1 Introduction

1.1 Project Background

The Auckland Manukau Eastern Transport Initiative (AMETI) programme was initiated in 2006 and has become the responsibility of Auckland Transport (AT) following the amalgamation of Auckland's previous local authorities in October 2010. The Eastern Busway Project (the Project)[2] is a flagship project for Auckland and will form a key part of the region's Rapid Transport Network (RTN). It will create dedicated bus lanes to connect people from Botany, Pakuranga, and the surrounding suburbs, to the rail network in Panmure. The Project includes cycling and walking paths, roading and safety improvements and a new RRF to ensure better journey reliability for all modes.

The Panmure to Pakuranga section of the busway (EB1) opened in late 2021. The Eastern Busway Alliance (EBA) has been formed to design and consent the Pakuranga to Botany sections of the Project (EB2,3,4), progressing towards construction, which is expected to start in 2022. The Project will provide a busway from Pakuranga Town Centre in the west to Botany Town Centre in the east. The busway will be approximately 5km long and will be running at grade primarily on Ti Rakau Drive. A median busway (Online Busway) is proposed along Ti Rakau Drive from Pakuranga Road to Gossamer Drive, while a separated busway (Offline Busway) is proposed between Gossamer Drive and Botany Station.

There will be one major interchange station at Pakuranga Town Centre, one major interchange station at Botany Town Centre, and three intermediate stations along Ti Rakau Drive. A separate cycleway and pedestrian footpath are also proposed along the length of Ti Rakau Drive. The proposed busway will serve the major employment areas of East Tāmaki, Botany and Panmure, as well as Botany and Pakuranga Town Centres. The proposed busway will also connect with major interchanges at Botany, including local bus services and Airport to Botany (A2B) RTN services, and at Panmure for suburban rail services.

1.1.1 Strategic Context

Auckland's eastern suburbs have one of the highest levels of journey to work trips by car and lowest use of public transport in Auckland[3]. This is due to a combination of lower density land uses and relatively unattractive bus services, lack of cycle facilities and low urban amenity on main roads. Without intervention, demand for public transport, walking and cycling will remain low and the heavy reliance on car travel will continue. This will further impede the efficient movement of people and goods within the area, lead to detrimental environmental outcomes and exacerbate the area's limited access to opportunities compared to the rest of the region. It will also limit the area's potential to sustainably accommodate further residential and employment growth.

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

[2] Formally known as AMETI.
[3] SNZ Census 2018

1.1.2 Project Objectives

The Project has a set of clear objectives and are outlined below:

1. Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network

2. Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport options

3. Safeguard future transport infrastructure required at (or in vicinity of) Botany Town Centre to support the development of a strategic public transport connection to South Auckland

4. Provide transport infrastructure that integrates with existing land use and supports a quality, compact urban form

5. Contribute to accessibility and place shaping by providing better transport connections between, within and to the town centres

6. Provide transport infrastructure that is safe for everyone

1.1.3 Benefits of the Project as a Whole

With the Panmure to Pakuranga (EB1) section of the Project completed, once delivered the next stage between Pakuranga and Botany (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

1.1.4 EB2 and EB3R Project Benefits

The Project will deliver significant benefits to the communities of southeast Auckland and the wider Auckland Region. The Project has been developed in response to transport issues within southeast Auckland, to meet projected population growth, reduce regional greenhouse gas emissions and to achieve modal shift goals.

With regard to the Project area's transport issues, it was previously identified that the Howick Local Board area experiences heavy congestion, with 90,000 vpd using the Panmure and Waipuna Bridges. Recent rapid population growth and a heavy dependence on private vehicles has put significant strain on the existing road network. EB2 and EB3R will help alleviate this congestion. This will principally be achieved through the diversion of traffic from the Ti Rakau Drive / Pakuranga Road intersection and onto the RRF. This diversion will reduce the volumes of through-traffic within Pakuranga Town Centre and local roads. As such, EB2 and EB3R's contribution to congestion reductions will improve travel times, supporting the rapid movement of freight and people.

In addition, the development of the Project has been driven by both previous and projected population growth within southeast Auckland. Pakuranga Town Centre is a major transport hub for southeast Auckland, with traffic flows coming from both established and new suburbs. Ti Rakau Drive and SEART are also important for the efficient movement of freight and goods vehicles, connecting the commercial areas of East Tāmaki, Highbrook, Botany, Pakuranga and Highland Park to the wider region.

The established suburbs, such as Howick and Highland Park are experiencing high levels of redevelopment, through both infill housing and wholesale redevelopment of sites. This redevelopment will only grow in intensity through the new medium density residential standards introduced in late 2021 by the New Zealand Government. Traffic flows from the Auckland Isthmus are also expected to increase given population growth from brownfield developments like the Tāmaki regeneration programme[4]. Large growth is also being generated by greenfield developments like Flat Bush, where 1700 ha of land is being urbanised for a population of 40,000 people. Lastly, congestion due to the growth in commercial activity is also anticipated.

Without the construction of the Project and the provision of improved transport choices (i.e., public and active transport modes), southeast Auckland's road network would experience significantly increased congestion. This would in-turn, impact both the quality of life for residents and the economic wellbeing of Auckland's businesses. The Project will alleviate, in part, increases in road congestion.

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

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

[4] Tāmaki regeneration programme will deliver 10,500 new homes over the next 20 years.

1.2 Scope and Purpose of Report

The assessment and consenting phases of the proposed alignment of the Project has been divided into three 'packages'. The rationale is to aid in obtaining relevant RMA approvals for sections of the Project without potential undue delay to the Project as a whole.

This Integrated Transport Assessment (ITA) assesses the traffic and transportation effects during construction and upon completion of the EB2 and EB3 Residential (EB3R) sections of the Project.

Assessment of the William Roberts Road Extension (WRRE), which will precede EB2 and EB3R, has been provided for in the Early Works resource consent package, but has been taken into account in this assessment as part of the existing environment. Assessment of the EB3 Commercial (EB3C) and EB4 sections of the Project, which will follow after this ITA, will be addressed in a separate report.

The full extent and location of the Project is shown in **Figure 1** below.

Figure 1: Full project extent and location[5]

The main elements of EB2 and EB3R include the construction of the RRF, the busway along Ti Rakau Drive from Pakuranga Road to Reeves Road (EB2) and Reeves Road to Gossamer Drive (EB3R) as well as three new bus stations. The general extent and location of these sections of the Project are shown in **Figure 2** below.

[5] https://at.govt.nz/projects-roadworks/eastern-busway/

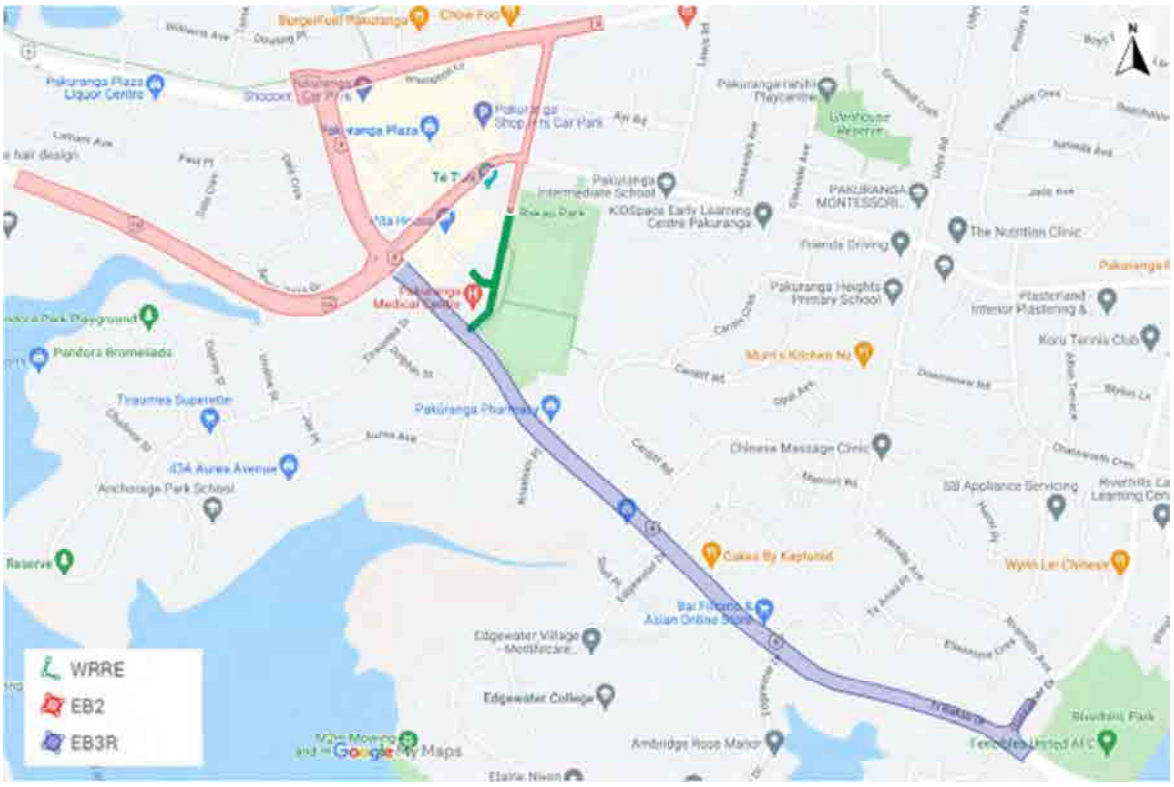

Figure 2: EB2 and EB3R general extent and location

The purpose of this report is to:

1. Identify and describe the existing transport environment, including the key issues that the environment faces
2. Describe the potential positive and adverse transport effects of EB2 and EB3R during its construction, in order to highlight the benefits of the Project and to develop mitigation measures as needed
3. Recommend measures (including any conditions/ management plans required); as appropriate to avoid, remedy or mitigate potential traffic and transportation effects including as these relate to effects from construction traffic
4. Present an overall conclusion of the level of potential transport effects of EB2 and EB3R after the recommended measures are implemented

1.3 Report Structure

This ITA has been structured as follows:

Section 2 describes the methodology used to assess the effects of EB2 and EB3R on the transport environment. This includes EB1, WRRE and other enabling works that will form part of the baseline traffic environment, traffic modelling methodology, public transport, walking and cycling, property access and parking, safety performance and freight traffic.

Section 3 provides a description of the existing transport environment including land use zoning, the transport network, traffic volumes, travel times, road characteristics, bus services and facilities, walking and cycling facilities, parking, crash environment, over-dimension and over-weight (OD and OW) routes, and changes to the baseline traffic environment for modelling.

Section 4 provides an overview of the proposed design and construction of EB2 and EB3R.

Section 5 provides an assessment of the temporary effects of EB2 and EB3R during construction, including construction effects, general traffic, bus services and facilities, pedestrians and cyclists, property access and parking, and safety performance.

Section 6 provides an assessment of the permanent effects of EB2 and EB3R upon completion, including a description of the future transport network, general traffic, bus services and facilities, pedestrians and cyclists, property access and parking, and safety performance.

Section 7 provides a summary of the mitigation measures proposed in this ITA.

Section 8 provides the conclusions from this ITA.

2 Assessment Methodology

2.1 Introduction

This section describes the methodology used to assess the effects of EB2 and EB3R on the transport environment including:

- A description of the transport environment for assessment (which includes EB1 (Panmure to Pakuranga), WRRE works, and other enabling works)
- Traffic modelling methodology
- Public transport
- Walking and cycling
- Property access and parking
- Safety performance
- Freight traffic

2.2 Guidance and Scope

The preparation of this ITA has taken into account the guidance set out in the Auckland Transport (AT) document "*Integrated Transport Assessment Guidelines*" (January 2015) and the Waka Kotahi NZ Transport Agency (Waka Kotahi) document "*Integrated Transport Assessment Guidelines*" (November 2010). This assessment has considered the operational effects of the following areas in the system:

- Road network – general traffic flows and travel time
- Public transport network
- Walking and cycling network
- Property access
- Parking
- Safety performance
- Heavy vehicle routes

2.3 Transport Environment for Traffic Modelling Assessment

Auckland's transport networks are constantly changing, undergoing improvements from new initiatives and being optimised. Furthermore, the global COVID-19 pandemic dramatically effected travel patterns and behaviours, and uncertainty remains that these effects would continue into the future. Assessment of the Project against the existing environment was therefore not considered appropriate.

Instead, a more conservative approach was followed whereby a future year scenario was used to compare a 'without Project' and a 'with Project' scenario. Throughout this assessment, the 'without Project' scenario is also referred to as the 'Do-Minimum' scenario, whilst the 'with Project' scenario is also referred to as the 'EB2/EB3R' scenario. The transport models used to simulate the effects of the future year scenarios are listed below:

- Do-Minimum – 2028
- EB2 and EB3R – 2028

Notable major changes to the existing transport network, that were included in the modelling assessments, are detailed below.

2.3.1 Eastern Busway 1 (EB1)

EB1 is a key component of the overall Project. It is the segregated busway connection from Panmure train station to Pakuranga Town Centre. EB1 was completed near the end of 2021 and was included in all 'future year' scenarios.

2.3.2 WRRE Works

This assessment has considered the effects of the WRRE to be undertaken prior to EB2 and EB3R construction. The WRRE includes the extension of William Roberts Road south to Ti Rakau Drive and the completion of the Cortina Place link between William Roberts Road and Reeves Road. WRRE was included in all future year scenarios.

2.3.3 Other EB2 and EB3R Enabling Works

This assessment has also considered the effects of other enabling works to be undertaken during the initial phases of the EB2 and EB3R construction programme, to enable the temporary closure of Reeves Road. The enabling works include geometric and traffic signal timing plan amendments at the Ti Rakau Drive / Reeves Road and Ti Rakau Drive / Gossamer Drive intersections. These enabling works will form part of the EB2 and EB3R consent packages.

2.4 Traffic Modelling Methodology

Traffic modelling undertaken of the proposed design of the Project used data cascaded from a number of higher-order, more strategic models provided by the Auckland Forecasting Centre (AFC).

Macro Strategic Model (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 general traffic demand and public transport demand.

AMETI Regional Traffic Models (EMME) – The outputs of the MSM models were used as inputs into the Regional Traffic Models to generate traffic demands across the region. The outputs of the regional models were then fed into project specific AIMSUN models to allow for a more detailed assessment of traffic effects.

Operational Microsimulation Models (AIMSUN) – These models provide information regarding travel times along different routes within the project area as well as turn movements and traffic demand along roads within the project area. The turning movement outputs from these models were used as inputs into the SIDRA models.

Intersection Models (SIDRA) – These models were used to determine the performance of intersections using traffic movement data from the AIMSUN models. The key outputs include Degree of Saturation (DOS or v/c ratio), delay in seconds, Level of Service (LOS) and queue lengths in metres.

2.4.1 Supplied Models

The AIMSUN 2018 Base Model was subjected to various calibration and validation checks to assess the accuracy and suitability of the model. These checks were undertaken with reference to criteria for Category C: Urban Area NZTA Model Development Guidelines (Criteria) on individual link flows, turn flows and travel time for each hour between 07:00 – 09:00 and 16:00-18:00 and is considered acceptably calibrated and validated for the purposes of Eastern Busway design work[6] (see **Appendix J**).

Turning movement volumes from the AIMSUN models were used in the SIDRA models to assess intersection performance.

2.4.2 Model Outputs

As above, traffic flow outputs (in vehicles per hour) from the AIMSUN models were used as inputs in the SIDRA models to assess intersection performance. AIMSUN models simulate several hours of the network operation during the AM and PM peak periods. However, in order to account for residual demand and queues within the network and to maintain consistency across the various model runs, the AM peak hour adopted was 08:00 – 09:00 while the PM peak hour was 17:00 – 18:00. Traffic flows from these peak hours, produced by AIMSUN, were used to assess intersection performance in SIDRA.

Another key AIMSUN model output considered during this ITA was travel time. Route travel times were determined along various routes through the Project areas for the Do-Minimum and EB2/EB3R scenarios. The effects of EB2 and EB3R were determined by comparing these scenarios in each direction, for the AM and PM peak periods.

Key SIDRA outputs considered during this ITA included Level of Service (LOS), Degree of Saturation (DOS) or v/c ratio, and delay in seconds.

2.4.3 Traffic Demand

The traffic demand data, cascaded down from the various models as detailed above and used in the SIDRA models, represent an average weekday's traffic demand in the AM and PM peak hours. Interpeak periods and weekends were determined to generally have lower traffic activity and congestion compared to weekdays, so explicitly modelling these periods was not considered necessary to understand the effects and outcomes of the Project.

[6] Eastern Busway – Base 2018 Model Update Report, BECA, February 2019

2.4.4 Assumptions

Below are the key assumptions used in the modelled transport environments.

2.4.4.1 MSM Assumptions

- Auckland Council's Scenario I Modified Version 11.5
- All relevant projects that have been identified in the ATAP plan delivery 2021 – 2031 were included in the MSM version 11.5. Notable projects that may influence the demand of the movement of people around the Project include:
    - Airport to Botany interim bus improvements
    - Sylvia Park bus improvements
    - Connected Communities (Pakuranga Road)
    - City Rail Link
- Eastern Busway 1 Panmure to Pakuranga was included in the future Do-Minimum, 2028 and 2048 scenarios

2.4.4.2 AIMSUN Assumptions

- Similarly, relevant and notable projects were included in the AIMSUN models

2.4.4.3 SIDRA Assumptions

- Where turning movement volumes were <10 veh/h, a minimum of 10 veh/h was adopted
- Rather than being random, bus arrivals at intersections were set to Arrival Type 6 on all busway lanes. This means a high percentage of arrivals occur during the green phases, which was used to simulate Traffic Signal Priority for buses
- Free flow speeds along Ti Rakau Drive were assumed from the free-flow speeds provided by the MSM modelling. The following speeds were assumed for the various other streets:
    - Side streets – 50 km/h
    - William Roberts Road - 30km/h
    - Entrances (i.e., to the mall) – 20 km/h
    - Along busways – 50 km/h
- Saturation flow rate was left at the SIDRA default Basic Saturation Flow of 1950 tcu/h per lane
- Where the approach/ intersection was modified, lanes widths for general vehicle lanes and bus lanes were taken as 3.2 m and 3.5 m, respectively

The following model adjustments were added to simulate the effects of a raised table or raised intersection as per the updated proposed design (see **Appendix B** and **Appendix C**):

- Saturation flow rate of 1860tcu/h per lane, calculated from a jam spacing assumption of 6.5m which is between 6m (standard queue space value) and 7m (default SIDRA light vehicle jam spacing value)
- Saturation speed of 25km/h (MOTSAM guidelines for raised tables/humps)
- Negotiation speed of 25km/h

2.5 Public Transport, Walking and Cycling

2.5.1 Public Transport

The effects on the public transport network focused on the following aspects:

- Direct effects on bus routes and bus stops
- Effects on travel times of buses through the Project area

2.5.2 Walking and Cycling

The assessment considered the potential effects of EB2 and EB3R on pedestrians and cyclists. This was primarily via a qualitative assessment of changes in the type and quality of connections and facilities provided.

2.6 Property Access and Parking

2.6.1 Property Access

The assessment considered the potential effects of changes in property access. Local access effects were assessed in terms of extra travel time and distance as well as safety.

2.6.2 Parking

This included assessment of the potential physical effect of reducing properties' on-site parking spaces, as well as any on-street parking that may be affected by the proposed design.

2.7 Safety Performance

A Safe System Assessment (SSA) was undertaken for the Project, which provides a comprehensive assessment of the existing crash environment and the potential future environment.

The safety performance assessment considered the effects of the proposed design on existing roads, new roads and vulnerable users.

2.8 Freight Traffic

It is recognised that cars and trucks generally have the same travel times in congested urban networks and therefore the same methodology described in **Section 2.4.2** was used to assess the effect of the Project on freight traffic and direct effects to heavy vehicle routes.

3 Existing Transport Environment

This section provides a description of the existing transport environment, including the following:

- A description of the existing problems and challenges
- Land use zoning
- Existing transport network
- Traffic volumes
- Travel times
- Road characteristics
- Bus services and facilities
- Walking and cycling facilities
- Parking
- Crash environment
- Over-dimension and over-weight (OD and OW) routes
- Changes to the baseline traffic environment

3.1 Description of the Existing Problems and Challenges

In 2016, AT, Waka Kotahi and Auckland Council agreed the following key problems in the AMETI Project area for the AMETI programme, including the Eastern Busway, to address:

- **Problem 1** – Lack of connections in the transport network creates congestion and unreliable travel times for people accessing employment and other destinations

- **Problem 2** – Lack of travel choices and reliance on private cars is resulting in congestion, lack of access to opportunities and poor environmental outcomes

- **Problem 3** – Provision of transport capacity and options has not kept pace with land use development resulting in congestion and inefficient use of transport corridors

- **Problem 4** – Poorly integrated land use and transport design is limiting accessibility, creating poor places and discouraging economic development

- **Problem 5** – Development and operation of the road network has prioritised the efficient movement of vehicles ahead of safety resulting in too many people dying or being seriously injures, especially vulnerable users

The Project will seek to address these problems through a range of improvements to existing infrastructure as well as new infrastructure.

3.2 Land Use Zoning

The Project area is located in East Auckland and bordered by Pakuranga Town Centre in the northwest and Botany Town Centre in the southeast. Major industrial and commercial areas in East Tāmaki are situated to the west and south which play an important role in providing employment opportunities to the residents in the vicinity of the Project. These employment zones include Panmure, Mt Wellington, Penrose/ Onehunga and Highbrook/ East Tāmaki.

The local land uses comprise of medium density/ single dwelling residential lots with retail-based town centres, local shops, commercial activities and industrial blocks. These areas are currently connected to the Project area by either direct property access or near-direct access via side roads. The Project will also have a through-function and will serve movements between and beyond the fringes of the project area, including links to Panmure, Mt Wellington, Flat Bush and Manukau.

Notable features of the existing land use and environment include:

Business Land Uses of Interest:

- Pakuranga Plaza
- GAS Pakuranga Road service station
- Gull Reeves Road service station
- Tai Ping Supermarket
- Eastside Pups Dog Grooming and Daycare
- Edgewater Shops

Residential and Community Land Uses of Interest:

- Pakuranga Library and Citizens Advice Bureau
- Te Tuhi Art Gallery
- Pakuranga Mosque
- Ti Rakau Park
- Pakuranga Leisure Centre
- Dementia Auckland
- Pakuranga Medical Centre
- Pakuranga Counselling Centre
- Pakuranga Baptist Church
- River Hills Park (Fencibles United Football Club)

Schools and Education Land Uses of Interest:

- Saint Kentigern College
- Barnardos Early Learning Centre
- Pakuranga Intermediate School
- KIDSpace Early Learning Centre Pakuranga
- Pakuranga Kindergarten
- Edgewater College
- Pakuranga Baptist Church and Kindergarten

Figure 3 shows the surrounding area zoning of EB2 and EB3R in the Auckland Unitary Plan (Operative in Part) (AUP(OP)), in the existing environment.

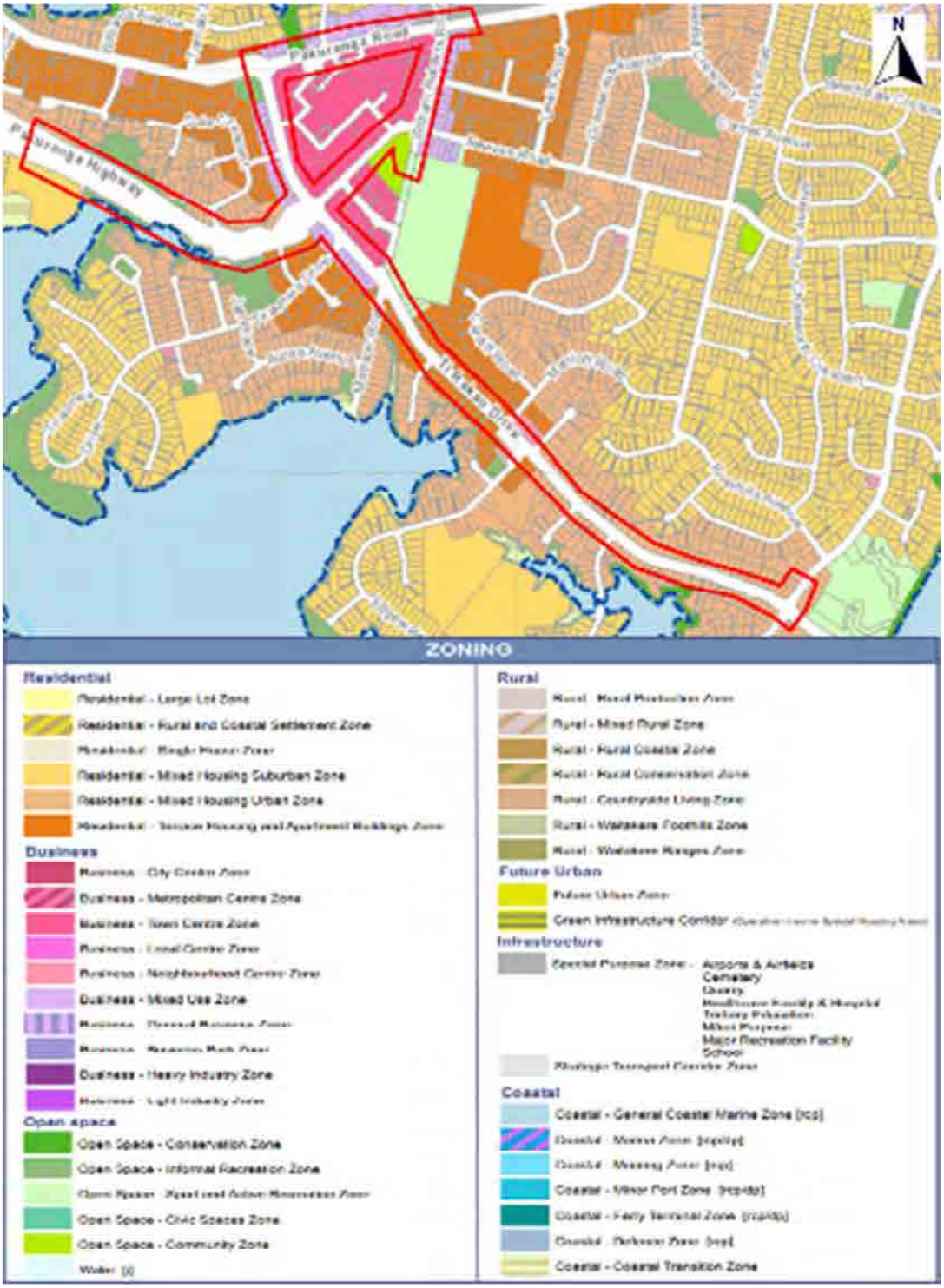

Figure 3: Existing EB2 and EB3R zoning (source: Auckland Council GIS)

3.3 Existing Transport Network

In order to align with AT's and Auckland Council's desire to consistently identify the different functions of roads and streets in Auckland, the EBA has adopted the Roads and Streets Framework (RASF) by using concepts of 'Place' and 'Movement' to reflect the strategic role of streets.

The RASF provides a systematic and consistent methodology for identifying the Place and Movement functions of roads and streets. In doing this, it reflects the needs and catchment of the adjoining land use as well as the movement of people, goods and services. A full RASF assessment was completed for the Project[7] and the section below summarises the key aspects of the existing transport network and modal priority in the EB2 and EB3R project areas.

Figure 4 shows the RASF typology matrix as a function of Movement and Place significance.

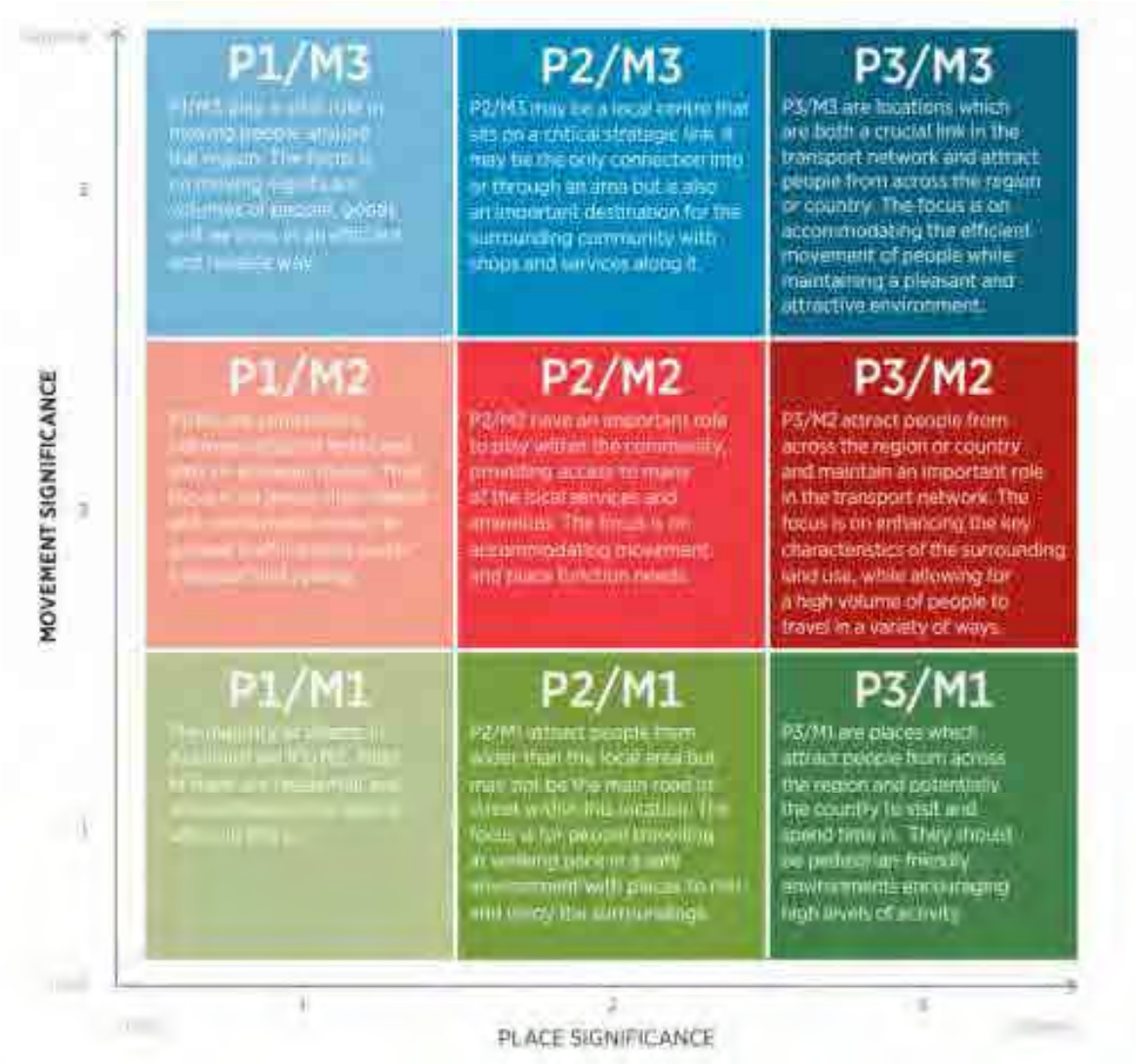

Figure 4: RASF typology matrix

[7] EB234-1-TE-RP-Z0-A2-Roads and Street Framework

Figure 5 outlines the current typology of the EB2 and EB3R project areas.

Figure 5: Existing EB2 and EB3R typology

Pakuranga Road is an east-west primary/ regional arterial, which connects Howick/Highland Park with Panmure via Pakuranga. It also intersects with Ti Rakau Drive, providing an arterial route towards Botany Town Centre and East Tāmaki. Pakuranga Road carries approximately 40,000 vehicles a day, as well as frequent bus services. The objective of this corridor is to move significant volumes of people, goods and services and as such, it has a typology of 'M3' classification.

The majority of land use along Pakuranga Road, west of the town centre, is residential. East of the town centre there are some retail properties along Pakuranga Road. However, these properties generally have a large setback between the footpath and the properties due to car parking spaces. As a result, the primary function of this corridor is Movement.

Ti Rakau Drive is a regionally significant corridor connecting Pakuranga with Botany. Along Ti Rakau Drive there are major employment sites such as Pakuranga Town Centre, Botany Town Centre, and East Tāmaki industrial zones. The section of Ti Rakau Drive east of SEART is a level 1B freight route. Frequent bus services also operate along this section. Given these factors, the primary function of this corridor is also Movement, and it also has a typology of 'M3' classification.

A trend is observed whereby Movement is largely prioritised over Place, especially along Ti Rakau Drive. The Project seeks to improve this, particularly at the proposed locations of the new bus stations.

3.4 Traffic Volumes, Travel Time and Road Characteristics

3.4.1 Traffic Volumes

The existing environment traffic volumes were determined predominantly using traffic data from 2017. In 2020/2021, COVID-19 dramatically affected the way people travelled and so these years would not accurately reflect the volumes of traffic expected on the road network. It was anticipated that data from 2019 would be the most accurate, however, it was determined that this data set was incomplete and would likely produce inaccurate results.

Data from 2017 was the most complete data set available from the previous life cycle of the AMETI EB2&3 specimen design. Although traffic volumes are expected to have grown marginally between 2017 and 2019, it is not expected that this growth would be significant, and the 2017 data is still considered relevant.

Table 3 shows the Average Annual Daily Traffic (AADT) volumes in the existing environment in the EB2 and EB3R project areas as well as the anticipated daily volumes for the 2028 and 2048 future years, without the Project. A conservative approach was followed to produce the 2028 and 2048 future year AADTs, by not including the effects of COVID-19. The purpose of this table is to provide context for a more detailed comparison of the future years.

Table 3: Existing[8] and future[9] AADT (without project)

Road Section	Direction	Existing AADT	2028 without project	2048 without project
Ti Rakau Drive				
Pakuranga Rd – Reeves Rd	Westbound	19,400	20,700	20,700
	Eastbound	14,800	17,400	17,400
Reeves Rd – Tiraumea Dr	Westbound	19,500	18,000	18,700
	Eastbound	17,300	16,600	18,200
Tiraumea Dr – Mattson Rd	Westbound	21,300	17,300	18,000
	Eastbound	18,800	16,600	18,200
Mattson Rd – Marriot Rd	Westbound	21,100	17,400	18,100
	Eastbound	17,900	16,100	17,700
Marriot Rd – Edgewater Dr West	Westbound	20,000	17,800	18,400
	Eastbound	17,900	16,400	17,800
Edgewater Dr West – Edgewater Dr East	Westbound	19,800	16,900	17,600
	Eastbound	17,500	15,600	17,200
	Westbound	19,700	16,600	17,400

[8] The majority of the existing volumes were sourced from 2017 SCATS data, however where this data was not available a mixture of RAMM, ONRC, and the most recent AT traffic counts have been reported.

[9] 2028 and 2048 future year demand was determined from the EMME models

Road Section	Direction	Existing AADT	2028 without project	2048 without project
Edgewater Dr East – Gossamer Dr	Eastbound	18,000	15,300	17,200
Side Roads				
Pakuranga Rd	Westbound	17,900	18,500	17,600
	Eastbound	16,000	20,000	19,400
SEART	Off-Ramp	27,400	26,200	27,900
	On-Ramp	27,000	29,900	30,600
Tiraumea Dr[10]	Exit	1,230	2,800	2,830
	Enter	410	2,600	2,620
William Roberts Rd[11]	Northbound	380	550	540
	Southbound	2,410	5,700	5,700
Reeves Rd	Exit	6,700	9,500	10,000
	Enter	6,600	4,100	4,400
Mattson Rd[12]	Exit	1,000	1,700	1,600
	Enter	1,600	2,300	2,300
Marriot Rd[13]	Exit	1,160	840	840
	Enter	1,090	950	1,000
Edgewater Dr West	Exit	1,500	1,800	1,900
	Enter	1,200	1,900	2,000
Fremantle Pl	Exit	400	520	530
	Enter	400	480	480
Gossamer Dr	Exit	7,200	1,2200	12,800
	Enter	5,800	8,800	10,000

It should be noted that no data was available for Cortina Place. This table provides useful context, however a more detailed comparison of future years 'without and with the Project' is discussed in **Section 5** and **Section 6** of this report.

[10] 2018 RAMM data used.
[11] Assumed 50/50 Split of volumes enter and exit.
[12] 2018 RAMM data used.
[13] 2028 design volume ratios used to determine volumes in each direction.

Large increases in traffic demand are predicted on Ti Rakau Drive between Pakuranga Road and Reeves Road in the 2028 future year, with no increases by 2048. With this section of the corridor near or at full capacity, especially at the Ti Rakau Drive / Reeves Road / SEART intersection, a trend is observed where traffic demand on Ti Rakau Drive to the east of the intersection is expected to remain roughly unchanged or in some cases decrease. This is likely due to large increases in queues and delays, acting as a bottle neck for the rest of the corridor, forcing vehicles to reroute to less congested links.

This trend is also observed on Pakuranga Road. An increase in traffic demand is predicted by 2028, with a decrease by 2048. In the existing environment, motorists travel along Pakuranga Road and turn left onto Ti Rakau Drive to head towards SEART. With this section of Ti Rakau Drive at capacity, large increases in queues and delays are likely. This in turn is expected to lead to rerouting to occur to less congested links.

Figure 6 shows the AADT volumes in the existing environment in a network context.

Figure 6: Existing environment AADT

3.4.2 Travel Time and Variability

Route travel times and variability in the existing environment were determined from the AIMSUN 2018 Base Model. The AM peak hour was recorded between 07:30-08:30 and the PM peak hour between 16:30-17:30. To maintain consistency across the different assessments already conducted and future ITAs, four routes were selected to determine the travel time of general traffic in the existing environment. These routes are outlined below, and the results are shown in **Table 4**:

- 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

Table 4: Base model (2018) general traffic travel times

AM Peak						
	Westbound			Eastbound		
Route	Base Model 2018 [min]	Variability + [min]	Variability – [min]	Base Model 2018 [min]	Variability + [min]	Variability – [min]
Botany - Pakuranga	17.4	2.0	-1.7	11.7	0.3	-0.4
Botany - SEART	10.7	1.6	-0.9	9.4	0.9	-0.7
Howick - Pakuranga	3.1	0.1	-0.1	3.3	0.2	-0.1
Howick - SEART	12.0	0.4	-0.5	6.9	0.5	-0.4
PM Peak						
	Westbound			Eastbound		
Route	Base Model 2018 [min]	Variability + [min]	Variability – [min]	Base Model 2018 [min]	Variability + [min]	Variability – [min]
Botany – Pakuranga	26.1	0.8	-1.1	16.0	0.8	-1.2
Botany - SEART	18.5	0.6	-0.9	9.3	0.6	-0.6
Howick - Pakuranga	2.9	0.1	-0.1	5.6	0.6	-0.5
Howick - SEART	4.5	0.1	-0.2	9.2	0.2	-0.1

In the AIMSUN model, the routes from Botany to Pakuranga and Botany to SEART travel along the same section of Ti Rakau Drive, up to Reeves Road. Therefore, these routes have the same travel time along this section of the corridor.

However, from the Ti Rakau Drive / Reeves Road / SEART intersection, the Botany to Pakuranga route heads towards the Williams Avenue intersection, a distance of roughly 780 m. Meanwhile, the Botany to SEART route extends up to the western abutment of the Waipuna Bridge, a distance of roughly 1.4km.

Although the Botany to Pakuranga Road route passes through three more intersections compared to the Botany to SEART route, its travel time is significantly longer. This is particular evident in the peak directions, westbound in the AM peak period and eastbound in the PM peak period. This is likely due to congestion on Ti Rakau Drive between Pakuranga Road and Reeves Road, leading to large queues and delays.

This trend is also observed in the Howick to Pakuranga and Howick to SEART routes. The two routes from Howick travel along the same section of Pakuranga Road, from Glenmore Road up to Ti Rakau Drive and will have the same travel times along this section. However, a significant increase in travel time is expected in the Howick to SEART route. Although the distance from the Pakuranga Road / Ti Rakau Drive intersection to the Waipuna Bridge is further than the distance to the Williams Avenue intersection, it is likely that congestion on Ti Rakau Drive is contributing to the large travel times.

3.4.3 Road Characteristics

The traffic data for Ti Rakau Drive demonstrated a tidal flow characteristic where westbound traffic movements (citybound) are dominant in the morning period and eastbound traffic volumes (outbound) are dominant in the evening period.

Figure 7 shows the existing directional signage on Ti Rakau Drive, upstream of Reeves Road / SEART intersection, westbound and eastbound, respectively.

Figure 7: Existing directional signage on Ti Rakau Dr westbound and eastbound, respectively

A raised median on Ti Rakau Drive between Pakuranga Road and Reeves Road prevents right-turn movements, except at Palm Avenue. Aylesbury Street has two accesses points onto Ti Rakau Drive with varying movement restrictions. A U-turn facility is provided on Ti Rakau Drive approximately 50 m south of the intersection with Pakuranga Road. This section of Ti Rakau Drive consists of three lanes in each direction.

A similar restriction currently exists on Ti Rakau Drive between Reeves Road and Mattson Road, preventing right-turn movements out of Tiraumea Drive and all properties fronting this section of Ti Rakau Drive. Three lanes westbound and two lanes eastbound are provided for the majority of this section.

The raised median continues from Mattson Road to Gossamer Drive, preventing right-turns out of properties fronting Ti Rakau Drive. However, full turning movements are provided at all intersections along this section of the corridor. Ti Rakau Drive has a 60 km/h posted speed limit in the existing environment.

3.5 Bus Services and Facilities

In December 2017, AT launched a new bus network for East Auckland. This launch included a new bus network, bus routes, route numbers, timetables and buses. The new East Auckland Bus Network philosophy was improved integration with other public transport networks for Auckland, such as buses connecting with trains at the Panmure and Otahuhu interchanges, as well as at the Middlemore, Papatoetoe and Manukau train stations. **Figure 8** outlines the existing bus routes operating in the EB2 and EB3R project areas.

Figure 8: Existing bus network through EB2 and EB3R project areas[14]

[14] https://at.govt.nz/media/1974487/east-new-network-get-ready-poster-aug17-v30.pdf

There are a number of routes within the EB2 and EB3R project areas that currently operate on the proposed Eastern Busway corridor. These routes are the 70, 72C, 72M, 72X, 352, 711, 712. School bus services 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

Details of the general routes are outlined in **Table 5** below.

Table 5: Existing bus services through EB2 and EB3R project areas

Route Type	Route No	Frequency	Description
Frequent Services	70	Every 15 minutes	Botany, Pakuranga, Panmure, Ellerslie, Newmarket, City
	72C/M	Every 15 minutes	Howick, Pakuranga Rd, Pakuranga, Panmure
Connector Services	711	Varying	Howick, Cook St, Union Rd, Bradbury Rd, Cascades Rd, Reeves Rd, Panmure
	712	Varying	Bucklands Beach, Casuarina Rd, Glenmore Rd, Panmure
Peak Period Services	72X	Services operate weekdays only, during morning and afternoon peaks	Botany, Howick, Pakuranga, Panmure, Southern Motorway, City
	352	Services operate weekdays only, during morning and afternoon peaks	Panmure, Highbrook, East Tāmaki, Manukau

In the existing environment, the 70, 352 and 711 services travel along Ti Rakau Drive and the 72C, 72M, 72X and 712 services travel along Pakuranga Road in the kerbside lanes with general traffic. As such, buses have roughly the same travel times as general vehicles along these sections (excluding dwelling time at bus stops) and experience the same delays at intersections. Furthermore, without the Project, buses are expected to experience the same increases in delays in the future as a result of congestion and queueing on Ti Rakau Drive and Pakuranga Road.

There are approximately 18 bus stops within the EB2 and EB3R project areas, which include 10 on Ti Rakau Drive. **Figure 9** below shows the existing bus stop locations, the stops are mainly for public bus services.

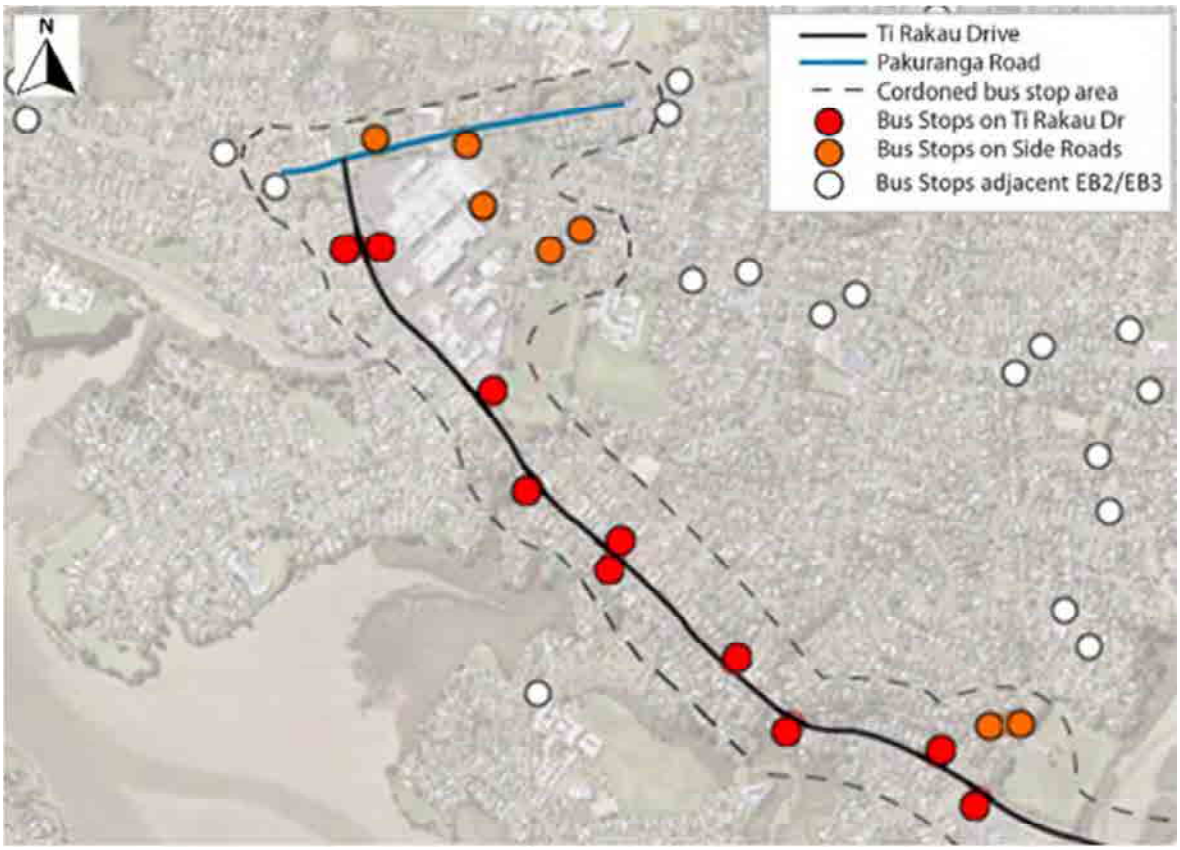

Figure 9: Existing bus stops within the EB2 and EB3R project areas

The spacing between bus stops varies between 200m and 1.5km with the average distance between stops being 500m. The walking catchments for these bus stops show that there are some significant gaps in the walking network over large areas, particularly along Ti Rakau Drive, based on a nominal 400m radius isochrone walking catchment.

There are also locations of considerable overlap in the bus stop catchments suggesting that stop locations may not be optimised. All existing bus stops are on-street, with the exception of off-street stops at Pakuranga Town Centre. The majority of the existing bus stops on Ti Rakau Drive and Pakuranga Road do not provide seating and sheltered cover. No bicycle parking is provided in the existing environment.

3.6 Walking and Cycling Facilities

3.6.1 Walking Facilities

Overall, pedestrian footpaths are provided along both sides of the majority of roads within the Project area in the existing environment. However, there is an absence of pedestrian facilities particularly along William Roberts Road south, and some slip lanes do not provide signalised pedestrian crossings. Various side roads intersecting Ti Rakau Drive do not have crossings facilities currently.

3.6.1.1 EB2 – Ti Rakau Drive (Pakuranga Road to Reeves Road)

- A pedestrian footpath is available on both sides of the road, approximately 1.5 m wide and separated from the live lane by a 1.0 m grass berm
- The only crossing facilities are at the two signalised intersections of Pakuranga Road / Ti Rakau Drive and Ti Rakau Drive / Reeves Road
- No mid-block crossing is available between the two intersections. The road is also separated by a median grass berm. From observation, pedestrians are finding gaps in traffic and utilise the median as a refuge area, waiting for a gap to cross to Pakuranga Plaza

3.6.1.2 EB2 – Pakuranga Road (Ti Rakau Drive to William Roberts Road)

- A pedestrian footpath is provided on both sides of the corridor, approximately 1.2 m wide on the northern side with a 1.5 m grass berm (no grass berm to the east of the Brampton Court access to the Pakuranga Plaza). The footpath is approximately 1.7 m wide on the southern side with a 0.6 m grass berm
- Crossing facilities are only provided at the Pakuranga Road / Ti Rakau Drive intersection and the signalised mid-block crossing near the Pepler Street exit at the Pakuranga Plaza. The westbound and eastbound carriageways are separated by a 3.0 m flush median
- A pedestrian refuge island is provided across William Roberts Road at its intersection with Pakuranga Road, however, no crossing facility is provided across Pakuranga Road at this location

3.6.1.3 EB2 – Reeves Road

- Footpaths are currently provided along both sides of Reeves Road, approximately 1.5m in width and separated from the live lanes by a 1.2 m grass berm
- Crossing facilities are provided at the Ti Rakau Drive / Reeves Road / SEART intersection and at the mid-block pedestrian crossing. A pedestrian refuge island is provided across William Roberts Road north at its intersection with Reeves Road, however, no crossing facility across Reeves Road is provided at this intersection

3.6.1.4 EB2 – William Roberts Road

- Currently, footpaths are available on both sides of William Roberts Road north (approximately 1.5 m wide), however, a grass berm of approximately 1.2 m width is only provided on the eastern side
- Pedestrian refuge islands are provided at the north end at Pakuranga Road and at the southern end at Reeves Road
- William Roberts Road south currently has no pedestrian footpaths on either side of the carriageway, except for a short section on the western side near the Pakuranga Community Centre
- No pedestrian facilities are currently provided to cross William Roberts Road south

3.6.1.5 Cortina Place

- Footpaths are currently provided on both sides of Cortina Place, approximately 1.7 m wide and no grass berm
- A pedestrian refuge island is provided near the intersection with Reeves Road, and 2.9 m grass median is provided along the majority of the road

3.6.1.6 EB3R – Ti Rakau Drive (Reeves Road to Gossamer Drive)

- On average, the footpath width is 1.5 m and is separated from the road carriageway and high volumes of fast-moving traffic by a 1.0 m grass berm
- Patches of the pedestrian path is encroached with tree branches, leaves and shrubs from the property side of the footpath reducing the width of the footpath, but generally the path itself is in good physical condition
- The Ti Rakau Drive residential area supports low to medium density housing with a number of cul-de-sacs, as well as local schools and parks. Footpath facilities enable pedestrian movements along Ti Rakau Drive, but there are no additional links between cul-de-sacs
- There is one access into Ti Rakau Park from Ti Rakau Drive itself, near the intersection with Mattson Road. Limited links and connections indicate poor pedestrian connectivity and access to the parks and schools in the surrounding area
- There are four crossing facilities to accommodate crossing the corridor in the residential section, located at the four signalised intersections:
    - Ti Rakau Drive / Reeves Road
    - Ti Rakau Drive / Mattson Road
    - Ti Rakau Drive / Edgewater Drive
    - Ti Rakau Drive / Gossamer Drive
- The intersections are of similar design along the route, which consist of left-turn slip lanes for vehicle efficiency and crossing facilities provided across the side street and one leg of the corridor. Pedestrians must cross the slip lanes, unprotected, to the refuge island before arriving at the push button to cross the road. Additionally, pedestrians can only cross at one side of the intersections on Ti Rakau Drive, reducing the pedestrian amenity and efficiency

3.6.2 Cycling Facilities

There is an absence of cycle facilities along the vast majority of Ti Rakau Drive. Neither on-road nor off-road cycle facilities are provided to encourage movement along Ti Rakau Drive, except at the Ti Rakau Drive / Gossamer Drive intersection.

Cyclists within the EB2 and EB3R project areas must currently share an on-road lane with high-volume, high-speed traffic, as well as with heavy vehicles (e.g., buses). Crossing facilities are limited to those at signalised intersections. More experienced and confident cyclists who mix with general traffic have the choice to cross at intersections from right turning bays, but must still cross multiple lanes of traffic to do so. Furthermore, cyclists must navigate numerous driveways along the corridor.

In the wider Pakuranga area, there are sections of short cycle routes, outlined in **Figure 10**. Reeves Road is suggested as a road with space for cyclists, albeit with high traffic demand. AT recently developed recreational cycle facilities in the eastern cycle network, such as the Cascades shared path that connects Pakuranga College, Burswood Drive and Meadowlands. AT has also developed the Pakuranga Rotary shared path that tracks the coastline of the Tāmaki River. Additional recreational cycle routes provide connection to and from Half Moon Bay Ferry Terminal, Farm Cove, Sunny Hills, and Pakuranga Plaza. With the completion of EB1, a bi-directional cycleway and shared path is located on the northern side of Pakuranga Road from Ireland Road to Ti Rakau Drive.

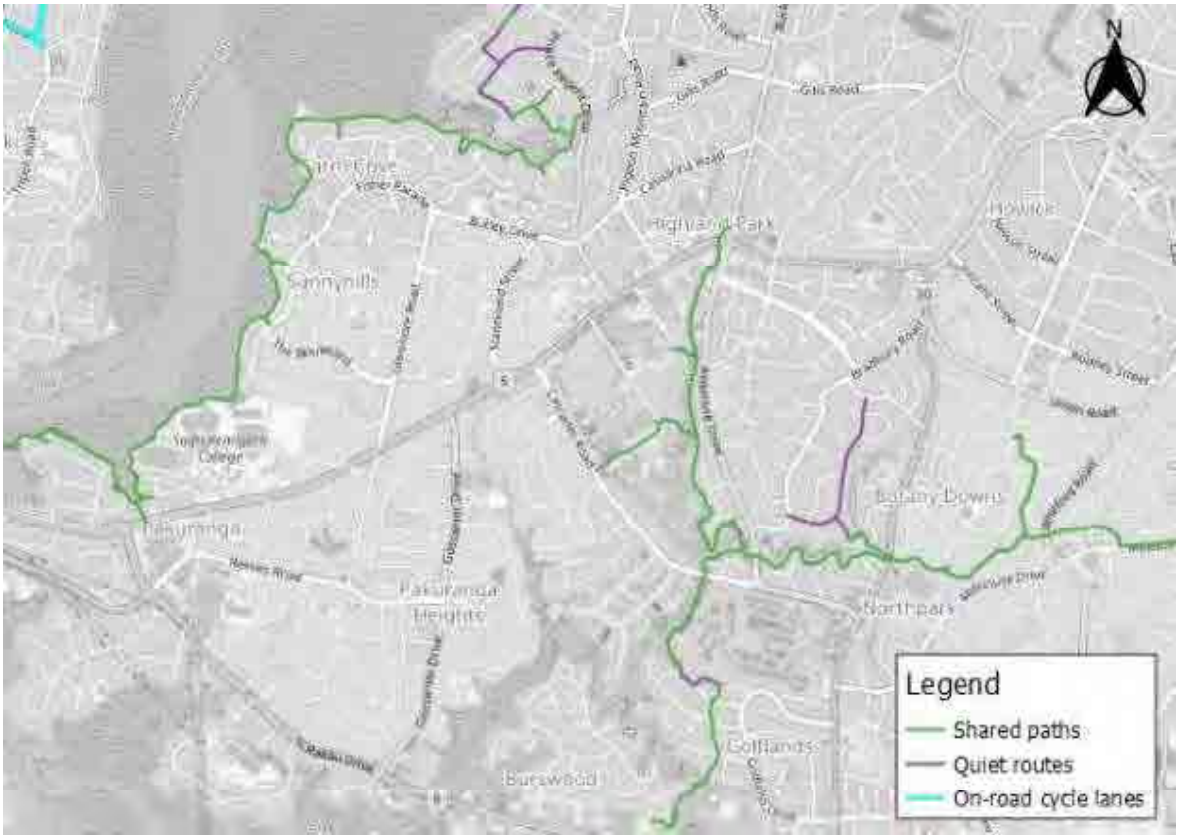

Figure 10: Existing cycle routes and facilities in the wider Pakuranga area

3.7 Parking

Within the EB2 and EB3R project areas there are a number of locations that offer parking, both on-street and off-street. The key locations in the EB2 and EB3R project areas are:

- Pakuranga Plaza
- Te Tuhi
- Ti Rakau Park
- Cortina Place
- William Roberts Road
- Ti Rakau Drive
- Edgewater shops
- Side roads

Currently, Pakuranga Plaza is classified as a Business Town Centre Zone. Under the AUP(OP), there are generally no upper limits on the amount of parking retail, office, education facilities, hospitals and commercial services can provide.

Parking surveys were conducted to determine the utilisation of the existing on-street and off-street parking demand and utilisation in the EB2 and EB3R project areas. **Figure 11** shows the surveyed areas, which were surveyed on Thursday 5 July 2018 and Saturday 7 July 2018. At the time of data collection, these survey dates were selected to represent typical weekday and weekend periods of parking utilisation at the selected sites. These data sets exclude the effects of COVID-19 on travel behaviour and are considered to represent the existing environment before EB2 and EB3R construction.

Figure 11: Parking survey locations

3.7.1 Pakuranga Plaza

Pakuranga Plaza currently supports 1,355 parking spaces on site. The utilisation of 840 of these parks was captured in the parking survey in the areas outlined in **Figure 12**.

Figure 12: Surveyed parking areas of Pakuranga Plaza

Table 6 outlines the findings of the surveys and **Figure 13** below illustrates the daily utilisation profile. The table and the graph indicate the Pakuranga Plaza parking is underutilized and does not exceed 60% capacity on a typical weekday or weekend.

Table 6: Pakuranga Plaza parking utilisation summary

Parking Utilisation	Thursday 5 July (7am – 7pm)	Saturday 7 July (10am – 6pm)
Maximum Stay [hours]	13	9
Minimum Stay [hours]	1	1
Average Stay [hours]	2.4	1.5
Maximum Parking (Utilisation)	418 (51%)	471 (57%)
Minimum Parking (Utilisation)	52 (6%)	306 (37%)
Average Parking (Utilisation)	301 (37%)	392 (48%)

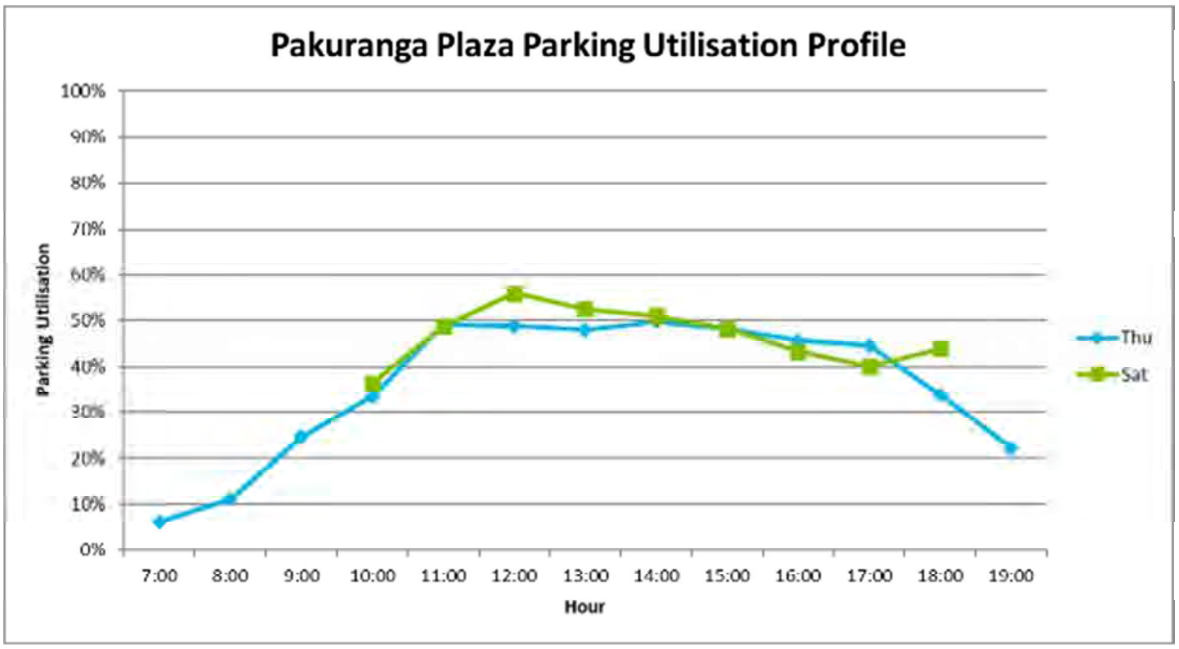

Figure 13: Pakuranga Plaza parking utilisation profile

3.7.2 Cortina Place

Cortina Place is a local cul-de-sac intersecting Reeves Road and provides access to a small commercial area. Overall, there are 25 on-street spaces available, with an average utilisation of 64% during weekdays and 71% during weekends. Full utilisation of the parking spaces occurs on weekend mornings for a short duration. The long duration of the average stay indicate that shop-owners and staff are likely using the spaces. **Table 7** outlines the findings of the survey and **Figure 14** below illustrates the parking utilisation profile across the days.

Table 7: Cortina Pl parking utilisation summary

Parking Utilisation	Thursday 5 July (7am – 7pm)	Saturday 7 July (10am – 6pm)
Maximum Stay [hours]	13	9
Minimum Stay [hours]	1	2
Average Stay [hours]	5.7	5.5
Maximum Parking (Utilisation)	21 (84%)	25 (100%)
Minimum Parking (Utilisation)	8 (32%)	15 (60%)
Average Parking (Utilisation)	16 (64%)	18 (71%)

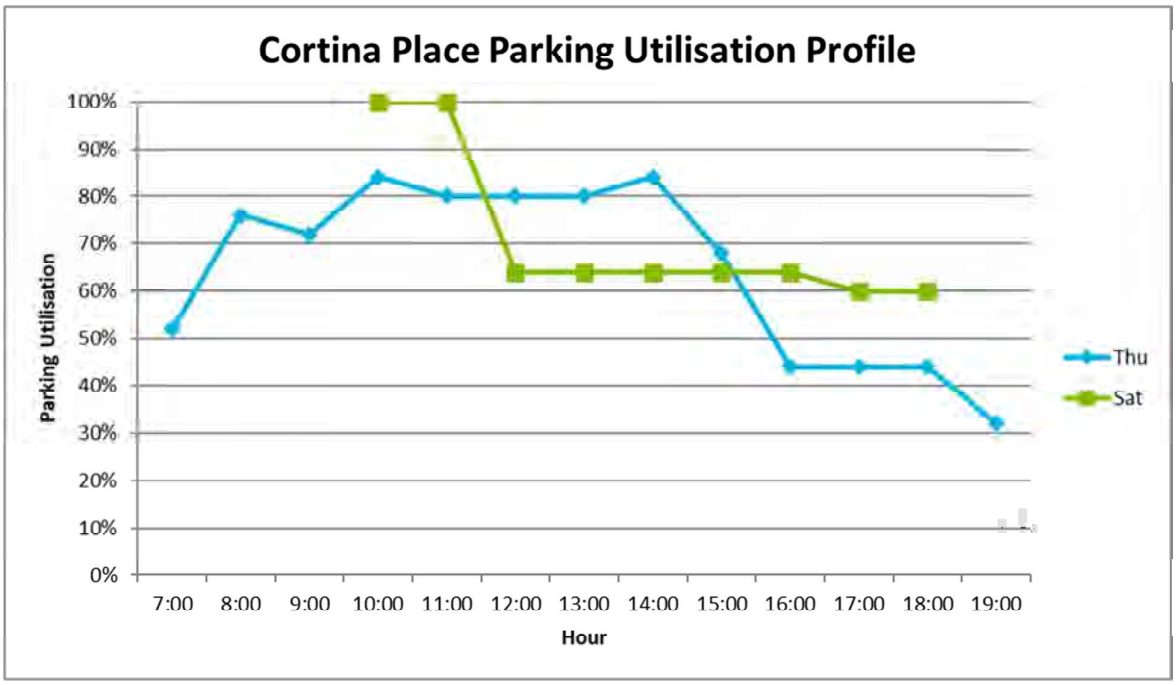

Figure 14: Cortina Pl parking utilisation profile

3.7.3 William Roberts Road

William Roberts Road connects Pakuranga Road to Reeves Road at its northern end and provides access to the Pakuranga Leisure Centre and Ti Rakau Park at its southern end. Overall, there are 127 parking spaces available, with an average utilisation of 49% on weekdays and 33% on weekends. There are 40 additional parks for the Ti Rakau Park which were considered off-street parking and were not surveyed. **Figure 15** outlines the area included in the parking survey of William Roberts Road.

Figure 15: Surveyed area of William Roberts Rd

Table 8 outlines the findings of the survey and **Figure 16** illustrates the parking utilisation profile across the days.

Table 8: William Roberts Rd parking utilisation summary

Parking Utilisation	Thursday 5 July (7am – 7pm)	Saturday 7 July (10am – 6pm)
Maximum Stay (hours)	13	9
Minimum Stay (hours)	1	1
Average Stay (hours)	3.7	2.8
Maximum Parking (Utilisation)	105 (83%)	113 (89%)
Minimum Parking (Utilisation)	25 (20%)	35 (28%)
Average Parking (Utilisation)	62 (49%)	42 (33%)

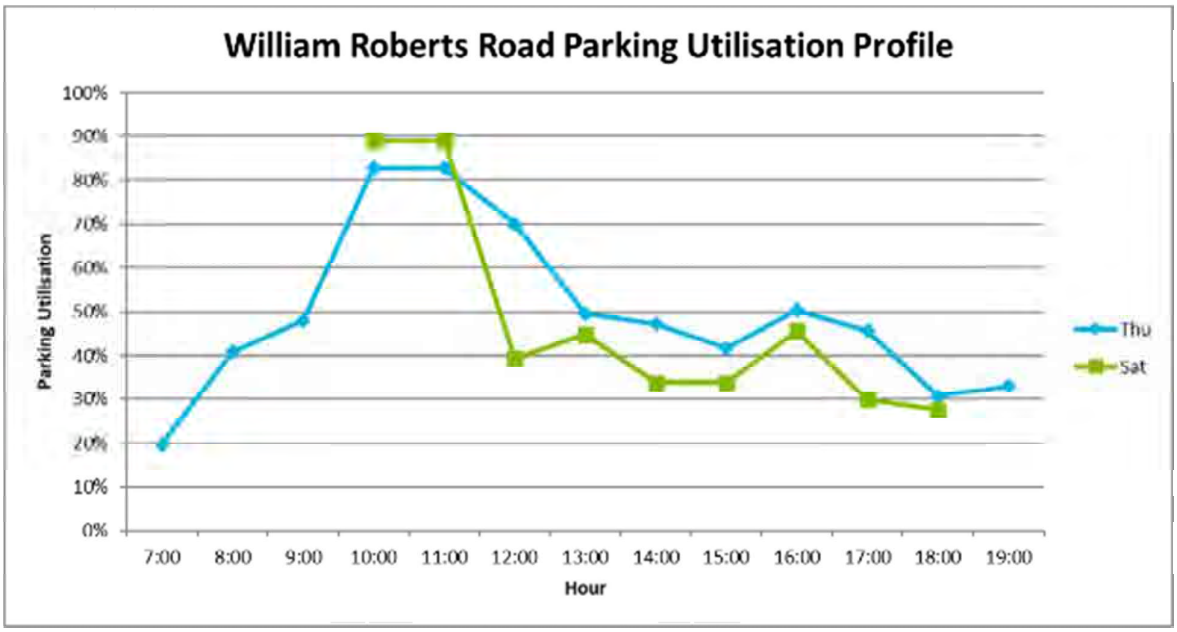

Figure 16: William Roberts Rd parking utilisation profile

Where the utilisation is around 90% for William Roberts Road and Cortina Place it is likely due to activities at the Pakuranga Leisure Centre or the Ti Rakau Park, such as Saturday morning sports. Additionally, the maximum stay for both Cortina Place and William Roberts Road was 13 hours, which is equivalent to the length of the parking survey. This indicates that a number of these parks are likely to be occupied by owners/ staff of the surrounding properties.

3.7.4 Ti Rakau Drive

Ti Rakau Drive is a major corridor connecting Pakuranga to East Tāmaki and Botany Town Centre in the southeast. The survey was conducted from the Roseburn Place intersection down to the Gossamer Drive intersection. Overall, there are 180 on-street parking spaces provided along Ti Rakau Drive, which are currently poorly utilised. **Table 9** below outlines the findings of the survey and **Figure 17** below illustrates the parking utilisation profile across the days.

Table 9: Ti Rakau Dr parking utilisation summary

Parking Utilisation	Thursday 5 July (7am – 7pm)	Saturday 7 July (10am – 6pm)
Maximum Stay [hours]	13	9
Minimum Stay [hours]	1	1
Average Stay [hours]	3.0	2.7
Maximum Parking (Utilisation)	10 (5%)	28 (15%)
Minimum Parking (Utilisation)	3 (2%)	9 (5%)
Average Parking (Utilisation)	5 (3%)	15 (8%)

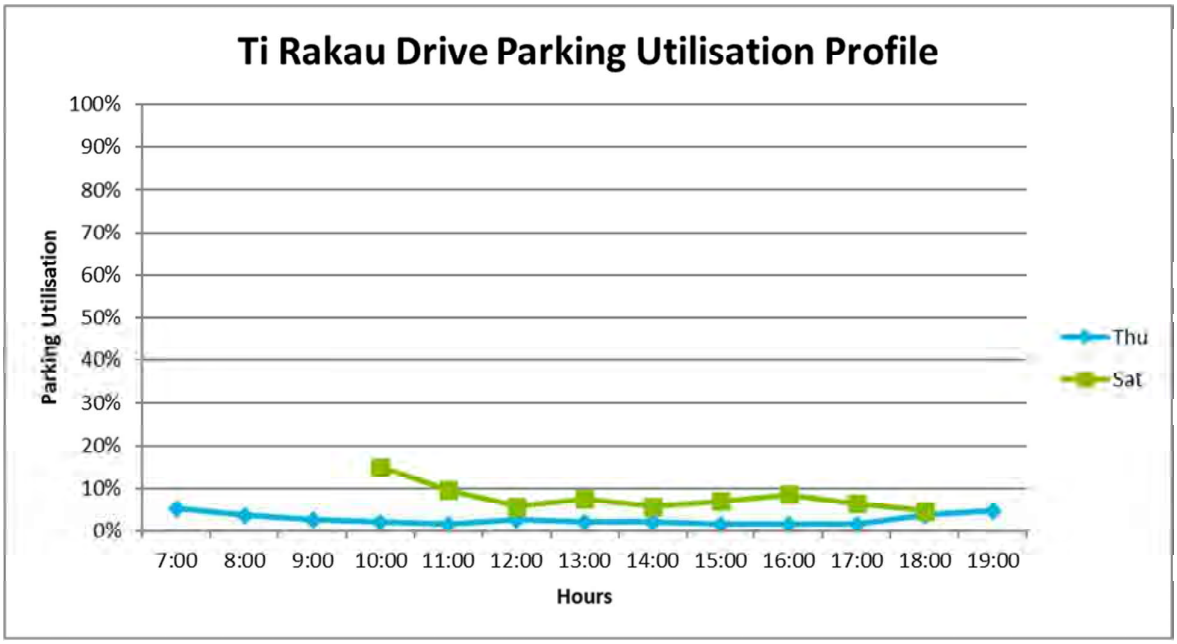

Figure 17: Ti Rakau Dr parking utilisation profile

The results shown are not unexpected. It is likely that the high traffic volume environment on Ti Rakau Drive does not create an appealing location to park vehicles given a perceived risk of accidents. Furthermore, this section of Ti Rakau Drive is surrounded by residential properties, and it would not be unreasonable to assume that properties have ample individual off-street parking due to the general size of these free-standing properties.

3.7.5 Edgewater Shops

The Edgewater Shops is a block of local shops located at the Ti Rakau Drive / Edgewater Drive intersection. Currently there are 30 parking spaces provided within an off-street parking area that serves the various commercial properties. The survey determined that the carpark is not fully utilised. **Table 10** outlines the findings of the survey and **Figure 18** illustrates the parking utilisation profile across the days.

Table 10: Edgewater Shops parking utilisation summary

Parking Utilisation	Thursday 5 July (7am – 7pm)	Saturday 7 July (10am – 6pm)
Maximum Stay [hours]	11	9
Minimum Stay [hours]	1	1
Average Stay [hours]	2.5	1.8
Maximum Parking (Utilisation)	18 (60%)	12 (40%)
Minimum Parking (Utilisation)	1 (4%)	3 (10%)
Average Parking (Utilisation)	11 (37%)	8 (27%)

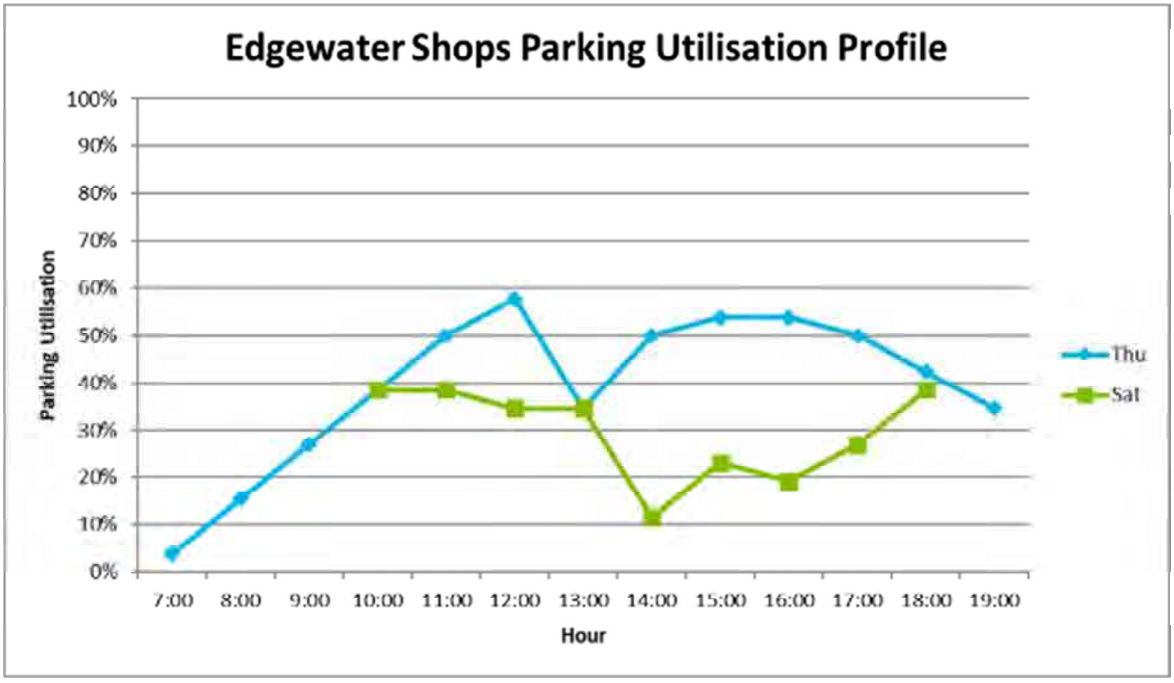

Figure 18: Edgewater Shops parking utilisation profile

Further analysis of the parking survey data shows that generally most vehicles are parked for short periods (one-hour survey intervals), with a minority of vehicles parked for longer periods (likely staff and shop owners). This is in line with what would be expected at these commercial properties. Parking utilisation is not expected to exceed 60% on a typical weekday or weekend.

3.7.6 Side roads

Due to the low utilisation of on-street parking along the side roads of Ti Rakau Drive, no further detailed analysis is presented. **Table 11** provides a summary of the parking surveys conducted on the side roads in EB2 and EB3R project areas.

Table 11: EB2 and EB3R side roads parking utilisation summary

Side Road	Parking Utilisation Comments
Ayr Rd	Ayr Road is a local road providing access to residential houses with 70 on-street spaces available. However, it is a poorly utilised road, with the maximum utilisation on Thursday being 12% and 6% on Saturday.
Roseburn Pl	Roseburn Place is a cul-de-sac joining to Ti Rakau Drive, providing access to residential properties. There are 45 on-street spaces available. However, it is poorly utilised with the maximum utilisation on Thursday being 9% and 10% on Saturday. The low utilisation could be attributed to residents having ample parking within their properties and visitors parking on the street.
Mattson Rd	Similar to Roseburn Place, Mattson Road is a cul-de-sac off Ti Rakau Drive with 80 on-street spaces. Again, it is poorly utilised with the maximum utilisation on Thursday being 4% and 8% on Saturday.
Marriott Rd	Marriott Road connects Ti Rakau Drive to Udys Road with 175 on-street parking spaces available. It is a poorly utilised road with a maximum of six parked vehicles.
Chevis Pl	Chevis Place is a cul-de-sac off Ti Rakau Drive providing access to residential properties to the east. There are 45 on-street parking spaces available. However, these spaces are poorly utilised with a maximum utilisation of 4% on Thursday and 16% on Saturday. The low utilisation could be attributed to most residents having ample parking within their properties.
Edgewater Dr	Edgewater Drive is a collector with a crescent shape that connects to Ti Rakau Drive at two locations. It provides access to residential properties, Edgewater College and Pakuranga Retirement Village. There are 500 on-street parking spaces available along the length of the road. It would be expected to see high utilisation of on-street parking during school peak periods; however, this is not the case, with a maximum weekday utilisation of five parked vehicles. A similar trend was observed on Saturday with a maximum of six vehicles parked within an hour.
Wheatley Ave	Wheatley Avenue is a small cul-de-sac off Ti Rakau Drive between the two sections of Edgewater Drive. It serves a small residential community and provides 30 on-street parking spaces. It is poorly utilised during weekdays with the maximum utilisation being 10%. This was observed to increase to 20% during the weekend.

3.8 Crash Environment

3.8.1 Crash Analysis System Data

All reported crashes within the EB2 and EB3R project area were extracted from the Crash Analysis System (CAS) for a five-year period from 2017 to 2022. For this assessment, the focus on the extracted data was in the area shown in **Figure 19**.

Figure 19: Extent of extracted CAS data for EB2 and EB3R project areas

There were 2 fatal crashes and 17 serious injury crashes in the 2017 – 2022 time period as described and analysed below:

- **Fatal crash 1 (2021/02/14)**: An eastbound vehicle on Pakuranga Road travelling in a through lane had turned right at the Pakuranga Road / Ti Rakau Drive intersection. A motorcycle travelling westbound on Pakuranga Road attempted to stop, lost control and collided with the right turning vehicle.
    - There were road works in the area at the time of the crash. A combination of traffic signals and road signage for all motorists in the eastbound lanes may have been confusing if they were unfamiliar with the road changes or area. Various road changes, layout changes, traffic cones, and signage were in effect (see **Figure 20**).

Figure 20: Pakuranga Rd / Ti Rakau Dr intersection, looking eastbound on Pakuranga Rd (source: Google Street View, Feb 2021)

- **Fatal crash 2 (2021/06/10)**: A vehicle was traveling in the south-west direction on Reeves Road while a pedestrian was crossing Reeves Road in the south-east direction. The pedestrian was hit by the vehicle while crossing the road.
    - There are two controlled pedestrian crossings within 90m of the crash scene.
    - A number of environmental factors were identified, but not limited to;
        - The change in speed zone from 60-50km/hr for eastbound traffic just before the driveway access to Pakuranga Plaza.
        - The merging of two lanes to one lane for eastbound traffic just before the driveway access to Pakuranga Plaza.
        - The amount of vehicle and pedestrian usage for the driveway to Pakuranga Plaza.
        - The width of Cortina Place and the amount of foot/vehicle traffic.
        - The increase in speed from 50-60km/hr just west of Cortina Place.
        - The widening of the westbound lane from one lane to three lanes just west of Cortina Place.
        - When Reeves Road traffic queues at the intersection with Ti Rakau Drive the tail can extend past Cortina Place obscuring visibility to pedestrians that cross from Cortina Place.
        - The average street lighting from nearby overhead lamp posts (if it was fully dark).

The majority of the serious injury crashes have occurred along Ti Rakau Drive. The data does not suggest commonality between the location and type of crashes. In total, of the 17 serious injuries, 47% was a result of vehicle collision with pedestrians, and 30% were attributed to loss of control from drivers. A further 18% of crashes were as a result of right turning collision between two motor vehicles, predominantly at intersections and a total of one serious injury attributed to a rear end crash were observed. The major factors influencing crashes are poor observation (42%), pedestrian factors (42%), alcohol (26%) and travel speed (16%). A further 11% were due to road factors. Time of day did not appear to be a significant factor in the crashes with 68% of crashes occurring during light/overcast conditions.

3.8.2 Safe System Assessment

A Safe System Assessment (SSA) was undertaken for the entire Project area[15]. 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. A summary of the SSA is provided below.

The SSA assessed a total of ten crash types as described below:

1. Run-off-road (R-O-R): Involving one or more vehicle(s) losing control on a curve or straight
2. Head-on (H-O): Crashes involving two or more vehicles travelling in opposite directions
3. Intersection (INT): Crashes involving two or more vehicles travelling in adjacent directions
4. Other: Includes manoeuvring, overtaking, parking and miscellaneous crashes
5. Motorcycle (M/C): Any crash type above involving a motorcycle
6. P1: Any crash involving a pedestrian and a vehicle turning at an intersection
7. P2: Any crash involving a pedestrian and vehicle travelling straight (midblock crossing)
8. P3: Any crash involving a pedestrian and vehicle travelling straight through an intersection
9. C1: Any crash involving a cyclist being struck by a vehicle travelling in the same direction
10. C2: Any Crash involving a cyclist being struck by a vehicle at an intersection (turning or straight)

Each crash type is scored based on exposure, likelihood and severity with a value between 0 and 4. A lower score corresponds with a safer system. A score of 0 for exposure, likelihood or severity means that a particular crash type is not applicable to the location being considered and will result in a product score of 0. **Table 12** and **Table 13** outline the safe system score of the existing environment in the EB2 and EB3R project areas. Location C in EB2 and locations F and H in EB3R indicate station locations on completion of the full Eastern Busway Project.

Table 12: EB2 existing environment safe systems assessment

ZONE EB2 ASSESSMENT SUMMARY											
EXISTING LAYOUT	R-O-R	H-O	INT	OTHER	M/C	P1	P2	P3	C1	C2	TOTAL
A) TI RAKAU DR - MB	16	16	32	16	64	24	48	0	36	36	288
B) TI RAKAU DR - INT	16	16	32	16	48	24	0	48	36	36	272
C) TI RAKAU DR - MB	16	16	32	16	64	24	48	0	36	36	288
D) TI RAKAU DR - INT	16	16	24	16	48	18	0	24	36	27	225
E) TI RAKAU DR - MB	8	16	16	24	48	24	48	0	31.5	27	243
F) TI RAKAU DR - INT	16	16	24	24	48	18	48	36	31.5	27	289
G) TI RAKAU DR - MB	16	16	0	24	48	0	48	0	36	0	188
H) PAKURANGA RD - INT	16	16	24	16	48	12	0	24	36	36	228
I) PAKURANGA RD - MB	16	24	24	24	48	18	36	0	36	36	262
J) PAKURANGA RD - INT	16	24	32	16	64	18	0	48	36	36	290
K) REEVES RD - MB	9	13.5	15.75	13.5	36	18	36	0	31.5	36	209
L) REEVES RD - INT	15.75	13.5	18	13.5	36	21	0	48	36	36	238
M) WILLIAM ROBERTS RD - MB	NOT APPLICABLE										
N) CORTINA PL - MB	3	3	0	5.25	28	0	24	0	24	0	87
O) CORTINA PL - INT	9	13.5	18	15.75	42	21	0	48	27	36	230
P) PAKURANGA HWY - MB	24	0	0	24	32	0	0	0	0	0	80

[15] EB234-1-TE-RP-Z0_000003

Table 13: EB3R existing environment safe systems assessment

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 STASTION EB	8	16	0	8	16	0	32	0	36	0	116

Motorcycle crashes were identified as the highest risk in the existing layout due to a maximum score of 4 for both exposure and severity.

3.9 Over-Dimension and Over-Weight (OD and OW) Routes

Within the Project area there are a number of roads that have been defined by Waka Kotahi as strategic Over-Dimensional (OD) routes[16]. These support the large commercial and industrial areas in and around Burswood and East Tāmaki which are the key generators of freight and OD loads. The OD routes relevant to the EB2 and EB3R project areas are listed below and shown in **Figure 21**:

- Pakuranga Road – Ti Rakau Drive to Howick
- Pakuranga Highway – Ti Rakau Drive to Waipuna Road
- Ti Rakau Drive – Pakuranga Road to Te Irirangi Drive

[16] http://nzta1.cwp.govt.nz/assets/resources/overdimen-veh-route-maps/4-auckland/docs/OD_4-35%20Auckland

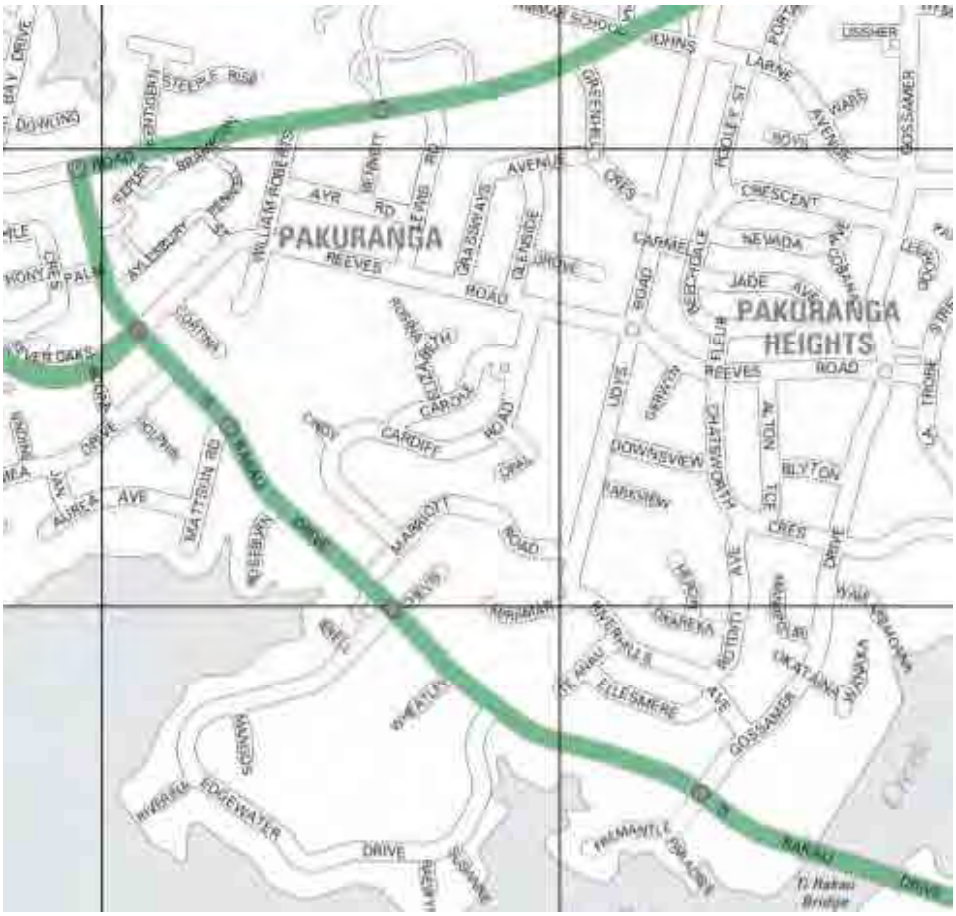

Figure 21: Over-dimensional vehicle routes

It is worth noting that no roads within the EB2 and EB3R project areas are designated as Over-Weight (OW) routes. The nearest OW route is Te Irirangi Drive further southeast, from State Highway 1 up to Botany Town Centre.

Table 14 below shows the current heavy commercial vehicle (HCV) percentage of traffic that travel through the EB2 and EB3R project areas. HCV data were sourced through a combination of AT traffic counts and RAMM data.

Table 14: Existing HCV percentage

Roads	HCV Percentage
Pakuranga Rd (east of Ti Rakau Dr)	6%
Pakuranga Rd (west of Ti Rakau Dr)	7%
Ti Rakau Dr (Pakuranga Rd – SEART)	7% westbound, 8% eastbound
Ti Rakau Dr (SEART – Edgewater Dr (west))	8%
Ti Rakau Dr (Edgewater Dr, west to east)	9% westbound, 8% eastbound
SEART	3%
William Roberts Rd	4%
Edgewater Dr	3%

3.10 Changes to the Baseline Traffic Environment

This section provides an overview of the changes to the baseline traffic environment that were included in the traffic modelling assessments conducted in this ITA.

3.10.1 EB1

Included in the modelling scenarios was EB1, which is a key component of the overall Project. It is the segregated busway connection from Panmure train station to Pakuranga Town Centre. The eastern terminus of EB1 is located beside the western boundary of the EB2 project area, at the Pakuranga Road / Ti Rakau Drive intersection and is shown in **Figure 22**.

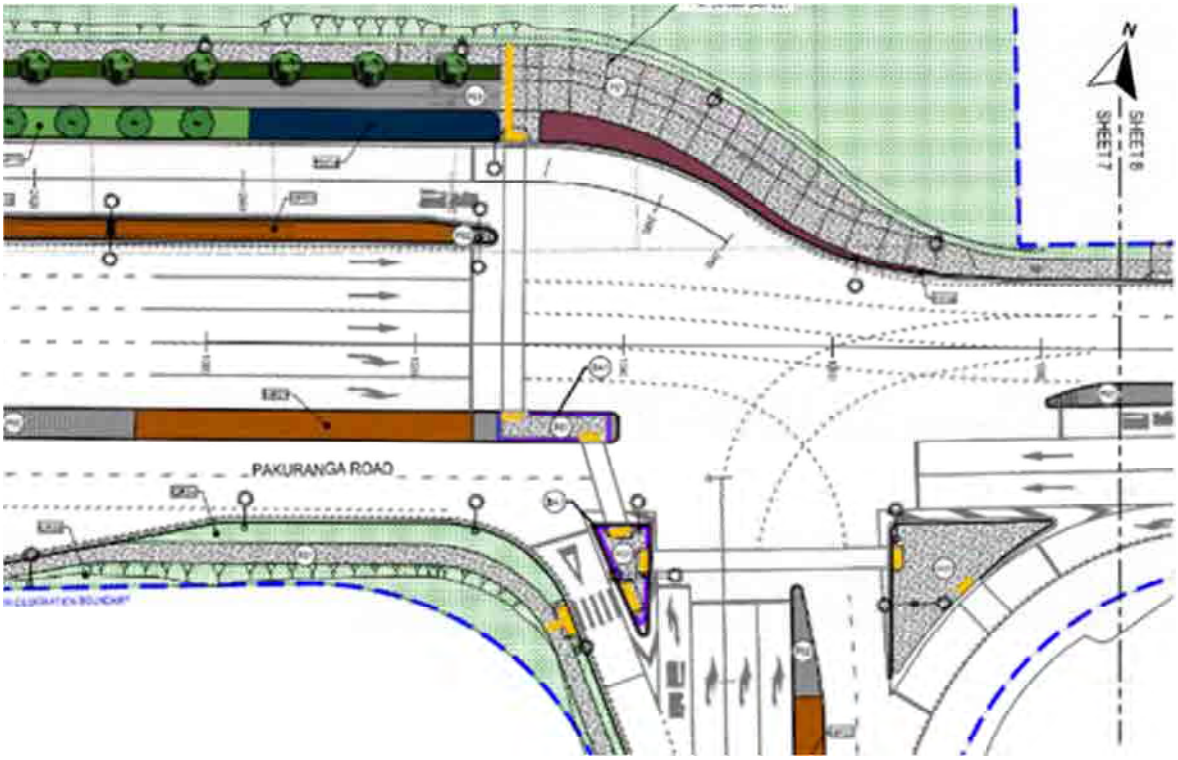

Figure 22: EB1 tie-in at Pakuranga Rd / Ti Rakau Dr intersection

3.10.2 WRRE Works

The WRRE construction will precede EB2 and EB3R, and is anticipated to have a duration of approximately eight months, from November 2022 to June 2023. The WRRE[17] will consist of:

- The extension of William Roberts Road further south to Ti Rakau Drive
- A new priority-controlled, left-in left-out (LILO) only intersection with Ti Rakau Drive at the southern end of William Roberts Road. The kerbside lane of Ti Rakau Drive eastbound will be a shared through and left-turn lane. It should be noted that a second lane at the northern approach will also be constructed during the WRRE but will not be operational until later stages of the overall construction of the Project (EB2)
- The extension of Cortina Place further east to connect to William Roberts Road. A new raised priority-controlled intersection with William Roberts Road at the eastern end of Cortina Place. All approaches to the intersection will provide one approach lane and one exit lane
- Five parallel on-street parking spaces will be provided on the eastern side of William Roberts Road and 11 angled parking spaces on the western side. A new raised pedestrian crossing will also be provided on William Roberts Road at Ti Rakau Park. The posted speed limit of this section of William Roberts Road will be 30 km/h

Figure 23 shows the layout of the William Roberts Road and Cortina Place extensions upon completion.

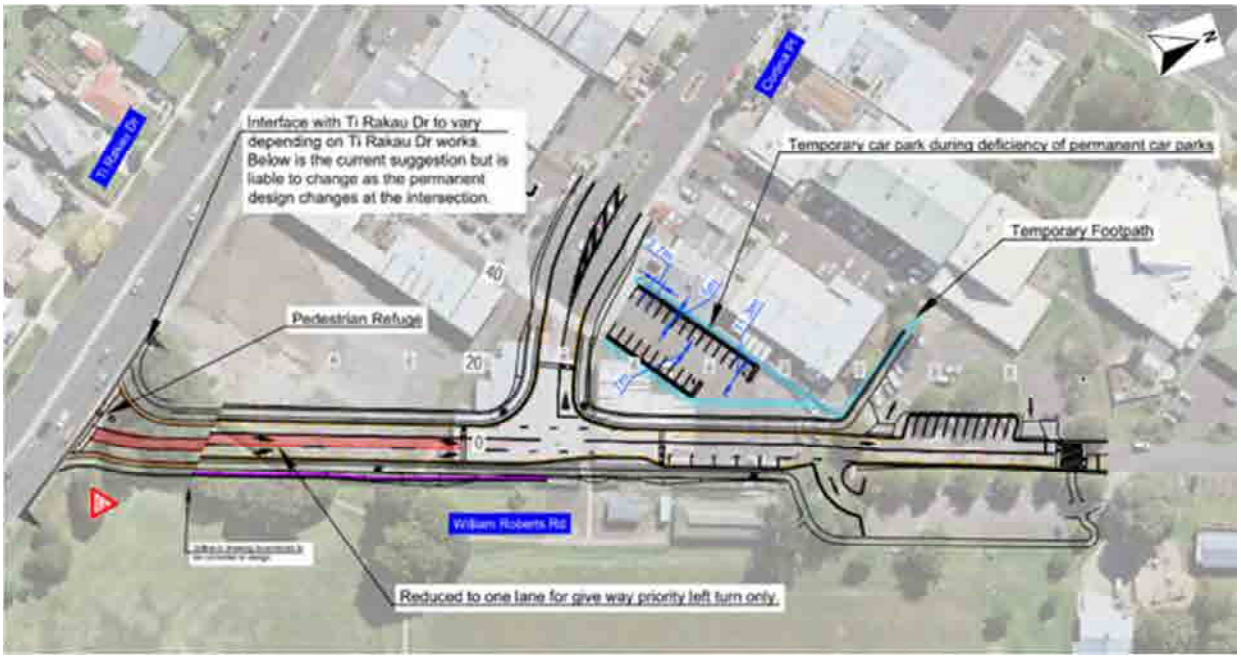

Figure 23: WRRE layout

[17] EB234-1-TE-RP-Z2-0001-A1-William Roberts Rd Extension ITA

3.10.3 Other EB2 and EB3R Enabling Works

An assessment was undertaken to understand the potential traffic redistribution that could occur on the network due to the closure of Reeves Road, which is required for the construction of the RRF during EB2. Furthermore, the assessment was aimed at identifying other potential enabling works that may be required to mitigate the effects of the resulting traffic redistribution. These enabling works will form part of the EB2 and EB3R consent package. Considering the construction programme, these enabling works will follow the WRRE and will precede the closure of Reeves Road during EB2 and EB3R construction.

The full results of the assessment are presented in the Technical Advice Memorandum provided in **Appendix A**, hereafter referred to as the 'Reeves Road Detour Assessment'. A summary of the results, and the enabling works required before the closure of Reeves Road, is presented below. **Figure 24** shows the proposed detour route during the Reeves Road closure.

Figure 24: Proposed detour route during Reeves Rd closure

The detour route along William Roberts Road north, westbound along Pakuranga Road and eastbound along Ti Rakau Drive towards SEART was determined to be less attractive than expected. Overall, only a small percentage of traffic could be expected to route along the proposed detour, likely due to the already congested nature of the Pakuranga Road / William Roberts Road intersection.

It was determined that inbound (citybound) traffic, during the AM peak, could be expected to detour via Gossamer Road to Ti Rakau Drive. Traffic in the outbound direction, during the PM peak, could be expected to return via Pakuranga Road and via SEART turning right onto Ti Rakau Drive.

It should be noted that the Reeves Road Detour Assessment followed a similar methodology as the WRRE ITA of assessing a 'future Do-Minimum' scenario in comparison to a 'future with detour' scenario. This approach allowed for the inclusion of known changes to the network that are expected to be completed before the Reeves Road closure and the associated traffic distribution on the network, such as the WRRE.

This assessment indicated that mitigation works would be required at the Ti Rakau Drive / Reeves Road and Ti Rakau Drive/ Gossamer Drive intersections.

3.10.3.1 Ti Rakau Drive / Reeves Road Intersection

Intersection performance is expected to be poor (LOS F) during both the AM and PM peaks in the Do-Minimum scenario. The Reeves Road Detour AM peak intersection performance could be expected to be slightly improved (LOS E), however the PM peak would still be LOS F.

The SEART off-ramp right-turn lanes into Ti Rakau Drive are expected to operate at LOS F during the PM peak. The increase in traffic volumes, due to Reeves Road closure, would result in delay increasing from around 50 sec to 215 sec (3.6 min), which would require mitigation.

Various mitigation measures were tested, however only the preferred option (Mitigation 2) is presented below. Mitigation 2 consists of the temporary removal of the pedestrian crossing on the eastern arm of the intersection, reducing the number of signal phases to three and redistributing the green time. **Table 15** provides a summary of the Ti Rakau Drive / Reeves Road intersection performance.

Table 15: Reeves Rd Detour Assessment – Ti Rakau Dr / Reeves Rd intersection performance summary[18]

Scenario	Level-of-Service (LOS)		Degree of Saturation (DOS)		Average Delay [sec]	
	AM	PM	AM	PM	AM	PM
Do-Minimum	F	F	0.90	1.13	178	83
Reeves Rd Detour	E	E	0.91	1.02	60	75
Mitigation 2	D	D	0.87	0.90	41	38

Mitigation 2 is expected to lead to improved intersection performance during both the AM and PM peaks compared to the Do-Minimum and the Reeves Road Detour scenarios.

[18] SIDRA analysis carried out based on traffic volumes for a 2028 horizon year.

3.10.3.2 Ti Rakau Drive / Gossamer Drive Intersection

The right-turn traffic volume from Gossamer Drive into Ti Rakau Drive is expected to increase by 160 veh/h in the AM peak during the Reeves Road closure. The resultant intersection performance is expected to be poor (LOS F), compared to the LOS E of the Do-Minimum scenario. This would require mitigation. The intersection is expected to experience little change during the Reeves Road closure in the PM peak and will remain at LOS D.

Again, various mitigation measures were tested, however only the preferred option (Mitigation 2) is presented below. Mitigation 2 consists of the following changes to the northern Gossamer Drive approach to the intersection; converting the short left-turn slip lane to pass through the intersection, converting the centre lane to a full length left-turn lane, providing an additional short lane for the shared through and right-turn movements, and increasing the length of the short kerbside exit lane (see **Figure 25**).

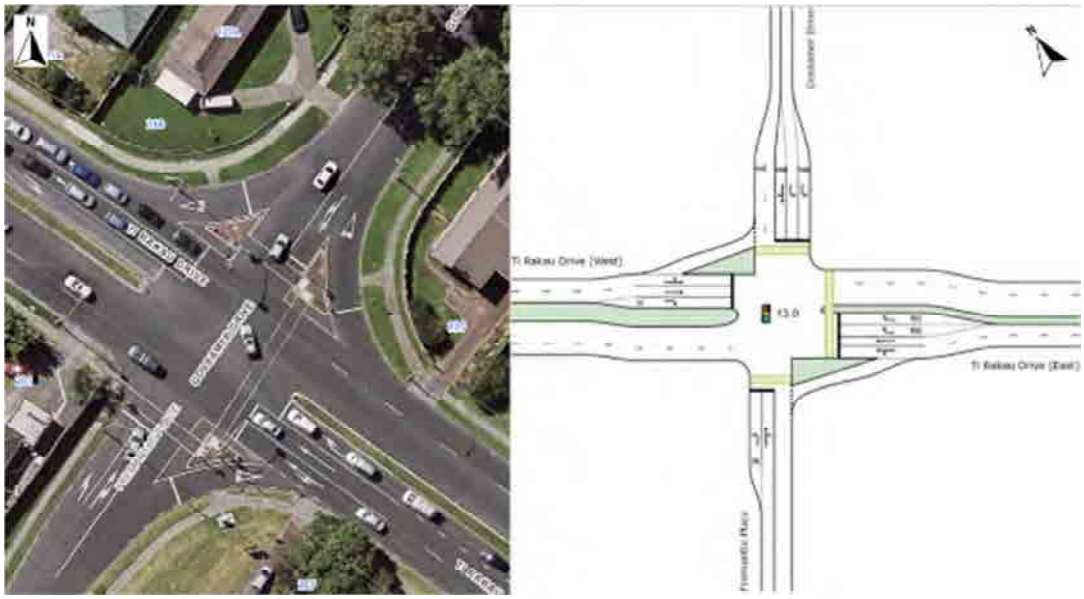

Figure 25: Ti Rakau Dr / Gossamer Dr intersection layout (left = current, right = enabling works)

Table 16 provides a summary of the Ti Rakau Drive / Gossamer Drive intersection performance.

Table 16: Reeves Rd Detour Assessment – Ti Rakau Dr / Gossamer Dr intersection performance summary[19]

Scenario	Level-of-Service (LOS)		Degree of Saturation (DOS)		Average Delay [sec]	
	AM	PM	AM	PM	AM	PM
Do-Minimum	D	D	1.02	0.90	48	45
Reeves Rd Detour	F	D	1.25	0.88	168	43
Mitigation 2	D	D	0.89	0.86	37	37

Mitigation 2 is expected to lead to improved intersection performance during both the AM and PM peaks compared to the Do-Minimum and the Reeves Road Detour scenarios.

[19] SIDRA analysis carried out based on traffic volumes for a 2028 horizon year.

4 EB2 and EB3R Design and Construction

4.1 EB2 and EB3R Overview

As stated in **Section 3.4.1**, without the Project, traffic volumes are predicted to increase on Pakuranga Road and Ti Rakau Drive (between Pakuranga Road and Reeves Road), reaching the capacity of the corridors by 2028. It is likely that large queues and delays on these sections will act as a bottle neck for the rest of the network. This issue is also highlighted in **Section 3.4.2**, with large travel times on these specific sections of the network in the existing environment.

The Project seeks to improve congestion and travel times across the transport network, and particularly in the area around the Pakuranga Town Centre. This will be achieved through the construction of the RRF, which will provide a direct and faster link between Pakuranga Road and SEART, as well as dedicated bus lanes for bus services.

Bus travel times will be improved primarily through the construction of dedicated bus lanes. Buses will also have priority at intersections by way of 'call-ahead' features and advance loops to extend the traffic signal green time when a bus is within approach distance of an intersection. Furthermore, the buses will in future laydown at new bus stations with improved efficiency and merge back into dedicated bus lanes, instead of general traffic lanes, further improving travel times as well as safety.

The Project will also seek to improve the catchment areas of public transport via improved bus stations and improved walking and cycling infrastructure. In the future, all bus stations in the EB2 and EB3R project area will provide seating and sheltered cover as well as bicycle and scooter parking for passengers. Separated walkways and cycleways will improve safety, amenity and travel time for an all-around improved trip to/from the bus stations.

Pedestrian and cyclist safety and amenity will be improved through the construction of separated footpaths and cycleways. Raised tables will be provided across all approaches on the southern side of Ti Rakau Drive as well as both intersections along Cortina Place. Additional signalised pedestrian crossings will be provided across Pakuranga Road, Ti Rakau Drive, Reeves Road, Aylesbury Street and William Roberts Road. A raised pedestrian crossing will also be provided on William Roberts Road near the Ti Rakau Park.

Lastly, the Project will seek an all-around improvement in safety to all users through the use of relevant TDM design standards. Improved pedestrian crossing facilities will be provided to discourage jaywalking and to improve amenity.

4.2 EB2 and EB3R Design and Construction Works

The sections below provide details, split between the EB2 and EB3R project areas, of the proposed design and construction works. Details are also provided to highlight when in the construction programme these works will occur as this is important to understand the development of the modelling scenarios presented in **Section 5.2.2**.

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.

4.2.1 EB2 – Design and Construction Works

The general extent of the EB2 project area encompasses the following roads (see **Figure 26**, dark purple):

- Ti Rakau Drive from Pakuranga Road to Reeves Road
- SEART from the eastern Waipuna Bridge abutment to Ti Rakau Drive
- Reeves Road from Ti Rakau Drive to William Roberts Road
- Pakuranga Road from Ti Rakau Drive to William Roberts Road
- Specific sections of Palm Avenue, Aylesbury Street, Seven Oaks Drive, Cortina Place, and William Roberts Road

Figure 26: EB2 general extent (dark purple)

EB2 will be a complex area with multiple work zones occurring simultaneously against different time scales. Below are sections of geographical works roughly in sequential order, however significant overlap will occur between some of these sections of work. A full set of EB2 layout drawings is provided in **Appendix B**. The EB2 construction works are anticipated to occur over a period of approximately four years.

4.2.1.1 Reeves Road and the Flyover

Reeves Road between Ti Rakau Drive and William Roberts Road will consist of one lane per direction, similar to the existing environment. However, unlike the existing environment, Reeves Road will not serve as a through route from SEART to Pakuranga Heights. In the future, it will serve buses between Ti Rakau Drive and Pakuranga Road, and will provide access to the Pakuranga Plaza and businesses on Cortina Place.

The lower section of Reeves Road between Ti Rakau Drive and Cortina Place as well the new Reeves Road 'ramps' connecting to the RRF tie-in at Pakuranga Road will be bus only lanes to improve bus travel times between Ti Rakau Drive and Pakuranga Road. Reeves Road between Cortina Place and William Roberts Road will be mixed traffic with access to Pakuranga Plaza at Aylesbury Street and the private access road. The intersections with Aylesbury Street and William Roberts Road will be signalised upon completion of the RRF to avoid midblock queues blocking the bus lane ramps.

The RRF will in future provide a direct and faster link between Pakuranga Road and SEART, by eliminating the need to travel along Ti Rakau Drive. The RRF will consist of four lanes, two lanes per direction. Adjacent to the Pakuranga Plaza, the alignment of the RRF will be directly above Reeves Road.

A raised intersection will be provided at the Reeves Road / Cortina Place intersection, with uncontrolled courtesy crossings on the western, northern and eastern approaches. Signalised crossings will be provided across the southern and western approaches at the Reeves Road / Aylesbury Street intersection and all approaches at the William Roberts Road / Reeves Road intersection. The southern crossing at the Reeves Road / Aylesbury Street intersection and the western crossing at the William Roberts Road / Reeves Road intersection will be shared crossings. The existing midblock pedestrian crossing on Reeves Road will be removed to avoid potential sightline issues. As the columns of the RRF will be located along the centre of Reeves Road, the view of pedestrians may be obstructed to vehicles.

Unidirectional cycleways will be provided on both sides of Reeves from Ti Rakau Drive to Aylesbury Street, with a bidirectional cycleway on the eastern side between Aylesbury Street and William Roberts Road.

Figure 27 shows the proposed layout of Reeves Road underneath the RRF.

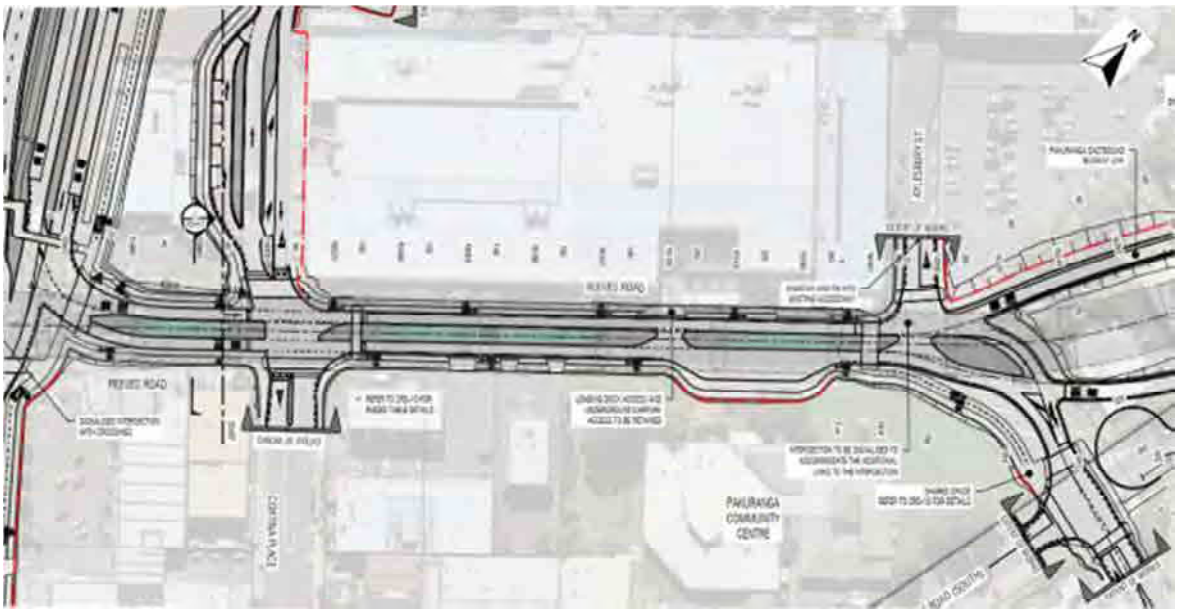

Figure 27: Reeves Rd (underneath RRF)

Figure 28 shows the proposed layout of the RRF itself.

Figure 28: RRF

The works on Reeves Road will be extensive and will encompass offline works heading north along William Roberts Road. Reeves Road will be closed to enable these works and will not fully reopen until all works associated with the RRF and the remaining environment below the RRF have been completed.

Figure 29 shows the indicative work zones associated with Reeves Road and the RRF. The works associated with the RRF, and Reeves Road underneath are anticipated to have a duration of approximately three years.

Figure 29: Indicative work zones – Reeves Rd and RRF

The existing alternate routes, during the Reeves Road closure, are at capacity and additional traffic loading will result in increased delays. This means that to enable the closure of Reeves Road without significant effects, three works must be completed prior to the closure to accommodate the displaced traffic volumes:

1. William Roberts Road extension. Effects of these works have been assessed in the WRRE ITA, see **Section 3.10.2**.
2. Ti Rakau Drive enabling works. To close Reeves Road will require the temporary removal of the pedestrian crossing on the eastern arm of the Ti Rakau Drive / Reeves Road intersection, reducing the required signal phases to three and redistributing the green time. The pedestrian crossing on the western approach will be maintained.
3. Gossamer Drive enabling works. During the Reeves Road closure, citybound traffic is expected to find an alternate route, via Gossamer Drive then proceeding along Ti Rakau Drive. As stated in **Section 3.10.3.2**, the enabling works at Gossamer Drive will include converting the short left-turn slip lane to pass through the intersection, converting the centre lane to a full left-turn lane, providing an additional short lane for the shared through and right-turn movements, and increasing the length of the kerbside exit lane.

The traffic modelling undertaken for EB2 and EB3R assumes that these three works have been completed and so form part of the baseline traffic environment discussed in **Section 3.10**.