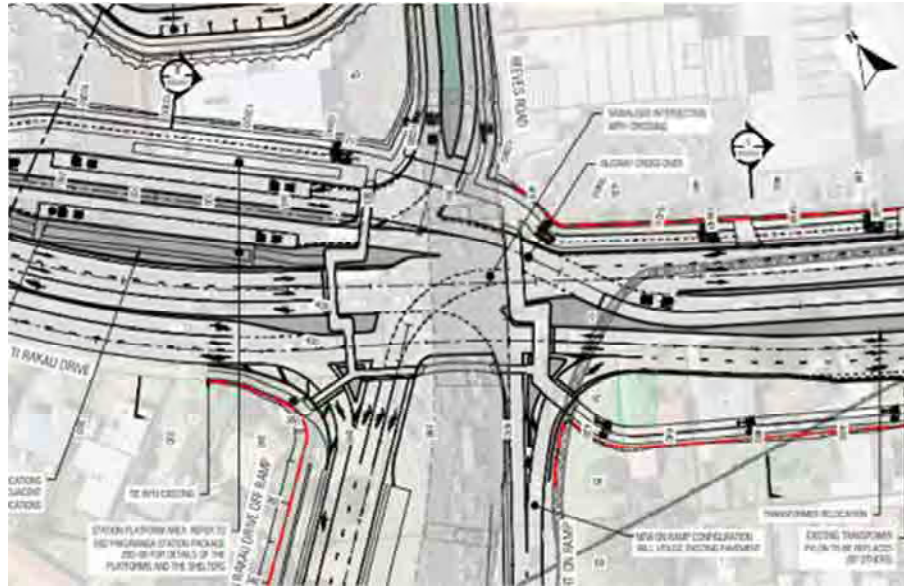


Figure 37: Indicative work zones – Ti Rakau Dr from Pakuranga Rd to Reeves Rd

**Ti Rakau Drive / Reeves Road Intersection:**

The Ti Rakau Drive / Reeves Road intersection will provide for the transition of offline bus lanes from the west to online or central running bus lanes to the east. The northern Reeves Road approach to the intersection will serve bus movements only up to Cortina Place, and will connect to the bus lanes to the west of the intersection. The western approach will provide two full length through lanes and one short right-turn lane. The eastern approach will provide **one full length left-turn lane and two full length through lanes.**

As stated in **Section 4.2.1.4**, the SEART off-ramp will consist of one left-turn lane and three right-turn lanes. The intersection will also provide for the transition of the bidirectional cycleway to unidirectional cycleways on both sides of Ti Rakau Drive to the east of the intersection. **Again, a signalised shared crossing will be provided on the northern and eastern approaches, and signalised pedestrian crossings on the remaining approaches.** **Figure 38** below shows the proposed layout of the Ti Rakau Drive / Reeves Road intersection underneath the RRF.



**Figure 38: Ti Rakau Dr / Reeves Rd intersection**

To minimise the adverse effects to traffic, temporary pavement will be constructed on the southern side of the intersection as part of the enabling works for the closure of Reeves Road. This will allow lanes to be shifted over while works are undertaken within the intersection footprint, as well as maintaining the majority of the existing number of lanes. The temporary realignment will be constructed and ready for use upon completion of the new Ti Rakau Drive / Palm Avenue / Aylesbury Street crossroads intersection further west, early in the construction programme.

**Figure 39** shows the indicative work zone of the Ti Rakau Drive / Reeves Road intersection.

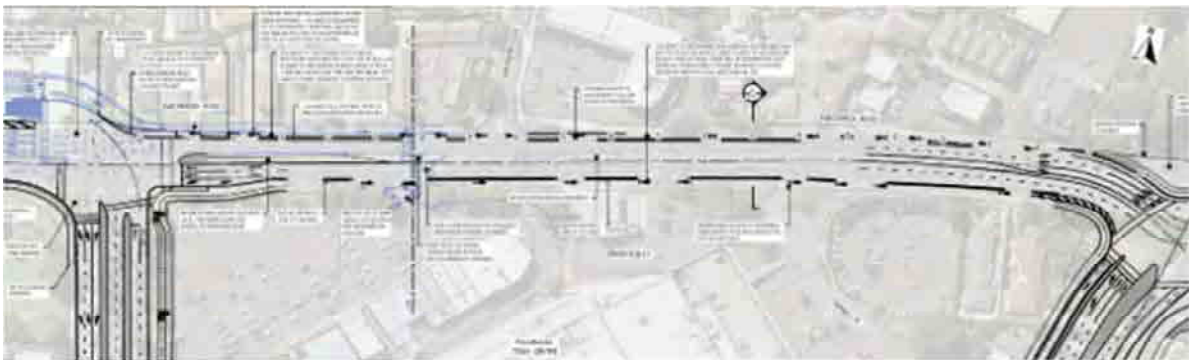


**Figure 39: Indicative work zone – Ti Rakau Dr / Reeves Rd intersection**

#### 4.2.1.6 Pakuranga Road

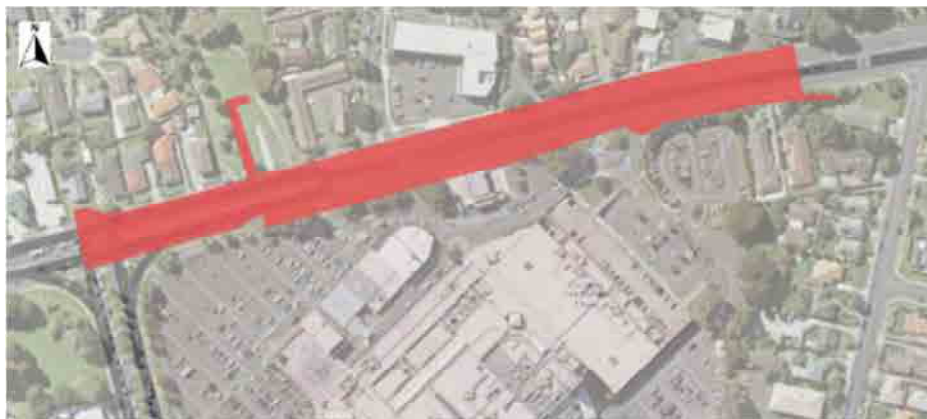
Pakuranga Road between Ti Rakau Drive and the RRF will consist of four lanes (two lanes per direction) with unidirectional cycleways on each side. The eastern approach of Pakuranga Road at the intersection with Ti Rakau Drive will consist of a short left-turn lane and two full length through lanes. As stated in **Section 4.2.1.3**, the western Pakuranga Road approach at the intersection with the RRF will consist of two full length left-turn lanes and one short right-turn lane.

The works associated with Pakuranga Road will involve converting the existing kerbside lanes to cycleways while retaining the existing footpaths along both sides. The existing signalised midblock pedestrian crossing on Pakuranga Road, constructed as part of EB1, will remain. **The Pakuranga Road / Brampton Court priority-controlled access to the Pakuranga Plaza will be realigned to improve access safety for right turners.** **Figure 40** below shows the proposed layout of Pakuranga Road from Ti Rakau Drive to the RRF tie-in.



**Figure 40: Pakuranga Rd from Ti Rakau Dr to the RRF**

The initial stages of the Pakuranga Road construction will also include longitudinal drainage works between Kentigern Close and St Kentigern College, and will be undertaken concurrently with the enabling works, early in the construction programme. The new longitudinal drainage will tie into the existing drainage infrastructure crossing Pakuranga Road. Works to complete the tie-in of the drainage works between Kentigern Close and the signalised pedestrian crossing will be undertaken after the RRF is completed. **Figure 41** shows the indicative work zone for Pakuranga Road. Construction works along Pakuranga Road are anticipated to have a duration of approximately six months.



**Figure 41: Indicative work zone – Pakuranga Rd**

#### 4.2.2 EB3R – Design and Construction Works

The general extent of the EB3R project area encompasses the following roads (see **Figure 42**, yellow):

- Ti Rakau Drive from Reeves Road to the western Ti Rakau Bridge abutment
- Short sections of Tiraumea Drive, Mattson Road, Roseburn Place, Edgewater Drive west, Wheatley Avenue, Edgewater Drive east, Gossamer Drive and Freemantle Place



**Figure 42: EB3R general extent (yellow)**

Ti Rakau Drive in the EB3R section of the Project will largely consist of two lanes per direction, similar to the existing environment. Online bus lanes will be provided along the entire length of the corridor from Reeves Road to Gossamer Drive. For the purposes of this ITA the online bus lanes will terminate at the western approach of the Ti Rakau Drive / Gossamer Drive intersection. An intermediate bus station will be provided in the centre of the carriageway between Roseburn Place and Wheatley Avenue, and another intermediate bus station near the intersection with Gossamer Drive. A full set of EB3R layout drawings is provided in **Appendix C**.

#### 4.2.2.1 Ti Rakau Drive – Reeves Road to Mattson Road

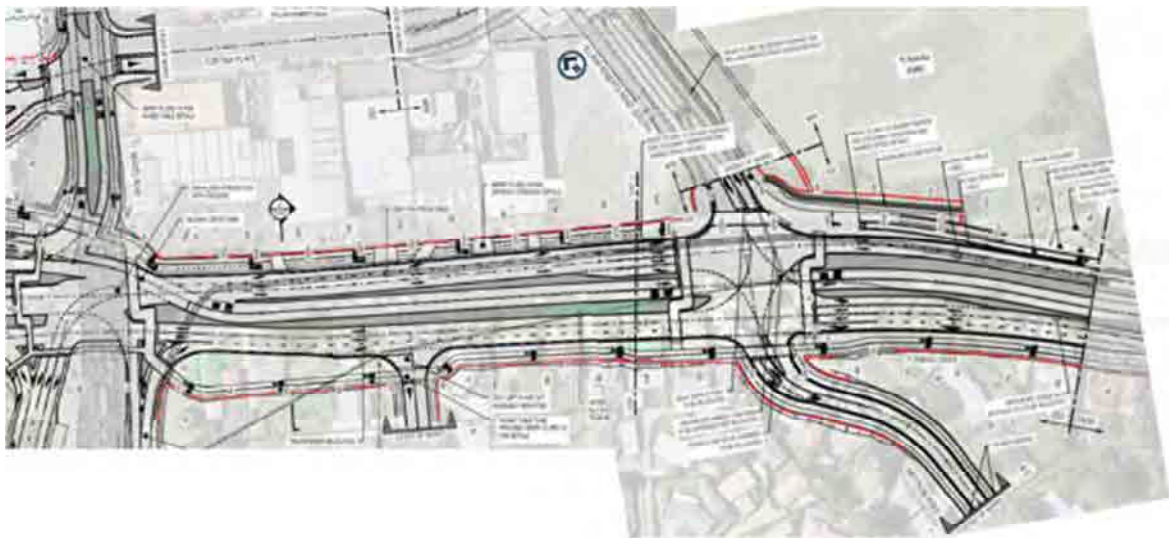
This section of Ti Rakau Drive, between Reeves Road and Mattson Road, will consist of three lanes per direction. Bus lanes will also be provided along the centre of the carriageway.

The Tiraumea Drive intersection will remain left-in left-out only, as per the existing environment.

The intersections with William Roberts Road and Mattson Road will be combined into one signalised crossroads intersection. Both the William Roberts Road and Mattson Road approaches will consist of two lanes, a short left-turn lane and a full length shared through and right-turn lane. The Ti Rakau Drive eastern approach will consist of one full length shared through and left-turn lane, two full length through lanes and one short shared right-turn and U-turn lane. The western approach will consist of one full length left-turn lane, two full length through lanes and one short right-turn lane.

A bidirectional cycleway will be provided on the northern side of Ti Rakau Drive between Reeves Road and William Roberts Road, while a unidirectional cycleway (westbound) will be provided on the southern side as well.

Signalised shared crossings will be provided on all approaches at the Ti Rakau Drive / William Roberts Road / Mattson Road intersection. -A raised table will be provided across Tiraumea Drive. **Figure 43** shows the proposed layout of Ti Rakau Drive from Reeves Road to Mattson Road.



**Figure 43: Ti Rakau Dr from Reeves Rd to Mattson Rd**

The construction of this section of Ti Rakau Drive will be divided into six phases and will for the majority of its duration occur during the Reeves Road closure.

The first **four** phases will largely consist of offline works to construct the new westbound lanes on the acquired properties on the southern side of the carriageway. In addition, these **phases will include the construction of the Mattson Road approach to the new crossroads intersection** and will also include the construction of the Tiraumea Drive intersection.

The next phase will consist of works in the centre of the carriageway to construct the new bus lanes, after the completion of the RRF. During Phase 5, the new signalised Ti Rakau Drive / William Roberts Road / Mattson Road crossroads intersection will be operational as well as all lanes on the William Roberts Road approach.

Finally, Phase 6 will include works in the existing eastbound lanes while traffic is diverted onto the newly constructed bus lanes. **Figure 44** shows the indicative works zones for Ti Rakau Drive from Reeves Road to Mattson Road. Construction of this section of Ti Rakau Drive is anticipated to have a duration of approximately one and a half years.



**Figure 44: Indicative work zones – Ti Rakau Dr from Reeves Rd to Mattson Rd**

#### 4.2.2.2 Ti Rakau Drive – Mattson Road to Gossamer Drive

The intersections with Roseburn Place, Marriott Road, Edgewater Drive west and Chevis Place, and Wheatley Avenue which currently provide for all movements in/out of the side roads, will be converted to LIL0 intersections. A U-turn facility will be provided along Ti Rakau Drive, between Roseburn Place and Marriott Road for the westbound traffic (see Figure 45). The Ti Rakau Drive / Edgewater Drive east intersection will be signalised, and a separate turn lane will be provided to allow eastbound motorists to turn right from Ti Rakau Drive into Edgewater Drive east or make a U-turn to return along Ti Rakau Drive in a westbound direction. This will provide access for eastbound traffic into Wheatley Avenue and the properties on the southern side of Ti Rakau Drive, between Edgewater Drive east and west.

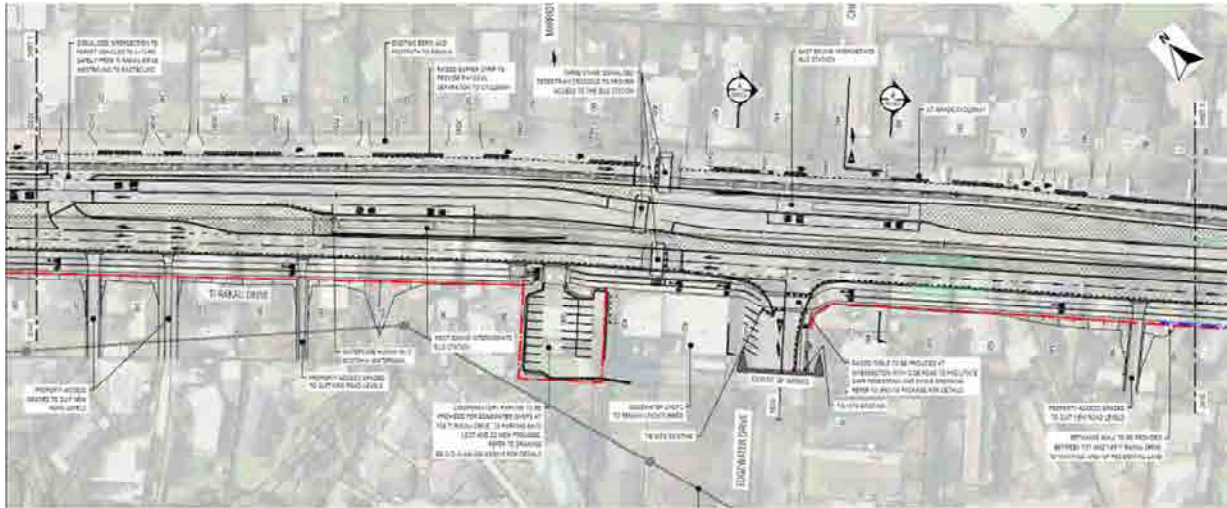


Figure 45: Ti Rakau Dr between Roseburn Pl and Wheatley Ave

Additionally, a U-turn manoeuvre will also be provided on the western approach at the Ti Rakau Drive / Gossamer Drive intersection. This is to provide access from Ti Rakau Drive eastbound into the properties on the southern side of Ti Rakau Drive between Edgewater Drive east and Freemantle Place. A U-turn manoeuvre will also be provided on the eastern approach of the Ti Rakau Drive / William Roberts Road / Mattson Road intersection to provide access onto Ti Rakau Drive eastbound from Roseburn Place.

A three-stage raised signalised crossing will be provided, between Marriot Road and Edgewater Drive, to facilitate pedestrian access to the bus station from both sides of Ti Rakau Drive. A two-stage signalised crossing will also be provided on the eastern approach of the Edgewater Drive east intersection. Raised tables will be provided across Roseburn Place, Edgewater Drive west and Wheatley Avenue.

Figure 46 below shows the proposed layout of the Ti Rakau Drive / Gossamer Drive intersection. The western approach will consist of a short left-turn lane, two full length through lanes and one shared right-turn and U-turn short lane. The eastern approach will consist of one full length shared through and left-turn lane, one full length through lane, one short bus queue-jump lane and two short right-turn lanes.

The eastbound bus lane will transition to the northern side of Ti Rakau Drive to the proposed bus stop, and taper back into Ti Rakau Drive before the Ti Rakau Bridge. The southern Freemantle Place approach will consist of a short left-turn lane and a full length shared through and right-turn lane. The northern Gossamer Drive approach will consist of one short and one full length left-turn lane, and a shared through and right-turn short lane.

Signalised shared pedestrian and cyclist crossings will be provided on the northern and western approaches at the Ti Rakau Drive / Gossamer Drive intersection, with signalised pedestrian crossings on all other approaches. The Ti Rakau Drive / Gossamer Drive intersection will also be a raised intersection.



**Figure 46: Ti Rakau Dr at Gossamer Dr**

Throughout the construction of EB3R, the preferred methodology is to complete works offline to allow space to be provided for future lateral shifts of running lanes. The EB3R construction works between Mattson Road and Gossamer Drive are anticipated to occur over a period of approximately three years, and will be split into three main phases.

#### 4.2.2.3 Ti Rakau Drive – Mattson Road to Gossamer Drive (Phase 1)

Phase 1 will involve constructing the new westbound lanes offline in the acquired properties along the southern side of Ti Rakau Drive and rebuilding pavement at intersections where the new busway intersects. This phase will be divided into six sub-phases, a summary of which is provided in **Table 17** and will occur during the closure of Reeves Road.

**Table 17: EB3R Phase 1 construction summary**

Sub-Phase	Summary of Activities
1a-b	Construction of Roseburn Place in two sub-phases.
1c	Edgewater Drive west in one sub-phase.
1d-e	Wheatley Avenue in two sub-phases.
1f	Edgewater Drive east in one sub-phase.

The new westbound carriageway will consist of two lanes, similar to the existing environment. Establishing works will also be able to commence on the north-east quadrant of the Ti Rakau Drive / Gossamer Drive intersection to enable construction of the eastbound Gossamer Drive bus station to commence at any time.



**Figure 47** below shows the indicative work zones for Phase 1 of EB3R, and is anticipated to have a duration of approximately one year and three months.



**Figure 47: Indicative work zones – EB3R Phase 1**

The pavement type specified for design requires closures of specific roadway sections for periods of at least one week before being opened to general traffic. These roadway sections have been divided into two categories with varying Temporary Traffic Management (TTM) approaches.

**Category 1 (Detour Loops) – Edgewater Drive west and east:**

The preferred approach to construct pavement through these intersections is to close one intersection at a time. As Edgewater Drive is a loop with two accesses to Ti Rakau Drive, traffic will be detoured to one end of the loop enabling the other end to be closed and rebuilt. The full closures are anticipated to reduce the overall time TTM will be required.

As above, Phase 1c will consist of the construction of the Edgewater Drive west intersection. All traffic along Edgewater Drive will be diverted to the Ti Rakau Drive / Edgewater Drive east intersection. A temporary traffic signal will be provided at this intersection to aid vehicles turning right into and out of Edgewater Drive. Phase 1f will include the construction of the Edgewater Drive east intersection, and all traffic along this side road will be diverted to the existing traffic signal at Edgewater Drive west.

## Category 2 (Cul-de-sac Roads) – Wheatley Avenue and Roseburn Place:

Two cul-de-sac roads are located along Ti Rakau Drive that enable residential property access. To maintain access through Wheatley Avenue and Roseburn Place intersections, the approaches will be constructed in halves with temporary traffic signals installed and set back from the works, creating a one-way system on the side roads. As above, these intersections will be constructed during sub-phases 1a-b and 1d-e, respectively.

To minimise disruption to the main road, vehicles entering the cul-de-sac will have right-of-way. Green phases for vehicles leaving the cul-de-sac roads will only be triggered on the basis of demand. Traffic volumes on the side roads are predicted to be low during both peak periods (see **Table 18**).

**Table 18: Ti Rakau Dr side road traffic volumes (2028)<sup>20</sup>**

Side Road	Movement Out	AM Peak	PM Peak
Roseburn Pl	Left	20	7
	Right	10	8
	<b>Total</b>	<b>30</b>	<b>15</b>
Wheatley Ave	Left	31	22
	Right	0	0
	<b>Total</b>	<b>31</b>	<b>22</b>

Approximately one vehicle every two minutes would require access onto Ti Rakau Drive from Roseburn Place and Wheatley Avenue during the peak periods. Improved performance is expected on the side roads as the temporary traffic signal control would improve the delay currently being experienced at the priority-controlled intersections.

An alternative approach is also being considered whereby traffic to/from these side roads will be diverted to Edgewater Drive west and east, respectively, via temporary access tracks along the back of the acquired properties. This approach would support a more efficient construction programme. As above, the traffic volumes on these side roads are expected to be low during the peak periods, and the effects of this additional traffic at the Edgewater Drive intersections is expected to be low.

### Freemantle Place:

The construction of the Freemantle Place approach will be brought forward in the programme, and will be undertaken during Phase 1 in EB3R (Mattson Road to Gossamer Drive). This will involve temporarily closing the kerbside left-turn short lane to construct the new kerblines.

### Ti Rakau Drive / Gossamer Drive Intersection:

The Gossamer Drive approach enabling works will also be undertaken during Phase 1 of EB3R (Mattson Road to Gossamer Drive), see **Section 3.10.3.2** for a detailed description. These works will be undertaken before the closure of Reeves Road.

<sup>20</sup> Traffic volumes sourced from the WRRE AIMSUN model, with a 2028 horizon year.

Lastly, during Phase 1 of EB3R (Mattson Road to Gossamer Drive), the Ti Rakau Drive eastbound and westbound left-turn slip lanes at this intersection will be converted to a signalised left-turn once the necessary stacking space has been constructed.

#### 4.2.2.4 Ti Rakau Drive – Mattson Road to Gossamer Drive (Phase 2)

Phase 2 will consist of the construction of the bus lanes in the centre of Ti Rakau Drive and is expected to be undertaken during the closure of Reeves Road. The new bus lanes will tie into the EB2 bus lanes to the west and will terminate at Gossamer Drive to the east. The new Edgewater Drive bus station, the new westbound Gossamer Drive bus station and the new U-turn facility will also be constructed during this phase.

During Phase 2 of EB3R (Mattson Road to Gossamer Drive), the right-turn movements from all side roads will require removal, resulting in the intersections supporting LIFO movements only. To mitigate these adverse effects to traffic, two new U-turn facilities will be constructed near Roseburn Place and Wheatley Avenue, respectively. The works in the median along Ti Rakau Drive, to enable the operation of the U-turn facilities, will be minimal and will be undertaken during night works. In the interim, while the bus lanes along the centre of Ti Rakau Drive are under construction, these U-turn facilities are expected to be unsignalised.

To provide access into Wheatley Avenue and Edgewater Drive east, while travelling eastbound on Ti Rakau Drive, a U-turn movement will also be provided on the western approach of the Ti Rakau Drive / Gossamer Drive intersection. Efforts will be made to complete this piece of work as early as possible during Phase 2 of EB3R (Mattson Road to Gossamer Drive).

**Figure 48** below shows the indicative work zone for Phase 2 of EB3R (dark grey), and is expected to have a duration of approximately 11 months.



**Figure 48: Indicative work zone – EB3R Phase 2**

4.2.2.5 *Ti Rakau Drive – Mattson Road to Gossamer Drive (Phase 3)*

Phase 3 will consist of works in the existing eastbound lanes and will have some temporal overlap with Phase 2 as some sections are completed. This is due to **some** Phase 3 works being completed under night works with discrete closures. **However, the majority of the works under Phase 3 are expected to be completed after the completion of the RRF.**

There is a large number of properties with driveways on the northern side of Ti Rakau Drive, meaning long term access will be required to allow vehicles to traverse through the site. As the pavement only requires resurfacing and not major reconstruction, this work will be completed in sections, with the road being trafficable during the daytime.

**Figure 49** shows the indicative work zones for Phase 3 of EB3R, and is anticipated to have a duration of approximately six months.



**Figure 49: Indicative work zones – EB3R Phase 3**

During Phase 3 of EB3R (Mattson Road to Gossamer Drive), eastbound traffic along Ti Rakau Drive will be diverted onto the new bus lanes. Furthermore, all side roads on the southern side of Ti Rakau Drive will be temporarily converted back to full movement priority-controlled intersections during this phase. This will be enabled by not fully constructing the entire median under the previous phase of work, and by providing short right-turn pockets at Roseburn Place, Edgewater Drive west, Wheatley Avenue and Edgewater Drive east.

Phase 3 construction will also consist of works at the Ti Rakau Drive / Gossamer Drive intersection. Works during Phase 3 of EB3R (Mattson Road to Gossamer Drive) on the western and eastern approaches of the intersection have been brought forward in the construction programme and will occur during the Reeves Road closure, but after the RRF is open. These works will consist of the construction of the approach lanes of the western arm and the departure lanes as well as the medians on the eastern arm. This construction methodology, coupled with the updated construction methodology of Phases 1 and 2 above, will allow for more general traffic lanes to remain open during construction.

## 5 Assessment of Temporary Effects during Construction

The sections below provide an assessment of the temporary effects during construction of EB2 and EB3R including:

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

### 5.1 Construction Effects

#### 5.1.1 Construction Support Areas and Site Access Points

Construction Support Areas (CSAs) and Site Access Points (SAPs) are anticipated to vary throughout the construction phases, shifting as sections of the roadway are completed. The sections below provide details of notable CSAs and SAPs within the EB2 and EB3R project areas as advised by the construction team as well as an assessment of their temporary effects.

##### 5.1.1.1 EB2 – 2 Cortina Place and 5 Reeves Road Site Offices

The properties at 2 Cortina Place and 5 Reeves Road have been acquired by AT and will serve as site offices for the EB2 project area. Therefore, the current use of these properties will no longer exist in the future. It is envisaged that Site Office 1 at 5 Reeves Road will accommodate approximately 120 workstations and Site Office 2 at 2 Cortina Place will accommodate approximately 30 workstations at the peak of construction. Office hours for the site offices will be from 07:00 to 19:00. **Figure 50** shows the location of Site Office 1 and 2 in the EB2 project area.



**Figure 50: Site Office 1 and 2 locations**

During the closure of Reeves Road, vehicle access to Site Office 1 from Reeves Road will not be maintained, although the property will still be accessible via Cortina Place. Pedestrian access to the property will be maintained at all times. Approximately 11 off-street parking spaces will be maintained on the eastern side of the property for visitors and deliveries.

The closure of Reeves Road will result in the loss of the access to Site Office 2 from the western frontage, however the property will still be accessible from Cortina Place. Pedestrian access to the property will be maintained at all times. The building in the centre of the property will be used as site office space, while the building along the eastern frontage of the property (red outline) will be demolished. Approximately five off-street parking spaces will be maintained on site and accessed from Cortina Place for material deliveries.

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. A WTMP will be developed to achieve this. The aim of the WTMP will be to reduce the number of private vehicles travelling to the worksites and to increase the accessibility of the worksites through more travel options. Therefore, the temporary traffic effects from the site offices in the first year are expected to be very low. Following the initial year and as construction activities ramp up, a staff carpark will be provided at 26 Ti Rakau Drive.

### 5.1.1.2 EB2 – 26 Ti Rakau Drive Staff Carpark

It is envisaged that the property at 26 Ti Rakau Drive will be acquired by AT and will serve partially as a site office staff parking area and partially as a work zone for the new Pakuranga Town Centre bus station during construction. The existing building and parking area on the property are not in use and therefore the Project will have no effects on the property from a transport perspective.

Once the existing infrastructure has been demolished and the work zone has been established, a temporary staff carpark will be established until the construction of the Kiss-and-Ride facility. For the purposes of this ITA it was assumed the staff carpark will provide 150 parking spaces, one parking space per workstation in Site Office 1 and 2. The property currently has no direct access from Ti Rakau Drive, and is accessed via Reeves Road and the internal road network inside the Pakuranga Plaza.

**Figure 51** below shows the location of the CSA to be located at 26 Ti Rakau Drive.



**Figure 51: 26 Ti Rakau Dr CSA location**

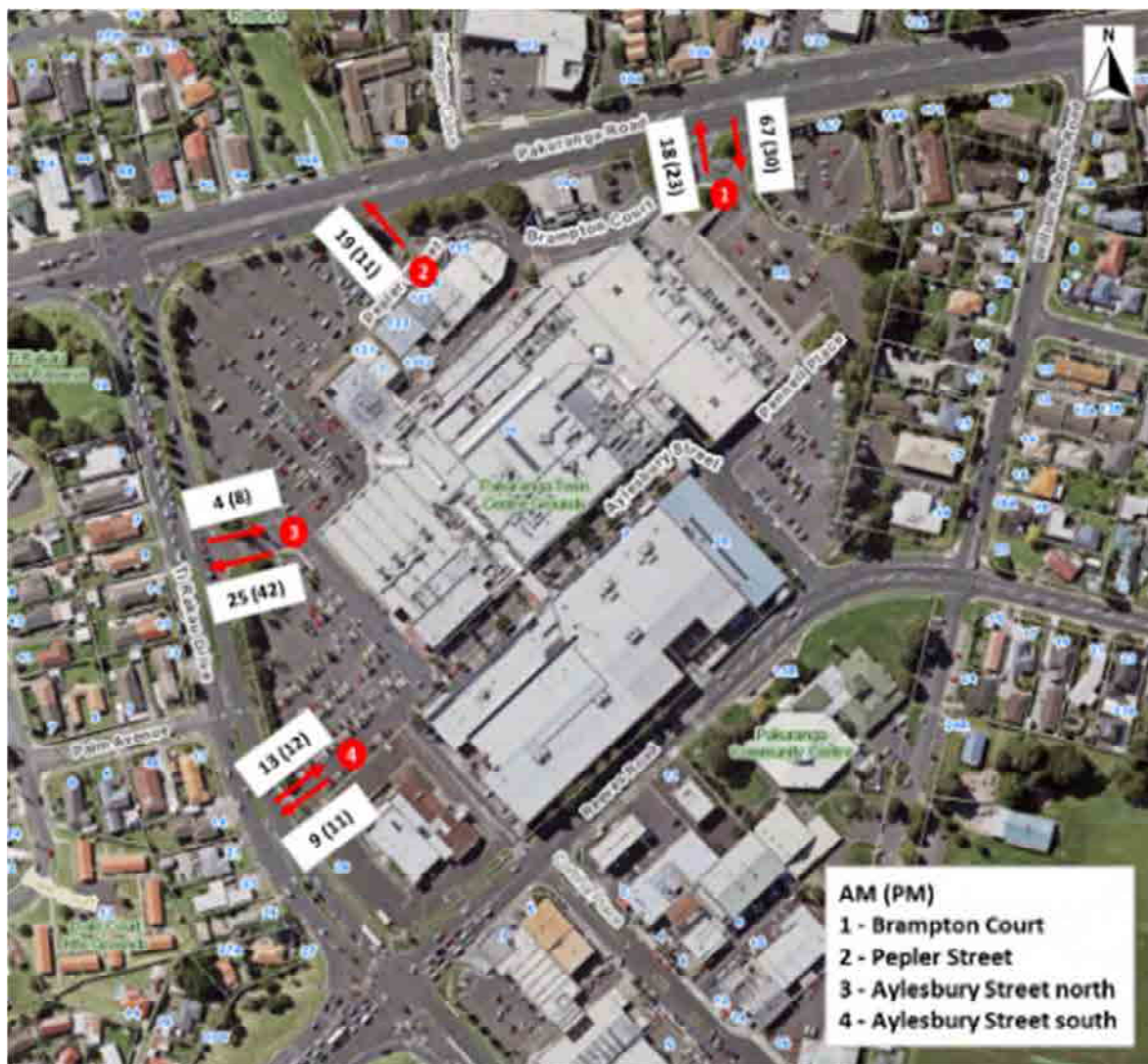
In the existing environment, the Pakuranga Plaza has six access points allowing for both in and out movements, with a seventh at Pepler Street allowing for movements out onto Pakuranga Road only. Throughout the construction programme of EB2, the accesses to Pakuranga Plaza will undergo several changes, some of which will be closed temporarily. Further details of effects to property access at the Pakuranga Plaza are provided in **Section 5.5.5.3**.



For the purposes of assessing the effects of the staff carpark, the ‘worst-case’ has been considered here, which will be during the Reeves Road closure. During this closure, access to this carpark will be gained via the three remaining accesses at Aylesbury Street north and south and at Brampton Court. It should be noted that the Pepler Street exit will also be open during this time.

As stated in **Section 5.1.1.1**, office hours for the site offices will be from 07:00 to 19:00, meaning a large proportion of site office staff is expected to travel on the road network outside of the AM and PM peaks. For the purpose of this ITA, assumptions were made to consider the staff carpark fully utilised and 50% of staff would be arriving/departing during the AM and PM peak hours, respectively.

Therefore, 150 parked vehicles, which would translate to 75 veh/h added to the traffic network and these vehicles would be accessing the Pakuranga Plaza from three access points during the peak hours. **Figure 52** below shows the background traffic volumes for both the AM and PM peak hours at these access points (PM traffic volumes in brackets).



**Figure 52: Pakuranga Plaza background traffic volumes<sup>21</sup>**

<sup>21</sup> Traffic volumes sourced from the Do-Minimum AIMSUN model, with a 2028 horizon year.

The background traffic volumes on these access points are expected to be low during both the AM and PM peak hours. Furthermore, it would not be unreasonable to assume that the additional 75 veh/h would be distributed roughly evenly across these access points or to where the highest capacity is available. Therefore, the temporary effects of the staff carpark are expected to be very low.

#### 5.1.1.3 EB2 – 2R Ti Rakau Drive Pennell Place CSA

During construction, the parking area off Pennell Place in the Pakuranga Plaza will be temporarily occupied and established as a CSA. **Figure 53** shows the location of the CSA.



**Figure 53: Pennell PI CSA location**

The CSA will be used to support the construction of the RRF. In particular, it will be used to receive and pre-assemble the special Gantry (bespoke crane) to be used to lift and position the ‘Super-T’ beams. The CSA will also provide parking on site for specialist personnel and deliveries. The Pennell Place parking area will be occupied for approximately two years and two months.

Given the nature and operation of the CSA, general vehicle traffic volumes entering/exiting from the site are considered negligible. The operation and movement of the Gantry 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).

Therefore, the effects of the CSA on the transport network are expected to be very low. Effects to property access and parking at the Pakuranga Plaza due to the occupation are discussed in further detail in **Section 5.5.5.3**.

#### 5.1.1.4 EB2 – William Roberts Road North Construction Yard

A CSA will be located on the south-western quadrant of the Pakuranga Road / William Roberts Road intersection and will serve as a laydown area of materials and aggregates. This construction yard is subject to a separate resource consent application<sup>22</sup>, but is mentioned here for completeness.

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 safety of turning across three lanes of through traffic. Further details on intersection performance are provided in **Section 5.2.2.3 to Section 5.2.2.5**.

#### 5.1.1.5 EB2 – 14 Seven Oaks Drive Site Office / Laydown Area

A site office / laydown area will be established at 14 Seven Oaks Drive for the construction of EB2. The property has been acquired by AT. As such, the current residential use of this property will no longer exist during construction or at completion, therefore the CSA will have no effects on this property.

**Figure 54** shows the location of the CSA to be located at 14 Seven Oaks Drive.



**Figure 54: 14 Seven Oaks Dr CSA location**

Access will be maintained off Seven Oaks Drive, utilizing the existing driveway. The existing house will be utilised as the office until de-construction of the structure is required. The site will be relatively small, and all parking requirements will be accommodated on site. The temporary effects of this contained site on the road network are expected to be negligible.

<sup>22</sup> LUC60403744

5.1.1.6 EB3R – 12 Bolina Cr, 143 Ti Rakau Dr and 178 Gossamer Dr Site Offices / Laydown Areas

Site offices / laydown areas will be established at 12 Bolina Crescent, 143 Ti Rakau Drive and 178 Gossamer Drive for the construction of EB3R. The properties have been acquired by AT. As such, the use of these properties will no longer exist during construction or at completion, therefore the CSAs will have no effects on these properties.

**Figure 55** shows the location of the CSA to be located at 12 Bolina Crescent.



**Figure 55: 12 Bolina Cr CSA location**

**Figure 56** shows the location of the CSA to be located at 143 Ti Rakau Drive.



**Figure 56: 143 Ti Rakau Dr CSA location**

Figure 57 shows the location of the CSA to be located at 220-222 Ti Rakau Drive and 178 Gossamer Drive.



Figure 57: 178 Gossamer Dr CSA location

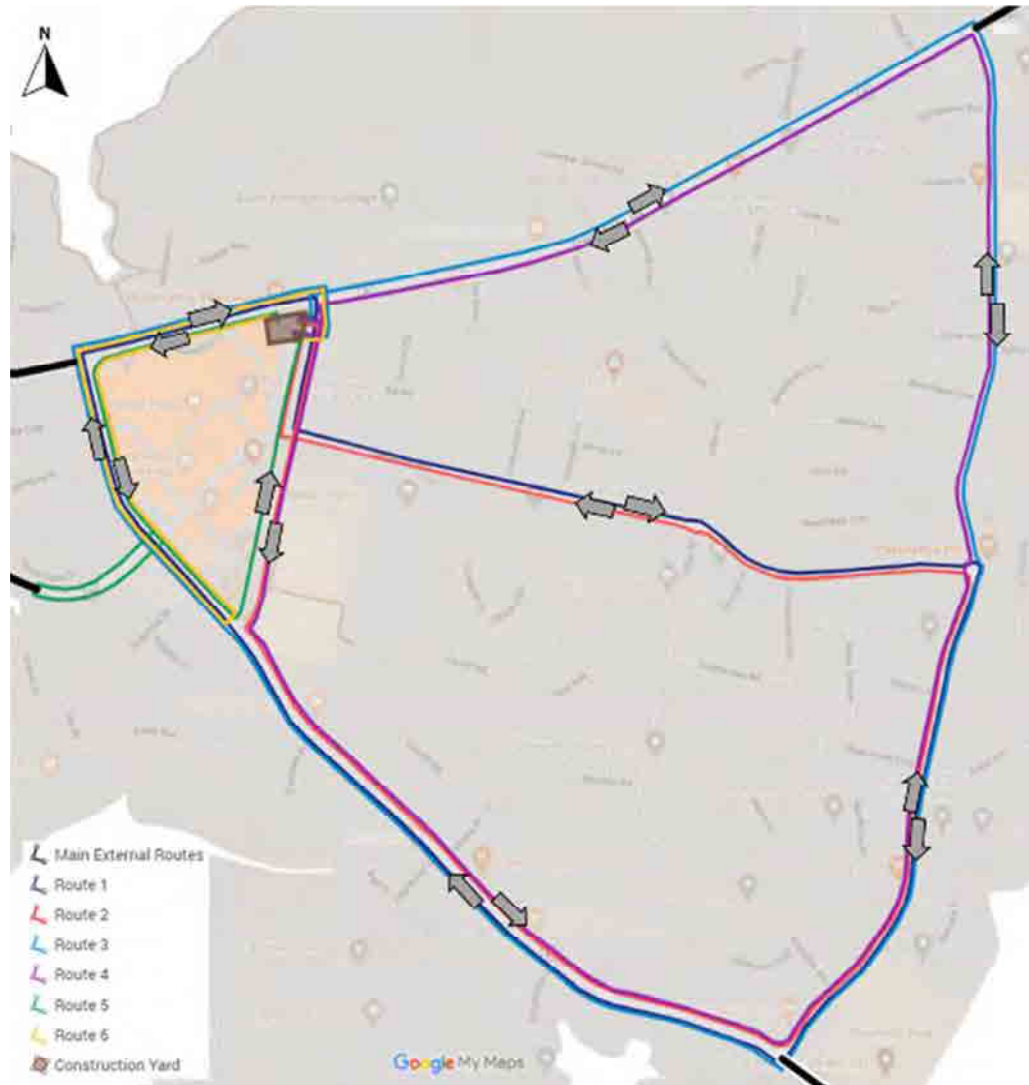
Access will be maintained off Bolina Crescent, Ti Rakau Drive and Gossamer Drive, utilizing the existing driveways. The existing houses will be utilised as offices until de-construction of the structures is required. The sites will be relatively small, and all parking requirements will be accommodated on site. The temporary effects of these contained sites on the road network are expected to be negligible.

### 5.1.2 Construction Vehicle Effects

The sections below provide details on the construction routes, construction traffic volumes, hours of operation and vehicle types as advised by the construction team. Thereafter, an assessment of construction vehicle effects is provided, split into sections of the EB2 and EB3R project areas.

### 5.1.2.1 Construction Routes and Construction Traffic

The construction routes in and around the EB2 and EB3R project areas are shown in **Figure 58**. At the time of writing, suppliers of construction materials had not been confirmed. Therefore, the most likely routes for construction vehicle movements to the project area from plant and material sites not in the immediate vicinity will be the main corridors of Ti Rakau Drive, Pakuranga Road and SEART (main external routes below). The figure also shows the construction yard at 169-173 Pakuranga Road and the ‘internal material transfer routes’ to be used by construction vehicles.



**Figure 58: Construction vehicle routes**

During EB2 and EB3R construction, roughly 50% of materials will be transported directly to the work zones from external supply yards as needed. The remaining 50% will be transported to the construction yard for storage until required. Construction material will be transported from the construction yard to the various work zones via six routes. **Table 19** below provides a description of each route as well as the anticipated number of vehicle movements. The number of vehicle movements also include the carting of demolition materials and excess spoil.

**Table 19: Construction route description and movements**

Route	Construction Activity	Description	Vehicle Movements [veh/h]
Route 1	EB3R Ti Rakau Dr westbound lanes (primary route)	Egress from the construction yard onto William Roberts Rd southbound, then Reeves Rd eastbound, Gossamer Dr southbound, Ti Rakau Drive westbound, Pakuranga Rd eastbound, William Roberts Rd southbound, return to construction yard.	9
Route 2	EB3R Ti Rakau Dr eastbound lanes (primary route)	Egress from construction yard onto William Roberts Rd southbound, then Ti Rakau Dr eastbound, Gossamer Drive northbound, Reeves Rd westbound, William Roberts Road northbound, return to construction yard.	10
Route 3	EB3R Ti Rakau Dr westbound lanes (secondary route)	Egress from construction yard onto William Roberts Rd northbound, then Pakuranga Rd eastbound, Gossamer Dr southbound, Ti Rakau Dr westbound, Pakuranga Rd eastbound, William Roberts Rd southbound, return to construction yard.	8
Route 4	EB3R Ti Rakau Dr eastbound lanes (secondary route)	Egress from construction yard onto William Roberts Rd southbound, then Ti Rakau Dr eastbound, Gossamer Dr northbound, Pakuranga Rd westbound, William Roberts Road southbound, return to construction yard.	9
Route 5	EB2 SEART	Egress from construction yard onto Pakuranga Rd westbound, then Ti Rakau Dr eastbound, SEART southbound, U-turn within work zone, SEART northbound, Ti Rakau Dr eastbound, William Roberts Rd northbound, return to construction yard.	10
Route 6	EB2 Ti Rakau Dr	Egress from construction yard onto Pakuranga Rd westbound, then Ti Rakau Dr eastbound, U-turn within work zone, Ti Rakau Drive westbound, Pakuranga Road eastbound, William Roberts Rd southbound, return to construction yard.	8

Route 1 will be the primary route for the construction of the Ti Rakau Drive westbound lanes with Route 3 as a secondary route in case of congestion or emergencies on Reeves Road. Similarly, Route 2 will be the primary route during the construction of the Ti Rakau Drive eastbound lanes, with Route 4 as a secondary route.

It should be noted that Route 1 and Route 3 will not be operating simultaneously with Route 2 and Route 4. This is due to the construction staging of Ti Rakau Drive in the EB3R project area. The new westbound lanes will be constructed first followed by the bus lanes in the centre and lastly the eastbound lanes.

#### *5.1.2.2 Vehicle Types*

It is anticipated that a range of vehicle sizes and types will be used for the construction activities within the EB2 and EB3R project areas. As stated above, roughly 50% of materials will be transported directly to the work zones as needed along the main external routes of Ti Rakau Drive, Pakuranga Road and SEART. The remaining 50% will be transported to the construction yard for storage until required. It is anticipated that 19m truck and trailers will be used for these activities. Materials from the construction yard will be transported to the various work zones via the six internal routes with smaller vehicles units such as 6-wheeler trucks.

Over-dimensional and over-weight deliveries are also expected; however, these will be infrequent, during low traffic periods such as night deliveries and will travel along appropriate routes such as arterial roads. The Ti Rakau Drive, Pakuranga Road and SEART corridors are well-suited to larger vehicles. Overall, the effects of these types of construction vehicles to the road network are expected to be negligible.

#### *5.1.2.3 Hours of Operation*

The vast majority of construction activities will be undertaken during 'typical weekdays' throughout the construction programme, as well as some weekends. Some construction activities will also be undertaken during lower traffic periods such as Easter and December holiday periods.

The general hours of operation for the construction activities and the construction routes will be from 07:00 to 18:00 on weekdays and 07:00 to 15:00 on Saturdays<sup>23</sup>. As such, construction vehicle movements will be balanced throughout the day, avoiding concentrations of construction traffic during the AM and PM peak hours. Therefore, the effects are expected to be very low.

It is anticipated that some night works will be undertaken to minimise the disruption to the public, businesses and traffic. Night works will be intermittent, and will not be continuous in a single location or activity for more than one month. These works will be controlled in part by the Project's consent conditions and management plans<sup>24</sup>.

The sections below provide an assessment of construction vehicle effects on specific sections of the road network within the EB2 and EB3R project areas.

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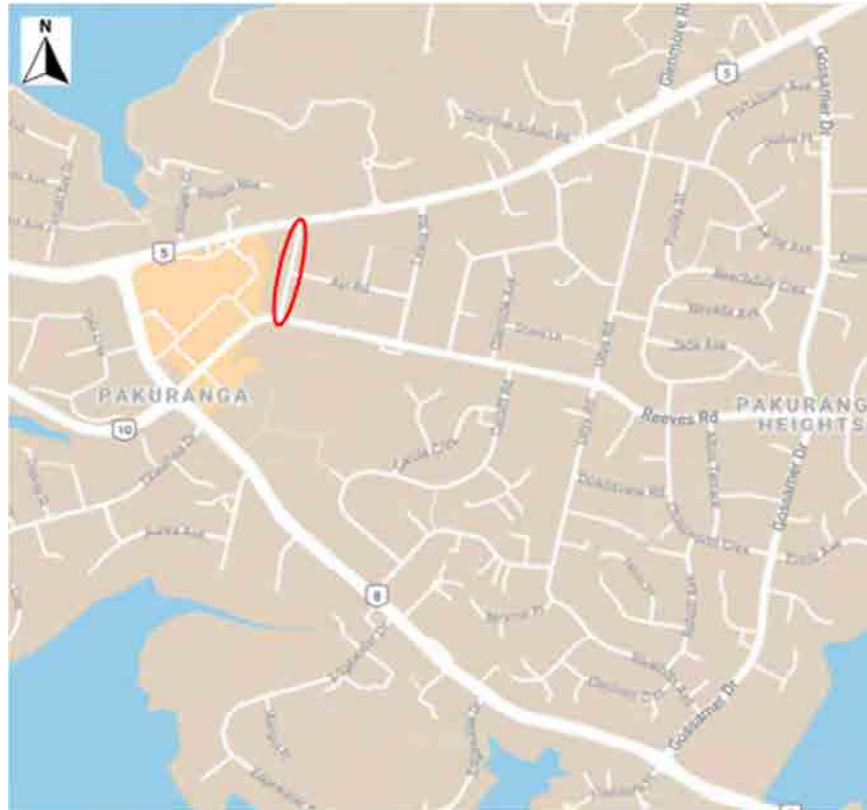
<sup>23</sup> It should be noted that staff will begin arriving at site prior to construction start times and leave after construction end times.

<sup>24</sup> These management plans include the Construction Noise and Vibration Management Plan (CNVMP).



#### 5.1.2.4 EB2 – William Roberts Road North

This section provides an assessment of construction vehicle effects on William Roberts Road north, from Pakuranga Road to Reeves Road (see **Figure 59**).



**Figure 59: William Roberts Rd north construction vehicle effects**

The construction yard will be located on this section of roadway and will support the highest concentration of construction vehicles in the EB2 and EB3R project areas. At the peak of construction, William Roberts Road north is expected to carry an additional 20 veh/h northbound and 19 veh/h southbound. It should be noted that if Reeves Road is experiencing congestion or in case of an emergency, construction vehicles would be rerouted through Pakuranga Road, thereby reducing the construction vehicle traffic volumes on William Roberts Road.

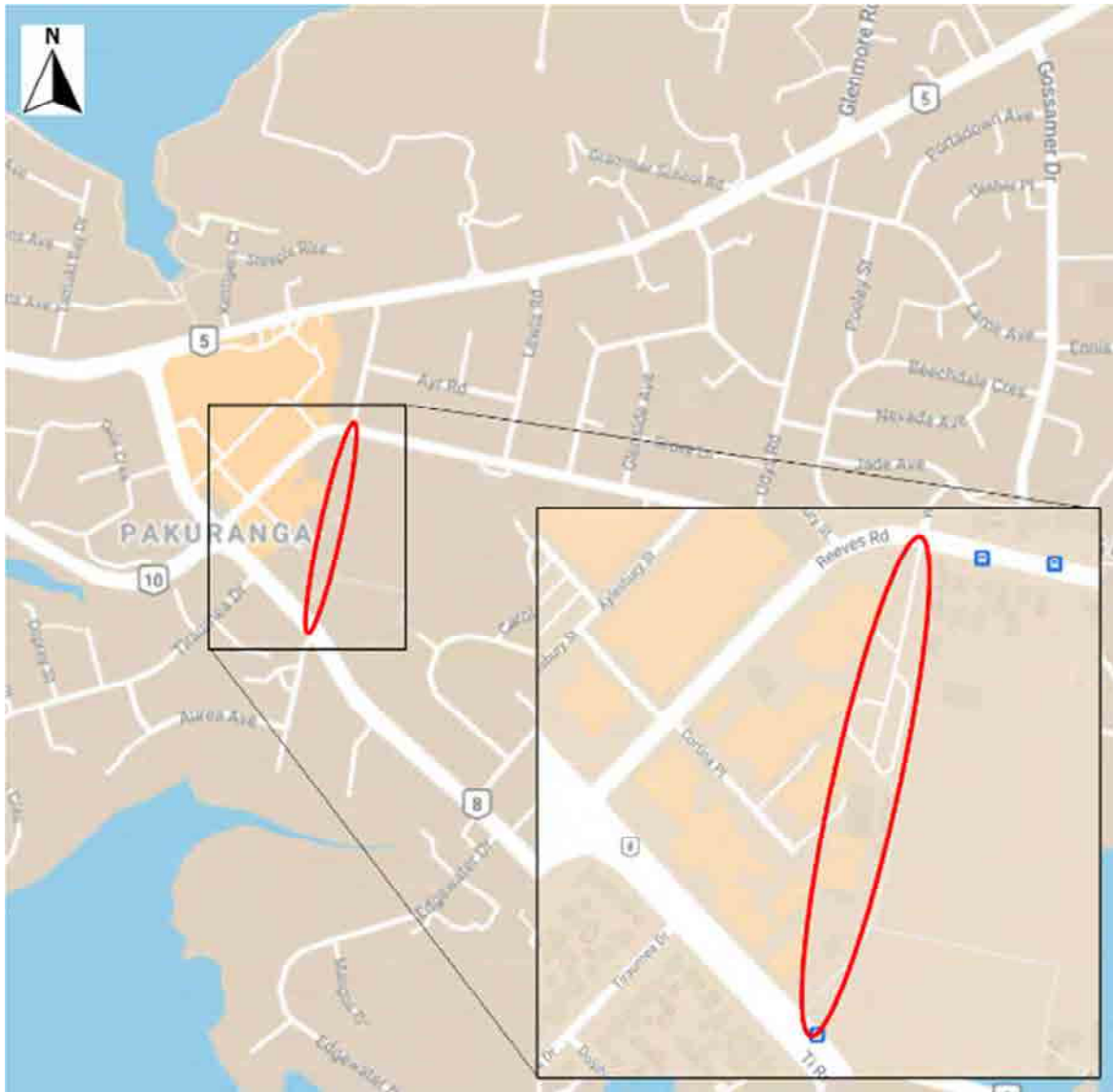
In addition to the properties used by AT for the construction yard, all of the remaining properties on the western side of William Roberts Road north as well as 2 and 2A William Roberts Road on the eastern side have also been acquired and are flagged for demolition. Therefore, the demand for on-street parking along this section of road will be significantly reduced.

Pedestrian refuge islands are currently provided at both ends of William Roberts Road north to provide pedestrians with safe crossing opportunities.

Overall, the addition of the construction vehicles to William Roberts Road north will be roughly one vehicle every three minutes in each direction, on-street parking demand will be significantly reduced, and safe pedestrian crossing points are provided. Therefore, the effects are considered to be very low.

5.1.2.5 EB2 – William Roberts Road South

This section includes William Roberts Road south, from Reeves Road to Ti Rakau Drive, once the WRRE is completed (see **Figure 60**).



**Figure 60: William Roberts Rd south construction vehicle effects**

At the peak of construction, William Roberts Road south is expected to carry an additional 10 veh/h northbound and 10 veh/h southbound.

Some properties with vulnerable users such as the Pakuranga Leisure Centre, Barnardo’s Early Learning Centre, Ti Rakau Park, and Dementia Auckland are located along this section of road. **Figure 61** below shows the location of these community and educational facilities.



**Figure 61: William Roberts Rd south community and education facilities**

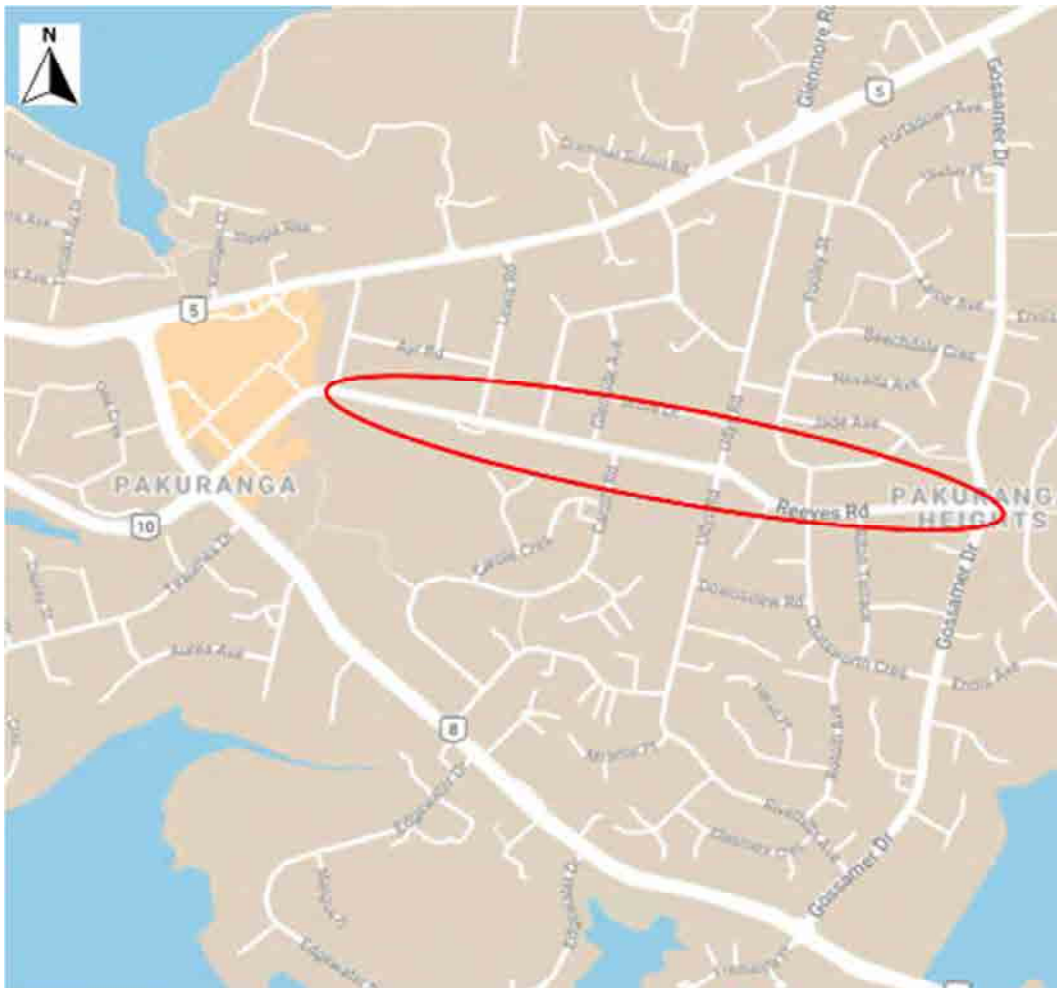
However, once the William Roberts Road extension is completed, a low-speed environment will be created through a combination of the **raised tables** at the William Roberts Road / Cortina Place intersection, the raised pedestrian crossing near Ti Rakau Park and a 30 km/h posted speed limit. Furthermore, pedestrians will also be provided with safe crossing points at the Ti Rakau Drive / William Roberts Road and the William Roberts Road / Cortina Place intersections.

Nevertheless, appropriate community engagement will be undertaken to raise awareness of the increase in construction vehicles that will pass through the area. Construction vehicle drivers will also be briefed on these properties so that additional caution is employed when driving through the area. This will be achieved through the CTMP.

Overall, William Roberts Road is expected to carry roughly one construction vehicle every six minutes northbound and southbound, and a combination of speed calming features will create a low-speed environment. Therefore, the effects are considered to be very low.

### 5.1.2.6 EB2 – Reeves Road

This section includes Reeves Road from William Roberts Road in the west to Gossamer Drive in the east (see **Figure 62**).



**Figure 62: Reeves Rd construction vehicle effects**

During construction of the Ti Rakau Drive westbound and eastbound lanes, Reeves Road will support an additional 9 veh/h in the eastbound direction and 10 veh/h in the westbound direction, respectively. It should be noted that these two construction phases will not occur simultaneously.

Reeves Road, in the existing environment, serves as a through route between Pakuranga Town Centre and Pakuranga Heights. As such, the carriageway consists of 4.4 m wide lanes and a 1.8 m flush median along the entire length. It also serves as a bus route for the 711 service.

In the existing environment there are three educational facilities that front Reeves Road, which will experience an increase in heavy vehicle traffic volumes. The Pakuranga Intermediate School, KIDSpace Early Learning Centre Pakuranga, and the Pakuranga Kindergarten are educational facilities with vulnerable users, and all have direct access off Reeves Road in the existing environment. The locations of these facilities are shown in **Figure 63** below.



**Figure 63: Reeves Rd education facilities**

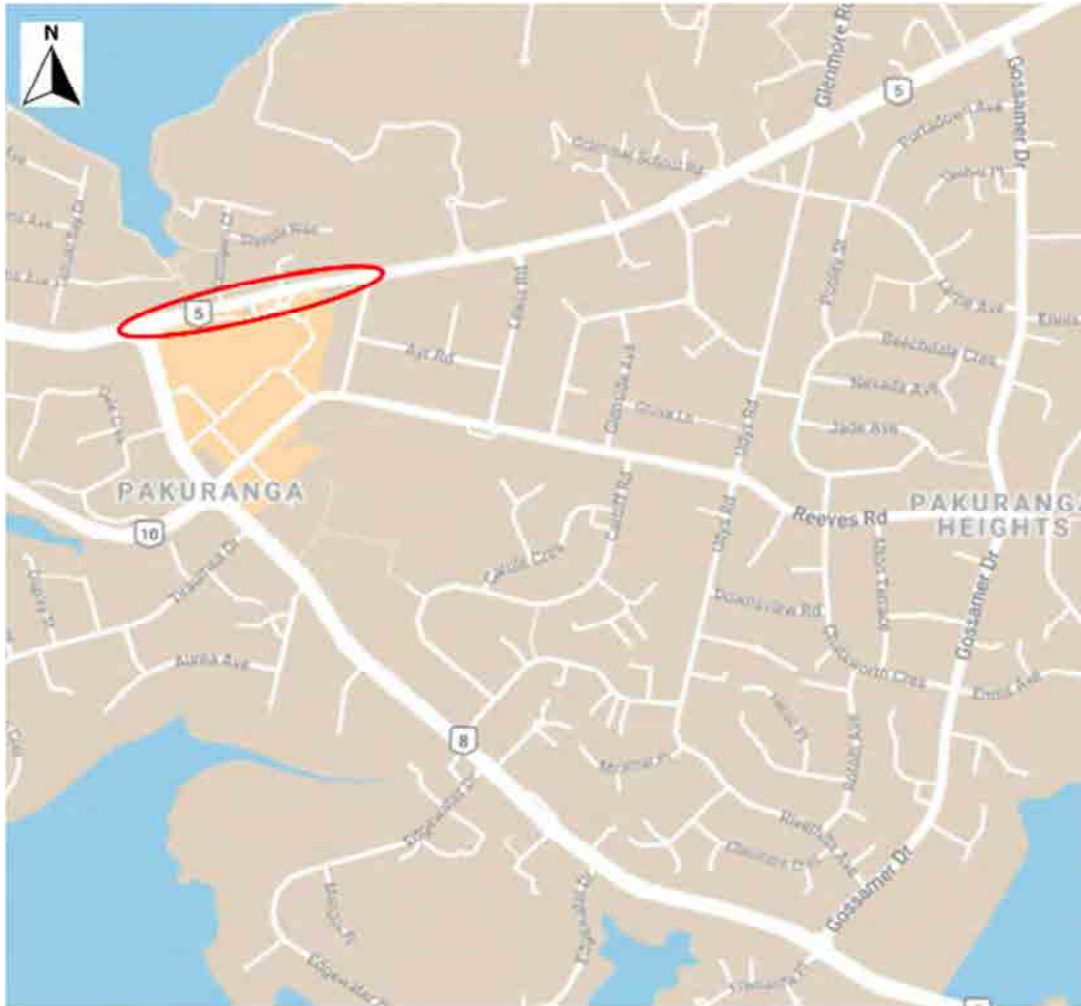
The users of the facilities are, however, currently provided with ample and safe crossing facilities. Pedestrians are provided with a signalised pedestrian crossing outside the Pakuranga Intermediate School, and a pedestrian crossing near Cardiff Road for users of the KIDSpace Early Learning Centre. An uncontrolled pedestrian crossing is located near Gerwyn Place outside the Pakuranga Kindergarten; however, a pedestrian refuge island is provided here to facilitate a staged crossing if required.

Nevertheless, appropriate community engagement will be undertaken to raise awareness of the increase in construction vehicles that will pass through the area. Construction vehicle drivers will also be briefed on these properties so that additional caution is employed when driving through the area. This will be achieved through the CTMP.

Overall, Reeves Road will carry roughly one construction vehicle every six minutes either in the westbound or eastbound directions at the peak of construction. Furthermore, Reeves Road consists of a wide carriageway which supports larger sized vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be very low.

### 5.1.2.7 EB2 – Pakuranga Road

This section includes Pakuranga Road from Ti Rakau Drive in the west to William Roberts Road in the east (see **Figure 64**).



**Figure 64: Pakuranga Rd construction vehicle effects**

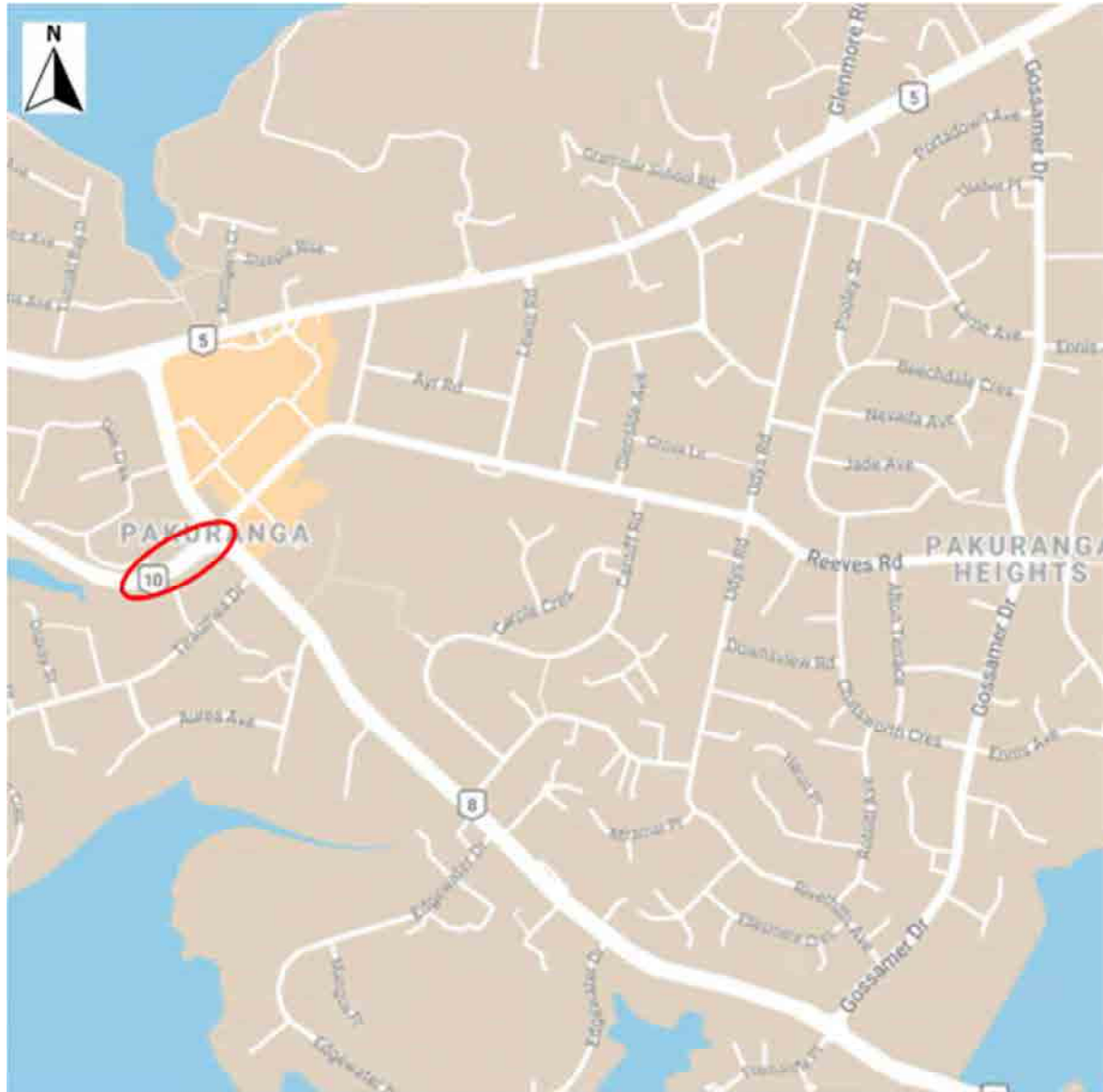
At the peak of construction Pakuranga Road is expected to carry an additional 17 veh/h eastbound and 18 veh/h westbound.

Pakuranga Road is an arterial road, and will for the majority of the construction period consist of three lanes per direction. Multiple bus services run along this road and as such Pakuranga Road is well-suited to larger sized vehicles. Signalised pedestrian crossings are also provided at the Ti Rakau Drive / Pakuranga Road intersection and the Pepler Street exit from Pakuranga Plaza.

Overall, Pakuranga Road will carry roughly one construction vehicle every three minutes eastbound and westbound at the peak of construction. Furthermore, Pakuranga Road is an arterial route supporting large vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be negligible.

5.1.2.8 EB2 – SEART

This section includes SEART from Ti Rakau Drive to the southern abutment of the RRF, see **Figure 65**.



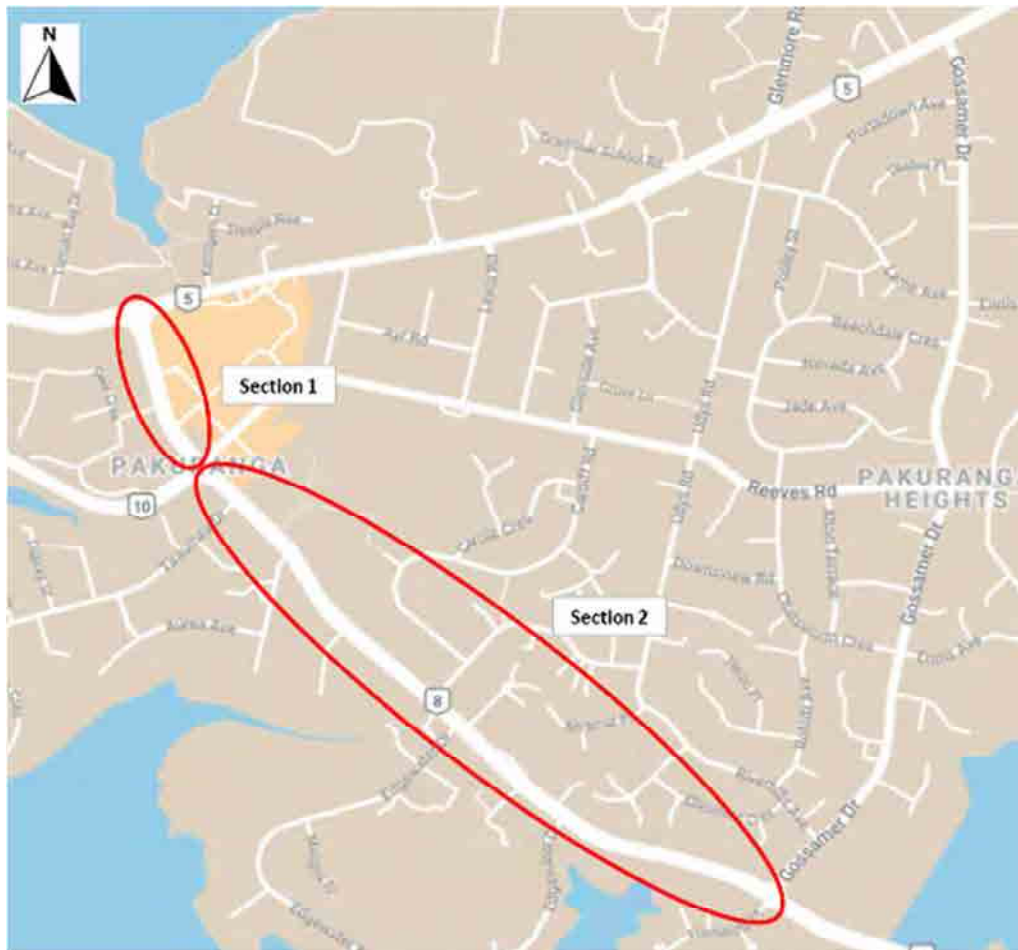
**Figure 65: SEART construction vehicle effects**

During construction of the RRF southern abutment, construction vehicles will enter onto SEART turning right from the western Ti Rakau Drive approach and will gain access to the work zone from the on-ramp. A 180° turn will be executed within the work zone, allowing construction vehicles to exit back onto the SEART off-ramp. Construction vehicles will head back to the construction yard by turning right onto Ti Rakau Drive.

At the peak of construction, the SEART on-ramp and off-ramp are expected to carry an additional 10 veh/h each, which translates to one construction vehicle every six minutes. Therefore, the effects are considered to be negligible.

5.1.2.9 EB2 and EB3R – Ti Rakau Drive

This section includes Ti Rakau Drive between Pakuranga Road to SEART (Section 1) and SEART to Gossamer Drive (Section 2), see **Figure 66**.



**Figure 66: Ti Rakau Dr construction vehicle effects**

Section 1 is expected to carry an additional 17 veh/h westbound and 18 veh/h eastbound at the peak of construction, while Section 2 is expected to carry an additional 9 veh/h westbound and 10 veh/h eastbound, respectively. It should be noted that the westbound and eastbound directions of Section 2 will not be loaded simultaneously as described above.

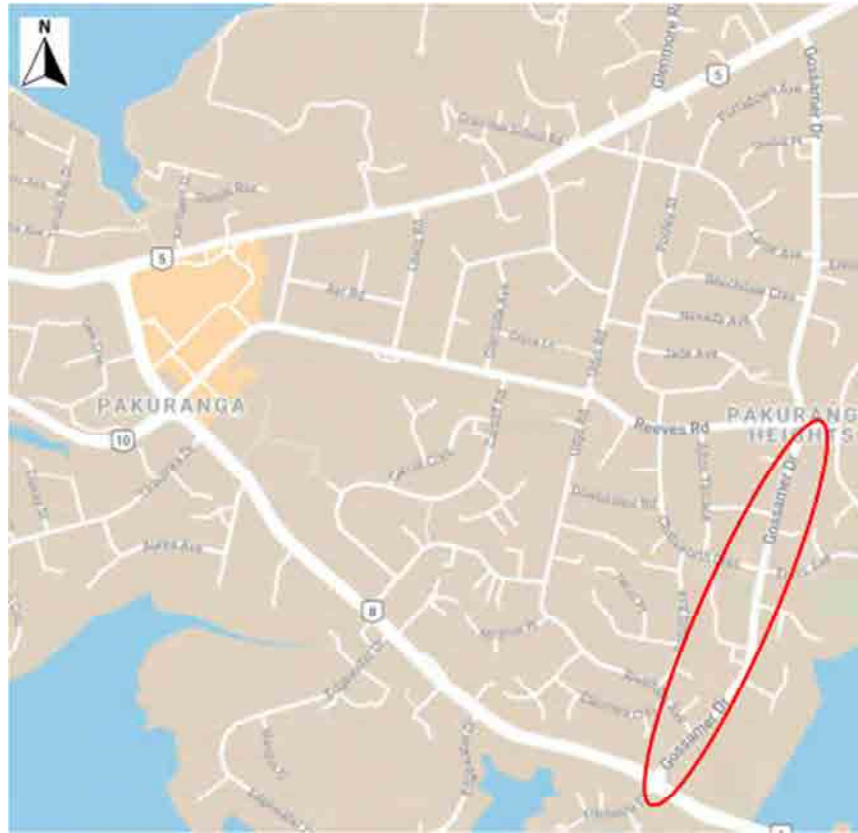
Ti Rakau Drive is an arterial road, and will for the majority of the construction period consist of two lanes per direction. Multiple bus services currently run along this road and as such is well-suited to larger sized vehicles. Signalised pedestrian crossings are provided at Pakuranga Road, Reeves Road, Mattson Road, Edgewater Drive west and Gossamer Drive.

Overall, Ti Rakau Drive will carry roughly one construction vehicle every three minutes westbound and eastbound at the peak of construction. Furthermore, Ti Rakau Drive is an arterial route supporting large vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be negligible.



#### 5.1.2.10 EB3R – Gossamer Drive

This section includes Gossamer Drive from Ti Rakau Drive in the south to Reeves Road in the north (see **Figure 67**).



**Figure 67: Gossamer Dr construction vehicle effects**

During the construction of the Ti Rakau Drive westbound and eastbound lanes, Gossamer Drive will support an additional 9 veh/h southbound and 10 veh/h northbound, respectively. It should be noted that these two construction phases will not occur simultaneously.

Gossamer Drive, in the existing environment, serves as a through route between Ti Rakau Drive and Pakuranga Road. As such, the carriageway consists of 4.0 m wide lanes. Gossamer Drive is also a school bus route.

In the current environment, pedestrians are provided with a signalised pedestrian crossing at the Ti Rakau Drive / Gossamer Drive intersection and a pedestrian crossing near Chatsworth Crescent. In addition, all approaches to the Gossamer Drive / Reeves Road roundabout are provided with pedestrian refuge islands to facilitate a staged crossing if required.

Overall, Gossamer Drive will carry roughly one construction vehicle every six minutes either in the northbound or southbound directions at the peak of construction. Furthermore, Gossamer Drive consists of a wide carriageway which supports larger sized vehicles in the existing environment and multiple safe pedestrian crossing points are provided. Therefore, the effects are considered to be negligible.

### **5.1.3 Summary of Temporary Construction Effects**

Overall, the temporary effects of the various CSAs that will be established as well as the construction traffic in the EB2 and EB3R project areas will be mitigated appropriately and are considered to be negligible or very low.

A WTMP will be developed to reduce the number of private vehicles travelling to the worksites and to increase accessibility of the worksites through more travel options.

CTMPs will be developed for the Project to avoid, remedy or mitigate the adverse effects of construction on transport, parking and property access so far as is reasonably practicable. The CTMPs will be developed in accordance with the conditions of consent and will include management strategies, controls and reporting protocols to achieve this.

Hours of operation, especially night works, will be controlled in part by the Project's consent conditions and management plans, including the CNVMP.

## 5.2 General Traffic Effects

The sections below provide an assessment of effects to general traffic during construction. General traffic effects refer to the movement of traffic across the road network as a whole. An assessment at a network-wide level, provides a better understanding as to the wider traffic effects of the Project and is based on the results from various AIMSUN and SIDRA traffic modelling assessments<sup>25</sup>.

As stated in **Section 2.3**, Auckland’s transport networks are constantly changing, undergoing improvements from new initiatives and being optimised. Furthermore, the global COVID-19 pandemic dramatically affected travel patterns and behaviours, and uncertainty remains that these effects would continue into the future. Given these factors, careful consideration was given to determine what formed the “existing environment”.

For the purposes of the scenarios employed by the traffic modelling and this assessment, the existing environment was based on pre COVID-19 travel behaviours and a number of committed transport projects (including EB1 and WRRE Works) as well as the EB2/EB3R enabling works. Furthermore, a conservative approach was followed, whereby a 2028 future year was used to compare a Do-Minimum (without project) scenario and the EB2/EB3R scenarios. This approach allowed for the direct comparison between scenarios.

### 5.2.1 Construction Traffic

As stated in **Section 5.1.2**, the effects of the estimated construction traffic volumes are expected to be negligible or very low and will be catered for within the existing road network. Therefore, a separate modelling assessment of the ‘Do-Minimum’ and ‘Do-Minimum + Construction Traffic’ scenarios on the entire network was not considered necessary.

### 5.2.2 Intersection Performance during Construction

#### 5.2.2.1 Overview of Performance Criteria and Modelling Scenario Development

Intersection performance analyses were undertaken, using SIDRA, of the transport network comprised of selected intersections in the EB2 and EB3R project areas. The analyses consisted of a comparison between the Do-Minimum and EB2/EB3R scenarios for both the AM and PM peak hours. The performance criteria for the assessment were based on the Level of Service (LOS), degree of Saturation (DOS) or v/c ratio and delay in seconds. The LOS is a measure of the average delay at an intersection and is a function of the intersection control (see **Table 20** below).

**Table 20: Level of Service for intersections**

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

<sup>25</sup> These assessments were undertaken in accordance with the methodology set out in **Section 2.4**.

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

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

The traffic modelling undertaken in this ITA considered the ‘worst-case’ scenarios to determine the temporary effects during construction. During the development of the updated construction methodology, based on an updated design, efforts have been made to shorten the overall construction programme where feasible as well as to produce construction staging with less adverse effects to road traffic. This process has led to a more refined construction staging. The temporary effects were modelled in five separate construction scenarios to simulate the expected traffic distribution that could occur due to changes in the road network.

Figure 68 provides a simplified schematic of the construction activities that informed the development of the construction scenarios assessed in this ITA. It should be noted that activity duration should not be interpreted from this schematic.

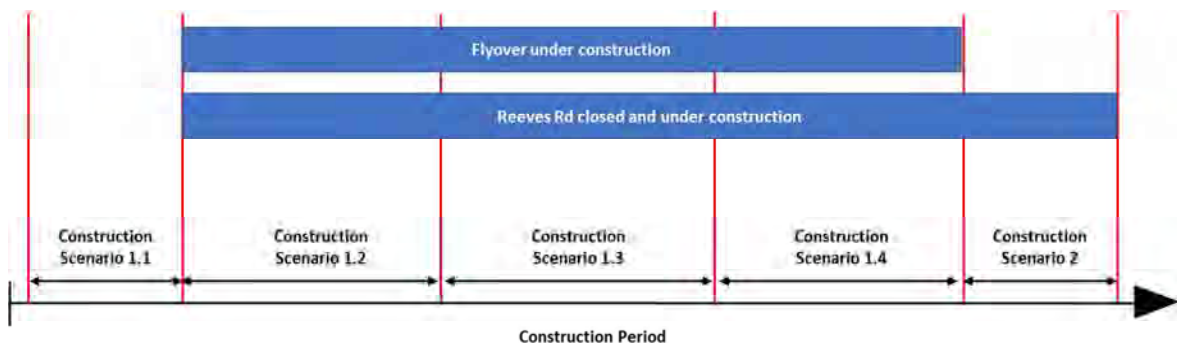


Figure 68: Construction modelling scenarios

Considering the construction programme from a transport perspective, the closure of Reeves Road and the ongoing construction of the RRF are considered as major changes to the transport network in the EB2 and EB3R project areas. Construction Scenario 1.1 to 1.4 simulate these activities.

The next major change to the transport network is the completion of the RRF, while Reeves Road underneath the RRF remains closed. These changes are simulated in Construction Scenario 2.

The sections below provide a description of each individual scenario, analysis of the scenario, followed by an assessment.

### 5.2.2.2 Construction Scenario 1.1

Construction Scenario 1.1 simulates various enabling works being undertaken, drainage works and offline works with some resultant lane closures as safety barriers are installed (see **Appendix K** for indicative construction staging diagrams in EB2 and **Appendix L** for EB3R). These include:

- WRRE works are not expected to be completed by this stage and therefore Reeves Road in EB2 will remain open.
- Construction of the new bus lanes in EB2 on the northern side of Ti Rakau Drive, between Pakuranga Road and Reeves Road, as well as the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection, see **Section 4.2.1.5** (Phase 1). This will reduce the eastbound carriageway to two lanes.
- Longitudinal drainage works in the kerbside lane of the westbound carriageway along Pakuranga Road in EB2, between Kentigern Close and St Kentigern College, see **Section 4.2.1.6**. The flush median will be utilised to maintain three traffic lanes in the westbound direction, while temporarily reducing the eastbound direction to two lanes and removing the right-turn into William Roberts Road.
- Construction of the new westbound lanes in EB3R on the southern side of Ti Rakau Drive, between Reeves Road and Gossamer Drive, as well as the new Ti Rakau Drive / William Roberts Road / Mattson Road crossroads intersection, see **Section 4.2.2.1** (Phases 1-4) and **Section 4.2.2.3** (Phase 1). This will reduce one through lane on the eastern approach at the Ti Rakau Drive / Reeves Road / SEART intersection to a short lane and the westbound carriageway to two lanes between Tiraumea Drive and Mattson Road.
- Temporary closure of the kerbside left-turn lane at Freemantle Place in EB3R, see **Section 4.2.2.3** (Phase 1).

#### Intersection Performance:

Demand flows from the 2028 AIMSUN Do-Minimum Scenario were used to test Construction Scenario 1.1. Traffic signal phasing diagrams per intersection are provided in **Appendix D** and lane performance summaries per intersection are provided in **Appendix E**.

**Table 21** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 1 during the AM peak, with a 2028 horizon year.

**Table 21: Intersection performance – Do-Minimum vs Construction Scenario 1.1 (AM peak)**

Intersection	Do-Minimum			Construction Scenario 1.1		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	C	0.89	32	C	0.89	32
Pakuranga Rd / Brampton Ct	N/A	2.31	10	N/A	1.69	7
Pakuranga Rd / William Roberts Rd	N/A	7.23	265	N/A	7.23	228
Pakuranga Rd / St Kentigern College	C	0.86	22	C	0.87	27
Reeves Rd / Aylesbury St	N/A	0.24	1	N/A	0.26	1
William Roberts Rd / Reeves Rd	N/A	0.69	8	N/A	0.89	14
Ti Rakau Dr / Aylesbury St north	N/A	1.46	5	N/A	1.12	4
Ti Rakau Dr / Aylesbury St south	N/A	0.24	1	N/A	0.34	1
Ti Rakau Dr/ Reeves Rd / SEART	D	0.91	54	D	0.89	50
Ti Rakau Dr / Mattson Rd	B	0.78	15	C	0.89	21
Ti Rakau Dr / Edgewater Drive west	C	0.85	27	C	0.86	28
Ti Rakau Dr / Gossamer Dr	F	1.07	91	F	1.06	84

SIDRA analysis indicates that in the AM peak, overall Construction Scenario 1.1 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 all intersections, except the William Roberts Road / Reeves Road and Ti Rakau Drive / Mattson Road intersections. However, these intersections are still expected to operate with spare capacity.

Table 22 provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 1 during the PM peak, with a 2028 horizon year.

**Table 22: Intersection performance – Do-Minimum vs Construction Scenario 1.1 (PM Peak)**

Intersection	Do-Minimum			Construction Scenario 1.1		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	D	0.92	53	D	0.89	46
Pakuranga Rd / Brampton Ct	N/A	1.81	9	N/A	1.86	10
Pakuranga Rd / William Roberts Rd	N/A	53.18	3474	N/A	48.04	3108
Pakuranga Rd / St Kentigern College	C	0.89	27	B	0.72	14
Reeves Rd / Aylesbury St	N/A	1.03	42	N/A	0.37	1
William Roberts Rd / Reeves Rd	N/A	1.05	26	N/A	1.00	22
Ti Rakau Dr / Aylesbury St north	N/A	5.50	49	N/A	4.67	35
Ti Rakau Dr / Aylesbury St south	N/A	0.38	1	N/A	0.38	1
Ti Rakau Dr/ Reeves Rd / SEART	E	0.98	56	E	1.02	69
Ti Rakau Dr / Mattson Rd	B	0.68	13	B	0.88	20
Ti Rakau Dr / Edgewater Drive west	C	0.89	31	C	0.85	26
Ti Rakau Dr / Gossamer Dr	D	0.91	45	D	0.89	44

SIDRA analysis indicates that in the PM peak, Construction Scenario 1.1 is expected to result in acceptable intersection performance along the network overall, with minor mitigation measures in place.

In order to manage the heavy demand on Pakuranga Road eastbound during the drainage works, it is recommended that Signal Phase D, at the Pakuranga Road / St Kentigern College intersection, be modified to a variable phase in the PM peak, only to be called when necessary. Through SIDRA analysis, it is expected that overall, more green time would be available to the major eastbound movement and queues would be manageable (see **Appendix D**). Consultation with the Auckland Transport Operations Centre (ATOC) will be undertaken with regards to this mitigation measure.

Compared to the Do-Minimum scenario, similar or better intersection performance is expected at all intersections, except the Ti Rakau Drive / Reeves Road / SEART intersection. However, this intersection is still expected to operate at an acceptable LOS E.

### 5.2.2.3 Construction Scenario 1.2

Construction Scenario 1.2 simulates various completed enabling works, the initial closure of Reeves Road and ongoing offline works (see **Appendix K** and **Appendix L**). These include:

- Closure of Reeves Road between Ti Rakau Drive and Cortina Place in EB2.
- Ongoing construction of the new bus lanes in EB2 on the northern side of Ti Rakau Drive and the completion of the new Ti Rakau Drive / Aylesbury Street / Palm Avenue crossroads intersection. Safety barriers will be installed on the existing kerblines of the eastbound carriageway to maintain three lanes.
- Completion of the temporary pavement on the southern side of the Ti Rakau Drive / Reeves Road / SEART intersection in EB2 (see **Section 4.2.1.5**), undertaken as part of the previous stage. In addition, a 3<sup>rd</sup> right-turn lane will be provided on the SEART offramp for vehicles turning onto Ti Rakau Drive eastbound. All slip lanes will be temporarily converted to pass through the intersection during this stage. As such, a double left-turn onto SEART will be provided. The pedestrian crossing on the eastern approach will be removed temporarily.
- Completion of the WRRE (see **Section 3.10.2**).
- Temporary signalisation of the Pakuranga Road / William Roberts Road intersection in EB2, see **Section 5.1.1.4**.
- Ongoing construction of the new westbound lanes in EB3R on the southern side of Ti Rakau Drive as well as the new Ti Rakau Drive / William Roberts Road / Mattson Road crossroads intersection. This will reduce the westbound carriageway to two lanes between Tiraumea Drive and Mattson Road.
- Temporary closure and construction of the Ti Rakau Drive / Edgewater Drive west intersection in EB3R, see **Section 4.2.2.3** (Phase 1c). During this closure, all traffic along Edgewater Drive will be diverted to the eastern intersection, which will be signalised temporarily.
- Completion of the enabling works at the Ti Rakau Drive / Gossamer Drive intersection in EB3R (see **Section 3.10.3.2**) as well as converting the left-turn slip lane on the western and eastern approaches to pass through the intersection, see **Section 4.2.2.3** (Phase 1). These works will be undertaken in the preceding stage, will be offline works, and will partly be undertaken during night works if necessary.
- Ongoing temporary closure of the kerbside left-turn lane at Freemantle Place in EB3R.

#### Intersection Performance:

Traffic signal phasing diagrams per intersection are provided in **Appendix M** and lane performance summaries per intersection are provided in **Appendix N**. Demand flows from the 2028 AIMSUN Construction Scenario 1.3 were used to test Construction Scenario 1.2 as Construction Scenario 1.3 was determined to be the most critical.



**Table 23** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 1.2 during the AM peak, with a 2028 horizon year.

**Table 23: Intersection performance – Do-Minimum vs Construction Scenario 1.2 (AM Peak)**

Intersection	Do-Minimum			Construction Scenario 1.2		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	C	0.89	35	C	0.89	29
Pakuranga Rd / Brampton Ct	N/A	2.31	10	N/A	4.75	52
Pakuranga Rd / William Roberts Rd	N/A	7.23	265	C	0.89	22
Pakuranga Rd / St Kentigern College	C	0.86	22	C	0.85	22
Reeves Rd / Aylesbury St	N/A	0.24	1	N/A	0.02	2
William Roberts Rd / Reeves Rd	N/A	0.69	8	N/A	0.25	5
William Roberts Road / Cortina Pl	Built during WRRE			N/A	0.17	3
Ti Rakau Dr / Aylesbury St / Palm Ave	Built during EB2			D	0.84	38
Ti Rakau Dr/ Reeves Rd / SEART	D	0.91	54	C	0.92	33
Ti Rakau Dr / William Roberts Rd	Built during WRRE			N/A	0.50	1
Ti Rakau Dr / Mattson Rd	B	0.78	15	C	0.89	22
Ti Rakau Dr / Edgewater Dr west	C	0.85	27	C	0.86	21
Ti Rakau Dr / Edgewater Dr east	N/A	1.99	17	C	0.89	23
Ti Rakau Dr / Gossamer Dr	F	1.07	91	F	1.21	113

The analysis indicates that overall in the AM peak, Construction Scenario 1.2 is expected to result in minimal adverse effects at the majority of intersections.

Average delay at the Pakuranga Road / Brampton Court intersection is expected to increase due to the increased demand on Pakuranga Road as a section of Reeves Road will be closed during this stage. However, all other access points to the Plaza are expected to have spare capacity should these vehicles wish to divert elsewhere.

The temporary signalisation of the Pakuranga Road / William Roberts Road intersection is expected to significantly reduce the average delay, particularly for vehicles turning right into/out of William Roberts Road.

The Ti Rakau Drive / Gossamer Drive intersection is also expected to experience an increase in delay. However, the intersection is already at capacity in the Do-Minimum Scenario and average delay is still expected to be less than the traffic signal cycle length.

**Table 24** provides a comparison of the intersection performance between the Do-Minimum and Construction Scenario 1.2 during the PM peak, with a 2028 horizon year.

**Table 24: Intersection performance – Do-Minimum vs Construction Scenario 1.2 (PM Peak)**

Intersection	Do-Minimum			Construction Scenario 1.2		
	LOS	DOS (v/c)	Delay [s]	LOS	DOS (v/c)	Delay [s]
Pakuranga Rd / Ti Rakau Dr	D	0.92	53	C	0.92	34
Pakuranga Rd / Brampton Ct	N/A	1.81	9	N/A	1.88	26
Pakuranga Rd / William Roberts Rd	N/A	53.18	3474	E	1.91	67
Pakuranga Rd / St Kentigern College	C	0.89	27	B	0.85	16
Reeves Rd / Aylesbury St	N/A	1.03	42	N/A	0.04	2
William Roberts Rd / Reeves Rd	N/A	1.05	26	N/A	0.14	4
William Roberts Rd / Cortina Pl	Built during WRRE			N/A	0.20	3
Ti Rakau Dr / Aylesbury St / Palm Ave	Built during EB2			C	0.85	24
Ti Rakau Dr / Reeves Rd / SEART	E	0.98	56	E	0.99	72
Ti Rakau Dr / William Roberts Rd	Built during WRRE			N/A	0.44	1
Ti Rakau Dr / Mattson Rd	B	0.68	13	B	0.88	19
Ti Rakau Dr / Edgewater Dr west	C	0.89	31	C	0.88	22
Ti Rakau Dr / Edgewater Drive east	N/A	3.41	28	C	0.89	23
Ti Rakau Dr / Gossamer Dr	D	0.91	45	E	1.08	76

Construction Scenario 1.2 is expected to have acceptable intersection performance overall during the PM peak with some mitigation measures in place.

In order to manage the heavy demand on Pakuranga Road eastbound, it is recommended that fixed time cycles and offsets be implemented at the following intersections:

- Pakuranga Road / William Roberts Road (temporary traffic signal)
- Pakuranga Road / St Kentigern College

Through SIDRA analysis, a cycle length of 150 seconds and an offset of 13 seconds to St Kentigern College using the William Roberts Road intersection as reference, is expected to lead to manageable queues and delays (see **Appendix M**). Consultation with ATOC will be undertaken with regards to this mitigation measure.

Similar to the AM peak, average delay at the Pakuranga Road / Brampton Court intersection is expected to increase. However, all other access points to the Plaza are expected to have spare capacity should some diversions occur.

Although moderate increases in average delay are expected at the Ti Rakau Drive / Reeves Road / SEART and Ti Rakau Drive / Gossamer Drive intersections, these intersections are still expected to operate an acceptable LOS E.