



# Eastern Busway Alliance



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## Eastern Busway EB2 Options Report

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# Eastern Busway EB2 Options Report

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## Abbreviations and definitions

Abbreviation and definitions	Description
AMETI	Auckland Manukau Eastern Transport Initiative
ALT	Alliance Leadership Team
AT	Auckland Transport
EB1	Eastern Busway 1 (Panmure to Pakuranga)
EB2	Eastern Busway 2 (Pakuranga Town Centre Station)
EB3	Eastern Busway 3 (East of Pakuranga Town Centre to West of Botany Town Centre)
EB4	Eastern Busway 4 (Botany Town Centre Station)
EBA	Eastern Busway Alliance
FOA	Further Options Assessment
IPAB	Interim Project Alliance Board
MCA	Multi criteria assessment
RTN	Rapid Transit Network
VE	Value engineering

## Executive Summary

Eastern Busway 2 (EB2) is the part of the Eastern Busway Project located within the vicinity of Pakuranga Town Centre and includes the provision of a bus station and the Reeves Road Flyover. A specimen design for EB2 was confirmed in 2018 (2018 Specimen Design).

### Reeves Road Flyover

20 alternative options were developed from the 2018 Specimen Design (21 Options in total) and have been assessed using a two-step filter to identify the preferred option. Assessment criteria was developed that was derived from the Eastern Busway Project Objectives and environmental considerations or factors. A total of seven criteria were developed and applied to the options assessment.

The first filter considered the options in relation to the assessment criteria. If any of the options did not meet one or more of the criteria, the option was discounted, and no further assessment was undertaken. Of the 21 options considered, three were taken forward and considered using the second filter.

The second filter considered how the options perform in relation to criteria 1 and 2 only:

*Criteria 1: Does it achieve an acceptable busway alignment/system?*

*Criteria 2: Does the option significantly improve affordability?*

The remaining options were assessed using a 5-point scoring system in relation to criteria 1 and 2. The option with the most points was ranked the highest. The table below provides the outcome of the second filter assessment.

Option	Name and description	Score	Ranking
3	<b>Bus Station located under Reeves Road Flyover</b> Bus station located under Reeves Road Flyover, in vicinity of Cortina Place and Reeves Road intersection.	4	<b>3</b>
9	<b>Two-lane Reeves Road Flyover</b> Specimen Design with two lane Reeves Road Flyover structure.	9	<b>2</b>
15	<b>Straighten Reeves Road Flyover + 60kph Design Speed</b> Straighten Reeves Road flyover by decreasing speed environment for western approach including measures such as active speed management through central planted median, ITS and speed enforcement measures. Reduces posted speed to 70-75km/h compared to 90km/h in Specimen Design.	10	<b>1</b>

Based on the assessment using the two-step filter, Option 15 was ranked the best and recommended to be taken forward for further development as part of the project. It is considered that no further multi-criteria assessment (MCA) work is required due to the level of development already undertaken as part of the 2018 Specimen Design work.

### Pakuranga Bus Station

17 Long list options were developed by the Eastern Busway Alliance (EBA) Design Team. Consideration was taken of the 2018 , however some of the options developed look beyond the Ti Rakau Drive

corridor. To determine the options to be taken forward to short list, the following matters have been considered:

- The impact upon open space within the EB2 area, with specific consideration to Ti Rakau Corner Reserve
- Integration with Pakuranga Town Centre
- Integration with EB1
- Impacts upon residential properties
- Position of bus stations in relation to Busway alignment
- Land take requirements

Using the above factors, six options were identified to be taken forward for refinement and assessed using MCA. All six options taken forward are within or directly adjacent to Ti Rakau Drive in the vicinity of Pakuranga Town Centre.

Each option was assessed by technical assessors against assessment criteria. The assessment criteria used is consistent with that used for previous option assessments for EB2. Each option was scored against the criteria using a 7-point metric (-3 to +3). The table below provides an overview of the scoring outcome for the six options.

EB2 Pakuranga Bus Station – Scoring outcomes						
	Alt Option A	Alt Option B	Alt Option G	Alt Option H	Alt Option I	Alt Option J
<b>Assessment Criteria Score</b>	19	3	14	2	2	-1
<b>Location Assessment Criteria Score</b>	21	16	18	14	16	15
<b>Total Combined Score</b>	<b>40</b>	<b>19</b>	<b>32</b>	<b>16</b>	<b>18</b>	<b>14</b>
<b>Option Ranking:</b>	<i>1st</i>	<i>3rd</i>	<i>2nd</i>	<i>5th</i>	<i>4th</i>	<i>6th</i>

Based on the total scores, Option A was preferred, with Option G coming second. Option A was taken forward for further design refinement and formed part of the recommended scheme for Eastern Busway.

# 1 Introduction

This report outlines the option assessments undertaken for Eastern Busway 2 (EB2). Options have been developed and assessed in relation to criteria developed by the EBA to help determine the preferred option.

The Eastern Busway Project is part of the Auckland Manukau Eastern Transport Initiative (AMETI) programme of initiatives to improve performance of the transport system in the East Auckland/ Manukau area to provide increased transport choice to support the existing forecast growth in transport demand. A key initiative of the AMETI programme included a busway linking Panmure to Botany. Key initiatives completed to date include the Panmure Bus-Rail Interchange, whilst the first stage of the busway, Eastern Busway 1 (EB1), is currently under construction.

EB2 is part of the key initiative to develop a busway from Panmure to Botany and the wider Eastern Busway Project from Pakuranga to Botany. EB2 comprises the Pakuranga Town Centre Bus Station and the Reeves Road Flyover. Figure 1 provides a map of the project and the surrounding area.



Figure 1 Project extent, including EB1, EB2, EB3, and EB4

A preferred option for EB2 was identified in 2018. EBA, using the preferred option from 2018 as the specimen design (Specimen Design), developed a number of alternative options for the Reeves Road Flyover and the Pakuranga Bus Station and Busway.

The alternative options have each been assessed to determine the preferred option for EB2.

### 1.1 Reeves Road Flyover

The Reeves Road Flyover will provide a connection between Pakuranga Highway (SEART) and Pakuranga Road that avoids the need for general traffic to use Ti Rakau Drive. The flyover will cross Ti Rakau Drive and be elevated above Reeves Road. The flyover will connect with Pakuranga Road near to the existing intersection of William Roberts Road. To accommodate the flyover, the existing alignment of Pakuranga Highway will be altered.

A total of 21 alternative options were developed and assessed. The assessment undertaken was based on a two-step filter to determine the preferred option.

### 1.2 Pakuranga Bus Station

Pakuranga Bus Station will provide a six-bay bus station within the vicinity of Pakuranga Town Centre. The bus station will be connected to the busway at the north and south, providing a through route for buses between Panmure and Botany.

A total of 17 long list options were developed and assessed. From the long list assessment, a total of six options were taken forward to be assessed using a Multi-Criteria Analysis (MCA) to determine the preferred option for the bus station.

## 2 Programme and Project Objectives

### 2.1 Programme Objectives

The overall AMETI Programme (which Eastern Busway is derived from) has overarching objectives that were agreed in a Memorandum of Understanding (MoU) by the former legacy programme partners on 1 February 2016. The overarching Programme Objectives were identified as:

To secure the ability to implement and, in due course, to develop integrated multimodal transport infrastructure within the Auckland-Manukau Eastern Transport Initiative which:

- Provides for sustainable movement of people, goods and services in a modern, planned and integrated manner;
- Provides connectivity between communities and businesses;
- Promotes economic development and the economic and social well-being of communities;
- Provides for Auckland's growth needs;
- Has a good urban design, a sense of place, physical safety, and environmental sensitivity; and
- Addresses travel demand requirements.

### 2.2 Project Objectives

The Eastern Busway Project Objectives are set out below:

1. Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport options.
2. Provide transport infrastructure that integrates with existing land use and supports a quality, compact urban form.
3. Contribute to accessibility and place shaping by providing better transport connections between, within and to the town centres.
4. Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network.
5. Provide transport infrastructure that is safe for everyone.
6. Safeguard future transport infrastructure required at (or in vicinity of) Botany Town Centre to support the development of a strategic public transport connection to Auckland Airport.

Project Objective 6 only relates to EB4 and is not applicable to EB2.

### 3 Previous Option Assessments (Eastern Busway)

Numerous investigations have been undertaken in the development of the Project. Figure 2 provides an overview of the investigations undertaken since 2014 whilst table 1 provides a summary of the identified outcomes.

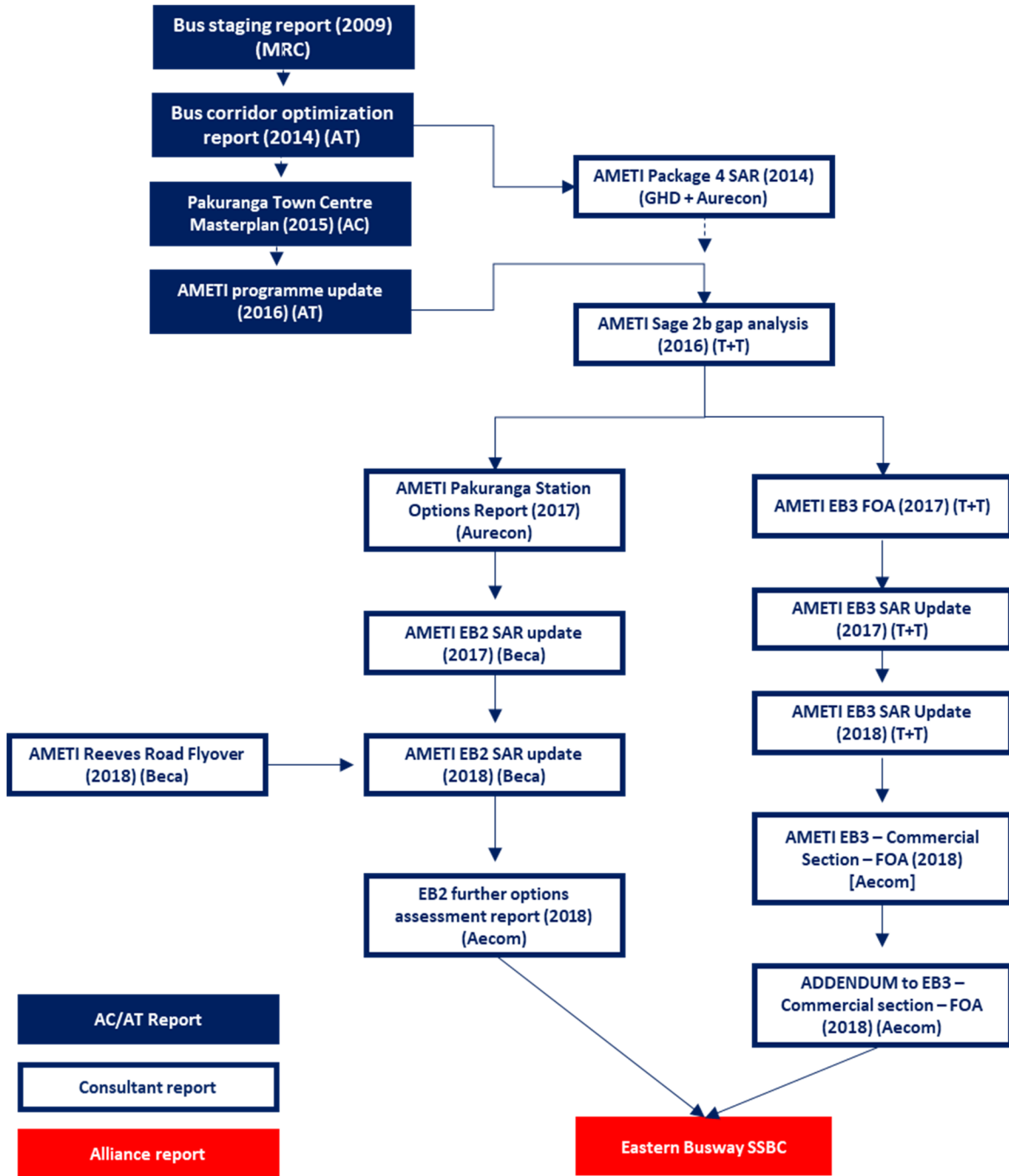


Figure 2 Previous investigations



Table 1 Summary of previous investigations

Investigation	Outcome
<b>Bus Staging Report (2009)</b>	Identification of the form and function of the wider Auckland Rapid Transit Network.
<b>AMETI Bus Corridor Optimisation Report (2014)</b>	Development of the AMETI programme (including development of the 'do minimum' scenario) and initial programme cost estimate.
<b>AMETI Package 4 Scheme Assessment Report (2014)</b>	Developed the original scheme design and updated cost estimate.
<b>Pakuranga Town Centre Masterplan (2015)</b>	Auckland Masterplan outlining the vision for the development of Pakuranga Town Centre
<b>AMETI Programme Update (2016)</b>	Update to the AMETI project including development of programme problem and benefit statements and project objectives
<b>AMETI Stage 2b GAP Analysis Report (2016)</b>	Review of previous Scheme Assessment Reviews (SAR) and identification of aspects requiring further investigation
<b>AMETI Pakuranga Bus Station Options Report (July 2017)</b>	Development of 4 options for the development of the Pakuranga Bus Station. The Technical Preferred Option is Option 2 (lollipop design)
<b>AMETI Eastern Busway 2 (Pakuranga Town Centre) - Scheme Assessment Update 2017</b>	SAR update to reflect further option development and assessment undertaken.
<b>AMETI Eastern Busway 3 - Further Options Assessment (March 2017)</b>	Development and assessment of 28 shortlist options for EB3. Identification of a Technical Preferred Option for each section
<b>AMETI Eastern Busway 3 - Scheme Assessment Update Report (May 2018)</b>	Updated SAR based on 2017 FOA. SAR documents construction considerations and specialist assessments
<b>AMETI Eastern Busway 2 (Pakuranga Town Centre) - Scheme Assessment Update (May 2018)</b>	SAR update included the identification and assessment of 21 longlist and 6 shortlist options. Identification of an emerging option
<b>AMETI Reeves Road Flyover - Specimen Design Value Engineering Report (Feb 2018)</b>	Identification and assessment 6 options for the design and construction of the Reeves Road Flyover. Identification an emerging option
<b>AMETI Eastern Busway 2 - Further Options Assessment (Aug 2018)</b>	Additional analysis and MCA assessment of EB2 options identified in May 2018 FOA. Options undergone minor alterations. Separate MCA on bus station location based on locations proposed in the 3 shortlist options. Technical preferred option is Option 3
<b>Eastern Busway 3 Commercial Section - Further Options Assessment (Aug 2018)</b>	Development and assessment of 3 shortlist options for the commercial section of EB3 to reduce impact on adjoining commercial properties. Option 1 is a refinement of the Technical preferred option in the 2018 EB3 SAR whilst options 2 and 3 are elevated structures. Option 1 identified as the emerging option.
<b>ADDENDUM to Eastern Busway 3 Commercial Section - Further Options Assessment (2018)</b>	Updates project risks, costs and consenting requirements

The following provide a more detailed overview of the Further Options Assessment for EB2.

### 3.1 AMETI EB2 – Further Options Assessment 2017/2018 (Beca)

As part of the AMETI EB 2 (Pakuranga Town Centre) Scheme Assessment Update (issued in draft 24 February 2017 and finalised on 9 May 2018), prepared by Beca, further options were considered through an MCA process. Through this MCA process it was determined that a Ti Rakau Drive Busway with Reeves Road Flyover and a bus station in Pakuranga Town Centre was the preferred option. Features of the 2017/2018 preferred option included:

- A new overbridge and realignment of Pakuranga Highway/Reeves Road;
- A new bus station and dedicated urban busway along Ti Rakau Drive (between Pakuranga Road and William Roberts Road);

- New strategic cycle route and high-quality pedestrian facilities;
- Closure of William Roberts Road at Pakuranga Road;
- Extension of William Roberts Road to Ti Rakau Drive;
- Extension of Cortina Place to connect with William Roberts Road;
- Upgrades to existing residential roads; and
- New and / or upgraded signalised intersection treatments.

The MCA included consideration of 21 long list options against the project objectives and other identified criteria, in order to select a shortlist for further assessment. Six short list options were developed into more detailed concept option plans for evaluation to determine the 2017/2018 preferred option.

Key Result Areas (KRAs) constituted the criteria used for this MCA process. Assessment of the KRAs measured the suitability of alignment options through a qualitative analysis and included MCA workshops where the AMETI EB2 project team was responsible for capturing the logic and confirming the MCA scoring for both MCA assessments. In undertaking this process, the project team went through an iterative process of discussion and reviews with the relevant subject matter experts to confirm the scores and logic.

The 2017/2018 preferred option was taken forward for further design development in the 2018 SAR Update.

A detailed overview of the outcome of this MCA process is provided in the AMETI Eastern Busway 2 – Further Options Assessment (drafted 24 February 2017 and finalised on 9 May 2018) prepared by Beca.

### 3.2 AMETI Pakuranga Bus Station Options Report (July 2017)

The AMETI Pakuranga Bus Station Options Report 2017, prepared by Aurecon, outlines the MCA process used to assess four options for the location of the Pakuranga Bus Station.

The assessment was a refinement on the AMETI Eastern Busway 2 – Further Options Assessment (2017) prepared by Beca and built upon the criteria used to assess the Bus Station location more critically. The assessment had regard to the form and function of the possible station locations and considered land use, urban design, traffic, walking, cycling, as well as public transport needs.

The criteria used for this MCA process was derived from key performance indicators (KPIs), which were used to measure the suitability of each Bus Station location through qualitative analysis. Through this MCA process it was determined that Option 2, the 'Lollipop Station' was preferred. A detailed overview of the process and outcome of this MCA is provided in the Pakuranga Bus Station Report (2017).

### 3.3 AMETI EB2 Further Options Assessment 2018 (AECOM)

The AMETI Further Options Assessment (FOA) 2018 report prepared by AECOM provides an assessment of alternative options including revised bus services arrangements, different traffic lane configurations and a revised Bus Station configuration.

The report builds upon the AMETI Eastern Busway 2 - Further Options Assessment undertaken by Beca in 2017/2018 and the Pakuranga Bus Station Report produced by Aurecon in 2017.

As work progressed on developing the concept design based on the Scheme Design provided in the Scheme Assessment Update Report (Beca, 2018), a value engineering process was undertaken to consider if further improvements to bus travel times, efficiency and reliability of the network, and better urban outcomes for the Pakuranga Town Centre could be made. During this process, concerns with the existing scheme design were identified. These included:

- Lack of cycling facilities surrounding the Bus Station and Pakuranga Road/Ti Rakau Drive Intersection;
- Buses mixing with general traffic along Pakuranga Road;
- Efficiency of the lollipop station with bus movements;
- Ride quality;
- Spacing of bus station/stops;
- Complexity and size of South Eastern Arterial/Ti Rakau Drive intersection; and
- Use of space under Reeves Road Flyover.

From this value engineering process, three key considerations were identified, likely to have further positive impacts on the benefits of the project and address the concerns raised previously. These included: re-routing Howick buses travelling to and from Howick at the new Pakuranga Road/ Reeves Road intersection (adjacent to the proposed Flyover) down Reeves Road (to meet at grade) and connecting into Ti Rakau Drive; the re-prioritisation of the proposed Reeves Road / Pakuranga Road intersection; in conjunction with the replacement of the proposed lollipop station with a linear station in a new location.

The key reason to investigate redirecting buses down Reeves Road was the time efficiencies that could be gained. Furthermore, the reliability of buses would be improved. In addition, taking buses underneath Reeves Road Flyover (RRF) was seen to provide activation and passive surveillance of the area, utilising the space underneath the flyover for transport benefits. In addition, the redirection of buses has the potential to provide improved ride quality for passengers (the inclusion of the roundabout in the scheme design had the potential to reduce ride quality).

Realigning the Pakuranga Road/ Reeves Road intersection provides direct connection to Pakuranga Road and provides priority for the high traffic volumes expected to use the RRF.

Moving the bus station from the Pakuranga Road / Ti Rakau Drive intersection corner of the Town Centre was seen to create a more equal walking and cycling catchment along the busway. Additionally, a central location would bring the bus station closer to community, education and recreational facilities.

The MCA process undertaken was based on best practice guidance and application applied in previous phases of AMETI. The purpose of the MCA was to provide a structured, consistent and systematic process for assessing options against one another.

As with the previous FOA, the options were assessed against meeting the project objectives, performance against the Bus Station Location Criteria (integration, transport, customer value) legislative considerations (RMA matters), and performance against constructability (whether the option could be constructed within reasonable and known construction constraints).

The criteria assessed to determine the preferred bus station location was adopted from the 2017 Pakuranga Bus Station Report. On balance, positive effects and adverse effects of Bus Station locations were considered to be similar overall, albeit with slight differences. Furthermore, when considering the positive effects of Station options, the positive effects of integrating the busway with the Town Centre and the ability to provide a better customer experience proved to be key differentiators in the consideration of the station location options.

The preferred option (option 3) directs bus movements onto Reeves Road, removing buses from, and downgrading, Pakuranga Road between Reeves Road and Ti Rakau Drive. Traffic movement between Reeves Road and Pakuranga Road is prioritised to allow better flow and optimisation of the flyover and bus lanes. Changing the bus routes onto Reeves Road avoids buses having to enter the station and perform a U-turn (the lollipop option from the 2017 assessment), increasing efficiencies, improving ride comfort for passengers and making the station more legible for bus patrons. Furthermore, this alignment separates buses and general traffic into two 'T' intersections at the SEART/Ti Rakau Drive intersection, creating benefits for both buses and general traffic.

The positioning of the bus station in option 3 avoided acquiring more property on the west side of Ti Rakau Drive but requires property acquisition at 26 Ti Rakau Drive. In addition, the preferred option required partial property acquisition from two properties in Palm Avenue.



## 4 2018 Specimen Design

As detailed in section 3 of this report, a preferred option was identified for the EB2 project area as part of the Specimen Design undertaken in 2018 and is described below.

The key features of EB2 includes bus station located at Pakuranga Town Centre and the provision of the Reeves Road Flyover (RRF), providing a direct road connection from Urban Route 10/ Pakuranga Highway (South Eastern Arterial Route (“SEART”)) to Pakuranga Road (Urban Route 5) near the existing intersection with William Roberts Road.

Figure 3 provides an overview of the 2018 Specimen Design, including the bus station, RRF and the extension of William Roberts Road.

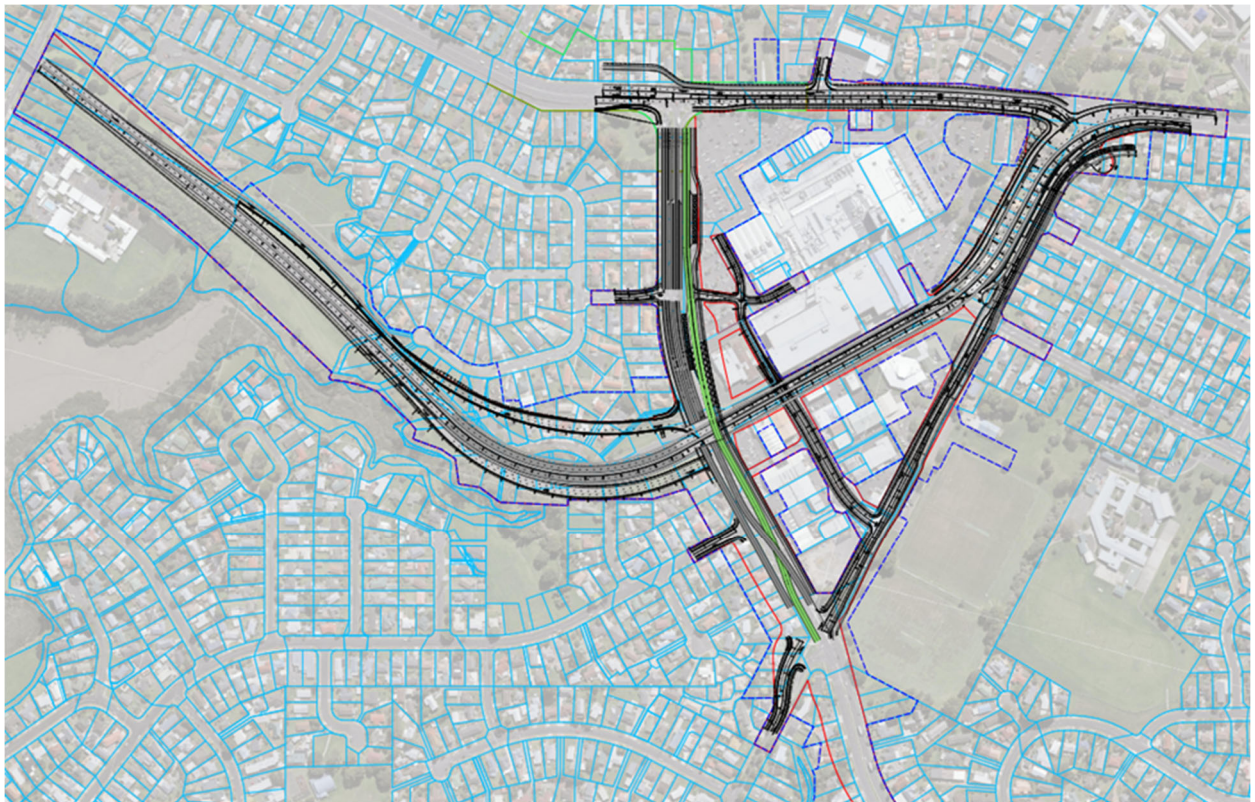


Figure 3 Overview of EB2 (Specimen Design)

### 4.1 Reeves Road Flyover

To provide for the RRF, the alignment of Pakuranga Highway/ SEART will be amended, with the road corridor being widened to provide entry and exit ramps from/to Ti Rakau Drive. The RRF would have two travel lanes in each direction and be elevated above the existing legal formation width of Reeves Road. The RRF would connect with Pakuranga Road near to the location of the existing intersection with William Roberts Road. Direct access between William Roberts Road and Pakuranga Road would be removed, with access required via Ayr Street.

A new intersection would be provided for the connection of the RRF with Pakuranga Road. Link roads/ramps would be provided to either side of the bridge abutment to provide access to/from Reeves Road.

## 4.2 Pakuranga Bus Station

The Specimen Design provided a bus station on the north side of Ti Rakau Drive, positioned between Palm Avenue and Reeves Road. Aylesbury Street would be realigned to provide a single intersection with Palm Avenue and Ti Rakau Drive.

The Pakuranga Bus Station is a two-platform design, with the opposing platforms facing each other. A lane is provided in each direction along the middle of the station to allow buses which are in service to pass buses which are halted at the platforms. At grade passenger crossings are provided at either end of the platforms.

Figure 4 is an extract of the Specimen Design layout for the bus station.

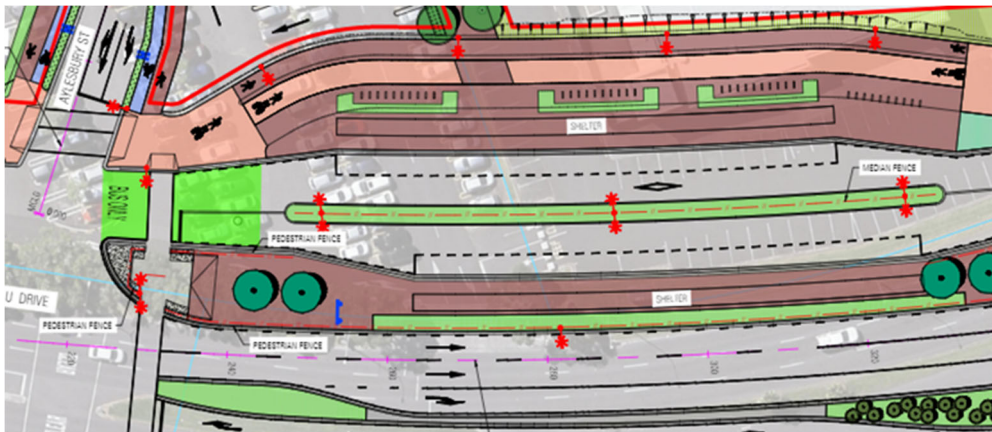


Figure 4 Pakuranga Bus Station (Specimen Design)

## 4.3 Other elements

The Specimen Design included the provision of enhanced walking and cycling facilities, as well as landscaping improvements. The design also included the extension of William Roberts Road to the south, providing a connection to Ti Rakau Drive. The extension of William Roberts Road would be positioned along the west side of Ti Rakau Park.

A copy of the Specimen Design plan is provided in Appendix 3.

## 4.4 Review and retest of the Specimen Design

Following the establishment of the EBA, the Specimen Design has been reviewed and retested. Alternative options have been developed for the RRF and Pakuranga Bus Station which are set out in the following sections of this report

- **Sections 5 and 6** – Assessment of Reeves Road Flyover
- **Sections 7 and 8** – Assessment of Pakuranga Bus Station

## 5 Assessment Process – Reeves Road Flyover

The following provides an overview of the assessment process that has been undertaken by the EBA for EB2 Reeves Road Flyover. The diagram below outlines the process followed.



### 5.1 Long List Considerations/ Sifting of Options

A review of previous investigations and option assessments was undertaken. The purpose of the review was to assist in developing a range of long list options for EB2. A total of 20 options (plus the Specimen Design) were identified for consideration as part of the long list assessment. All 20 options are derived from the Specimen Design.

### 5.2 Assessment methodology and criteria

The assessment of the long list is based on a two-step process, using filters. The first filter considers each option against the assessment criteria. If any option does not meet one or more of the criteria, the option is discounted. Options that ‘strongly meets’ or ‘meets criteria with some impacts’ will be further assessed.

The first filter used the scoring scale as shown in Table 2 below.

Table 2 Scoring Scale

First Filter Scoring Scale	
	Strongly meets criteria
	Meets criteria with some impacts
	Does not meet criteria

The second filter is applied to those options considered viable to rank in terms of affordability and busway alignment criteria. Any criteria given an amber in the first filter is given a score of 0. For both the affordability and busway alignment criteria, the remaining options are given a score between 1 to 5, with 1 given to options that are considered to least meet the criteria, and 5 given to the options which most strongly meet the criteria.

The options are then ranked using the total scores against the affordability and busway alignment criteria to prioritise which options should progress.

The scoring scale used for the second filter is shown in Table 3 below.

Table 3 Scoring scale

Second Filter Scoring Scale	
0	Meets criteria with some impacts
1	Contributes
2	Moderate contribution
3	Moderate to strong contribution

4	Strong contribution
5	Strongest contribution

The assessment criteria developed by the EBA is provided in Table 4.

Table 4 Assessment Criteria

Assessment Criteria	
1	Does it achieve an acceptable busway alignment/ system?
2	Does the option significantly improve affordability?
3	Does the option provide a safe environment for all users?
4	Does this option have a lesser degree of difficulty for statutory approvals?
5	Is the station located to support integration with Pakuranga Town Centre?
6	Does it provide an acceptable urban design outcome for Reeves Road?
7	Does it minimise impacts on Transpower/ Watercare assets?

The assessment criteria applied was derived from the project objectives and environmental factors. The weighting in the second filter in relation to busway alignment (criteria 1) and affordability (criteria 2) was considered to be a good measure to ensure that the preferred option is workable and could be implemented within the project's affordability requirements.

### 5.3 Reeves Road Flyover – Assessment of Options

A total of 21 options were assessed using the two-step filter process and are described in Table 5. Drawings of each option are provided in Appendix 2.

#### 5.3.1 First Filter

With the application of the first filter, the following options have been discounted as one or more of the assessment criteria is not met.

Table 5 EB2 Long List Options discounted (1st filter)

Options discounted by first filter		
Option	Name/ option description	Reason not taken forward
0	<b>Specimen Design</b> Northern side-running busway on Ti Rakau Drive adjacent to Aylesbury Street, with off-street separated bi-directional cycle facilities on northern verge. Station located in line of sight of Aylesbury Street central town centre spine. Cycle facilities down William Roberts Road.	Does not meet assessment criteria 2.
1	<b>Bus station located south (west) of Ti Rakau Drive</b> Busway on southern side of Ti Rakau Drive with bus station located between Pakuranga Road and Pakuranga Highway. Station located south of Ti Rakau Drive.	Does not meet assessment criteria 1 and 5
2	<b>Bus station located at the north eastern side of the town centre</b> Bus station located behind town centre and Pennell Place on north-east side.	Does not meet assessment criteria 1, 2 and 5
4	<b>Bus Station located west (citybound) from 26 Ti Rakau Dr – busway on northern side or centre</b> Specimen Design Station location shifted to the west towards Pakuranga Road.	Does not meet assessment criteria 2 and 4
5	<b>Position bus station east of Aylesbury Street.</b> Bus Station located to the east of Aylesbury Street.	Does not meet assessment criteria 2, 4 and 5





6	<b>Position bus station at corner of Reeves Road and Cortina Place</b> Bus Station located at the corner of Reeves Road and Cortina Place.	Does not meet assessment criteria 2 and 5
7	<b>Central elevated bus station on Ti Rakau Drive, west of 26 Ti Rakau Drive</b> Central elevated bus station on Ti Rakau Drive, to the west of 26 Ti Rakau Drive to eliminate Reeves Road Flyover.	Does not meet assessment criteria 1
8	<b>Reeves Road cut and cover tunnel under Pakuranga Road</b> Reeves Road provided in cut and cover tunnel under Pakuranga Road.	Does not meet assessment criteria 2 and 7
10	<b>Two-lane Reeves Road at grade</b> Reeves Road to remain as is with 2 lanes in Reeves Road for general traffic. Eliminates flyover from Specimen Design.	Does not meet assessment criteria 1
11	<b>Four lane Reeves Road at grade with elevated station</b> Elevated bus station in front of 26 Ti Rakau Drive. At grade four lane Reeves Road.	Does not meet assessment criteria 2
12	<b>Four lane Reeves Road at grade with at grade station</b> Reeves Road at grade, with four general traffic lanes. Bus station provided at grade.	Does not meet assessment criteria 1 and 5
13	<b>Cycle facilities through Cortina Place including extension through park</b> Divert bi-directional cycleway through Cortina Place and extending through Ti Rakau Park to link with Ti Rakau Drive east of Ti Rakau Park.	Cycle facility sub-option for value engineering. Not progressed.
14	<b>Millen Diversion</b> Busway linking Ti Rakau Drive to SEART and then connecting through Millen Avenue to Pakuranga Road just south of Panmure Bridge.	Does not meet assessment criteria 1, 2 and 5
16	<b>Reeves Road Flyover with steel structure</b> Reeves Road Flyover with steel structure in lieu of concrete structure proposed in Specimen Design.	Does not meet assessment criteria 1
17	<b>Eliminate cycle facilities on William Roberts extension</b> Specimen Design without cycle facilities on William Roberts extension.	Does not meet assessment criteria 2
18	<b>Dedicated Freight Lane</b> Dedicated freight lanes along Ti Rakau Drive.	Does not meet assessment criteria 1, 2, 4 and 5
19	<b>Shift station south away from 26 Ti Rakau Drive with busway alignment on northern side</b> Shift busway alignment including station south to remove impact to properties on northern side of Ti Rakau Drive with busway alignment on northern side of alignment.	Does not meet assessment criteria 2
20	<b>Eel Station</b> Specimen Design with 'eel' station configuration.	Does not meet assessment criteria 2

The remaining long list options are assessed using the second filter.

### 5.3.2 Second Filter

As noted above, the second filter assessed the remaining options in relation to assessment criteria 1 and 2 only. Table 6 presents the outcome for the remaining options.

Table 6 EB2 Long List Second filter assessment

Second filter assessment				
Option	Name and description	Score	Ranking	Reason
3	<p><b>Bus Station located under Reeves Road Flyover</b></p> <p>Bus station located under Reeves Road Flyover, in vicinity of Cortina Place and Reeves Road intersection.</p>	4	3	<p>This option scored 4 for alignment, but 0 for improved affordability.</p> <p>Benefits of this option include more activated area under Reeves Road Flyover, however, may potentially have passive surveillance issues with the location being away from the main town centre spine.</p> <p>Option may have potential property access impacts on Reeves Road, including the Warehouse loading dock. May need to provide circulation for Warehouse loading dock and other properties. May also sever property access along Reeves Road (particularly at 3 Reeves Road and for 26 Ti Rakau Drive).</p> <p>Overall, trade-offs in property costs compared to Specimen Design. Integrating station or commercial space into Reeves Road structure potentially reduces impact of flyover structure.</p> <p>Option considered worthy of further development as part of Value Engineering (VE) of station location.</p>
9	<p><b>Two-lane Reeves Road Flyover</b></p> <p>Specimen Design with two lane Reeves Road Flyover structure.</p>	9	2	<p>This option scored 4 for alignment and 5 for improved affordability.</p> <p>The reduction in structure size will provide a cost reduction compared to the Specimen Design. Property impacts may be reduced due to the flyover fitting within the existing legal road width.</p> <p>Traffic modelling has noted some issues with the reduction in lane widths for the Specimen Design, further modelling is required to check that this option has sufficient capacity.</p> <p>Need to assess the footprint of the intersection and the associated impacts it may have.</p>
15	<p><b>Straighten Reeves Road Flyover + 60kph Design Speed</b></p> <p>Straighten Reeves Road flyover by decreasing speed environment for western approach including measures such as active speed management through central planted median, ITS and speed enforcement measures. Reduces posted speed to 70-75km/h compared to 90km/h in Specimen Design.</p>	10	1	<p>This option scored 5 for alignment and improved affordability.</p> <p>Option achieves savings through removing barriers and improving sightlines and therefore reducing structural size. The affordability savings in physical structure, property and construction are achieved.</p> <p>This option may have an impact upon Transpower asset, further review of this would need to be undertaken.</p> <p>The design does result in a larger radius curve on the flyover/ bridge, which may require wider shoulders to accommodate sightlines. This would result in property acquisition as the footprint would extend beyond the existing road corridor, however reduced impacts on Reeves Road properties.</p> <p>This option is to be progressed as part of the Value Engineering (VE) for Reeves Road Flyover.</p>

Based on the application of the second filter, Option 15 provided the highest ranking. Table 7 shows how this option was assessed in relation to all of the first filter assessment criteria and assessment criteria 1 and 2 of the second filter.



Table 7 Option 15 Assessment

Option 15 Assessment Outcome		
Criteria	First Filter	Second Filter
1 Does it achieve an acceptable busway alignment/ system?	Strongly meets criteria	5
2 Does the option significantly improve affordability?	Strongly meets criteria	5
3 Does the option provide a safe environment for all users?	Strongly meets criteria	-
4 Does this option have a lesser degree of difficulty for statutory approvals?	Strongly meets criteria	-
5 Is the station located to support integration with Pakuranga Town Centre?	Strongly meets criteria	-
6 Does it provide an acceptable urban design outcome for Reeves Road?	Strongly meets criteria	-
7 Does it minimise impacts on Transpower/ Watercare assets?	Meets criteria with some impacts	-

### 5.4 Preferred Option

Based on the above, **Option 15** was recommended and approved by the EBA to be taken forward for further consideration for design refinement and value engineering.



## 6 Reeves Road Flyover – Assessment Outcome and Recommendations

Using the Specimen Design as a base, 20 alternative options were developed by the EBA for the RRF (a total of 21 options). Each option, including the specimen design was assessed against criteria using a two-step filter. The assessment of the options was undertaken in November and December 2020.

When the first filter was applied, 18 options were discounted due to not being able to meet one or more of the assessment criteria. The remaining three options were tested against the second filter. A score was provided to the three remaining options, with the options being ranked based on their performance.

As a result of this assessment, Option 15 was ranked first based on having the highest score. This identified that the RRF component of EB2 would be retained on or near its alignment contained within the Specimen Design, and elements related to its form or function would be refined during the design refinement and value engineering phases of the project.

For this reason, no further MCA was considered necessary for the RRF and EBA determined that the previous assessments undertaken in 2017-2018 (as summarised in section 3 of this report) could be relied upon.

## 7 Assessment Process – Pakuranga Bus Station

The diagram below outlines the assessment process undertaken for Pakuranga Bus Station.



### 7.1 Pakuranga Bus Station Long List Options

The design team considered a range of options as part of the development of the long list for Pakuranga Bus Station. A total of 17 options were developed for consideration by the EBA. The long list options were developed with the following considerations:


- Where possible, the AT Public Transport Interchange Design Guidelines and ATCOP Section 20 Public Transport Buses were adopted.
- Capacity requirements used were based on those outlined in the EB2 Draft Specimen Design Traffic Modelling Report (20 Sept 2019)
- Operational and maintenance requirements were not considered in detail for the options developed.

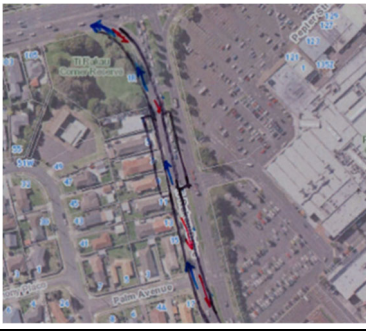



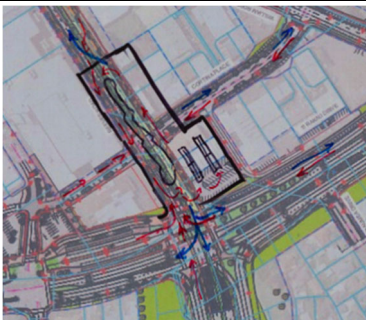
Table 8 provides an overview of the long list options development, and reasons why they were discounted by EBA.

The following matters were considered when assessing the long list options:






- The impact upon open space within the EB2 area, with specific consideration to Ti Rakau Corner Reserve
- Integration with Pakuranga Town Centre
- Integration with EB1
- Impacts upon residential properties
- Position of bus stations in relation to Busway alignment
- Land take requirements




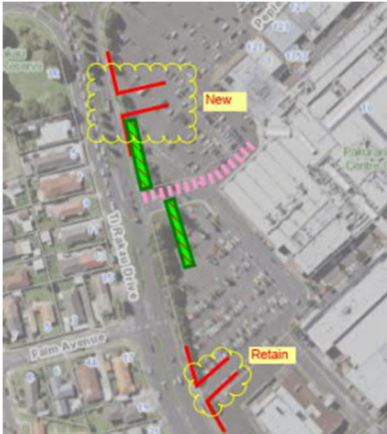
Table 8 Long List Options

#	Description		Discounted or taken forward? Why?
Westside Online Option 1	The bus station would be situated within Ti Rakau Corner Reserve (adjacent to the intersection of Ti Rakau Drive and Pakuranga Road). The busway connections would be on the southside (west) of Ti Rakau Drive. The bus station would be formed by two adjacent parallel platforms.		<b>Discounted</b> Impact upon Ti Rakau Corner Reserve and the stations lack of integration with the town centre. Connection with EB1 would result in a complex intersection.


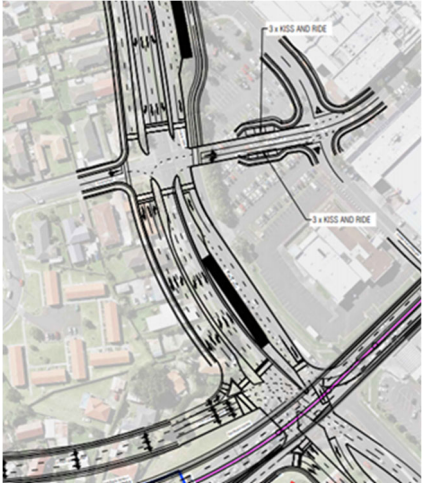
<p>Westside Online Option 2</p>	<p>The bus station would be situated on the south (west) side of Ti Rakau Drive. The station would be formed by two opposing platforms. The platforms would be situated on land currently occupied by 9 to 3 Ti Rakau Drive. The busway connections would also be located on land currently used for residential dwellings.</p>		<p><b>Discounted</b> Impact upon residential properties and Ti Rakau Corner Reserve. The station lacks integration with the town centre. Connection with EB1 would result in a complex intersection.</p>
<p>Westside Online Option 3</p>	<p>The bus station would be situated on the south (west) side of Ti Rakau Drive. The station would be formed by two opposing platforms. The platforms would be situated adjacent to Palm Avenue. The station would occupy land currently occupied by residential dwellings. The busway connections would also be located on land currently used for residential dwellings.</p>		<p><b>Discounted</b> Impact upon residential properties and Ti Rakau Corner Reserve. The station lacks integration with the town centre. Connection with EB1 would result in a complex intersection.</p>
<p>Westside Online Option 4</p>	<p>Bus station would be located within the existing road corridor (Ti Rakau Drive), near the intersection with Pakuranga Road. The busway and bus station would be located on the south (west) side of the road. This design is based on an island platform with buses moving on the right-hand side.</p>		<p><b>Discounted</b> Station has lack of integration with town centre. Connection with EB1 would result in a complex intersection.</p>
<p>Offline Option 1</p>	<p>Bus station would be located next to the intersection of Reeves Road/ William Roberts Road and Pakuranga Road. The land that the bus station would occupy is currently residential in character but is provided with a Town Centre Zone within the AUP. The bus station is an island design, with the bus platforms in the middle. Buses would move around the island platforms in a counterclockwise direction.</p>		<p><b>Discounted</b> Buses would be required to deviate from the busway alignment to access the station. Increase in travel times.</p>
<p>Offline Option 2</p>	<p>Bus station would be located under the Reeves Road Flyover, adjacent to Ti Rakau Drive. The layout of the station would require land to the east of Reeves Road (currently a petrol station). The station would be an island design, with bus movements being in a counterclockwise direction.</p>		<p><b>Discounted</b> Station would have poor integration with the surrounding urban environment, with potential adverse effect for place making. Would also increase bus travel times and an increased land take area.</p>



<p>Offline Option 3</p>	<p>Bus station situated within the Pakuranga Town Centre car park, adjacent to the intersection of Ti Rakau Drive and Pakuranga Road. Station is orientated with the platforms parallel to Pakuranga Road. Buses would move around the island platform in a counterclockwise direction.</p>		<p><b>Discounted</b> Station location is too far from the centre of the town centre. Increase travel time for buses using busway.</p>
<p>Offline Option 4</p>	<p>Bus station situated within Pakuranga Town Centre car park, adjacent to the intersection of Ti Rakau Drive and Pakuranga Road. Station is based on island design with bus movements being in a counterclockwise direction.</p>		<p><b>Discounted</b> Station location is too far from the centre of the town centre.</p>
<p>Option A</p>	<p>Specimen design with opposing platforms. Bus Station located between Reeves Rd and the realigned Aylesbury St.</p>		<p><b>Take forward to short list</b></p>
<p>Option B</p>	<p>Bus platforms are offset, separated by realigned Aylesbury St.</p>		<p><b>Take forward to short list</b></p>
<p>Option C</p>	<p>Bus Station located under Reeves Road Flyover but does not require land from the parcel of land (as required by Offline Option 2).</p>		<p><b>Discounted</b> Station would have poor integration with the surrounding urban environment, with potential adverse effect for place making.</p>

<p>Option E</p>	<p>Opposing platforms located wholly within 26 Ti Rakau Drive. Would require full acquisition of 26 Ti Rakau Drive.</p>		<p><b>Discounted</b> Would require the whole of site at 26 Ti Rakau Drive for the bus station, but noted that the design is similar to Option A.</p>
<p>Option F</p>	<p>Provision of offset platforms along Ti Rakau Drive (green in drawing), using realigned Aylesbury Street to separate them.</p>		<p><b>Discounted</b> Poor integration with the town centre.</p>
<p>Option G</p>	<p>Provision of parallel platforms (blue in drawing) within the car park of Pakuranga Town Centre. Platforms would be located perpendicular to Palm Avenue.</p>		<p><b>Take forward to short list</b></p>
<p>Option H</p>	<p>Provision of offset platforms, using the existing alignment of Aylesbury Street as the separation point between the platforms.</p>		<p><b>Take forward to short list</b></p>



Option I	Original Baseline option. Based on non-opposing platforms. Platforms are separated by Aylesbury Street.		Take forward to short list
Option J	Similar to Option I, but the alignment is moved to the west, avoiding 26 Ti Rakau Drive.		Take forward to short list

From the above long list, six options were considered suitable to be taken forward for further development and used as part of the short list alternatives assessment.

## 7.2 Pakuranga Bus Station – Short List Options

The following provides an overview of the short list alternative options. All of the options have the following common features:

- Three bus bays provided at each platform
- Kiss and ride facility provided on Aylesbury Street
- All options required land take from Pakuranga Town Centre (car parking area) and 26 Ti Rakau Drive, with the exception of Option J. Note that the extent of land take varies between the options.
- All options were designed on the assumption that the busway in EB3 Residential (to the east of Pakuranga) will be central running along Ti Rakau Drive
- For all options, Aylesbury Street was realigned, creating a 4-way intersection with Ti Rakau Drive and Palm Avenue

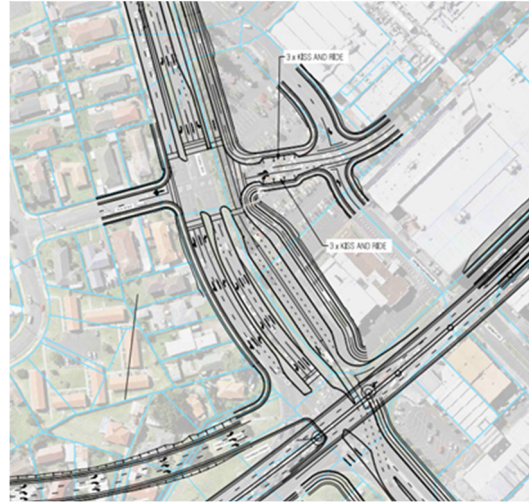
Drawings of the options are provided in Appendix 4 of this report.

### 7.2.1 Option A

This option placed the bus station on the north side of Ti Rakau Drive, between Reeves Road and Aylesbury Street. The bus station platforms would be parallel with each other.

The position of this bus station is situated more centrally within the town centre and has better alignment with Aylesbury Street.

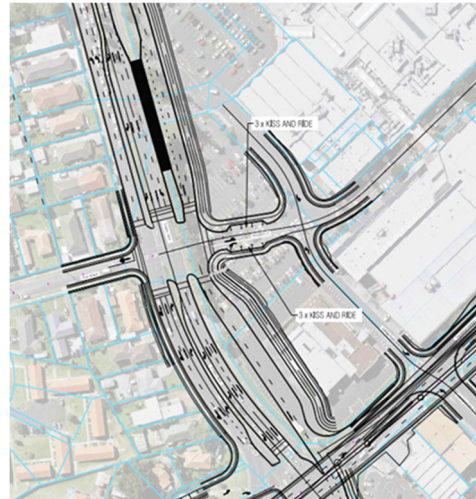
This option would require 6849m<sup>2</sup> of land area outside of the existing road corridor.



### 7.2.2 Option B

This option would separate the bus station platforms, with Aylesbury Street positioned between them. The city-bound platform would be positioned to the west of Aylesbury Street, with the Botany-bound platform positioned to the east of Aylesbury Street.

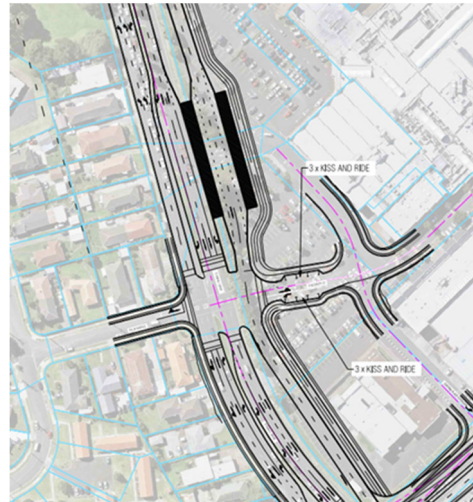
This option would require 8016m<sup>2</sup> of land area outside of the existing road corridor.



### 7.2.3 Option G

This option would place the bus station to the west of Aylesbury Street, with parallel platforms. The station is positioned further from the core of the town centre. The busway to the east of the platforms would be situated to the north of Ti Rakau Drive, moving to the centre of the road at the intersection with Reeves Road.

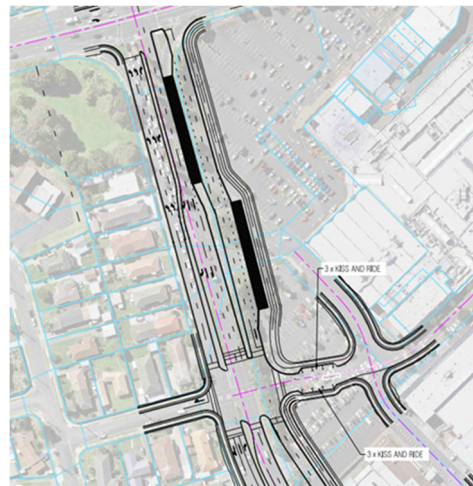
This option would require 7719m<sup>2</sup> of land area outside of the existing road corridor.



### 7.2.4 Option H

This option would place the bus station to the west of Aylesbury Street, with non-parallel platforms. The city-bound platform would be positioned further west, closer to the intersection with Pakuranga Road. The Botany-bound platform would be positioned adjacent to Aylesbury Street. This station arrangement moves the bus station further from the core of the town centre.

This option would require 7195m<sup>2</sup> of land area outside of the existing road corridor.

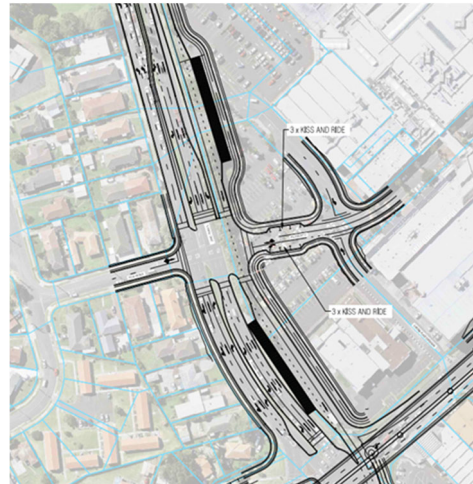




### 7.2.5 Option I

This option is similar to Option B; however the position of the city-bound, and Botany-bound platforms have been switched.

This option would require 6515m<sup>2</sup> of land area outside of the existing road corridor.

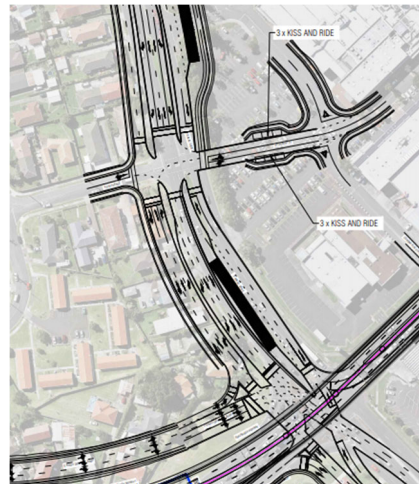


### 7.2.6 Option J

This option is similar to Option I in terms of the proposed arrangement of bus station platforms, however the alignment of the busway is shifted to the west, avoiding commercial properties (26 Ti Rakau Drive).

The alignment will require acquisition of residential properties located on the west side of Ti Rakau Drive.

This option would require 6121m<sup>2</sup> of land area outside of the existing road corridor.



## 7.3 Assessment of Alternative Options

### 7.3.1 Scoring and Assessment Criteria

To be consistent with previous assessment for EB2, a 7-point scoring criteria was used, ranging from -3 to +3. The scoring criteria is noted in Table 9 below.

Table 9 MCA Scoring Criteria

Description	Scoring
Significant adverse effect (very difficult to manage/ mitigate)	-3
Moderate adverse effect (can be managed/mitigated utilising relatively common methods)	-2
Minor adverse effect (little/ no mitigation required)	-1
Neutral/ no change	0
Minor positive effect	1
Moderate/ major positive effect	2
Significant positive effect	3

Table 10 and Table 11 provide the assessment criteria that was used by technical assessors when undertaking the assessment of alternative options for Pakuranga Bus Station. The criteria is consistent with that used in previous stages of the Ameti Programme. The project objectives were updated to reflect the current objectives for the project.

Table 10 Assessment Criteria (Bus Station)

Benefit/ Topic	Criteria #	Key Results Area/ Criteria	Assessor
Performance against Eastern Busway Project Objectives (updated to current objectives)	1	Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport options (SD, CB)	Shane Doran/ Chris Bentley
	2	Provide transport infrastructure that integrates with existing land use and supports a quality, compact urban form (CB)	Chris Bentley
	3	Contribute to accessibility and place shaping by providing better transport connections between, within and to the town centres (CB)	Chris Bentley
	4	Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network (SD)	Shane Doran
	5	Provide transport infrastructure that is safe for everyone (SD)	Shane Doran
Legislative Considerations	6	Assessment against critical legislative requirements (AS)	Alisdair Simpson
Constructability	7	Can the option be constructed within reasonable and known construction constraints? (AG)	Andy Gibbard
Transportation Effects	8	Traffic and Transport effects (SD)	Shane Doran
Built Environment	9	Property implications (FF)	Fenella Fischer
	10	Impacts on utilities and significant infrastructure (SJ/LW/AH)	Ashok Hirani

	11	Permanent effects – Connectivity (circulation) (SD)	Shane Doran
	12	Permanent effects – Built Form (CB)	Chris Bentley
	13	Permanent effects – Activities/ Use (CB)	Chris Bentley
	14	Permanent effects – Visual Amenity (CB)	Chris Bentley
	15	Permanent effects – Associative Elements (CB)	Chris Bentley

Table 11 Location assessment criteria (Bus Station)

Benefit	Stakeholder Outcome	Criteria #	KPI	Assessors
Integration	A facility integrated with the proposed town centre development	16	Enables opportunities for an active edge to town centre development (CB)	Chris Bentley
	Provides safe and improved multi-modal connectivity with surrounding neighbourhoods, reserves and with town centre facilities	17	Safe active mode connection to, and around the interchange centre (SD)	Shane Doran
		18	Reduced barrier across Ti Rakau Drive, improved TC frontage (SD)	Shane Doran
Transport	Reduced journey times and improved reliability for buses, while ensuring the resilience of the network	19	Efficient and safe bus access and egress (SD)	Shane Doran
	Meets forecast public transport demand and enables expansion/ or modifications to allow future growth beyond 2041	20	Accommodates at least 6 bus bays with room for further growth (SD)	Shane Doran
Customer	Serves through passengers during peak periods well, by enabling improvements to journey times, frequency and reliability of the transport network	21	Convenient location for through passengers with minimised perception of journey time delay (SD)	Shane Doran
	Comfort and quality of waiting environment and connections with surrounding areas	22	Comfort, legibility and quality of waiting environment and connections with surrounding areas (SD)	Shane Doran
	Priority provided for access to and from and around the station by cyclist	23	Priority provided for cycle access to and from and around the station (SD)	Shane Doran
Value	Maximise the benefits to the transport network and the surrounding land use from the proposed investment in transport infrastructure	24	Comparable land acquisition sq.m required (FF)	Fenella Fischer

### 7.3.2 Technical Specialists

Technical Specialists (or assessors) were identified from within EBA to undertake the assessment of the alternative options. Based on the nature of the options presented, the technical specialists that were required is noted in Table 12.

Table 12 Technical Specialists

Technical Specialist	Area of consideration/ assessment
Shane Doran/ Chris Bentley	Performance against Project Objectives
Alisdair Simpson	Legislative and consenting
Chris Bentley	Urban Design, Landscape and Visual
Shane Doran	Busway Operations and Transportation
Andy Gibbard	Constructability
Fenella Fischer	Property
Ashok Hirani	Civil Design and Utilities

Each specialist was allocated specific areas for consideration in Table 10 and Table 11.

### 7.3.3 Scoring of Alternative Options – Pakuranga Bus Station

Each option was scored by the technical assessors. The technical assessors provided a score against the relevant assessment criteria. The outcome of the scoring is shown below, with the options ranked based on total combined scores.

Table 13 Scoring of Options

EB2 Pakuranga Bus Station – Scoring outcomes						
	Alt Option A	Alt Option B	Alt Option G	Alt Option H	Alt Option I	Alt Option J
<b>Assessment Criteria Score</b>	19	3	14	2	2	-1
<b>Location Assessment Criteria Score</b>	21	16	18	14	16	15
<b>Total Combined Score</b>	<b>40</b>	<b>19</b>	<b>32</b>	<b>16</b>	<b>18</b>	<b>14</b>
<b>Option Ranking:</b>	<i>1st</i>	<i>3rd</i>	<i>2nd</i>	<i>5th</i>	<i>4th</i>	<i>6th</i>

A copy of the scoring metric sheet is provided in Appendix 5. Based on the above combined scores, Option A was preferred, with Option J being least preferred.

### 7.3.4 Assessment of Alternative Options – Pakuranga Bus Station

To support the scores provided, commentary and reasons for assessment were provided by each technical assessor. A summary of the comments is provided below in relation to the relevant criteria (identified as CR below).

#### Bus Station Operations and Transportation

The alternative options were considered against 13 of the criteria in undertaking the assessment in relation to bus station operations and transportation. A score was provided for each option against each criterion. Overall Option A was the preferred option from an Operations and Transportation perspective.

*CR1: Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increase choice of transport operations*

Option A	Option B	Option G	Option H	Option I	Option J
+3	+3	+3	+3	+3	+3

In relation to CR1, all of the options provide a multimodal corridor, as required by the criteria. All options provided suitable connections for buses and active modes (walking/ cycling).

*CR4: Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network*

Option A	Option B	Option G	Option H	Option I	Option J
+3	+3	+3	+3	+3	+3

For CR4, all options provided improved linkages, reliability and journey times for the public transport network. This is achieved by providing a dedicated, separated corridor for bus movements.

*CR5: Provide transport infrastructure that is safe for everyone*

Option A	Option B	Option G	Option H	Option I	Option J
+3	+2	+2	+1	+2	+2

All options provided a positive outcome in regard to CR5. Option A was the best performing, as it provides a bus station with clear sightline within the town centre. This option also has opposing platforms, which increase customer safety and security due to increased levels of passive surveillance between the platforms.

All options provide an improvement over the existing situation, but do not provide the same level of benefits/improvements as Option A and as such have a reduced score.

*CR8a: Traffic and Transport effects – construction*

Option A	Option B	Option G	Option H	Option I	Option J
-2	-2	-2	-2	-2	-2

*CR8b: Traffic and Transport effects – operational*

Option A	Option B	Option G	Option H	Option I	Option J
+3	+3	+3	+3	+3	+3

During construction, all of the options generate moderate adverse effects upon traffic and transport. The level of effect generated is consistent between the options. Once operational, all options will generate significant positive effects for traffic and transport. Each option provide a dedicated separated corridor for buses, whilst retaining the existing general traffic lanes along Ti Rakau Drive. The operational benefit is consistent between the options.

*CR11: Permanent effects – Connectivity (circulation)*

Option A	Option B	Option G	Option H	Option I	Option J
+3	+2	+2	+1	+2	+2

All options were assessed as having positive benefits in relation to CR11. Option A was considered to have significant positive effects as it is centrally located, offering a large catchment coverage and direct access into the town centre.

Options B, G, I and J were assessed as having positive effects, but not to the same level of significance as Option A. The options have a reduced catchment coverage compared to Option A, with the station



position and layout being less optimal. Option H was assessed as having minor positive effects as the catchment coverage is greatly reduced when compared to the other options.

<i>CR17: Safe active mode connection to, and around the interchange centre</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
+3	+3	+3	+3	+3	+3

All options provided major improvements to active mode connections with Pakuranga Town Centre and other locations in the immediate vicinity. When compared to the current facilities provided for active modes, all options were assessed as having significant positive effects.

<i>CR19: Efficient and safe bus access and egress</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
+3	+3	+3	+3	+3	+3

All options provided significant improvements to bus access with the provision of a dedicated separated busway within the Pakuranga Town Centre area. All options provide significant positive effects when compared to the existing situation.

<i>CR20: Accommodates at least six bus bays with room for further growth</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
+2	+2	+3	+1	+2	+2

All options would provide six bus bays, with all but one of the options being expandable to meet future demand.

Option A can be expanded to provide a total of eight bays. Additional bays could be provided in Reeves Road, which due to Options A's position, would provide reasonable connection for passengers interchanging between services. A similar outcome can be achieved in relation to the expansion of Option B.

Option G is able to be expanded to a total of 10 bays. As per Options A and B, additional bays could also be provided along Reeves Road with reasonable connection for passengers between services. As this option can be expanded by the greatest number of bays, it is considered to have significant positive effects, which is reflected in the score.

Options I and J can both be expanded to a total of nine platforms and provided similar connection for passenger with additional bays on Reeves Road as the other options. Option H can provide six bays however it cannot be expanded.

All options achieved a positive score as they are all an improvement on the current arrangement.

<i>CR21: Convenient location for through passengers with minimised perception of journey time delay</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
+3	+3	+3	+3	+3	+3

All options provided a bus station along the Ti Rakau Drive corridor. All options, based on their design and location, minimised perception of journey time delays for through passengers. Each option provided a dedicated separate corridor within the Pakuranga Town Centre area.

<i>CR22: Comfort, legibility, and quality of waiting environment and connections with surrounding areas</i>					
---	--	--	--	--	--

Option A	Option B	Option G	Option H	Option I	Option J
+3	+2	+2	+1	+2	+2

In terms of comfort, quality of the waiting environment and connections with the surrounding area, Option A performed the best as it is centrally located, offered the greatest catchment coverage and provided direct access into the spine of the town centre. Option H scored the lowest, due to its platform layout and position resulting in reduced catchment. The remaining options were a compromise between Option A and H.

CR23: Priority provided for cycle access to and from and around the station					
Option A	Option B	Option G	Option H	Option I	Option J
+3	+3	+3	+3	+3	+3

All options provided significant improvements for cycle access to and from and around the station. All station options provided an equal level of services in this regard.

In summary, Option A was preferred as it has a walk-up catchment that is situated between the Williams Avenue Station and proposed Edgewater Station. Its position avoids overlapping with the catchment of the adjacent stations. The station is also positioned with a direct sightline with the Pakuranga Town Centre spine, providing casual and regular users with legibility. It also provided a direct link from the station into the centre of the Town Centre.

**Legislative and Consenting**

CR6: Assessment against criterial legislative requirements					
Option A	Option B	Option G	Option H	Option I	Option J
0	0	0	0	0	0

In terms of legislative and consenting, all options were considered to be equal. The options faced similar considerations and effects upon the environment. There were no specific matters that differentiated the options. All the options required land to be acquired that is currently located outside of the road corridor.

All options were assessed as having an equal score.

**Construction**

CR7: Can the option be constructed within reasonable and known construction constraints?					
Option A	Option B	Option G	Option H	Option I	Option J
-1	-1	-1	-1	-1	-2

The impacts of construction were common across all options for: utilities relocation; traffic management constraints; demolition of property; Aylesbury Street connection; westbound traffic impacts; removal of vegetation and Busway tie ins.

Option J was differentiated by additional property acquisition and demolition of properties in a new westbound carriageway, further service relocations in the west bound traffic lanes of Ti Rakau and additional staging for the new section of Aylesbury Street was required as the entrance is more difficult to construct as the Left turn in movement is restricted. Additional staging and demolition of residential properties in the west bound Ti-Rakau Carriageway was also required.

## Urban Design, Landscape and Visual

The assessment for urban design, landscape and visual considered eight criteria.

*CR1: Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport operations*

Option A	Option B	Option G	Option H	Option I	Option J
+3	+3	+3	+3	+3	+3

From an urban design perspective, all station options had significant positive effects in relation to providing a multimodal transport corridor. The options would provide a significant enhancement over the existing situation.

*CR2: Provide transport infrastructure that integrates with existing land use and supports a quality, compact urban form*

Option A	Option B	Option G	Option H	Option I	Option J
+2	-2	+2	-2	-2	-2

Options A and G would provide moderate to major positive effects in providing a station that is integrated with existing land use and supports a quality compact urban form. The remaining options were determined as having moderate adverse effects. The options that would have moderate adverse effects make use of offset platforms, resulting in the station layout being longer and less compact.

*CR3: Contribute to accessibility and place shaping by providing better transport connections between, within and to the town centres*

Option A	Option B	Option G	Option H	Option I	Option J
+2	-2	+1	-1	-2	-2

Options A and G were considered to have positive effects in terms of accessibility and place shaping. All other options had adverse effects when compared to the existing situation. Options A and G provided a bus station with opposing platforms, located closer to the spine of the town centre. The other options provided a bus station using offset platforms, which reduces accessibility and place shaping outcomes.

*CR13: Permanent effects - Activities/ use*

Option A	Option B	Option G	Option H	Option I	Option J
+2	-1	+1	-1	-1	-1

In terms of the bus station's ability to integrate with surrounding activities and uses, Option A was preferred, with moderate to major positive effects.

*CR14: Permanent effects - Visual amenity*

Option A	Option B	Option G	Option H	Option I	Option J
-1	-1	-1	-1	-2	-2

All options would have an adverse effect in terms of visual amenity.

*CR15: Permanent effects – Associate elements*

Option A	Option B	Option G	Option H	Option I	Option J
-1	-1	-1	-1	-1	-1

All options had an adverse effect in terms of associate elements.

<i>CR16: Enables opportunities for an active edge to town centre development</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
+2	-2	-1	-2	-2	-2

All options had a negative impact in enabling for an active edge to town centre development along Ti Rakau Drive. Option G scored -1, with all other options scoring -2.

### Property

The assessment of property considered two criteria, being property implications and comparable land acquisition required.

<i>CR9: Property implications</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
-1	-1	-1	-1	-1	-2

All of the options were provided with a negative score in relation to property implications as they all required property acquisition. Option J scored -2 as more sites/titles were required to be purchased to enable this option to proceed. From a property acquisition perspective, it was more complex and involved multiple landowners. All other options have two property owners (the owners of Pakuranga Town Centre and 26 Ti Rakau Drive), reducing the complexity for purchasing property.

<i>CR24: Comparable land</i>						
<b>Option</b>	<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
<b>Land requirement</b>	6849m <sup>2</sup>	8026m <sup>2</sup>	7709m <sup>2</sup>	7190m <sup>2</sup>	6576m <sup>2</sup>	6121m <sup>2</sup>

The area of land required for the options ranged from 6121m<sup>2</sup> to 8026m<sup>2</sup>, a difference of 1905m<sup>2</sup>. Option J required the least amount of land outside of the road corridor, with Option B requiring the most land outside of the road corridor. Although Option J required the least amount of land, as noted above, it did impact a greater number of properties when compared to all other options.

### Civil Design

<i>CR10: Impacts on utilities and significant infrastructure</i>					
<i>Option A</i>	<i>Option B</i>	<i>Option G</i>	<i>Option H</i>	<i>Option I</i>	<i>Option J</i>
0	0	0	0	0	-1

In considering civil design, all options were assessed on the basis that the impacts upon utilities would be mitigated. The options required the re-alignment of Aylesbury Street, therefore, access to Ti Rakau Drive was maintained for all options. It has also been assumed that the loss of car parks within the shopping area is covered under property implications.

Options A, B, G, H and I all scored 0 (neutral effect) with Option J scoring -1. For all options the impact upon utilities can be mitigated. Option J scored -1 as it was considered that the opportunity to re-use the existing pavement on Ti Rakau Drive is reduced when compared to the other options.



## Summary of Assessment

Based on the assessments undertaken by the technical assessors, Option A was preferred, with Option G coming second. This outcome is reflected in the scoring.

Option A was favoured for a variety reasons, the primary ones relating to station location and platform layout. The station is located in a prime location, being close to the spine of the town centre, and in the optimum location to provide the best walk up catchment. Furthermore, the design is based on opposing platforms, which create a more legible station, that is more compact in form.



## 8 Pakuranga Bus Station - Assessment Outcome and Recommendation

The 2018 Specimen Design was used as a starting point for the development of 17 long list options. The long list options were assessed against a number of factors to determine the options to be refined and taken forward to the short list. The assessment of the long list resulted in six options being taken forward to be assessed via MCA.

The MCA assessment was undertaken, with technical assessors providing an assessment of each option in relation to specific criteria. The criteria used was consistent with the criteria used in previous option assessments.

The preferred option identified was **Option A**, which provides a bus station on the north side of Ti Rakau Drive, in the vicinity of 26 Ti Rakau Drive.



## 9 Overview of EB2 Assessments

Numerous investigations have been undertaken in the development of the Project since 2014 to investigate options.

Since its establishment, the EBA has undertaken option assessments of the two primary components of EB2, being Reeves Road Flyover (RRF) and Pakuranga Bus Station. For both elements, the starting point was the Specimen Design for EB2 that was confirmed in 2018.

For RRF, 20 alternative options were developed from the 2018 Specimen Design and were assessed using a two-step filter to identify the preferred option. Following the assessment, the preferred option was Option 15. This option ranked the best and was selected to be taken forward for the project.

It was considered by the EBA that no further MCA work was required for RRF due to the level of development already undertaken as part of the 2018 Specimen Design and the fact that under this option the RRF would be retained on or near its alignment contained within the Specimen Design, and elements related to its form or function would be refined during the design refinement and value engineering phases of the project.

For Pakuranga Bus Station, 17 long list options were developed by the EBA. Consideration was taken of the Specimen Design, however some of the options developed looked beyond the Ti Rakau Drive corridor. To determine the options to be taken forward to short list the following matters were considered:

- The impact upon open space within the EB2 area, with specific consideration to Ti Rakau Corner Reserve
- Integration with Pakuranga Town Centre
- Integration with EB1
- Impacts upon residential properties
- Position of bus stations in relation to Busway alignment
- Land take requirements

Using the above factors, six options were identified to be taken forward for refinement and assessment. All six options taken forward were within or directly adjacent to Ti Rakau Drive in the vicinity of Pakuranga Town Centre.

Based on the assessment of the six options using the MCA tool, **Option A** was identified as the preferred option for Pakuranga Bus Station.



## Appendix 1: Reeves Road Flyover – Long List Assessment Framework

CSF No.	Critical Success Factors	Busway Al					
		Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
		Specimen Design	Bus station located south (west) of Ti Rakau Drive	Bus station located at the north-eastern side of the town centre	Bus station located under the Reeves Road Flyover	Bus Station located west (citybound) from 26 Ti Rakau Dr - busway on northern side or centre	Position bus station east of Aylesbury Street
	Summary Description	Northern side-running busway on Ti Rakau Drive adjacent to Aylesbury Street, with off-street separated bi-directional cycle facilities on northern verge, with shared use path on southern verge. Station located in line of sight of Aylesbury Street central town centre spine. Cycle facilities down William Roberts Road.	Busway on southern side of Ti Rakau Drive with bus station located between Pakuranga Road and Pakuranga Highway. Station location south of Ti Rakau Drive.	Bus station located behind town centre and Penell Place on north-eastern side.	Bus station located under Reeves Road Flyover, in vicinity of Cortina Road and Reeves Road intersection.	Specimen Design Station location shifted to the west towards Pakuranga Road	Position bus station east of Aylesbury Street
1	Does it achieve an acceptable busway alignment/system?				4		
2	Does the option significantly improve affordability?				0		
3	Does the option provide a safe environment for all users?						
4	Does this option have a lesser degree of difficulty for statutory approvals?						
5	Is the station located to support integration with Pakuranga Town Centre?						
6	Does it provide an acceptable urban design outcome for Reeves Road?						
7	Does it minimise impacts on Transpower/Watercare assets?						
	<b>Score</b>	0	0	0	4	0	0
	<b>Ranking</b>				3		
	Summary of decision made	Provides for multi-modal transport outcomes. Not affordable due to impacts on major utilities, cost of Reeves Road flyover due to width and length of structure, property acquisition costs for commercial properties and other properties, and scale of works along Pakuranga Road and William Roberts Road; further refinement through narrowing lanes does not significantly reduce property impact. Not progressed.	Station is not placed on the town centre side, therefore not integrating well and supporting development of town centre. Contrary to town centre master plan. Potential safety issues from customers crossing Ti Rakau Drive between station and town centre. Impacts on the reserve which is a former landfill, potential contaminated land issues and increased cost, potential increased consenting complexity due to impacts on open space. Additional property impacts on residential properties on southern side of Ti Rakau not currently acquired for the project and associated costs. Not progressed.	Northeast side of town centre is poorly integrated. No visibility with town centre central spine. Potential CPTED issues with station location. Station location results in gap in catchment coverage. GYP property impact which has existing consents for high density development, with higher associated costs. Diverts the busway by 1km to get in and out of the site resulting in increased CAPEX and long term increased OPEX costs. Optimised sub-option would still be located on GYP site. However, some opportunities for air-rights. Impacts carpark (utility reserve). Challenging to identify suitable segregated busway alignment to and from station location, as access to station impacts Reeves Road with increased property impacts. Not progressed.	Benefits include a more activated area under Reeves Road, however potentially has CPTED and passive surveillance issues with location away from main central town centre spine. Potential property access impacts on Reeves Road, including the Warehouse loading dock. Option may need a roundabout or circulation to retain loading dock access for the Warehouse and other properties. Potentially severs property access along Reeves Road and for 26 Ti Rakau. Overall additional property impacts along Reeves road and additional costs, including a petrol station. Overall, trade-offs in property costs compared to Specimen Design. Integrating station or commercial space into Reeves Road structure potentially reduces / mitigates effects of structure. Further investigation of property access to be undertaken. Option considered worthy of further development as part of VE of station location. Not progressed.	Provides for multi-modal transport outcomes. Station location does not provide line of sight with town centre spine. The change of station location west to partially avoid 26 Ti Rakau Drive does not substantially minimise the property impacts compared to the Specimen Design due to the need to acquire land on the opposite side of the road. Risk associated with property acquisition of commercial land to overall programme remains compared to Specimen Design. Does not achieve the affordability objective. Not progressed.	Busway geometrics are constrained, including tight 90 degree corners. The location severs circulation around the town centre and the connections through/around. Access removed for Cortina Way properties results in increased complexity and costs. A portion of road is owned by the Warehouse and 26 Ti Rakau Drive resulting in additional property acquisition process complexity and cost. Undercroft parking severed increasing compensation costs. Does not achieve affordability or town centre master planning objectives. Not progressed.
	<b>Proceeds to scheme-level option development?</b>						



Management Options						
Option 6	Option 7	Option 8	Option 9	Option 10	Option 11	Option 12
Position bus station at corner of Reeves Road and Cortina Place	Central elevated bus station on TI Rakau, West of 26 Ti Rakau Drive	Reeves Road cut and cover tunnel under Pakuranga Road	Two-lane Reeves Road Flyover	Two-lane Reeves Road at-grade	Four-lane Reeves Road at-grade with elevated station	Four-lane Reeves Road at-grade with at-grade station
Position bus station at corner of Reeves Road and Cortina Place	Central elevated bus station on TI Rakau, West of 26 Ti Rakau Drive to eliminate Reeves Road Flyover	Reeves Road cut and cover tunnel under Pakuranga Road.	Specimen Design with two lane Reeves Road Flyover structure.	Reeves Road to remain as is with 2 lanes in Reeves Road for general traffic. Eliminates flyover from the Specimen Design.	Elevated bus station in front of 26 Ti Rakau Drive. At-grade four-lane Reeves Road.	Four-lane Reeves Road at-grade with at-grade station.
			4			
			5			
0	0	0	9	0	0	0
			2			
Does not support town centre integration and future growth and has poorer connectivity to the town centre through no visible connection to main town centre spine of Aylesbury Street. However has the potential to improve catchment coverage. Would require active wayfinding for users as the station is not as visible from Aylesbury Street. Additional property acquisition and affordability impacts. Overall higher property costs than the Specimen Design. Not progressed.	Ramp geometry does not have sufficient length to achieve this option; structure would be longer than the flyover (approx. 500 m). Incompatible with over-dimension route. Elevated structure near residential properties may result in sense of enclosure, overshadowing, privacy / overlooking issues, as well as visual effects and increased consenting complexity. Discontinued as suitable geometry cannot be achieved for an acceptable busway alignment/system. Not progressed.	Drainage and utilities are significantly impacted and would require relocation. Constructability issues through construction and traffic management required and high associated cost. Higher cost for tunnel structure. Cut and cover tunnel structure would not free-drain due to high water table. Does not achieve objectives to minimise utility impacts or improved affordability. Not progressed.	Provides for multi-modal transport outcomes. Reduction in structure size will provide a significant cost reduction compared to the Specimen Design. Property impacts may be reduced due to fitting within the road reserve. May resolve a merge issue prior to Waipuna Bridge. Traffic modelling has noted some issues with the reduction in lane widths for the Specimen Design; further modelling required to check there is sufficient capacity. Intersection footprint impacts to be reviewed. Depending on the station locations, this may be able to be resolved. Option to be further assessed as VE to other zone options. Intersection footprint impacts to be reviewed. Progressed.	Traffic modelling shows that traffic worsens compared to the Specimen Design. Bus Services reliability and travel time significantly impacted. Not progressed.	Elevated bus station in front of 26 Ti Rakau Drive improves the geometry for the ramp. Geometry at the station would need to be further refined to ensure safe operation. Centre-line and platform edge - radius. Potential concerns it cannot safely operate due to reverse curve. Depends on speed environment. Could be optimised - straightened out. Fail safe operations and busway alignment criteria. However could look at optimising with property AT owns. Elevated structure near residential properties may result in sense of enclosure, overshadowing, privacy / overlooking issues, as well as visual effects and increased consenting complexity. Transpower lines would still need to be modified/moved but an improvement on Specimen Design. Howick Bus's connection would require more lanes and additional surface works or a roundabout 'hamburger' layout. Option could be further developed to determine the extent of property impacts and station sizing, route options for all bus routes. Elevated station structure does not provide any cost advantage compared to Reeves Road Flyover. Not progressed.	Similar assessment to Option 11. Significant impact on travel reliability and travel time for bus services. Fails on busway alignment criteria. Not progressed.



Option 13	Option 14	Option 15	Option 16	Option 17	Option 18	Option 19	Option 20
Cycle facilities through Cortina Place including extension through park	Millen Diversion	Straighten Reeves Road Flyover + 60kph Design Speed	Reeves Road Flyover with steel structure	Eliminate cycle facilities on William Roberts extension	Dedicated Freight Lane	Shift station south away from 26 Ti Rakau Drive with busway alignment on northern side	Eel Station
Divert bi-directional cycleway through Cortina Place and extending through Ti Rakau Park to link with Ti Rakau Drive east of Ti Rakau Park	Busway linking Ti Rakau Drive to SEART and then connecting through Millen Avenue to Pakuranga Road just south of Panmure Bridge	Straighten Reeves Road flyover by decreasing speed environment for western approach including measures such as active speed management through central planted median, ITS and speed enforcement measures. Reduces posted speed to 70-75km/h compared to 90km/h in Specimen Design.	Reeves Road Flyover with steel structure in lieu of concrete structure proposed in Specimen Design	Specimen Design without cycle facilities on William Roberts extension	Dedicated Freight Lanes along Ti Rakau Drive	Shift busway alignment including station south to remove impact to properties on northern side of Ti Rakau Drive with busway alignment on northern side of alignment	Specimen Design with 'eel' station configuration.
		5					
		5					
0	0	10	0	0	0	0	0
		1					
Cycle facility sub-option for VE. Not progressed.	Severs community and does not connect well with EB1; was previously reviewed with the SAR option. Would result in a large part of EB1 as being redundant. Does not link with Pakuranga Town Centre. Property impacts due to alternative alignment and increased consenting complexity due to alignment through residential area. Does not achieve the agreed corridor for Eastern Busway. Not progressed.	Provides for multi-modal transport outcomes. Achieves savings through removing barriers and improving sightlines and therefore reducing structure size. Potential impact on Transpower asset to be reviewed. Could be reduced to 50km/hr through active ITS, more urban place road type treatments etc. Westbound on-ramp to SEART to be reviewed. Larger radius curve ends up on bridge - review wider shoulders to accommodate sightlines. Balance here - straighten geometry. Property acquisition required due to footprint exceeding the designation, however reduced impacts on Reeves Road properties. VE option with a number of optimisation areas to be reviewed. Affordability savings in physical structure, property and construction. Progressed as part of VE for Reeves Road Flyover.	VE Option. Not progressed.	VE Option. Not progressed.	Option does not provide for a busway and therefore does not meet project objectives. Not progressed.	Requires six additional properties to avoid properties on northern side of Ti Rakau Drive. Busway alignment as per Specimen Design on northern side. AECOM VE option 1E. Option to further use utility reserve land (VE 1D or 1C options) which has lower cost. Flyover increases in length, therefore higher cost for flyover. Location of station within queuing length for Ti Rakau / Pakuranga intersection. Station location on northern side with town centre, still results in integration. Does not improve affordability. Not progressed.	VE option to decrease property impact adjacent to the station. VE option to be combined with other options. Not progressed.

## Assessment methodology

### First Filter

After first filter, if any criteria is considered red then that option is not considered any further.

All other options are then scored and ranked in priority order to identify those options which are worth further investigation and consideration for including the development of schemes.

### Scoring Scale

Green	Strongly meets criteria
Yellow	Meets criteria with some impacts
Red	Does not meet criteria

### Second Filter

A second filter is undertaken for those options considered viable to rank in terms of affordability and busway alignment acceptance.

Any criteria given an amber in the first filter is given a score of 0.

For both the affordability and busway alignment criteria, the remaining options are given a score between 1 and 5, with 1 given to the options that are considered to least meet the criteria and 5 given to the options

The options are then ranked using the total scores against the affordability and busway alignment criteria to prioritise which options

### Scoring Scale

0	Meets criteria with some impacts
1	Contributes
2	Moderate contribution
3	Moderate to strong contribution
4	Strong contribution
5	Strongest contribution



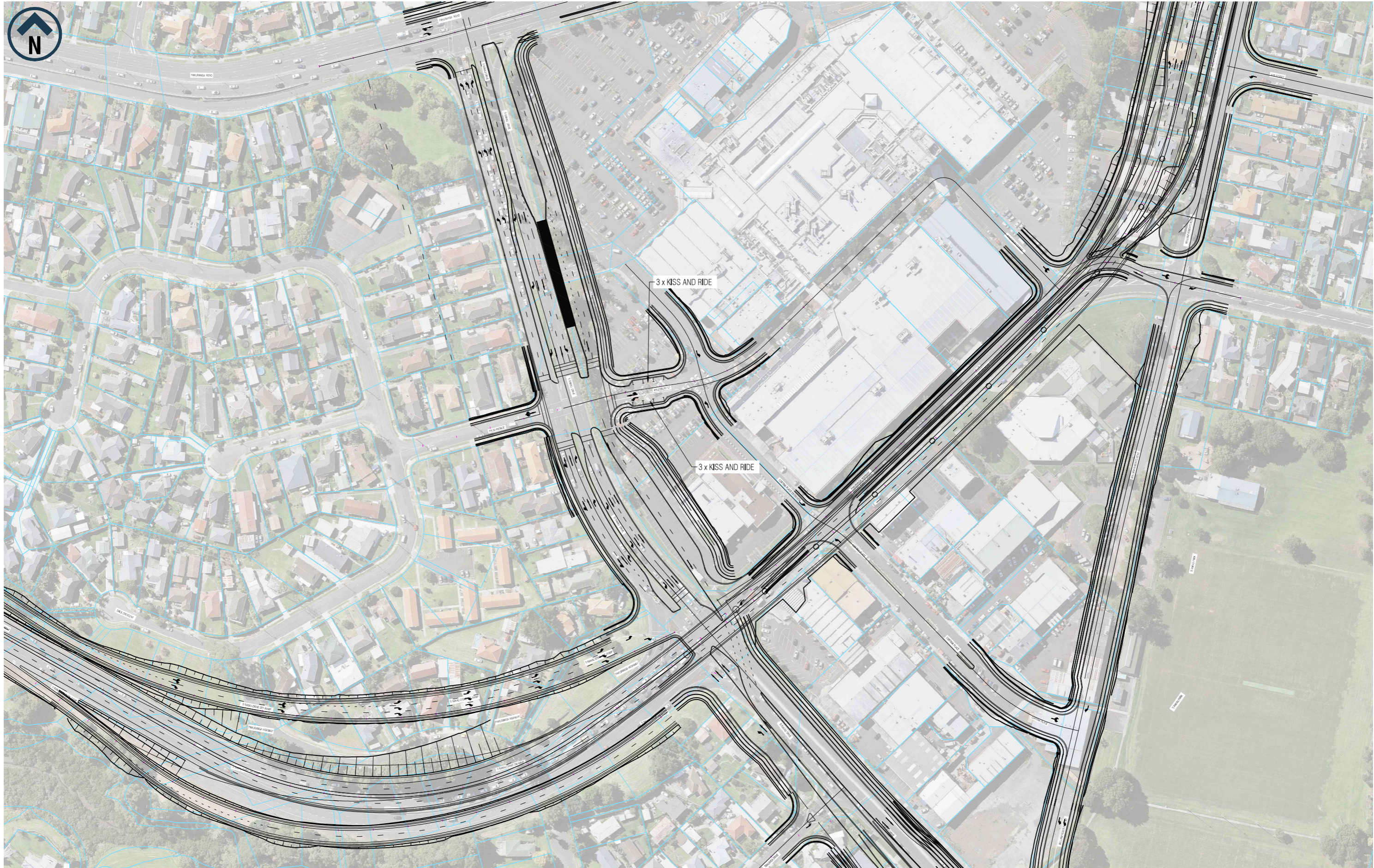


## Appendix 2: Reeves Road Flyover – Long List Options







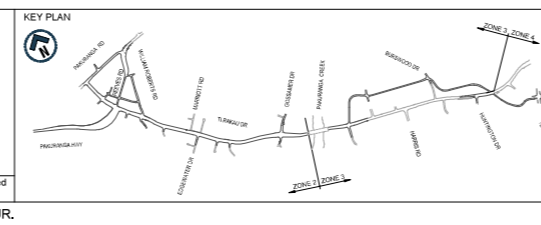


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DRAWN	DRAWING CHECK
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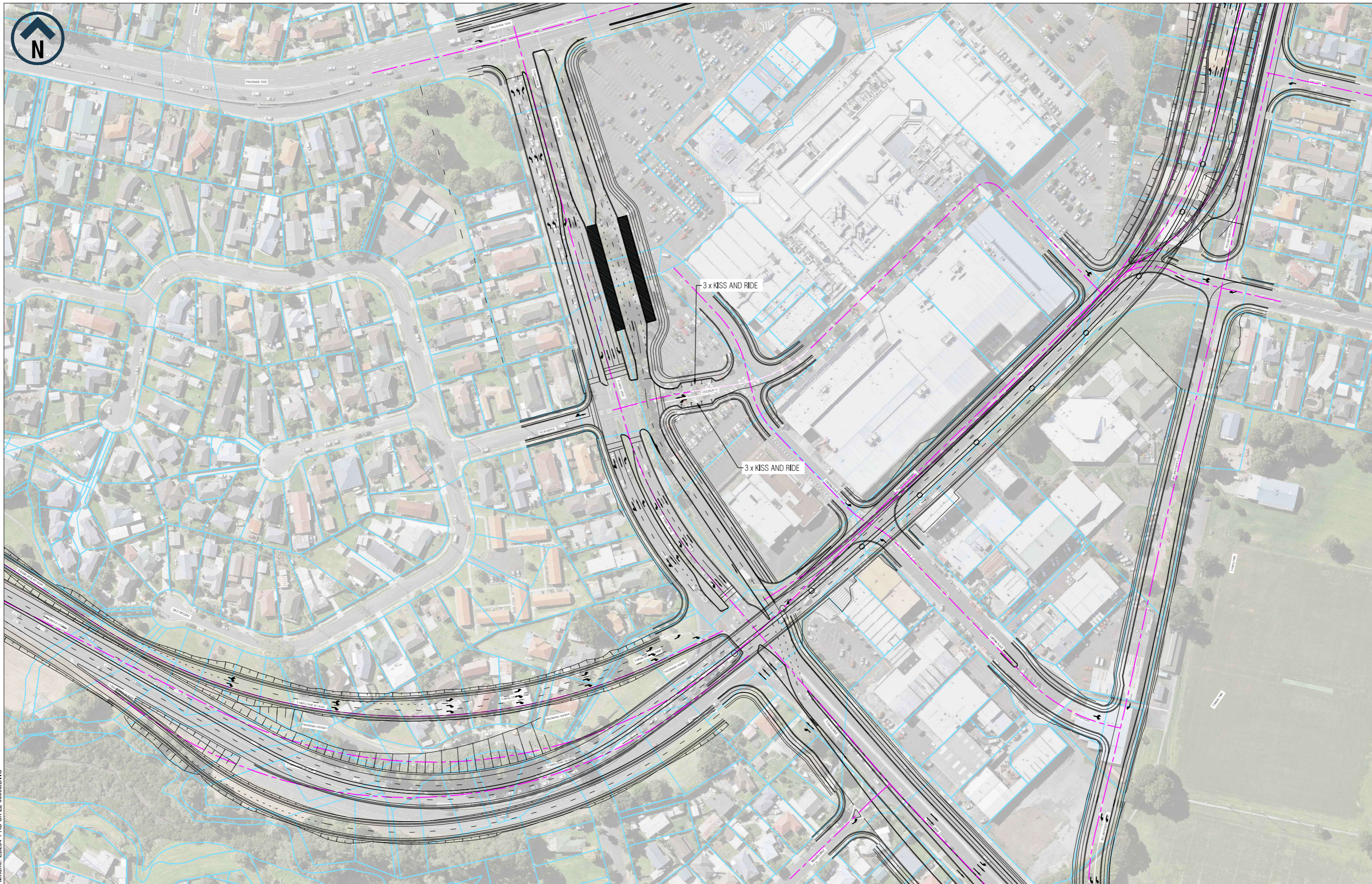


**AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE**  
**EASTERN BUSWAY STAGES 2, 3 AND 4**  
**(PAKURANGA TO BOTANY)**

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DRAWING STATUS		<b>PRICING</b>		<b>NOT FOR CONSTRUCTION</b>	
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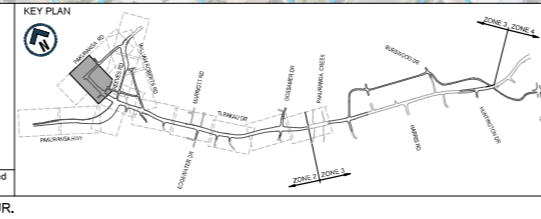
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**AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE**  
**EASTERN BUSWAY STAGES 2, 3 AND 4**  
**(PAKURANGA TO BOTANY)**

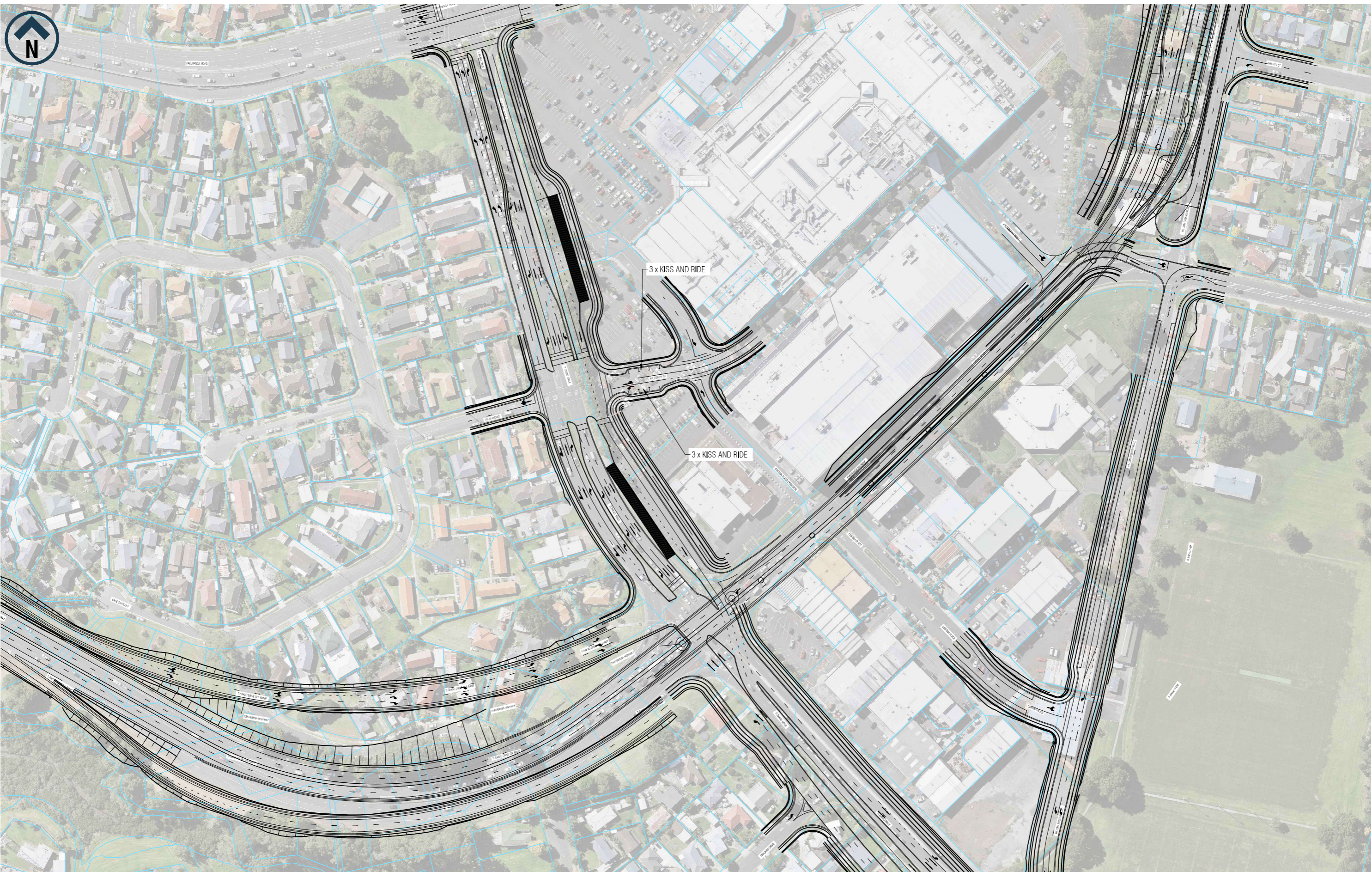
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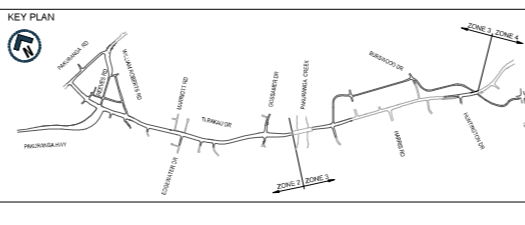


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**AUCKLAND MANUKAU EASTERN TRANSPORT INITIATIVE**  
**EASTERN BUSWAY STAGES 2, 3 AND 4**  
**(PAKURANGA TO BOTANY)**

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DRAWING STATUS		<b>NOT FOR CONSTRUCTION</b>	
DRAWING TITLE			
ZONE 2 - TI RAKAU DRIVE			
OPTION I			
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