Eastern Busway

EB3 Options Assessment 2022

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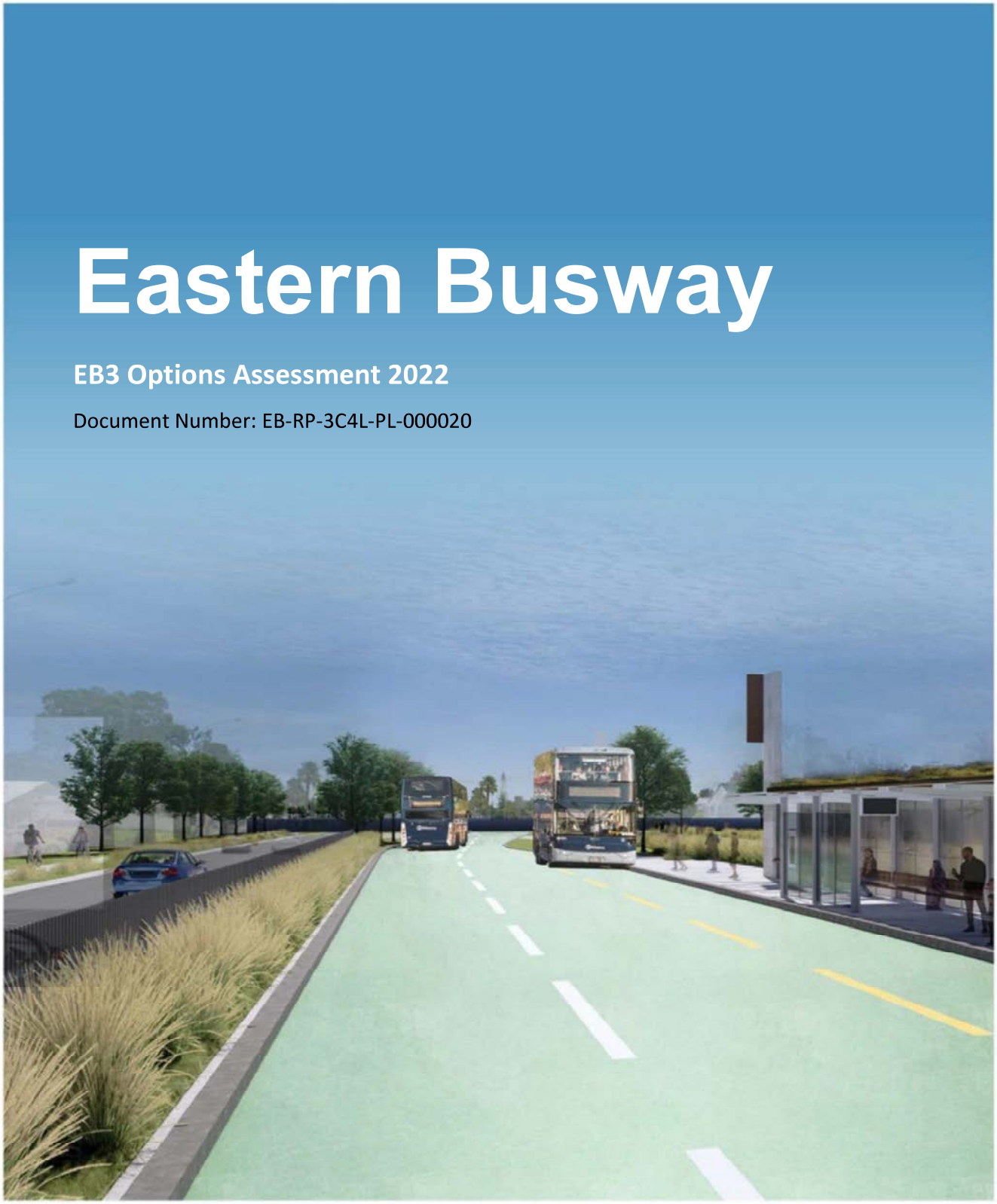

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Abbreviations and definitions

Abbreviation and definitions	Description
ALT	Alliance Leadership Team (formally Alliance Management Team (AMT)
AMETI	Auckland Manukau Eastern Transport Initiative
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)
EB4U	Eastern Busway 4 (Botany Town Centre ultimate station)
EB4L	Eastern Busway 4 (Link Road through Guys Reserve)
EB4i	Eastern Busway 4 (interim bus stops)
EBA	Eastern Busway Alliance
FOA	Further Options Assessment
IPAB	Interim Project Alliance Board
MCA	Multi criteria assessment
RTN	Rapid Transit Network

Executive Summary

The Eastern Busway Alliance (EBA) has undertaken an options assessment for Eastern Busway 3 (EB3) to determine the preferred option. In 2020 a review of previous investigations and options assessment was undertaken. The purpose of the 2020 review was to assist in developing a further range of options (both previously identified and new options) to be assessed and to determine the options to be taken forward.

For EB3 a total of 27 long list options where identified, 13 for EB3 Residential, and 12 for EB3 Commercial. Screening factors were developed by EBA and used to assess each long list option. A total of 4 options were recommended to be taken forward for further development and assessment.

For each section, two options were assessed using a Multi-Criteria Assessment (MCA) framework. The options assessed are identified as:

- EB3 Residential – Online
- EB3 Residential – Offline
- EB3 Commercial – Online
- EB3 Commercial – Offline

The MCA assessed each option against project objectives and a range of environmental factors. The performance of each option against the objectives and environmental factors was scored, without weighting, using an 11-point scale. A workshop was held with technical assessors to fully explore the options to ensure that assessment was based on consistent and commonly understood information. The scoring for each option was confirmed after the MCA workshop.

The MCA workshop and scoring shows that all four options scored positively against the project objectives. Positive effects of the options were also presented in terms of permanent transport effects, social impacts and in some instances urban design outcomes. Negative effects of the options were presented in relation to environmental factors, particularly where options were brought closer to sensitive receptors such as the Coastal Marine Area (CMA), streams and residential zones.

The scoring in the MCA generally reflected that the options were similar, and, in most cases, there was little to differentiate between them. EB3 Residential Online, and EB3 Commercial Online both scored marginally higher than their offline counterparts.

Following the MCA workshop, and confirmation of scores, the ALT met to discuss the findings, and to review the options against the Project Key Result Areas (KRA), identify risks and to select a preferred option for endorsement by the IPAB.

For EB3 Commercial, the **Offline Option** was selected by the ALT as the Technically Preferred option for the following reasons:

- Affordability - $50m cheaper than the online estimate for design and construction costs;
- Reliability – better travel reliability than the online option as busway crosses fewer intersections with general traffic;
- Increased exposure/ catchment – the bus station for the offline option would be closer to the Burswood Residential Area, increasing the catchment of potential bus users; and
- Property strategy – fewer properties/ partial acquisitions and less tenants to negotiate.

For EB3 Residential, the **Online Option** was selected as the Technically Preferred option for the following reasons:

- Urban integration – provides better opportunity for future integration, with the residual land created able to accommodate up to 728 (terraced) houses versus 630 houses in the offline option.
- Urban design opportunities – greater area of residual land available for terraced housing development. This form of development has been assumed as being more attractive to developers and this style of development lends itself well to a street frontage as afforded by the online option.
- Urban design preference – urban design assessment has a strong preference for the online option. Also considered to align with the Projects 'Legacy' KRA better than the offline option.
- Cost differences ($13M) were not seen as insurmountable.

The above recommendation was endorsed by the IPAB and the EB3R online option and the EB3C offline option were progressed by the Alliance for design development.as the Technically Preferred design.

Through the design refinement process for the Technically Preferred scheme for the EB3C section of the project a number of risks and challenges were identified by the EBA Design and Construction teams. These risks and challenges included:

- Whether there was sufficient space to safely construct the busway immediately adjacent to existing residential properties as there is a concern that some residential properties are built within close proximity to the proposed designation boundary;
- Construction noise and vibration may be an unacceptable disturbance to the residents of the adjacent properties; and
- The long-term operation of the busway within a metre of residential properties may be unacceptable to the community.
- Access to loading zones for commercial properties.

Following the identification of these risks the EBA undertook a design refinement process which led to the development and consideration of alternative designs through Burswood Reserve and alternative station locations in EB3C by the EBA.

These alternative design options were assessed through a series of workshops by the EBA through Q2/Q3 of 2021 and resulted in the selection of the Reference Design by the ALT. The EB3C Reference Design has an alignment that goes further into the Burswood residential area, compared to the Commercial Offline Option which was the Technically Preferred design.

Whilst the options assessment process for the Reference Design (which resulted in a different alignment through the Burswood area) was well documented the EBA identified that a gap in the process was that the option should have been scored using the MCA process for the EBA to show the differences between the options considered.

When an updated MCA process was carried out in 2022 comparing the Commercial Online and Commercial Offline options (which were the subject of the original 2021 MCA) against the Commercial Offline Burswood option, this indicated that the Offline Burswood residential option (i.e. the Reference Design) performed well against the Project Objectives and other MCA criteria and supported the earlier assessment undertaken by the EBA.

Overall, the updated MCA supported the outcomes of the design refinement process and assessment of the Burswood Esplanade Reserve and Stations options detailed at sections 10 – 13 of this report. The

outcomes of the MCA were reported to the ALT on the 04 December 23. As the updated MCA confirmed the outcomes of the previous options assessments and didn't necessitate any additional design changes the findings of the updated MCA were endorsed by the ALT and no further changes to the reference design were considered necessary.

1 Introduction

This report outlines the option assessment work undertaken for Eastern Busway Stage 3 (EB3) by the Eastern Busway Alliance (EBA). Several options have been developed and assessed against a range of factors to help determine the preferred option.

The Eastern Busway Project is part of the AMETI programme of initiatives to improve performance of the transport system in the East Auckland/Manukau area and to provide increased transport choices to support the existing and 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 and the first stage of the busway, Eastern Busway 1 – EB1.

EB3 is part of the key initiative to develop a busway from Panmure to Botany and the wider Eastern Busway Project from Pakuranga to Botany. EB3 comprises the section of the Project located to the east of Pakuranga Town Centre (connecting to EB2 at SEART intersection) and to the west of Botany Town Centre (connecting to EB4 at Guys Reserve/ Huntington Drive). Figure 1 provides a map of the Project and the surrounding area. The Pakuranga to Botany section is identified in Blue below and forms the project extent for the EBA. EB3C comprises that section of the corridor from Pakuranga Creek to Huntingdon Drive.

Figure 1 Project extent, including EB1, EB2, EB3 and EB4: Source EBA 2020

For the assessment of alternatives for EB3, the Ti Rakau Drive corridor has been split into two, using Pakuranga Creek as the breakpoint. The section to the west of Pakuranga Creek is identified as EB3 Residential (EB3R), and to the east of Pakuranga Creek as EB3 Commercial (EB3C). On each side of

Pakuranga Creek, two options have been considered, generally based on an online option (generally within the existing road reserve) and an offline option (outside of existing road reserve).

Consideration of options for the Ti Rakau Drive Bridge across Pakuranga Creek were not part of this assessment. To accommodate the busway, the crossing will be widened to allow for four general traffic lanes (two in each direction) and two lanes for the busway. The analysis on the preferred option for the Bridge is detailed in a separate report. The crossing of Pakuranga Creek was not subject to an options evaluation, as irrespective of the preferred options for EB3R and EB3C, an additional crossing would be necessary, and would need to be constructed upstream of the existing bridge to avoid conflicts with a significant pipebridge carrying Hunua 2 watermain that is located down stream of the bridge. The crossing of Pakuranga Creek was considered in a subsequent evaluation that is detailed in the Ti Rakau Drive bridge Options Assessment Report.

The first tranche of options assessment was undertaken using a multi-criteria assessment (MCA), with a range of technical specialists providing input into the process. The methodology used is consistent with previous MCAs undertaken for the Eastern Busway project, including EB1. The second tranche of options assessment was undertaken primarily through a series of technical workshops, and ultimately scored using the MCA framework for the Project.

The proposed long list options were presented to mana whenua at the southern mana whenua hui. The short list options were presented to mana whenua at a workshop held on 25 February 2021. Mana whenua identified the key issues for all options is the management of stormwater and the potential impact on water quality in the catchment. More details of engagement and discussions with mana whenua are provided in Section 7.

This report provides:

- A summary of the previous option assessments undertaken by AT prior to the establishment of the EBA;
- A summary of the options considered for EB3;
- Details of the option evaluation and MCA process;
- A summary of the process undertaken by the Alliance Leadership Team (ALT) and Interim Project Alliance Board (IPAB) to select the preferred option;
- A summary of the design refinement undertaken following selection of the preferred scheme:
- Consideration and evaluation of design changes for EB3C and the related process;
- Engagement with Key Stakeholders and the Community;
- Details of the further MCA Process carried out in relation to EB3C.

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 identified were:

To secure the ability to implement and, in due course, to develop integrated multi-modal 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 has a set of clear objectives (as set out below and documented in the Consenting Strategy for the Eastern Busway Project April 2021),which are integral when assessing alternative options for EB3. These Project Objectives are set out below and apply to EB3.

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.

The following section provides background and overview of the processes, outcomes and assessment criteria used to undertaken previous option assessments for the Project.

2.3 Background and previous option assessments

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

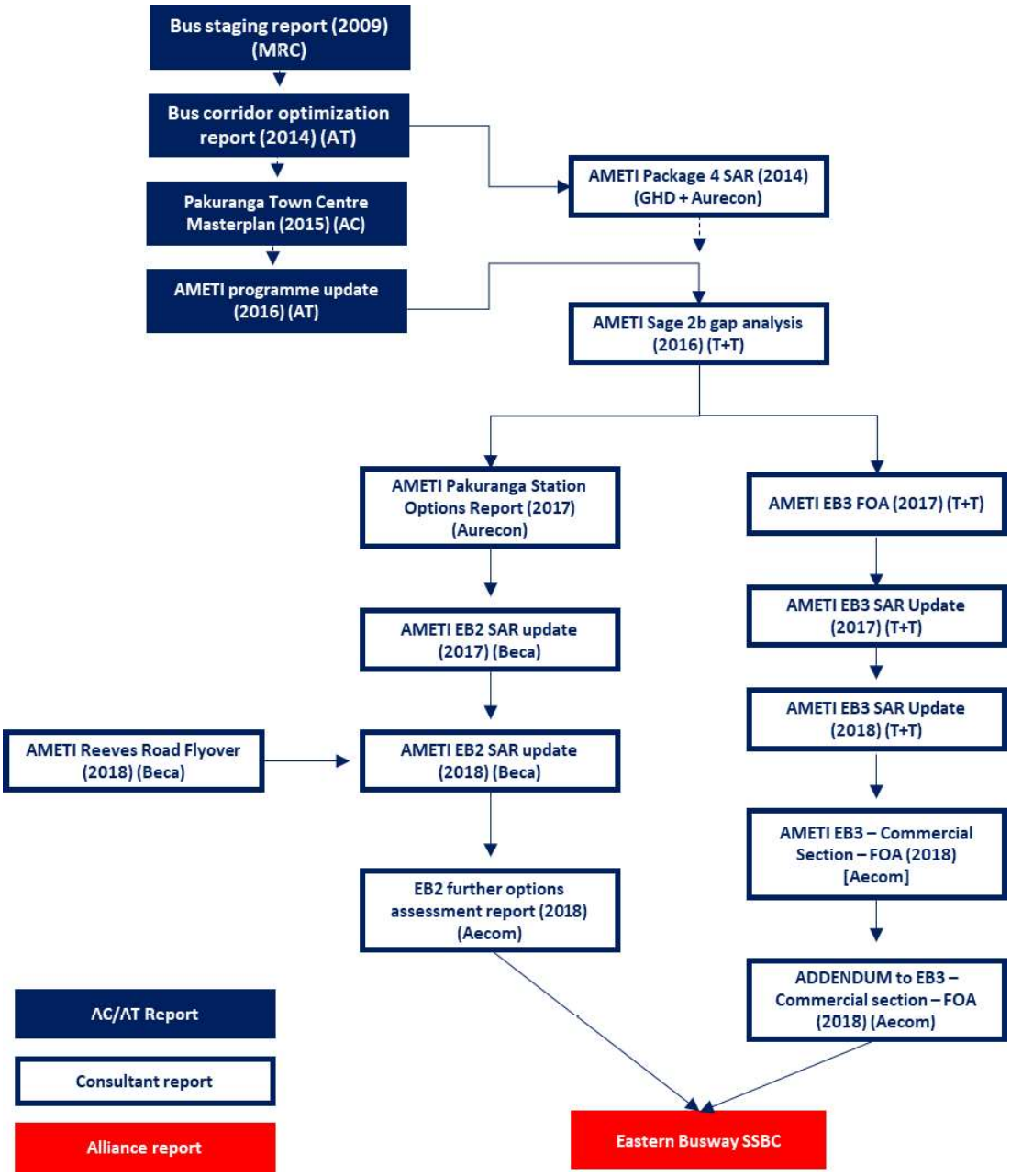


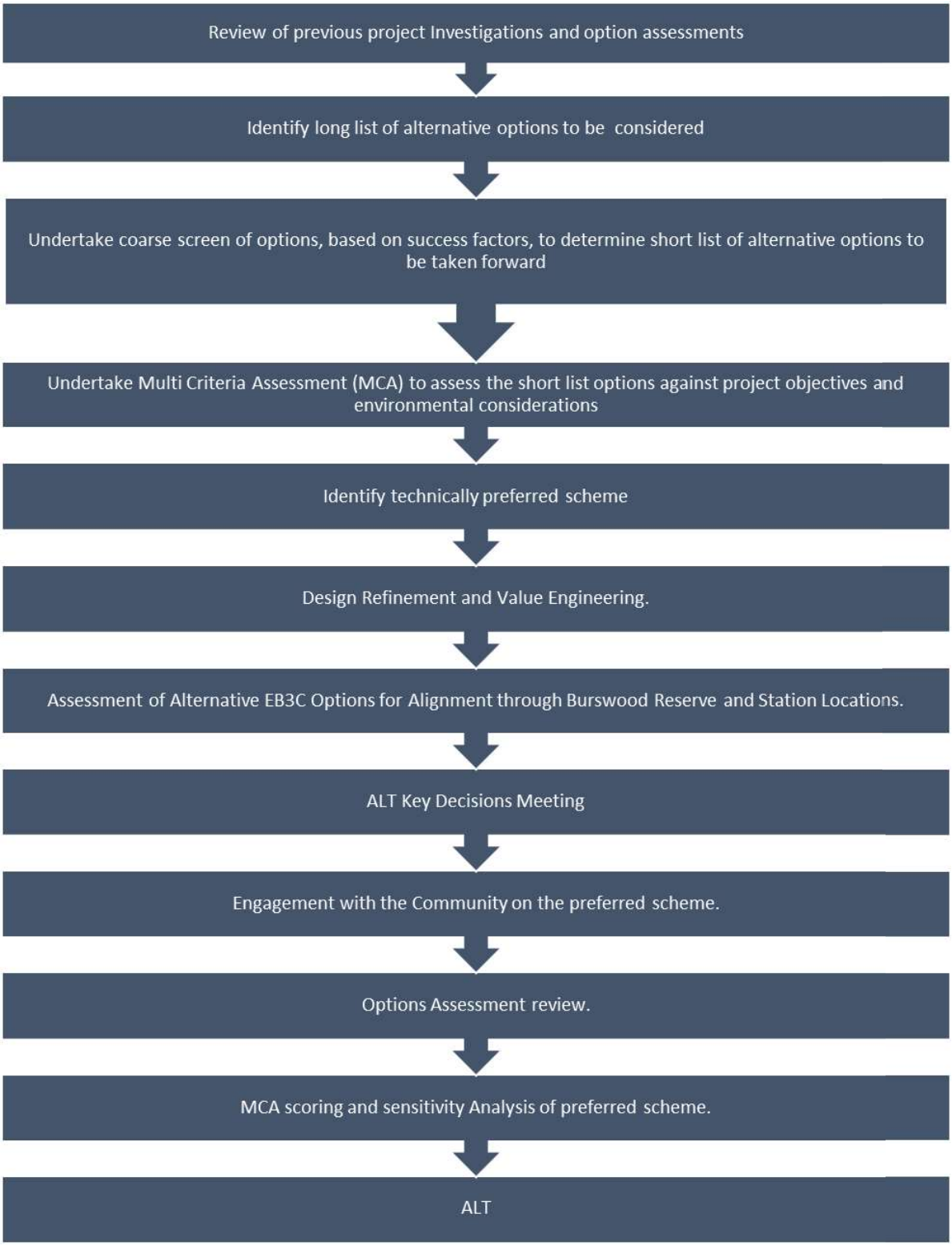
Figure 2 Previous investigations

Table 1 Summary of previous investigations

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

3 Eastern Busway Alliance assessment process

The following provides an overview of the assessment process that has been undertaken for EB3 by EBA since late 2020. The diagram below sets out the process followed.



3.1 Long List Considerations/ Sifting of Options

A review of previous investigations and option assessments was undertaken by EBA in 2020. The purpose of the review was to assist the development of long list options for EB3. The long list of options developed was drawn from the previous investigations detailed in table 1. . As such the 2020 long list has new variations in addition to the long list from 2018. Options previously discounted were not reconsidered as part of the 2020 long list.

The 2020 long list identified a total of 27 options, 15 for EB3 Residential, and 12 for EB3 Commercial. The outcome of the long list assessment determined the options to be taken forward for further development/refinement.

3.1.1 Long List Assessment Methodology

The assessment methodology is a two-step filtering process. The first filter considers each option in relation to the screening factors (outlined below). If any option does not meet one or more of the screening factors, the option is discounted. Options that strongly meet or meets the screening factors with some impact, will be taken forward for further assessment (second filter).

Table 2 First filter scoring scale

Long List Assessment: First Filter Scoring Scale	
	Strongly meets criteria
	Meets criteria with some impacts
	Does not meet criteria

Below are the screening factors that were developed by the EBA and used to assess the long list of options for EB3:

Table 3 Long list screening factors

Long List Assessment: Screening factors	
1	Does it achieve an acceptable busway alignment?
2	Does this option significantly improve affordability (when compared to the specimen design)?
3	Does this option provide a safe environment for all users?
4	Does this option have a lesser degree of difficulty for statutory approval (when compared to the specimen design)?
5	Does this option minimise impacts to property access along Ti Rakau Drive?
6	Does this option minimise impacts to property?
7	Does it support urban integration and growth? (EB3 Residential only)
8	Does it minimise impacts on significant utilities? (EB3 Residential only).

The screening factors have been developed by having regard to the Project objectives, project affordability constraints and consent and environmental considerations. As such the long list screening factors are considered to apply a balanced approach to the assessment process undertaken.

The second filter is applied to those long list options considered viable to rank in terms of affordability and busway alignment acceptance criteria/ screening factors. The consideration of these two factors as the second filter provides a link to the project objectives and affordability considerations of the project.

Any criteria given an amber in the first filter is given a score of 0. For both the affordability and busway alignment screening factors, the remaining options are given a score between 1 and 5, with 1 given to

options that are considered least to meet the screening factors, and 5 given to options which mostly meet the screening factors.

Once scored, the options are 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 provided in Table 4 below.

Table 4 Long list second filter

Long List Assessment: 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

3.1.2 Assessment of Long List Options

Table 5 below provides an overview of the long list of options assessed against the above screening factors and identifies the options to be progressed to the short list.

Table 5 EB3 Long List Options

Option No.	Proposed Option	Progress
	EB3 Residential	
Option 0	**Specimen Design** Centre-running busway on Ti Rakau Drive. Separated bi-directional cycle facilities on northern verge, with shared use path on southern verge. Station platforms provided on departure side of intersections. Construction of busway requires widening both sides of Ti Rakau Drive. Provides for multi-modal transport outcomes. Not affordable due to impact on major utilities and stormwater drainage requirements. Additional costs for online traffic management during construction and elongated programme duration. Residual residential land provides opportunities for urban integration and growth. Not progressed due to affordability.	No
Option 1	**Busway at rear of residential land** Offline busway along the back of the residential properties on southern side of Ti Rakau Drive, with stations placed at the rear of the properties. Complete separation to Ti Rakau Drive. On road uni-directional cycling facilities provided on the existing road by removing parking. All construction offline. Provides for multi-modal transport outcomes. Offline construction through largely Council-owned residential properties avoids the need to relocate major existing services on Ti Rakau Drive. Minimal space for stacking of cars on side roads at intersection with Ti Rakau Drive. Residual land between two carriageways support development, however not optimal from an urban integration perspective. Number of properties would need to have alternate access created through long right of ways or access lanes. Noise wall likely required to mitigate effects on adjacent residential properties. Retaining wall may be required due to topography - to be investigated. Future redeveloped front row properties would have access directly to Ti Rakau Drive which may be more attractive for development. Option taken forward for further investigation and refinement.	Yes
Option 2	**Busway at front of residential land** Offline busway along the front of the residential properties on the southern side of Ti Rakau Drive. with two stations along the alignment. Complete separation to Ti Rakau Drive. On road uni-directional cycling facilities provided on the existing road by removing parking. All constriction offline	No

	Provides for multi-modal transport outcomes. Offline construction through largely Council-owned residential properties avoids the need to relocate major existing services on Ti Rakau Drive and therefore reduces construction costs. All adjoining side roads would require signalised intersections to provide for safe traffic operations. This would have significant impact on bus reliability. All properties would require right of way or access lane to the rear of the property with no properties with direct access to Ti Rakau Drive. Option not progressed. No direct property access onto Ti Rakau Drive for future residential properties which may be less attractive for development than other options. Potentially up to approx. 700m long service lanes needed to service remaining residential properties to rear. Requirement for signalised intersections at all side roads would significantly impact reliability of busway.	
Option 3	**Optimised Specimen Design (option 0), with uni-directional cycle lanes on road**. Optimised Specimen Design (Option 0), with uni-directional cycle lanes on road (instead of bi-directional cycle path on northern verge and shared path on southern verge) to reduce construction width. Provides for multi-modal transport outcomes. Residual residential land provides opportunities for urban integration and growth. Marginal reduction in property acquisition compared to other options, therefore insufficient affordability reduction compared to Specimen Design. Potentially reduced safety for cyclists due to degree of separation from general traffic. Option not progressed. Not affordable due to impact on major utilities, stormwater drainage requirements and costs associated with online traffic management during construction and elongated programme duration.	No
Option 4	**Central narrow with eel station** Optimised Specimen Design with narrow general traffic and busway lanes, mid-block station locations with 'eel station' configuration and bi-directional cycle path on northern verge and shared path on southern verge. Provides for multi-modal transport outcomes. Residual residential land provides opportunities for urban integration and growth. Marginal reduction in property acquisition compared to other options. Potentially reduced footprint/ cross-section across corridor. An eel station configuration could be applied as value engineer sub-option, therefore not progressed as a standalone option. Option not progressed. Not affordable due to impact on major utilities and stormwater drainage requirements and costs associated with online traffic management during construction and elongated programme duration.	No
Option 5	**Busway on Local Roads on northern side of Ti Rakau Drive** Busway and cycle facilities through local streets on northern side of Ti Rakau Drive. Doesn't provide for multi-modal transport outcomes. Busway alignment traverses challenging topography and would require significant property acquisition and associated costs to provide for reliable busway system. Existing local road cross-sections are narrow, therefore substantial property impact. Does not make use of properties already acquired on Ti Rakau Drive. Option not progressed due to impact on local properties, poor quality busway alignment, unreliable travel times for buses, severance of community and costs. Option doesn't meet project objectives.	No
Option 6	**Central running busway on westbound lanes and widen for westbound general traffic** Existing eastbound general traffic lanes remain untouched with existing westbound carriageway converted to busway and two stations provided. New westbound general traffic lanes are constructed to the southern side of the existing verge. Unidirectional cycle facilities provided on-road in each direction. Provides for multi-modal transport outcomes. Provides a legible busway system that is visible to customers. Offline construction through largely Council-owned residential properties avoids the need to relocate major existing services on Ti Rakau Drive, therefore reducing costs substantially. Residual land supports redevelopment. Future redeveloped front row properties would have access directly to Ti Rakau Drive which may be more attractive for development. Utilises properties already	Yes

	acquired for the project. Reduced traffic management for offline construction resulting in faster and lower construction costs. Use of existing eastbound pavements reduces construction costs. Cycle facilities can be provided to a standard observed elsewhere on the network. Option could be optimised with cycle facilities on one side dual-directional, with walking facilities on the northern verge of Ti Rakau Drive. Option taken forward for further investigation and refinement.	
Option 7	**Central running cycleway** Variant on Option 6, putting cycleway between central running busway and general traffic lanes. Provides for multi-modal transport outcomes. Provides a busway system that is visible to customers. Offline construction through largely Council-owned residential properties avoids the need to relocate major existing services on Ti Rakau Drive, therefore reducing costs substantially. Residual land supports redevelopment. Future redeveloped front row properties would have access directly to Ti Rakau Drive which may be more attractive for development. Depth of residual land to be checked to confirm suitability for development. Utilises properties already acquired for the project. Reduced traffic management for offline construction resulting in faster and lower construction costs. Dual-directional cycle facility between general traffic and busway considered to be unsafe. Access to and from the cycle facility along its length is challenging due to requirement to provide access across general traffic lanes / busway. This generates potential safety issues for active mode users and potential unreliability for busway due to additional crossings. Commuter cyclists using facility for entire length may have a direct journey, however due to access issues this facility may not be suitable for all ages and abilities. Not progressed due to safety concerns around position of cycleway. Access to and from the cycleway would be challenging.	No
Option 8	**Remove bus station at Edgewater** Specimen design with no station at Edgewater Drive or one combined centrally located station. Provides for multi-modal transport outcomes. Removing a station will have reduced catchment coverage for customers. Station location not as convenient for school students. Not affordable due to impact on major utilities and stormwater drainage requirements. Additional costs for online traffic management during construction and elongated programme duration. Residual residential land provides opportunities for urban integration and growth. Minor improvement in affordability compared to Specimen Design due to removing one station. Potential to be incorporated in other options as part of VE. Not progressed due to reduced catchment coverage and affordability. Not affordable due to impact upon major utilities and stormwater drainage requirements	No
Option 9	**Tidal Flow (Dynamic Lane Management)** Constructing as few as five traffic lanes and altering the direction and purpose to suit peak demand. Challenging from traffic operations perspective due to the evenness of flows along Ti Rakau Drive in both directions in AM / PM peaks. In addition to complex turning movements and the need to accommodate turning lanes. Busway alignment would need to be located on either northern or southern side to allow for tidal flow operation for general traffic / freight. If busway is centre-running, four general traffic lanes needed each direction each side of the busway to allow for turning movements. Fixed centre-running station locations cannot be shifted easily. Overall cross-section requirements are greater than Specimen Design with substantial property acquisition required on Ti Rakau Drive. Significant impact on affordability. Likely there is insufficient residual land remaining for redevelopment. Option not progressed due to affordability, impact on properties, traffic operations and safety concerns with tidal operation in a built-up residential area.	No
Option 10	**Cycleway on coastal alignment** Cycle facilities along the coast south of Ti Rakau Drive, adjacent to Pakuranga Creek. Option not progressed. Cycleway is much longer and steeper, and not a direct route. Would be a recreational cycleway and does not serve the project objectives.	No
Option 11	**Busway on Viaduct**	No

	Busway located on elevated structure along centre of Ti Rakau Drive with two elevated bus stations. Provides for multi-modal transport outcomes. Not affordable due to scale of structures required. Potential privacy issues for adjacent residential properties - including northern side due to topography. Potential noise effects on adjacent residential properties - particularly northern side of corridor. Potential CPTED issues with passive surveillance of elevated bus station(s). Location of piers on Ti Rakau Drive for elevation structure would conflict with existing major utilities. Visual impacts of elevated / grade-separated structure at street level / views to structure, in addition to shading and urban design issues. There may be some complexity with obtaining statutory approvals due to potential effects. Not progressed. Option not progressed due to scale of structure required and associated costs, impact of piers for the elevated structure on existing major utilities, concerns related to privacy overlooking residential properties and urban design outcomes.	
Option 12	**Busway offline into Gossamer** Narrow centre-running busway along Ti Rakau Drive like Option 3, with busway diverting into Gossamer Drive and along the rear of the reserve (Soccer Fields), turning eastbound to head toward Botany. Assumes a new bridge over Pakuranga Creek approximately 150 north of existing bridge. Provides for multi-modal transport outcomes. Residual residential land provides opportunities for urban integration and growth. Increased property acquisition costs associated with busway alignment along Gossamer Drive and reserve, therefore insufficient affordability reduction compared to Specimen Design. Impact on playing fields potentially reduces number of fields. Potentially reduced safety for cyclists due to degree of separation from general traffic. New bridge closer to residents may be a challenge. Option not progressed due to property impact on reserve land and / or residential properties along Gossamer Drive, increased property costs, impacts on utilities and associated costs and affordability.	No
Option 13	**Bi-directional cycle facility on one side of the corridor only** Bi-directional cycle facility and footpath on one side of the corridor, with a footpath only on the opposite side. Option not progressed. However, component can be used with any busway option.	No
Option 14	**Scheme Design** Centre-running busway on Ti Rakau Drive with on-street, separated uni-directional cycle facilities, with raised median. Widens both sides of Ti Rakau Drive. This encompasses the work done prior to 2017, which assessed a range of options and identified a preferred option at the time and was referred as the Scheme Design. Provides for multi-modal transport outcomes. Residual residential land provides opportunities for urban integration and growth. Marginal reduction in property acquisition, therefore insufficient affordability reduction compared to Specimen Design. Potentially reduced safety for cyclists due to degree of separation from general traffic. Option not progressed. Not affordable due to impact on major utilities, stormwater drainage requirements and costs associated with online traffic management during construction and elongated programme duration.	No
EB3 Commercial		
Option 1	**Specimen Design** Centre-running busway on Ti Rakau Drive with off-street, separated bi-directional cycle facilities and footpath on northern verge, with shared use path on southern verge. Station platforms located on departure side of intersections. Construction of busway requires widening both sides of Ti Rakau Drive. Provides for multi-modal transport outcomes. Significant impact on commercial properties on both sides of Ti Rakau Drive. High construction costs associated with online construction and duration. Further refinement through narrowing lanes does not significantly reduce property impact.	No

	Option not progressed. Not affordable due to scale of property acquisition and online construction.	
Option 2	**Narrow Busway** Centre-running busway on Ti Rakau Drive with off-street, separated bi-directional cycle facilities on northern verge, with shared use path on southern verge. Widens both sides of Ti Rakau Drive. A value engineered version of the Specimen Design, which reconfigures bus stations (eel station configuration mid-block) and intersections to reduce width. Provides for multi-modal transport outcomes. Considered to be intuitive and legible for customers. Most direct busway route. Some signals to navigate, however likely managed with priority. Passenger comfort considerations due to eel station configuration chicanes. Eel configuration for station location between Edgewater and Huntington Drive does reduce cross section and associated property impacts and costs; however, the eel configuration does not entirely eliminate property acquisition between Huntington Station and EB4 boundary near to the Howick & Eastern bus depot and Amera Place commercial properties to the south. Further option refinement could include cycling facilities that are uni or bi-directional, or shared use, depending on available space. Widening of Ti Rakau Drive would ideally be limited to one side only. Option taken forward for further investigation and refinement. Option would still require some property acquisitions to accommodate bus stations. Widening of Ti Rakau Drive would ideally be limited to one side only.	Yes
Option 3	**Offline Busway Commercial Buffer and Bus Depot North** Busway alignment to the north of Ti Rakau Drive, between the commercial and residential properties, continuing to the north of Howick and Eastern Bus Depot and joining Ti Rakau Drive east of the Howick and Eastern Depot. Two bus stations are provided one west of Burswood Crescent (western end) and one east of Burswood Crescent (eastern end). No cycling facilities are provided. All construction is offline. Some structures required to cross the CMA and Pakuranga Creek crossings. Improves catchment coverage to the residential areas (Burswood). Removes some intersections for the busway, which is therefore neutral for additional distance / travel time. Slightly less directly busway route. Passenger comfort considerations due to corners on alignment. Potential CPTED matters for station location and visibility to be further considered to improve passive surveillance. Current level of investigation suggests busway can be accommodated within the buffer zone between the commercial and residential properties. Buffer zone is expected to result in significantly lower property acquisition costs due to fewer landowners and due to land not being able to be developed as part of current conditions (covenant). This requires further review as part of the next stage. Effects and consenting requirements for coastal marine areas, open space and proximity to residential activities to be further assessed. Further consideration of cycle facility requirements needed. Option improves affordability as construction offline reduces construction time and costs. Option taken forward for further investigation and refinement.	Yes
Option 4	**Offline Residential and Bus Depot North** Busway alignment to the north of Ti Rakau Drive, within residential properties and avoiding commercial properties, continuing to the north of Howick and Eastern Bus Depot, and joining Ti Rakau Drive east of the Howick and Eastern Depot. Two bus stations are provided one west of Burswood Crescent (western end) and one east of Burswood Crescent (eastern end). No cycling facilities are provided. All construction is offline. Some structures required to cross the CMA and Creek crossings. Improves catchment coverage to the residential areas (Burswood). Removes some intersections for the busway, which is therefore neutral for additional distance / travel time. Slightly less directly busway route. Passenger comfort considerations due to corners on alignment. Potential CPTED matters for station location and visibility to be further considered to improve passive surveillance. Impacts onto 34 residential properties. This requires further review as part of the next stage. Effects and consenting requirements for coastal marine areas, open space and proximity to residential activities to be further assessed. Further consideration of cycle facility requirements needed. All construction is offline. Some structures required to cross the CMA and Pakuranga Creek crossings. Option not progressed, however considered as part of value engineering for Option 3.	No
Option 5	**Specimen Design with Online Widening North**	No

	Centre-running busway on Ti Rakau Drive with off-street, separated bi-directional cycle facilities and footpath on northern verge, with shared use path on southern verge. Two stations provided near Burswood Crescent (west) and Huntington Drive. Station platforms located on departure side of intersections. Widens from the existing southern kerb line only. Properties impacted to the north of Ti Rakau Drive. Construction largely online. Provides for multi-modal transport outcomes. Increased property impact to north of Ti Rakau Drive including to buildings. Not affordable due to scale of property acquisition on commercial properties, particularly a significant impact on the Howick & Eastern Bus Depot and properties on Harris Road junction. Not progressed. Option not progressed due to increased property impacts, not affordable due to scale of property acquisition and significant impact upon Howick and Eastern Bus Depot and Transpower infrastructure.	
Option 6	**Specimen Design with Online Widening South** Centre-running busway on Ti Rakau Drive with off-street, separated bi-directional cycle facilities and footpath on northern verge, with shared use path on southern verge. Two stations provided near Burswood Crescent (west) and Huntington Drive. Station platforms located on departure side of intersections. Widens from the existing northern kerb line only. Properties impacted to the south of Ti Rakau Drive. Construction largely online. Provides for multi-modal transport outcomes. Increased property impact to south of Ti Rakau Drive. Not affordable due to scale of property acquisition on commercial properties, particularly a significant impact on Amera Place commercial properties and Harris Road junction. Option not progressed due to increased property impacts, not affordable due to scale of property acquisition and significant impact on Amera Place commercial properties and Harris Road Junction.	No
Option 7	**Viaduct** Busway located on elevated structure along centre of Ti Rakau Drive. Dedicated bi-directional cycle facilities and footpath provided on northern side of Ti Rakau Drive with shared path on southern side. Two stations provided, one elevated near Burswood Crescent and the other on ground near Huntington Drive. Provides for multi-modal transport outcomes. Not affordable due to scale of property acquisition on commercial properties and other properties. Potential CPTED issues with passive surveillance of elevated bus station. Affordability of structure. As cross-section cannot be narrowed enough to eliminate property costs on Ti Rakau Drive affordability remains an issue. Visual impacts of elevated / grade-separated structure at street level / views to structure, in addition to shading and urban design issues. There may be some complexity with obtaining statutory approvals due to potential effects. Option not progressed due to affordability associated with scale of property acquisitions required, construction cost of viaduct and visual effects. In addition, it was considered it may have complex statutory approvals.	No
Option 8	**Narrow with Offline Bus Depot North** Narrow centre-running busway on Ti Rakau Drive between Burswood Crescent and Greenmount Drive (Option 2 cross-section) with off-street, separated bi-directional cycle facilities and footpath on northern verge, with shared use path on southern verge. Widens both sides of Ti Rakau Drive. Offline busway north of Howick & Eastern Bus Depot. This option acknowledges the particular pinch point adjacent to the Bus Depot, where land purchase would be complex. For this short length the busway only would be relocated north. Provides for multi-modal transport outcomes. Considered to be intuitive and legible for customers. Slightly less direct busway route. Passenger comfort considerations due to corners on alignment. Narrow Ti Rakau cross-section and eel configuration for station location between Burswood Crescent and Huntington Drive does reduce cross section and associated property impacts and costs. For the section of busway offline north of the depot, due to topography, there would be increased amounts of earthworks and/or new structures required, which may present an affordability challenge. However, offline alignment reduces construction costs (utilities, programme, and traffic management). Alignment needs to be refined to minimise / avoid impacts on Howick & Eastern bus	No

	depot at the rear and proposed electric charging facilities, should parts of this option be progressed. Impact on open space reserves and waterways (bridged). Overall, not progressed due to affordability, however this option is a hybrid of Options 2 and 3 and will be considered further as part of those short-listed options.	
Option 9	**Split Direction Bus Lanes** Variant off-line busway entails relocating just the eastbound busway lane to the north of the commercial properties, whilst the westbound busway lane would remain centre-running on Ti Rakau Drive. Cycle facilities assumed to be located on Ti Rakau Drive. Two bus stations provided one west of split at western end and one east of split at eastern end. Due to a median required on each side of the online westbound busway lane, the decrease in cross section is limited to ~3.5m, therefore still impacts property on Ti Rakau Drive, while resulting in additional property costs for the offline eastbound busway to the north behind commercial properties. Effects and consenting requirements for coastal marine areas, open space and proximity to residential activities to be further assessed. The separation of the two directions of busway does not provide a legible system for patrons. Combination of construction online and offline considered disruptive to larger group of people. Option not progressed due to width of median on each side of westbound bus lane, still impacting property along Ti Rakau Drive whilst resulting in additional property cost for the offline eastbound bus lane. Separation of bus lanes does not provide legible system for patrons.	No
Option 10	**Tidal Flow** Constructing as few as five traffic lanes and altering the direction and purpose to suit peak demand with centre running busway. Two bus stations provided. Construction online. Challenging from traffic operations perspective due to the evenness of flows along Ti Rakau Drive in both directions in AM / PM peaks. In addition to complex turning movements and the need to accommodate turning lanes. Busway alignment would need to be located on either northern or southern side to allow for tidal flow operation for general traffic / freight. If busway is centre-running, four general traffic lanes needed each direction either side of the busway to allow for turning movements. Fixed centre-running station locations cannot be shifted easily. Overall cross-section requirements are greater than Specimen Design with substantial property acquisition required on Ti Rakau Drive. Significant impact on affordability. Option not progressed due to being challenging from a traffic operation perspective due to even flow along Ti Rakau Drive at peak times, significant impact upon affordability due to property acquisition requirements and safety grounds.	No
Option 11	**Specimen Design with Offline Cycleway** Centre-running busway on Ti Rakau Drive with bi-directional cycleway in northern buffer zone between commercial and residential properties. Provides for multi-modal transport outcomes. Significant impact on commercial properties on both sides of Ti Rakau Drive as well as through buffer zone properties between commercial and residential properties. High construction costs associated with online construction and duration. Further refinement through narrowing lanes does not significantly reduce property impact. Option not progressed as not considered to contribute sufficiently to affordability.	No
Option 12	**Scheme Design** Centre-running busway on Ti Rakau Drive with on-street, separated uni-directional cycle facilities, with raised median. Widens both sides of Ti Rakau Drive. This encompasses the work done prior to 2017, which assessed a range of options and identified a preferred option at the time and was referred as the Scheme Design. Provides for multi-modal transport outcomes. Residual residential land provides opportunities for urban integration and growth. Marginal reduction in property acquisition, therefore insufficient affordability reduction compared to Specimen Design. Potentially reduced safety for cyclists due to degree of separation from general traffic.	No

	Option not progressed. Not affordable due to impact on major utilities, stormwater drainage requirements and costs associated with online traffic management during construction and elongated programme duration.	

3.2 Short List Options

As a result of the sifting of the long list options, 4 short list alternative options were identified. Two options have been identified for EB3 Residential and two options identified for EB3 Commercial. Table 6 provides a summary of the EB3 Residential alternative options and Table 7 provides a summary of the EB3 Commercial alternative options.

Table 6 EB3 Residential Options

EB 3 Residential		
Components	**Online**	**Offline**
Busway	• Centre running busway along Ti Rakau Dr • Stations at Edgewater Dr and Gossamer Dr	• Offline busway set back approx. 30m for southern side of Ti Rakau Dr • Offline stations near Edgewater Dr and Gossamer Dr
Walking and Cycling	• Unidirectional (2m) cycleways • Pedestrian crossings on all approaches to signalised intersections	• Unidirectional (2m) cycleways • Signalised intersections remain unchanged • Additional signalised crossings at bus stations
Safety	• 50km/h posted speed for Ti Rakau Dr • 50km/h posted speed for busway (30km/h at stations) • Side road become left in/out • Raised tables on side roads	• 60km/h posted speed for Ti Rakau Dr • 50km/h posted speed for busway (30km/h at stations) • Signalisation of side road/busway intersections (may be linked to Ti Rakau Dr intersections (if signalised))
Residual land	• Residual land may be developed later	• Residual land may be developed later

Table 7 EB3 Commercial Options

EB3 Commercial		
Components	**Online**	**Offline**
Busway	• Centre running busway along Ti Rakau Dr • Stations near Trugood Dr and Burswood Dr	• Offline busway behind commercial area • Offline stations behind commercial area and in Burswood Esplanade Reserve
Walking and Cycling	• Unidirectional (1.5m) cycleways with possibility for wider passing bays • Pedestrian crossings on all approaches to signalised intersections	• Unidirectional (1.5m) cycleways with possibility for wider passing bays • Pedestrian crossings on all approaches to signalised intersections
Safety	• 50km/h posted speed for Ti Rakau Dr • 50km/h posted speed for busway (30km/h at stations) • Signalisation and crossing improvements at intersections	• 60km/h posted speed for Ti Rakau Dr • 50km/h posted speed for busway (30km/h at stations) • Signalisation of side road/busway intersections

4 Proposed Scheme Options for Assessment

The assessment of alternatives has considered two different options for EB3 Residential and EB3 Commercial respectively. The assessment did not consider the bridge crossing of Pakuranga Creek. The analysis to determine the preferred bridge option to cross the Pakuranga Creek is addressed in the Ti Rakau Drive Bridge Options Assessment report.

Table 8 EB3 alignment options

EB3 Residential Section		EB3 Commercial Section	
OPTION 1 **Online Option**	**OPTION 2** **Offline Option**	**OPTION 3** **Online Option**	**OPTION 4** **Offline Option**
Busway running along centre of Ti Rakau Drive	Busway positioned around 25m to the south of Ti Rakau Drive	Busway running along centre of Ti Rakau Drive	Busway positioned north of Ti Rakau Drive, located behind commercial properties and the Howick and Eastern Bus Depot.

The preferred scheme will be a combination of the preferred option for EB3 Residential and the preferred option for EB3 Commercial.

Below is a brief outline of the four alternative options, two for EB3R and two for EB3C that have been assessed.

4.1 EB3 Residential Section (west of Pakuranga Creek)

Between Mattson Road and Pakuranga Creek, Ti Rakau Drive is surrounded by residential land use, generally formed by detached dwellings. Small sections of commercial and community activity are provided and generally provides local services to the immediate neighbourhood.

4.1.1 Online Option

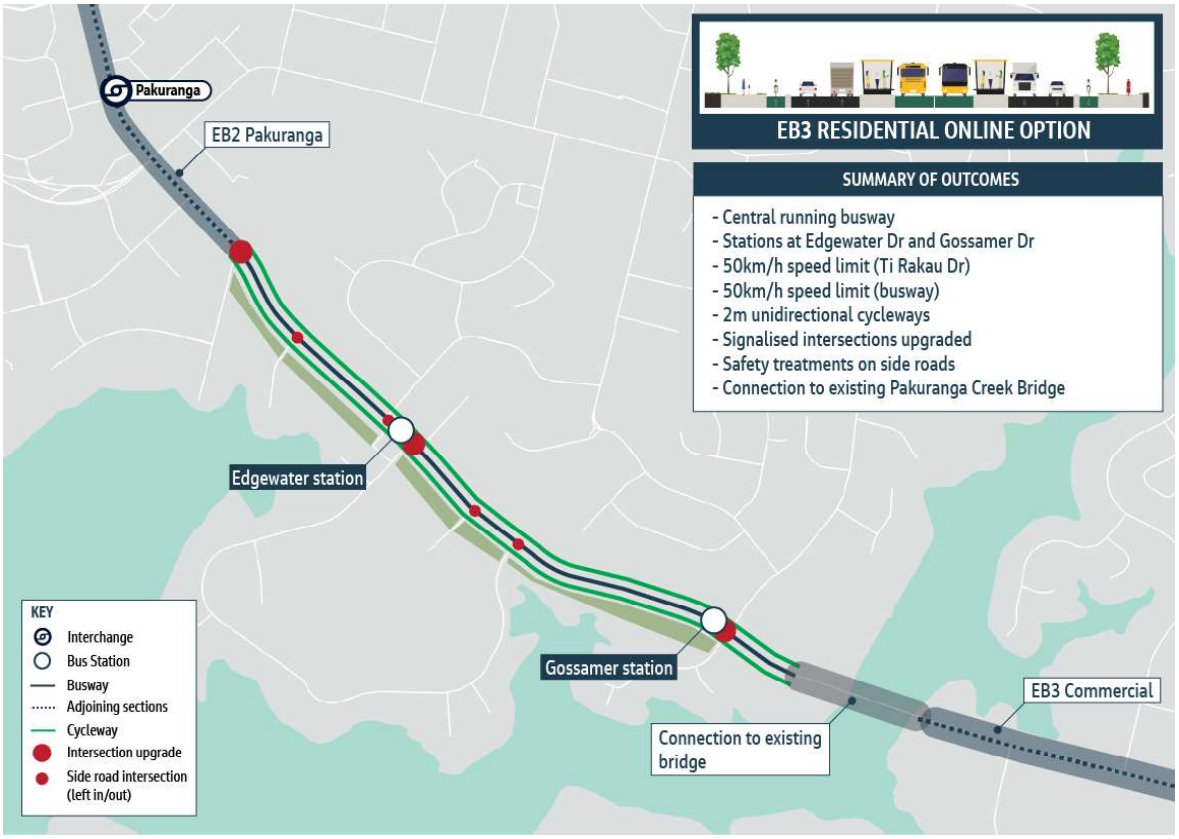


Figure 3 Residential Online Option

Between SEART/Ti Rakau Drive intersection and Pakuranga Creek, the busway would be an at grade central running busway. The busway would occupy the position of the existing westbound traffic lanes, with new traffic lanes provided directly to the south of the existing roadway. For more details of proposed alignment of the EB3 Residential Online Option refer Appendix 2.

To accommodate the wider road corridor, the existing properties to the south will be removed. Auckland Council owns all of the properties that are required to support this alignment option, with the exception of three property frontages and vehicle accesses that are required for this option which had not been acquired at the time of writing.

4.1.2 Offline Option

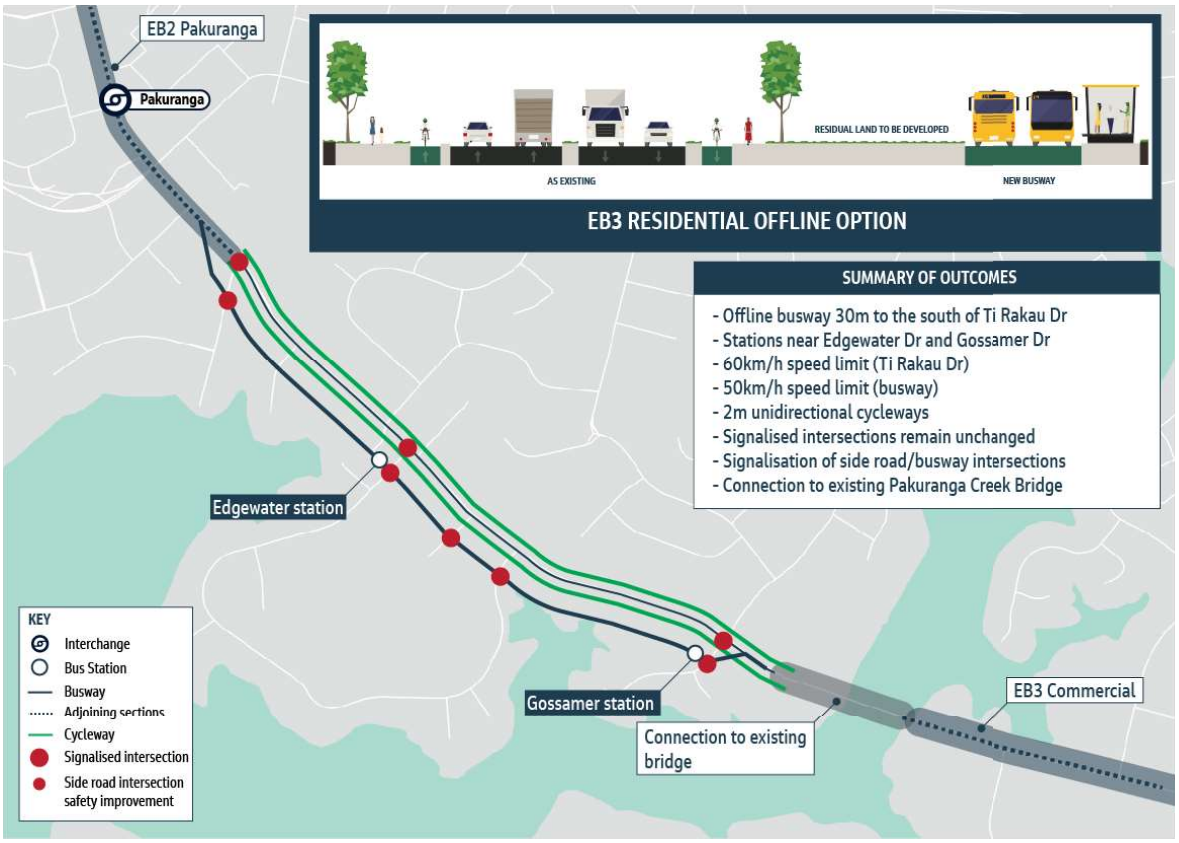


Figure 4 Residential Offline Option

Between SEART/Ti Rakau Drive intersection and Pakuranga Creek, the busway would be at grade, positioned around 35m to the south of Ti Rakau Drive, resulting in an area of residual land between the existing roadway and the busway. It is assumed that the residual land can be redeveloped for residential use. For more details of the proposed alignment of the EB3 Commercial Online Option refer Appendix 2

To accommodate the offline option, the existing properties to the south will be removed. Auckland Council currently own most of the properties that are required to support this alignment option, with the exception of the three property frontages referred to above.

4.2 EB3 Commercial Section (East of Pakuranga Creek)

Between Pakuranga Creek and Huntington Drive the land use is mainly commercial (zoned Light Industrial, with some of the properties being within the Identified Growth Corridor Overlay by the Auckland Unitary Plan). Towards the eastern end, the adjacent land use becomes more mixed and includes reserved land, residential properties and a bus depot.

4.2.1 Online Option

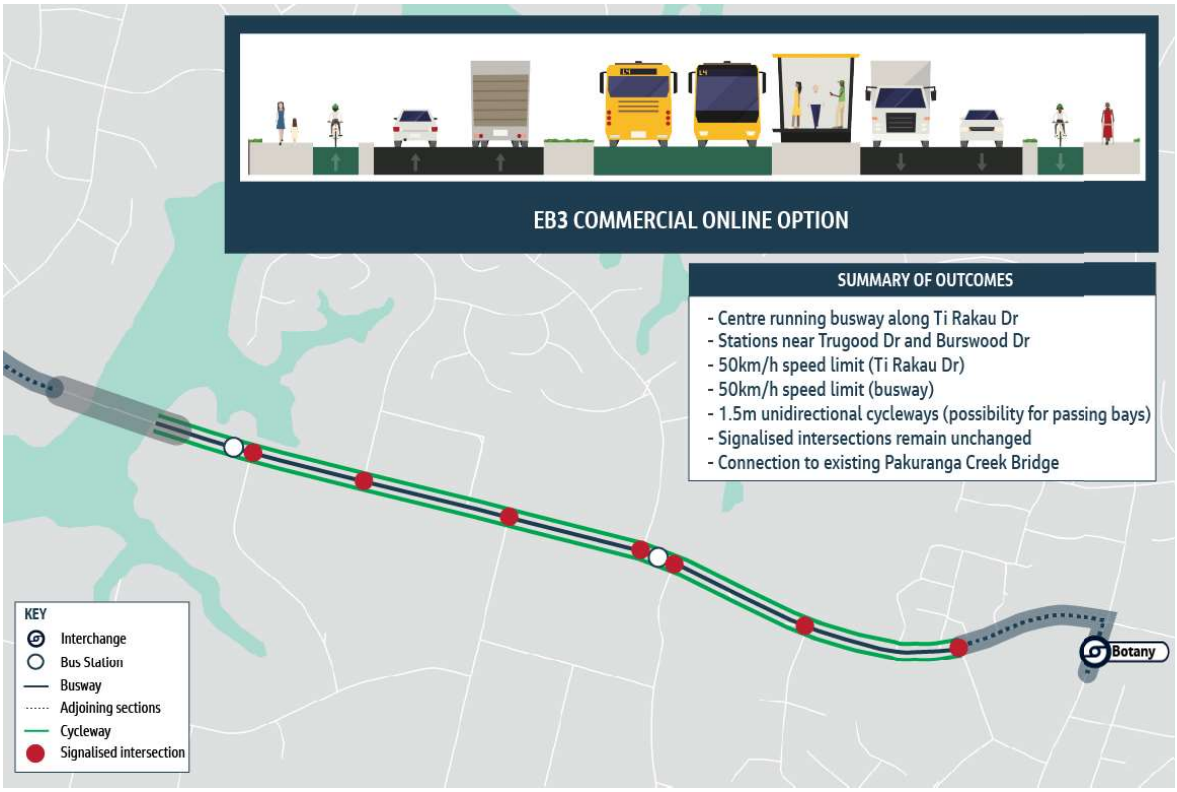


Figure 5 Commercial Online Option

The busway would be an at grade central running busway along Ti Rakau Drive. Like the residential section, the busway would occupy the existing westbound traffic lanes, with new traffic lanes provided immediately to the south of the existing roadway. For more details of the proposed alignment of the EB3 Commercial Online Option refer Appendix 2

To accommodate the wider road corridor, property acquisition would be required from land located on the southern side of Ti Rakau Drive. In most instances only partial takes of the properties to the south would be needed for the wider road corridor.

4.2.2 Offline Option

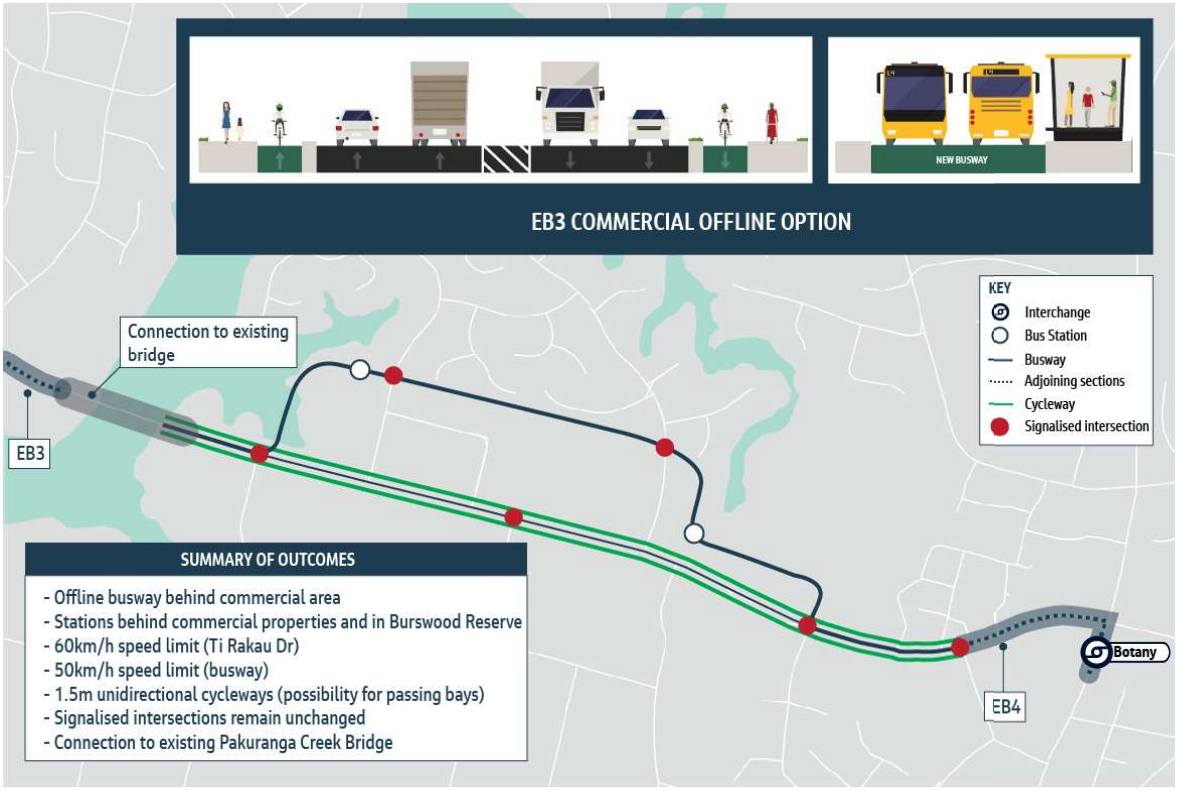


Figure 6 Commercial Offline Option

The busway would be located to the north of Ti Rakau Drive, behind the existing commercial development, but to the south of the Burswood residential area. Going west to east (from Pakuranga Creek to Huntington Drive), the busway alignment would depart from Ti Rakau Drive at the intersection with Trugood Drive, crossing the Coastal Marine Area on a bridge structure.

The busway would be routed behind the Chinatown property, running east across Burswood Place (west end), then being positioned behind the commercial properties that front onto Torrens Road. The busway would follow this alignment and then cross Burswood Drive (east end) and enter Burswood Esplanade Reserve.

The busway would continue to traverse Burswood Esplanade Reserve, running directly behind the Howick and Eastern bus depot and re-join Ti Rakau Drive at the intersection with Huntington Drive. The busway would then continue along the centre of Ti Rakau Drive toward Botany. For more details of the proposed alignment of the EB3 Commercial Offline Option refer Appendix 2.

5 Options Evaluation

5.1 MCA Overview

The purpose of an MCA is to provide a structured, consistent and systematic process for assessing each option. This tool is aligned to Project objectives and RMA requirements, providing evidence of structured option analysis, and maintaining consistency with other option assessment processes previously undertaken for the project. The outputs of the MCA assist the decision maker to understand relevant considerations when making a decision on the preferred option.

5.2 MCA Framework and Scoring Adopted

The MCA Framework for this assessment was adopted from previous MCAs undertaken for EB3, to ensure consistency in approach. The criteria were carried over from previous assessments. The completed MCA framework (in the form of an excel spreadsheet) identifying criteria, measures and information sources are provided in Appendix 3.

The performance of the options against the MCA criteria was scored, without weighting, using a 11-point scale as outlined in Table 9 below. A workshop was held with all evaluators to fully explore the options to ensure that evaluators' assessments were based on consistent and commonly understood information. The scoring was confirmed after the MCA workshop, ensuring scores were based on a common understanding of the options.

The assessments were not comparative to the previous and preferred options, rather the effects of the options were considered against the existing environment. In this case the existing environment also assumed that EB1 has been implemented.

Table 9 Scoring criteria

Score	Description/ indicators for assessment
-5 Very High Adverse Effect	**National or Greater**: Will have adverse effect on a nationally significant resource/ or may be experienced by a national scale audience; *and/or* May have a substantial/ complete effect (destruction) on the feature/ resource/ community identified; *and/or* **Long Term/ Permanent =** 20+ years.
-4 High Adverse Effect	**Regional**: Will have adverse effects on a regionally significant resource or may be experienced by a regional or wider audience; *and/or* May have a high extent of impact on features/ resource/ community identified; *and/or* **Long Term/ Permanent** = 10 -20+ years.
-3 Moderate Adverse Effect	**Local Area Level Impact**: Will have adverse effects on a locally significant resource (e.g. significant within an ecological district or within a catchment) or may impact on a local board community/ geographic scale; *and/or* May have a moderate extent of impact on the feature/ resource/ community identified; *and/or* **Medium term** = 5 -10 years
-2 Low Adverse Effect	**Local Area/ or Individual Level Impact**: Will have adverse effects on a locally prevalent resource (e.g. site specific significant within an ecological district but only local effect or within a catchment) or may impact on a local board community/ geographic scale; *and/or* May have some extent of impact on the feature/ resource/ community identified;

	and/or **Short term** = 1 -5 years
-1 **Very Low Adverse Effect**	**Individual level impact**: Will have adverse effects on resources not otherwise identified for their values or with otherwise innominate value or may impact a limited number of households (i.e. 20 households/ 50 people); *and/or* May have a low extent of impact on the feature/ resource/ community identified; *and/or* **Very Short Term =** <1 year.
0 **Neutral Effect**	Negligible effects from current situation/ natural
+1 **Very Low Positive Effect**	**Individual level benefit**: Benefits will be experienced for resources not otherwise identified for their values or with otherwise innominate value. Benefits may be experienced by a limited number of households (i.e. 20 households/ 50 people); *and/or* May have a very limited and confined extent of benefits on the feature/ resource/ community identified; *and/or* **Very Short Term** = < 1 year.
+2 **Low Positive Effect**	**Local level Benefits (2):** Benefits will be experienced by defined local environment or sub-catchment. Benefits may be on Census Area Unit or experienced by a limited number of households (i.e. 20-50 people); *and/or* May have a low extent of benefits on the feature/ resource/ community identified; *and/or* **Short Term** = 1-5 years.
+3 **Moderate Positive Effect**	**Local Level Benefits (1)**: Benefits will be experienced for values of an ecological district or within a catchment, or at a local board community/ geographic scale; And/or May have some extent of benefits on the feature/ resource/ community identified; And/or **Medium Term** = 5-10 years.
+4 **High Positive Effect**	**Regional Benefits**: Benefits will be experienced for a sub-regionally significant resource/ experienced by a sub-regional audience; *and/or* May have a high extent of benefits on the feature/ resource/ community identified (and confident of benefits being realised); *and/or* **Long Term Permanent** = 10-20+ years
+5 **Very High Positive Effect**	**Regional or Greater Benefit**: Benefits will be experienced by a whole region or across regions (including national) or may be to a regionally or nationally significant resource; *and/or* May have substantial benefits on features/ resources/ community identified. High degree of confidence of benefits being realised; *and/ or* **Long Term/ Permanent =** 20+ years.

A positive score indicated an opportunity for improvement to the existing environment, and a negative score indicated a worsening of the existing environment. Any 'very high adverse effect' (-5) in relation to key considerations was considered a fatal flaw, in which case the option would not progress as an alternative option. None of the options were considered to have a fatal flaw.

The technical specialists were provided a score sheet ensuring their rationale and assumptions made ensuring the assessment were captured. This was to ensure transparency and consistency of scoring. The scoring sheets from each specialist is provided in Appendix 3 of this report.

5.3 Briefing technical specialists

A briefing session was held on 17 December 2020 for technical specialists to provide an overview of the alternative options and the MCA process. A guidance pack was issued to technical specialists on 19 January 2021.

5.4 MCA Workshop

The workshop was held on 4 February 2021. The purpose of the workshop was to:

- Allow specialists to ask questions of the project team about the alternative options;
- Allow each specialist to present their individual assessments and preliminary scores;
- Allow for specialists to be asked questions by the wider team, test assumptions and issues discussed and clarified; and
- Provide an open and transparent discussion for specialists to base their scores on.

A list of workshop attendees and their assessments have been included in Appendix 3.

6 Evaluation of Options

Table 10 below provides an overview of the process undertaken to evaluate and analyse the alternative options for EB3.

Table 10 Overview of evaluation process

Date	Activity
17 December 2020	Technical assessors briefing session held to provide overview of the alternative options and to familiarise themselves with the Project. Session also provided the technical assessors opportunity to ask questions directly to the design team.
19 January 2021	A pre workshop briefing pack was issued to all technical asessors. The briefing pack included information on the options being considered, guidance criteria for assessment and scoring framework based on the 11-point scale. The pack included scoring sheets for the technical assessors.
2 February 2021	Technical assessors provided pre-workshop comments and scores (in draft form). The responses provided was based on the information previously provided to the technical specialists, each providing an analysis using their professional knowledge and any appropriate guidance. Each technical assessor provided a score for each option based on 'no mitigation' and 'with mitigation'.
4 February 2021	On site and Online MCA Workshop was held. Each technical assessor provided an overview of their assessment for each option. Each technical assessor outlined key assumptions used to undertake the assessment and any specific mitigation that is assumed in their assessment.
Post workshop	Following the workshop each assessor was provided with the opportunity to review their preliminary comments and scoring and make any changes they consider appropriate. All updated assessments and scoring were relied on to inform subsequent identification of the preferred option.

The following sections outline the scoring provided to each alternative option as well as the assessment provided by the technical assessors on a topic-by-topic basis.

6.1 Scoring of alternative options

The technical assessors assessed each option, providing a score, based on the scale provided in Table 9. A visual overview of the scores provided for each option is presented in Table 11. The scores shown are based on mitigation being provided to each option.

Table 11 EB3 Assessment Scores

EB3 Scoring Sheet (4 Feb 2021)				
Area of Expertise	OPTION 1	OPTION 2	OPTION 3	OPTION 4
	RES ONLINE	RES OFFLINE	COM ONLINE	COM OFFLINE
Constructability	-2	-1	-1	-2
Impact upon utilities	0	0	0	0
Acoustics	-1	-2	0	-2
Air Quality	0	0	0	-3
Property	-1	-2	-4	-2
Marine Ecology	-1	-1	-2	-2
Freshwater and Terrestrial	0	0	-2	-3
Urban Design	2	-2	2	-1
Landscape and Visual	0	-1	0	-2
Social Impact	2	1	2	1
Traffic and Transport (temp. effects)	-3	-2	-2	-1
Traffic and Transport (permanent effects)	4	3	3	4
Planning, consenting and legislation	4	3	4	0
Business Case/ Project Objectives	3	3	3	3

Assessment information is provided in the MCA framework attached in Appendix 3.

6.2 Assessment of alternative options

As part of providing a score for each option, the technical assessors provided a high-level assessment, outlining the reason for the scores provided. A copy of the scoring sheets, including the written comments can be found in Appendix 3.

6.2.1 Performance against Project Objectives

Residential Online (3)	Residential Offline (3)	Commercial Online (3)	Commercial Offline (3)

The alternative options have been considered against the project objectives (as outlined in section 2.2 above).

For the residential section, both options contribute strongly to the project objectives, . Overall, the Online option is judged to perform marginally better for transport reliability, transport safety and transport and land use integration (urban form).

For the commercial section, again both options contribute strongly to the project objectives, compared to the current state (do minimum). The differences between the options, although relatively minor, are more pronounced than for the residential section. The offline option provides better accessibility to the residential/walk up catchment at Burswood.

From a transport and land use integration (urban form) perspective the offline option impacts on the residential area to the east (reduced amenity), whereas the online option impacts on the commercial

area (loss of parking). From a transport perspective, the offline option performs slightly better, with a slightly longer journey time but with improved reliability and safety.

6.2.2 Legislative (RMA) and Consenting Considerations

Residential Online (4)	Residential Offline (3)	Commercial Online (4)	Commercial Offline (0)

None of the alternative options were fatally flawed from a legislative (RMA) and consenting perspective. The online residential, offline residential and online commercial options received positive scores, whilst the offline commercial gained a neutral score, with mitigation methods being applied as recommended by the other technical assessors.

The provision of an online busway for both the residential and commercial sections is preferred from a legislative perspective as the environmental effects will remain within or similar to the existing road corridor. The offline options are considered to generate new adverse effects beyond Ti Rakau Drive.

The offline commercial option would likely generate a greater level of adverse effect than the online option, and as such will require a higher level of environmental mitigation to enable the option to gain consent. This option interacts with the CMA, Open Space that is identified within the Auckland Unitary Plan and wetlands/watercourses that are recognised and afforded a level of protection in the National Policy Statement for Freshwater Management (NPS-FM).

Overall, it is considered that all the options are feasible, however more mitigation would be required to enable to the offline commercial option to gain consent compared to the online commercial option.

6.2.3 Constructability

Residential Online (-2)	Residential Offline (-1)	Commercial Online (-1)	Commercial Offline (-2)

The constructability assessment considered a range of factors, including resourcing, access, programme implications, Environmental and traffic management.

From a programme perspective, the offline options are considered to have a reduced construction period. The offline residential option reduces the construction period by 3 months, with the offline commercial option reducing the construction period by 6 months.

The Commercial Offline option was considered to have more negative environmental impacts than the Commercial Online option given the works required in the CMA and Burswood Reserve to construct bridges and retaining structures within marine and fresh water environments. The Commercial Offline option was also scored more negatively than the Online option given that the ground conditions within the CMA and Burswood Reserve are unknown compared to the known ground conditions of Ti Rakau Drive associated with the Commercial Online Option.

Another advantage of the offline options are that they reduced the need for complex traffic management arrangements along Ti Rakau Drive, as well as providing a safer working environment for onsite staff. The offline options also reduce the need for re-location of local utility services that current sit within the footpath/berm of Ti Rakau Drive.

6.2.4 Transportation Effects – Temporary

Residential Online (-3)	Residential Offline (-2)	Commercial Online (-2)	Commercial Offline (-1)

The construction of the busway will result in (temporary) adverse transportation effects. All options will generate adverse construction traffic effects; however, the implementation of Traffic Management and other construction techniques can reduce the effects along the project route.

For the residential section, the offline option is considered to perform better as the construction will generally be away from Ti Rakau Drive. This reduces the need for large scale on road traffic management during construction. It was noted however with the implementation of suitable mitigation, both the online and offline residential option have a similar level of effect upon transportation.

For the commercial section, the offline option is preferred as the effect upon the transport network are reduced compared to the online option. The online option would require traffic management to be implemented and ensure that access is maintained to all business along the alignment. Even with effective traffic management for the online option, the offline options are considered better for the commercial section.

6.2.5 Transport Effects – Permanent

Residential Online (4)	Residential Offline (3)	Commercial Online (3)	Commercial Offline (4)

For the residential section, the permanent transport effects are similar with the difference between the options being considered minor in comparison to the overall positive effect that either option has on the transport system. The key difference between the two options is the interaction between the side roads and Ti Rakau Drive, with the offline option introducing potential safety issues that would require additional traffic signals to mitigate and consequently negatively impact the travel time and reliability of the busway. Consequently, the online option scored more positively.

For the commercial section, it is considered that there is sufficient difference between the options in relation to accessibility, bus reliability and safety. Based on these three areas the offline option is preferred. The offline option provides better accessibility to the busway for the residential area of Burswood Drive, however this is the reverse for people living on Huntington Drive as the bus stations move closer to Burswood and further away from the Huntingdon Drive catchment. Bus travel time and reliability are better due to reduced conflict with general traffic at intersections along Ti Rakau Drive. This is also a benefit for safety.

6.2.6 Marine Ecology

Residential Online (-1)	Residential Offline (-1)	Commercial Online (-2)	Commercial Offline (-2)

For marine ecology, the effects for the residential options are likely to be the same. The effects will relate to the discharge of sediment during construction and the discharge of stormwater once operational. In both circumstances, the discharge is assumed to be treated prior to entering the CMA.

For the commercial section, the effects on marine ecology are more varied between the two options, however they scored the same for different reasons. The offline option would cross the CMA, running from Ti Rakau Drive (at the intersection with Trugood Drive (to the side and rear of China Town at 262 Ti Rakau Drive). It is assumed that the busway would be constructed on a bridge when crossing the CMA,

along the eastern side of Pakuranga Creek. It is considered that this would result in permanent loss of the mangroves and temporary habitat loss and disturbance associated with works in the CMA.

Due to the existing marine ecological values, the overall level of effect is assessed as low for the offline commercial option, and mitigation is not considered necessary.

The online option would have less impact on the CMA but still requires the widening of Ti Rakau Bridge, is built on close proximity to the CMA and the treated discharges of sediment (during construction) and treated discharges of stormwater (operational) has been assumed.

6.2.7 Freshwater and Terrestrial Ecology

Residential Online (0)	Residential Offline (0)	Commercial Online (-2)	Commercial Offline (-3)

The Technical Assessor for Freshwater and Terrestrial Ecology considered the effect the busway options would have on existing vegetation, habitat for wildlife and birds and the impact upon wetlands and freshwater streams.

For the residential section, the options are considered to have a similar effect, both requiring the removal of vegetation. The vegetation is a mixture of exotic and native and is considered to provide low ecological value. Its removal is not considered to have a significant adverse effect; however, removal of vegetation should only be undertaken outside of the bird nesting season. The area affected is a potential habit for lizards and it is recommended that lizard salvage is undertaken prior to construction activities commencing.

Both options for the commercial section are considered to have an adverse effect, due to the interaction with existing freshwater steams and identified wetlands. The level of impact is greater for the offline option, due to its potential to directly affect the location of wetlands in Burswood Esplanade Reserve. The offline alignment results in the busway running across the reserve, likely requiring a bridge structure across the wetlands and streams. The alignment could potentially result in the loss of habitat connectivity within the reserve. This option would need to be carefully designed to reduce the impact of the busway upon the wetlands and will require the consideration of appropriate mitigation.

6.2.8 Built Environment/ Urban Design

Residential Online (2)	Residential Offline (-2)	Commercial Online (2)	Commercial Offline (-1)

The Built Environment and Urban Design assessment considered how the proposed transport infrastructure integrates with existing and proposed land uses to support a quality, compact urban form along the Ti Rakau Drive corridor between Pakuranga and Botany. It was considered a positive that all options would provide a multi-modal transport corridor between Pakuranga and Botany.

For both the residential and commercial sections, the online options are considered to achieve a better built environment/ urban design outcome compared to the offline options. The provision of the online options provides the opportunity for amenity improvements to Ti Rakau Drive. As the offline options divert from Ti Rakau Drive, it is unlikely that amenity improvements would be made to Ti Rakau Drive.

For the residential section, both options result in residual land being available for future development. The online option is considered to achieve better integration of the residual land with adjacent residential properties to the south compared to the offline option, which would place the busway between the residual land and the adjacent residential properties. The online options also enable the

residual land to act as a buffer between Ti Rakau Drive (including the busway) and the residential properties to the south.

For the commercial section, the online option is considered to perform better as it will provide the opportunity for amenity improvements to Ti Rakau Drive and ensures the visibility of the transport corridor/ busway alignment. This option is also considered to integrate well with neighbouring land uses and represents a compact urban form. This option does however result in the introduction of retaining walls along sections of the carriageway.

The offline option for the commercial section does not integrate well with neighbouring land uses and provides limited opportunity for amenity improvements along Ti Rakau Drive. The busway would also be positioned to the rear of residential properties, potentially creating amenity issues for the occupants. The busway would also occupy part of Burswood Esplanade Reserve, resulting in fragmentation of the reserve.

6.2.9 Landscape and Visual Effects

Residential Online (0)	Residential Offline (-1)	Commercial Online (0)	Commercial Offline (-2)

The landscape and visual assessment considered the permanent effects resulting from the proposed options upon visual amenity and activity/use of landscape. For the residential section, the effects are very similar for both options. The main differences are the visual outcome for residential properties to the south, with the offline option generally resulting in greater visual change compared to the online option. With the online option the existing residential properties to the south of Ti Rakau Drive would have a visual outlook onto residential properties. The offline option would result in a visual outlook onto busway infrastructure, such as a noise wall.

The online commercial section is considered to have the less adverse visual effects when compared to the offline option. The viewing audience for the online option are less sensitive to change (being commercial) and would build on the existing landscape character of the area. The online option also provides the opportunity for amenity improvements to the streetscape.

The offline option would introduce new infrastructure for a range of viewing audiences. The most affected would be the residential properties directly to the north of the proposed offline alignment (Burswood residential area). The busway would result in a provision of a noise wall along the rear boundary of the residential properties, altering the outlook and landscape from the properties.

6.2.10 Social Effects

Residential Online (2)	Residential Offline (1)	Commercial Online (2)	Commercial Offline (1)

The social effects assessment considered the impact of the Options on community facilities/ open space, the impact upon viability/ productivity of business land areas and impacts upon social connectivity during construction and once the busway is operational.

During construction, both online options for the residential and commercial sections are considered to have a greater level of social effect compared to the offline options. This is due to the busway being constructed within the existing road corridor, resulting in increased disruption and travel times for uses of Ti Rakau Drive. This would affect people's ability to access community and commercial services within the area.

The offline options are generally considered to have fewer adverse social effects during construction. For the residential section, the construction site would be around 35m to the south of Ti Rakau Drive, resulting in less impact upon users of the road. A similar outcome is achieved for the offline commercial option. Both offline options will likely result in construction related noise being closer to residential properties, compared to the online options. Suitable noise mitigation will be needed during construction.

Once operational, the permanent social effects of the proposed options are overall positive. All options will provide enhanced transport choice within the local area, providing better local and regional connections. The offline residential option is considered to increase severance for north-south connections and would create an additional east-west transport corridor to be navigated. The offline Commercial Option was also assessed as severing the Burswood residential community as well as Burswood Reserve.

It is noted that the online option in the commercial section would result in the loss of front yard areas for properties to the south of Ti Rakau Drive. This may affect the operation of business, as they would lose an area that may be important for their day to day activities (such as customer parking). The offline option would occupy land to the rear of 320 Ti Rakau Drive (which includes Bunnings Warehouse) and part of the Burswood Esplanade Reserve. The occupancy of Burswood Esplanade Reserve reduces the amount of open space available in the local area for informal recreation. The offline option would however provide two bus stations closer to a residential catchment, compared to the online option, provide more travel choice for the local residents of Burswood. The Severance of communities and reserves provided a difference in the coring of the options.

6.2.11 Acoustic Considerations

Residential Online (-1)	Residential Offline (-2)	Commercial Online (0)	Commercial Offline (-2)

All the proposed options would result in an increase in noise and vibration effects upon surrounding receivers. For both the residential and commercial sections the online options for the busway perform better than the offline options once operational.

In the residential section the online option is considered to generate lower noise effect as the busway would be contained within the existing road corridor. The online option does not position the busway closer to residential properties to the south, with the residual land acting as a buffer between existing receivers and Ti Rakau Drive. The offline option for the residential section would position the busway directly adjacent to residential properties to the south, require a noise wall along the boundary to mitigate increase in noise generated from the busway.

For the commercial section, the online busway along the centre of Ti Rakau Drive is not considered to make a significant difference to noise within the area. Due to the corridor being formed from light industry and commercial activities, none of the receivers are considered to be sensitive. The offline commercial option would bring the busway closer to residential properties to the north, requiring the provision of a noise wall to mitigate noise.

During construction of the busway, it is considered that a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented to manage and/or mitigate effects upon receivers.

6.2.12 Property impacts

Residential Online (-1)	Residential Offline (-2)	Commercial Online (-4)	Commercial Offline (-2)

All the proposed options will require full or partial acquisition of property. For the residential section, the online option affects fewer properties, only requiring full or partial acquisition of 34 properties, compared to 40 properties for the residential offline option.

A section of residual land will be available following construction of the busway within the residential section. A greater area of residual land is provided with the online option, providing the opportunity for more development along the busway corridor. A high-level analysis has been undertaken, which shows that around 728 units can be provided for the online option, compared to around 630 units for the offline option. This analysis has assumed that the underlying zoning provided to the land would be consistent with the expectations of the National Policy Statement on Urban Development (NPS UD).

For the commercial section, the offline option affects fewer properties, only requiring full or partial acquisition of 25 properties, compared to 31 for the commercial online option. The properties required for the offline option are mainly residential, which are less complex to acquire than commercial properties because of more complex commercial ownership and tenancy arrangements.

The commercial online option would require the front part of commercial properties along the south side Ti Rakau Drive to be purchased. This is likely to be disruptive to the operation of businesses who currently occupy the commercial properties along Ti Rakau Drive. The offline option would require land to the rear of a number of commercial properties. This is considered to have less of an impact on business operations.

6.2.13 Impact upon Utilities

Residential Online (0)	Residential Offline (0)	Commercial Online (0)	Commercial Offline (0)

All the proposed options for the busway will interact with local and transmission utility services, with the ultimate effect being neutral as services would be maintained.

For local utility services, the online options will require a greater level of utilities being relocation. Most local utility services are located within footpaths/ berms along Ti Rakau Drive. These will need to be relocated to the south and placed within the new footpath/ berm as part of the widening of Ti Rakau Drive to support the central running busway. The offline options reduce the need for local utility services to be relocated as the existing utilities are generally unaffected.

Transmission networks (non-local utilities) would need to be relocated for all proposed options. Transmission networks relate to Watercare infrastructure such as the Hunua No.2 watermain and Transpower's high voltage cable network. Based on the assessment, it is considered that the online options for both the residential and commercial sections would result in a higher level of interaction with the transmission network, potentially requiring relocation of key network assets across the project area. The offline options reduce the level of interaction, reducing the need for relocation of transmission network assets.

With the provision of suitable mitigation, the provision of the busway will not have a permanent adverse effect upon existing utilities.

7 Mana Whenua

The EBA presented the long list of options at the Mana Whenua hui held on the 9th of December 2020. The long list options and differentiators for EB2and EB3 were detailed at this hui.

Comments and discussions of note from this hui included:

- EBA and Mana Whenua will need to develop an appropriate processes and systems including a robust Cultural Monitoring Plan which will outline steps for who / what / when / why / where / how things will be managed during construction.
- Mana Whenua identified that the project should utilise existing infrastructure wherever possible
- Mana Whenua identified the need to plan for safe cultural monitoring early in the construction methodology
- Mana Whenua identified that they want to be involved in stormwater design for the project.

The EBA presented the short list options and the findings from the EB3 MCA workshop to the Mana Whenua hui on the 25th of February 2021. The EB3 Residential online and offline options and the EB3 Commercial online and offline options were presented to mana whenua along with an overview of the MCA criteria and the emerging preferred options.

The Mana Whenua hui identified that the key issue for all options considered is the management of stormwater and the potential impact on water quality in the catchment. The hui noted that further design work is to be undertaken in respect of stormwater management and that this will be a future topic for engagement with Mana Whenua. The hui also identified that there is an opportunity to work with Auckland Council's Healthy Waters to investigate better outcomes for the wider catchment and the community.

The Mana Whenua forum also expressed interest in the future use of residual land and look forward to ongoing engagement with the EBA and Eke Panuku regarding the opportunities for urban reintegration that the project may afford.

The presentations to Mana Whenua hui are attached at Appendix 4.

8 Sensitivity Analysis of Options

Given the similarly of the scores provided for each option, and the differing views between the ALT and IPAB in relation to EB3 Residential, additional sensitivity analysis was undertaken. The sensitivity analysis and the methodology for undertaking this analysis is attached at Appendix 5 and is summarised below.

8.1.1 Sensitivity Analysis methodology

In summary the sensitivity analysis was undertaken by applying weighting to the assessment criteria to consider whether a different outcome would be achieved. The following weighting scenarios have been undertaken:

- Equal weighting
- Transport Benefits weighting
- Environmental weighting
- Effects weighting
- Cost weighting

When undertaking the weighting analysis, 50% weighting was applied to the specific criteria grouping, apart from the equal weighted scenario where all groupings were given equal weighting.

To undertake the sensitivity analysis, the assessment criteria from the MCA has been grouped for the application of weighting. Table 12 below shows how the assessment criteria have been grouped.

Table 12 Groupings of assessment criteria

Criteria groupings for weighted assessment of options	
Grouping	**MCA Criteria**
Transport Benefits	Performance against Business Case Objectives
Environmental	Legislative and Consenting Considerations
	Natural environment/ ecological effects
	Social effects
Effects	Constructability
	Transportation effects
	Built environment
Cost	sCosts- Capital Costs, Operating Costs, Whole of life cots, Present Day Value of Costs

Weighting for the sensitivity analysis was applied based on the groupings.

It should be noted that cost was not originally considered as part of the initial MCA and has been applied to the sensitivity analysis. The cost of an option is a matter that is required to be considered as there is a need to demonstrate the project is affordable and provides benefits are at least commensurate with the expenditure. The costs considered design, construction and property acquisition costs Its inclusion in the sensitivity analysis helps to ensure that the robust process has been undertaken.

8.1.2 EB3 Residential

For EB3 Residential, the Online option performed better in all weighting scenarios undertaken. Table 13 below provides an overview of the outcome.

Table 13 EB3 Residential sensitivity analysis

Weighting Scenarios and sensitivity analysis		
Scenario	Ranked first	Ranked second
Equal	EB3 Residential Online	EB3 Residential Offline
Transport Benefits	EB3 Residential Online	EB3 Residential Offline
Environmental	EB3 Residential Online	EB3 Residential Offline
Effects	EB3 Residential Online	EB3 Residential Offline
Cost	EB3 Residential Online	EB3 Residential Offline
Combined	**EB3 Residential Online**	**EB3 Residential Offline**

The application of weighting based on the different scenarios does not alter the outcome of the MCA.

8.1.3 EB3 Commercial

When weighting is applied, apart from the cost scenario, the online option performs better than the offline option. When cost scenario is considered, the offline option performs better. Table 14 provides an overview of the outcome when different weighting scenarios are applied to the options.

Table 14 EB3 Commercial sensitivity analysis

Weighting and sensitivity analysis		
Scenario	Ranked first	Ranked second
Equal	EB3 Commercial Online	EB3 Commercial Offline
Transport Benefits	EB3 Commercial Online	EB3 Commercial Offline
Environmental	EB3 Commercial Online	EB3 Commercial Offline
Effects	EB3 Commercial Online	EB3 Commercial Offline
Cost	EB3 Commercial Offline	EB3 Commercial Online
Combined	**EB3 Commercial Online**	**EB3 Commercial Offline**

The analysis of the different weighting scenarios shows that, in most circumstances, the best performing option is Online. It is also recognised that the two options considered across most of the scoring criteria was similar. Where there was bigger differences between the options was for the environmental and cost scenarios. For the cost scenario, the online option scored 182 whilst the offline scored 237. While for the environmental scenario, the online option scored 160 and the offline option scored 83.

8.1.4 Summary of Sensitivity Analysis

Sensitivity analysis has been undertaken to apply weighting to the assessment criteria used for the MCA plus cost. For EB3 Residential, the application of weighting to the different scenarios is consistent with the raw scores provided.

For EB3 Commercial, the raw scores, except for cost scenario, showed a preference for the online option. There were not major swings in the raw scores provided, generally being within 1 or 2 points of each other. The exception to this was legislative and consenting considerations, where a 4-point difference was recorded between the options.

With weighting applied, for all scenarios other than the cost scenario the online option performed better (although the differentials were slight).

The findings of the MCA and the sensitivity analysis were then presented to the ALT for discussion of the option to take forward. This is discussed in the next section of this report.

9 Assessment Outcomes and Recommendations

9.1 Summary of Options Analysis

All proposed options were assessed using the same MCA framework, being assessed in relation to Project Objectives and environmental factors. The combination of the Project Objectives and environmental factors are considered to provide a balanced assessment framework when considering the proposed options.

The outcome from the MCA showed, without weighting being applied, that all options scored positively in relation to the Project Objectives. This outcome was expected as all options align with the Project Objectives.

When considering environmental factors, all options had positive effects in relation to permanent transport and social impact. The EB3 Residential Online and EB3 Commercial Online both had positive effects in relation to urban design outcomes. The landscape and visual effects of these options was neutral.

From a consenting and legislative perspective, all options apart from EB3 Commercial Offline were provided with a positive score. EB3 Commercial Offline was provided with a neutral score, reflecting some potential risk associated with the options' interaction with the Coastal Marine Area and streams.

Environmental factors in which all options were provided with a neutral or negative score where acoustics, air quality, marine ecology, freshwater and terrestrial ecology and temporary traffic and transport effects. Negative effects where generally identified in situations that an option was brought closer to or directly impacted sensitive receptors, such as CMA, streams and residential zones.

All options have a negative effect upon existing property, requiring some level of land acquisition to be undertaken to provide for the busway. EB3 Commercial Online has the highest impact due to the complexities associated with acquisition of the types of properties that are required to be acquired, generally being commercial in nature.

The MCA scoring generally shows that all options are somewhat similar in terms of how they relate to the Project Objectives and the potential environmental effects generated. There were no big swings in scores provided by assessors between the options, with most raw scores being within 1 or 2 points of each other. As an outcome from the MCA, EB3 Residential Online and EB3 Commercial Online both scored marginally higher than their offline counterparts, with little differentiation between the options.

Overall, the MCA showed that the options considered did not present significant adverse impacts that could not be consented under the Resource Management Act 1991. Mitigation could also be incorporated into the design in most cases that can reduce the adverse effects of the options being considered.

9.2 Recommendations

Following the MCA Workshop, the Alliance Leadership Team (ALT) met to discuss the findings, review the options against the project's Key Result Areas (KRA's), identify risks and a preferred option for endorsement by the Interim Project Alliance Board (IPAB). The Eastern Busway Key Result Areas (KRA's) are:

- Safe and well;
- Collaborative Culture;

- Customer experience;
- Sustainability;
- Community and Partners;
- Project Controls; and
- Legacy.

The purpose of the Key Result Areas (KRA's) is to drive outstanding performance within the Alliance to achieve the broader project objectives, benefits and outcomes.

9.2.1 ALT consideration and recommendation

In addition to the outcome of the MCA and Sensitivity Analysis, the ALT also considered the following matters in the process of selecting a preferred option. The below factors have been applied to the decision-making process by the ALT to provide additional points of differentiation between the proposed options:

- KRA's
- Cost (Capital Costs, Operating Costs, Whole of life cots, Present Day Value of Costs)
- Suitability of residual land for redevelopment
- Safety

The meeting was also attended by members of the AT Integration Team, Transportation, Business Case and Planning Teams to assist in the provision of matters set out above.

For EB3 Commercial, the ALT identified the offline option as the preferred option for the following reasons:

- Affordability - $50m cheaper than the online estimate for design, construction and property acquisition costs;
- Reliability – better travel reliability than the online option as busway interacts with fewer intersections;
- Increased exposure/ catchment – the bus stations for the offline option would be closer to the Burswood Residential Area, increasing the catchment of potential bus users; and
- Property strategy – fewer properties/partial acquisitions and less tenants to negotiate.

It was acknowledged by the ALT that the EB3 Commercial offline option has several risks associated with it, including:

- Mitigation of impacts upon Burswood Esplanade Reserve – Consideration to the design of structures within the reserve and/or the option to accommodate the alignment of the busway within the Howick and Eastern Bus Depot, which would require redesign of the depot and possibly require more reserve land to meet the operational needs of the depot.
- Proximity of the option to wetlands
- Acceptance by key stakeholders and the community

For EB3 Residential section, the ALT members did not collectively agree on the preferred scheme as both options were assessed favourably but for different reasons. It was agreed that the offline option be identified as the preferred option when the affordability criteria was considered.

The EB3 Residential offline option was viewed favourably for the following reasons:

- Affordability – Nominally, the estimate order of cost for the offline option is $13m cheaper compared to the online option. While residual land values are not considered in terms of affordability, there is an expected larger residual land value for the online option of approx. $4.5m. If this is considered this results in a net cost difference of less than $10m.
- Customer experience – Members of the AT Integration team were of the view that the offline option presents a superior customer experience.
- Safety – Being able to separate the work area from Ti Rakau Drive was seen as a positive contributing factor, aligning better with the Project's Business Continuity and Disruption KRA.
- Hunua 2 – less impact upon Watercare's Hunua 2 watermain.

The EB3 Residential online option, whilst being approximately $13m more expensive, was viewed favourably for the following reasons:

- Urban integration – provides better opportunity for future integration, with the residual land created able to accommodate up to 728 (terraced) houses versus 630 in the offline option.
- Urban Design opportunities – Greater area of residual land available for terraced housing development. This form of development has been assumed as being more attractive to developers and this style of development lends itself well to a street frontage as afforded by the online option.
- Urban design preference – Urban design assessment has a strong preference for the online option. Also considered to align with the Projects "Legacy" KRA better than the offline option.
- Cost difference not seen as insurmountable.

Both residential options have favourable outcomes, however based on affordability and the ability for the offline option to be constructed in a safer and separate work area the ALT recommended the residential offline option as the preferred scheme to the IPAB. This recommendation was presented to the IPAB for endorsement on 11 February 2021.

9.2.2 **IPAB recommendation**

The IPAB considered the recommendation made by the ALT on 11 February 2021. The IPAB partially agreed with the recommendation presented.

The IPAB agreed with the ALT recommendation for the EB3 Commercial offline option, subject to more detailed consideration of design, mitigation and consentability of the option in relation to potential impacts to the wetlands within Burswood Esplanade Reserve.

For EB3 Residential section, the IPAB considered that the potential cost savings achieved from the offline option was outweighed by the strong urban design and increased integration that the online option achieves. Because of this, the online option was considered to achieve a better "legacy" for the project, in line with the KRAs.

Based on the above, the IPAB has endorsed the EB3 Commercial offline option and the EB3 Residential online option as the technically preferred scheme and these were taken forward for design development.

10 EB3 Commercial Design Refinement

10.1 Design Risks

Following selection of the Technically Preferred scheme the EBA undertook further design on the EB3C alignment in April 2021. This design found a number of risks associated with the Technically Preferred Scheme.

The design team identified that there was a significant risk that the Technically Preferred scheme was significantly more challenging to implement than initially thought during the option assessment phase of the project. These design challenges are discussed below.

The Technically Preferred scheme has a minimum corridor width between commercial buildings and the boundaries with residential properties of 12.0m, against a minimum busway corridor width of 11.6m, leaving as little as 400mm of excess space between the extents of the busway and existing buildings.

Whilst the design team were of the view that there may be opportunities to minimise this cross section further, for example by integrating the lighting column with the barrier, the main concerns for this length of the Busway were:

- There may be insufficient space to safely construct the busway immediately adjacent to existing residential properties as there is a concern that some residential properties are built within close proximity to the property boundary;
- Construction noise and vibration may be an unacceptable disturbance to the residents of the adjacent properties; and
- The long-term legacy of the busway within a metre of residential properties may be unacceptable to the community.

Further risks were identified in relation to the inwards and outwards goods delivery area for the adjacent commercial activities at 320 Ti Rakau Drive. The specific issues were documented as follows:

- The busway crosses Burswood Drive immediately adjacent to the entrance to the Bunnings delivery yard, creating potential conflicts between buses and delivery lorries, and potentially resulting in an intersection that is difficult or confusing to navigate.
- The residual land between the commercial properties and their boundary would be reduced. This in turn may have an impact on how the commercial activities use this space, and their ability to safely make deliveries.

The design team were of the view that the intersection issue could likely be overcome by signalising this intersection, including the access to the delivery yard, however it was noted that Auckland Transport do not typically signalise a private entrance. Relocating the busway intersection to the north was identified as a possible solution as it would create some separation between the busway and the access to the delivery yard, however it would require the acquisition of residential properties to achieve this.

The issue of how the delivery yard could be used was considered to be more difficult to resolve without topographic survey and engaging with the land owner and the occupiers to understand the physical boundaries better and to understand how the in wards and outwards good areas is utilised in practice.

At this stage of the project engagement with land owners and the public was not part of the project scope.

The design team investigated solutions to resolve the issue, which included:

- Creation of a one-way system with access from Burswood Drive to the east, and egress either towards Torrens Road or Ti Rakau Drive, as illustrated below and noting that this would have to pass through what appears to be a covered loading area to the west of the buildings.

- Alternatively, it may be possible to continue the use of the area essentially as it is believed to be used now, with access and egress to Burswood Drive east, and turning to the rear of the buildings. However how the area is used was unknown, with one aerial image suggesting lorries are reversed against a covered loading dock, and another suggesting parking parallel to what is assumed to be a loading dock.

Ultimately, the risk that the Technically Preferred scheme cannot be accommodated purely within commercial property was raised by the Design Team with up to $40M of property related risk identified.

The Design Team recommended that the above risks were taken into consideration when progressing the design of the alignment for this area, and specifically:

- The perceived lower cost of commercial land against the risk of future change forced by technical difficulties or negotiations with the landowner; and
- The potential for improved cost certainty by adopting an alignment which avoids the commercial properties.

10.2 Design refinement through Burswood Esplanade Reserve

Following the MCA process described in section 5 and 6 above, in addition to the identification of the design risks detailed above design refinement of the busway alignment was also progressed. As a result of the design refinement, potential changes to the alignment of the EB3C section within the Burswood Esplanade Reserve were identified by the Design team for consideration by the EBA. The alignment options were developed by the EBA Design Team to respond to specific constraints within the Burswood Esplanade Reserve area.

Technical and environmental constraints have driven some aspects of the busway alignment within the Burswood Esplanade Reserve. The key matters being:

- Location of streams and the wetland environment within Burswood Esplanade Reserve
- Position and location of Transpower overhead and underground high-power voltage cables
- Maximum length of bridge spans, without the need to place piers within streams and wetland environment
- Suitable connection between the proposed busway alignment and the Howick and Eastern Bus Depot.

A total of five alternative options were identified by the EBA to address these constraints, being:

A. Pricing Package Alignment (Commercial Online Option located to the rear of 380 Ti Rakau Drive)
B. Further West Alignment (a refinement of the Commercial Online Option)
C. Northern Alignment
D. Technically preferred, optimised for bridges
E. Online Arrangement

All of the alternative options were considered by the EBA to be consistent with the project objectives and to be of similar scope to the options considered within the February 2021 MCA.

Options A and B were determined to have significant design constraints and were discounted by the EBA Design Team.

Assessment of the Burswood Esplanade Reserve Options C, D and E are detailed in Section 11 of this report.

10.3 Design Refinement Station Locations

Following confirmation of the technically preferred option by the IPAB (as described in 9.2.2 above), design refinement, scope adjustment opportunities and value engineering were undertaken by the EBA design team.

The Technically Preferred station location was part of the scheme considered for EB3C in the February 2021 MCA and is shown in Figure 8.

Figure 8 Technically preferred option for EB3C

The Technically Preferred design features two bus stations within the EB3C Design with these stations being located at either end of Burswood Drive. The design team identified the following risk and opportunities associated with the provision of two bus stations:

- perceived increased risk of anti-social behaviour associated with multiple stations on the periphery of a residential area
- opportunities created by increased catchment and greater accessibility and transport choice for residents

At this stage of design development the design team considered an alternative arrangement for the EB3C stations being the provision of one centrally located station. The design team identified the following risks and opportunities associated with the provision of a centrally located bus station:

- smaller catchment and perception of reduced accessibility to the busway
- opportunity to create a well-designed hub, central to the community

The design development resulted in an alternative single centrally located station and two alternative 2 station locations being developed for consideration by the EBA. These alternative station locations are shown below in Figures 9 – 12.

Figure 9 Technically preferred option West and East

Figure 10 Option 1 West and Howick

Figure 11 Central and Howick

Figure 12 Central only

Station Option 1 and 2 were not progressed by the EBA because these options were considered to be too similar in terms of catchment coverage, travel time and cost when compared to the two station option delivered by the Technically Preferred design.

The EBA considered an assessment of a single station option in comparison to the Technically Preferred two station option to be of merit opportunity to create a well-designed hub, central to the community which potentially provides lower cost, faster travel time and only a marginal reduction in catchment coverage.

The Assessment of the Station Options is detailed at Section 12 of this report.

11 Burswood Esplanade Reserve Alignment Options Assessment

11.1 Alternative Options

As detailed at Chapter 10-.2 Design Refinement undertaken by the EBA identified alternative alignments through Burswood Esplanade Reserve and are described below

11.1.1 **Alternative Option C (Northern Alignment)**

This option would result in the busway alignment being placed further north within the Burswood Esplanade Reserve area, entering land owned by Transpower. This option only requires two bridges to be provided to cross streams, however large area of embankments may be required (shown in green in Figure 13 below). The alignment would also require areas of cut adjacent to the Transpower substation (shown in red in Figure 13 below).

A disadvantage of this option is that it is not possible to provide a direct link with the existing Howick and Eastern Bus Depot. Alterative Option C is shown in Figure 13.

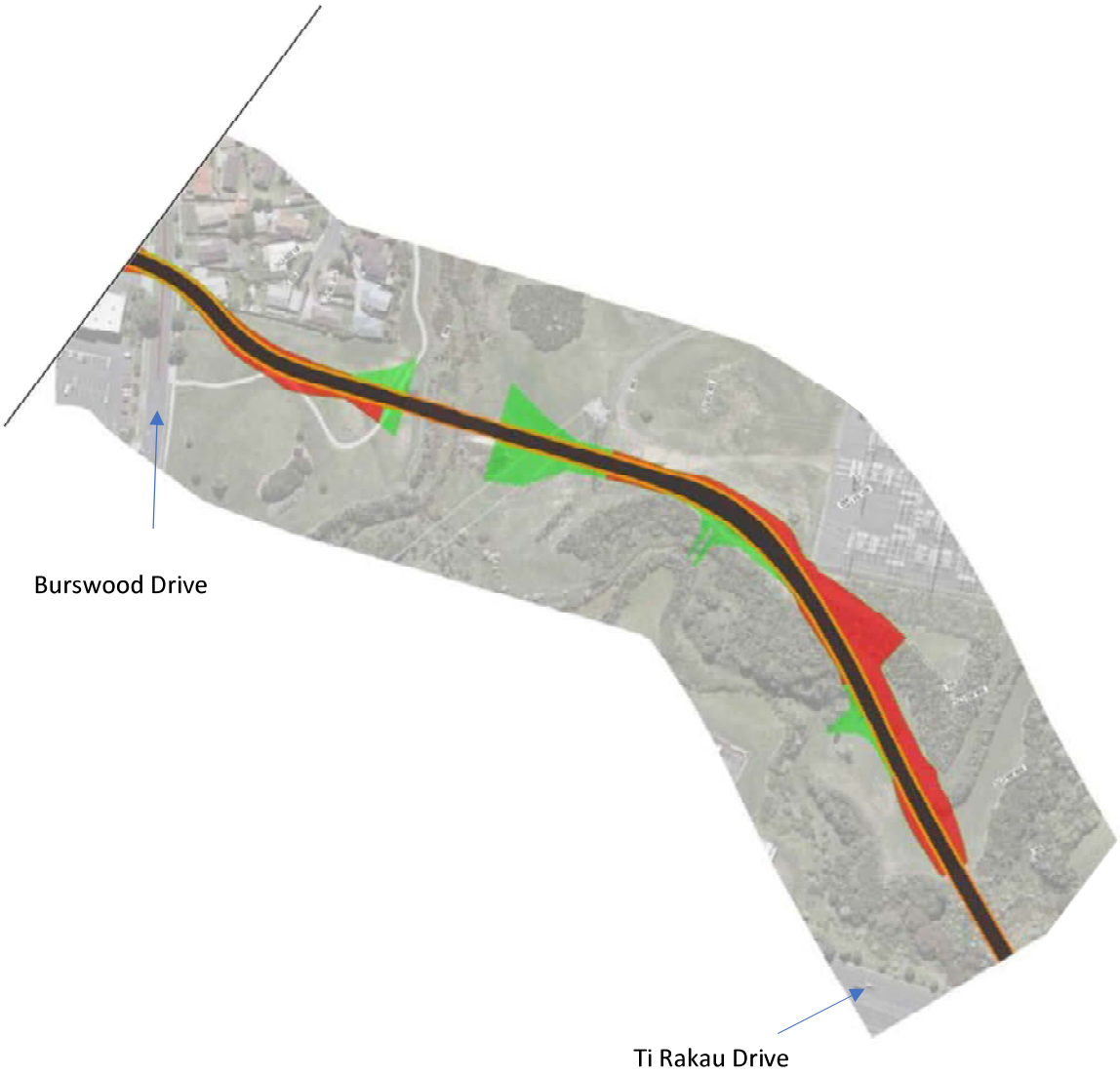


Figure 13 Alternative Option C - Northern Alignment

11.1.2 Alternative Option D (Optimised for Bridges)

This option provides an improved alignment for the bridges required for the busway within the reserve area. A total of three bridges will be needed. The busway in this option is mainly within the Burswood Esplanade Reserve, only entering land owned by Transpower at the eastern end of the alignment.

The busway would be located directed adjacent to the rear boundary of the Howick and Eastern Bus Depot, with the opportunity to provide direct access between the busway and depot. Due to the limited space, a retaining wall or structure would be required to support the busway to avoid impacts upon the steam/ wetland environment to the north (below the busway alignment).

Alterative Option D is shown in Figure 14.

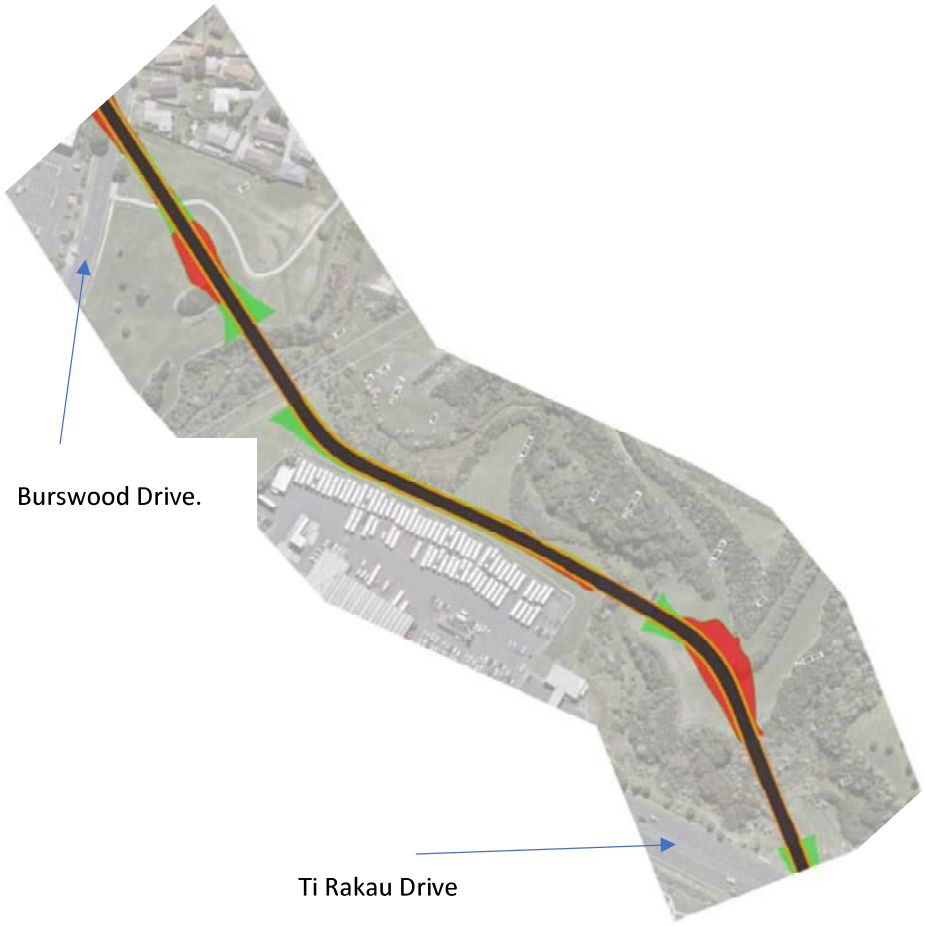


Figure 14 Alternative Option D - Optimised for Bridges

11.1.3 **Alternative Option E (Online Alignment)**

This option has a reduced impact upon Burswood Esplanade Reserve, with the busway being located along the western side of the esplanade reserve. The busway would join Ti Rakau Drive near the intersection of Burswood Drive. The busway would be situated to the north of the existing road, but to the south of the bus depot.

To provide for the busway within the existing road corridor, the number of general traffic lanes in each direction would be reduced from three to two. It is considered that this will have a slight increase in travel times for users of the general traffic lanes (around half a minute at peak times).

This option would enable buses to have access to and from the Howick and Eastern Bus Depot, using the existing site entrance. This option would likely require the existing petrol station adjacent to the bus depot to be acquired as access to the site would not be able to be retained.

Alterative Option E is shown in Figure 15.

Figure 15 Alternative Option E - Online Alignment

11.2 Evaluation of the Options

Based on the potential effects that may be generated by the alternative options, the following technical assessors participated in an options assessment process. Table 15 below notes the technical assessors and their area of consideration.

Table 15 Technical assessors

Technical Assessor	Area of consideration/ assessment
Alisdair Simpson	Legislative and consenting
Caitlin Smith	Ecological considerations
Chris Bentley/Tom Lines	Urban Design / Landscape and Visual
Shane Doran	Busway Operations and Transportation
Alex Taefu / Andy Gibbard	Constructability
Fenella Fischer	Property acquisition

John Daly	Social impact and business disruption

The options were presented to the Technical Assessors at a workshop held on the 26th of May 2021. The options were presented by Nic Smith and Simon Jones from the EBA Design Team. The workshop was facilitated by Jarrod Snowsill, EBA, RMA Planning Lead. Auckland Transport Subject Matter Experts Marcus Williams (Technical Interface Lead), Amy Thompson (Urban Integration Lead) and Sonja Lister (RMA Integration Lead) observed and provided input into the consideration of the alternative options at the Workshop.

11.3 Assessment of Alternative Options

The following is an assessment of Options C, D and E. Assessment and commentary has been provided by the technical assessors noted above. Comments on the options were provided at the workshop, with further comments provided post-workshop via email.

11.3.1 Legislative and consenting

The options have been considered in relation to the existing environment and the overarching consenting framework. The assessment of other technical specialists has also been considered, with focus on potential impacts to the wetlands situated within the Burswood Esplanade Reserve.

Options C and D place the busway within the Burswood Esplanade Reserve and Transpower owned land to the north of the reserve. Both options interact with the steams/ wetlands as well Transpower Designation 8514. Both options will need to be assessed in relation to the NPS-FM due to the interaction with wetlands. The final construction methodology and design of the busways should seek to avoid generating adverse effects upon the wetlands. Option C only requires two crossings of the wetlands, with Option D requiring three crossings. As such Option C would likely require less mitigation or offset in relation to impacts upon the wetlands.

The Transpower land to the north, which surrounds the Pakuranga Substation is subject to AUP Designation 8514. Both options enter the land covered by the designation, with Option C to a much greater extent. Designation 8514 contains specific conditions in relation to landscaping. It is considered that the busway alignment would likely require the existing landscaping on site to be altered. This will need to be assessed in relation to the designation conditions and may require the designation to be amended. This will require close working with Transpower and may increase consenting risk.

Option E has less impact on the streams and wetlands of the Reserve with the alignment being restricted to the western and southern edges of the reserve. This option avoids Transpower land and the associated designation. Because of the proposed alignment, this option is considered to have reduced environmental effects compared to Options C and D. Option E is preferred.

11.3.2 Ecological considerations

Ecological consideration of the options relates to the potential impacts upon the stream and wetland environment within the Burswood Esplanade Reserve. A key difference between the options is the number of crossings, or interactions the alignments have with the stream and wetlands.

Option C has two stream crossings, located on the western and eastern sides of the Esplanade Reserve, which results in an overall reduction in potential impacts when compared to Option D with three stream

crossings. Option E has no interaction with the streams and/or wetlands as the alignment avoids the majority of the reserve area.

Due to the change in alignment from the MCA Technically Preferred option, Option C being positioned further north, the stream crossing at the western side of the Reserve crosses over an estuarine wetland. This wetland is classified as 'Endangered' and is considered to have a very high/ high ecological value.

The crossing on the eastern side of the reserve will cross the stream adjacent to (or over) wetlands that are considered to be natural under the provision of the NPS-FM. These wetlands are classified as 'Critically endangered'. Potential impacts, considered to be high, to fish habitat due to construction of the bridge.

Option D, which is more closely aligned to the MCA Technically Preferred option, will have three stream crossings. The bridge at the western end of the reserve will cross adjacent to/over three natural wetlands, one which is classified as 'Critically Endangered'. On the eastern side of the reserve, the busway crosses over two wetlands, one of which is classified as 'Critically endangered'. It is also recognised that the construction of bridges may have an impact to fish habitats.

Option E alignment avoids any works within the sensitive stream and wetland habitat within the Burswood Esplanade Reserve. The alignment option may impact vegetation along the roadside of Ti Rakau Drive. This vegetation is considered to have a low ecological value.

When considering the ecological impacts, Option E is preferred as it avoids interaction with the streams and wetlands within the reserve. Option C is the second preferred has it has reduced impact upon the wetland environment when compared to Option D.

11.3.3 Urban Design

For Urban Design, consideration has been taken of how the options perform in relation to the specific Project Objectives relating to Urban Design being Project Objective 2 and Project Objective 3. Consideration was also given to the existing built environment. All three options are considered to provide multi-modal choice.

Both Options C and D are considered to have negative impacts when assessed in relation to the built environment given the potential length of the structures. Option C is preferred over Option D as the alignment avoids more of the reserve land, instead being located in land owned by Transpower.

Option E is considered to have positive integration with existing land use, with reduced impact upon Burswood Esplanade Reserve compared to Options C and D. The bus station in Option E provides a street frontage with, and is better aligned to, Burswood Drive..

Overall, from an urban design perspective Option E is preferred, then Option C.

11.3.4 Busway Operations and Transport

From an operational and transportation perspective, the difference between the options is marginal. Options C and D provide a separated corridor for buses, away from Ti Rakau Drive, offering reliable travel times. Option E, due to its alignment and the need for traffic signals along part of the route, has a slight reduction in travel times compared to Options C and D.

A benefit of Option E over Options C and D is additional redundancy (flexibility in the operating capacity of the Busway). Option E has increased connectivity with the wider road network, having an intersection provided at the entrance of the Howick and Eastern Depot.

Option E is preferred due to the increased operational redundancy/ flexibility compared to Options C and D. The reduction in travel times for Option E is marginal.

11.3.5 Construction

Both Options C and D are offline from the existing road network, resulting in minimal need for temporary traffic management requirements. Both options have minimal night work requirements and are considered to have a footprint that is further from stakeholders/commercial operators within the area. Option E in comparison will require works within the existing road corridor, potentially requiring complex temporary traffic management to be installed. Due to works occupying the road corridor, night works will be required due to staging constraints.

Options C and D will require access to the site via Golfland Drive, a residential street, with heavy vehicles being used to transport materials. Access would also be required over land owned by Transpower. Furthermore, the works would be undertaken in a constrained environment, with work required within watercourses. Option E in comparison avoids works within watercourses, reducing environmental construction risk. Furthermore, access to the construction area would not be required via Golfland Drive.

For Option C identified benefits include the need to construct only two bridges, reducing resources and construction timeframes and avoids the need for Transpower overhead cables to be propped.

Option D, compared to Option C, will require Transpower overhead cabling to be propped which will be a driving constraint to the construction programme. Furthermore, there is an extreme health and safety risk associated with undertaking pilling works under the overhead cables.

Option E during construction will need to ensure that access to and from Howick and Eastern Bus Depot can be maintained. This option, as noted above, will require traffic management to be provided on Ti Rakau Drive during construction. A benefit of this option is a reduced need for additional structures, resulting in a reduction in resources required to construct the busway.

Based on the above, Option C is preferred from a construction perspective due to health and safety, environmental and traffic management. No preference between Options D and E was identified.

11.3.6 Property

Consideration has been taken of the potential impacts upon property from each of the alignments. All three options impact 2 landowners, being either Auckland Council Parks and Transpower or Auckland Council Parks and the petrol station at 386 Ti Rakau Drive.

Option E is considered to have higher property acquisition costs compared to Options C and D. The alignment of Option E would remove access to the existing petrol station at 386 Ti Rakau Drive, and as such would need to be purchased. The land value of the petrol station is considered to be greater than the market value of Reserve land or the adjacent Transpower land.

Between Options C and D, Option D is preferred as the cost to purchase the land for the busway is likely to be less than Option C. This is because the alignment is mostly within the Burswood Esplanade Reserve. Reserve land will have a lower cost to purchase than land owned by Transpower.

As such, from a property acquisition perspective Option D is preferred.

11.3.7 Social impacts and business disruption

Consideration has been given to the potential social impacts and business disruption that the alternative alignment options may create. In terms of social impact, all options are located within the Burswood Esplanade Reserve, which is an area of green open space available for informal community use and recreation. It is likely to be valued by the community as an area of green space in an otherwise urban environment.

All of the options are in close proximity to residential properties on Burswood Drive and Midvale Place (which border the Reserve) which will likely require mitigation measures to address noise and disturbance from the construction and operation of the busway. The extent of social impacts varies between the options.

Option D has the largest footprint and will create severance within the Reserve. This option would create the largest potential impact on the community's use and enjoyment of the space. No additional residential properties are directly impacted by this option, however adjacent residential properties will be indirectly impacted noise and disturbance.

Option C has a reduced impact upon the Reserve compared to Option D but still cuts across the area and will likely require the realignment of an existing footpath/walkway. The busway would be a prominent feature within the Reserve and adjacent Transpower land, and it is likely to impact upon the community's use and enjoyment of the space.

Option E is located along the western edge of the Reserve, keeping a larger area of the reserve free for the community's use and enjoyment. This option, whilst having reduced impacts upon the reserve, will directly impact two residential properties (21 and 23 Burswood Drive) requiring their acquisition..

In terms of business disruption impacts, all options will be adjacent to Bunnings and Supercheap Auto (both located at 320 Ti Rakau Drive), with impacts upon these businesses similar with all options.

Option E will result in the greater level of business disruption. This option removes access to the petrol station and furniture business located at 386 Ti Rakau Drive, requiring the businesses to be acquired. This is considered to be a localised impact and will not undermine the function of the wider business environment located in Burswood/Botany.

Option E will also create temporary transport and construction disruption for business on the south side of Ti Rakau Drive. The impacts are not direct and can be managed with appropriate mitigation e.g. traffic management. Option E is least preferred from a business disruption perspective due to the loss of two business and residual construction impacts over and above what can be mitigated.

In terms of business disruption Option C is not considered to have any impacts as the alignment avoids businesses, being wholly located within the Burswood Esplanade Reserve and adjacent Transpower land (assuming the option would be agreed to by Transpower as the land and asset owner).

Option E is preferred overall, as it has a reduced impact upon Burswood Esplanade Reserve, minimising the impact on the community's enjoyment. The business disruption generated from on road construction is acknowledged, however this will be temporary and can be mitigated through suitable management measures. The impacts on the two residential properties and petrol station/furniture business are considered to be localised and do not outweigh the benefits of minimizing impacts on Burwood Reserve.

11.4 Identification of the Preferred Option

Table 16 below notes the preferred option for each technical assessor, based on the assessment and comments provided above.

Table 16 Technical assessors preferred option

Area of assessment (technical assessor)	Ranking of Options		
	Preferred (1st)	2nd	3rd
Legislative and consenting (Alisdair Simpson)	Option E	No preference between Options C and D	
Ecological considerations (Caitlin Smith)	Option E	Option C	Option D
Urban Design (Chris Bentley)	Option E	Option C	Option D
Busway Operations and Transportation (Shane Doran)	Option E	No preference between Options C and D	
Constructability (Alex Taefu)	Option C	No preference between Options D and E	
Property acquisition (Fenella Fischer)	Option D	Option C	Option E
Social impact and business disruption (John Daly)	Option E	No preference between Options C and D	

Based on the above table, the majority of technical assessors preferred Option E over Options C and D. The most notable exception is Construction who preferred Option C as it is easier to construct, avoiding the need for complex traffic management arrangements. Option D is preferred in relation to property acquisition as it has lower land purchase costs.

Taking account of the assessments provided, alternative Option E was preferred by the majority of the Technical Assessors

11.5 Risks and Opportunities

Table 17 outlines risk and opportunities that have been identified with the alternative options.

Table 17 Risk and Opportunities

#	Risk or Opportunity	Option	Description
01	Risk	C	Use of Transpower land for busway alignment. Unknown support and purchase cost for use of land currented owned by Transpower.
02	Risk	E	Reduction in general traffic lanes along Ti Rakau Drive. Unknown if reduction in traffic lanes will be supported by local community.
03	Risk	C & D	Impacts upon sensitive ecological environment. Options C and D may result in adverse effects upon the stream and wetland environments within the Burswood Esplanade Reserve.
04	Risk	E	Disruption to Howick and Eastern Bus Depot access point. Consideration is required of how traffic management can be implemented to ensure continued access to/from the bus depot.
05	Risk	ALL	Displacement of existing residents due to property acquisition. Existing residents are unlikely to find alternative properties within existing area.
06	Opportunity	E	Option avoids streams and wetlands within the reserve, with the busway being position along the west side of the reserve.
07	Risk	ALL	Workings under, adjacent or near Transpower assets.
08	Risk	C	Alignment would enter land covered by AUP Designation 8514. Designation has specific landscaping requirements. It is likely that the busway would not be compatible with requirements, requiring Designation to be amended.

11.6 Summary and Recommendations

As described above, following the February 2021 MCA, design refinement has been underway for the busway within the Burswood Esplanade Reserve area. The EBA Design Team developed five alternative options for the alignment. Due to significant engineering technical constraints, two of the option (A and B) were discounted by the EBA Design Team.

The three remaining alternative options (Options C, D and E) where presented to the Technical Assessors at an Options Assessment Workshop on 26 May 2021. Each Technical Assessor provided written assessments and comments on the options post-workshop.

Based on the assessments undertaken, Option E was identified as the preferred option by the majority of the Technical Assessors. The key reasons for this being the preferred option are:

- Likely to have the easiest consenting pathway, as it avoids the majority of the Burswood Esplanade Reserve and associated ecological environment. This option also avoids interaction with Transpower's designation for the Pakuranga Substation
- Considered to have positive integration with existing land uses, with the bus station being aligned with the street edge
- Provide increased operational flexibility for the busway compared to Options C and D
- Has a reduced impact upon the esplanade reserve, resulting in more of the open space remaining for community use and enjoyment.
- Only the construability and property acquisition assessments did not preferred Option E. Based on the above Option E is recommended as the preferred alignment of the busway.

The findings of the Options Assessment for the EB3CBurswood Esplanade Reserve Alignment were considered by the EBA Key Decisions Team on the 10 June 2021. For the reasons detailed above Option E was endorsed by the Key Decisions Team to progress as part of the technically preferred scheme.