Appendix 4: Presentations to mana whenua

Iwi Hui – Options Assessment

9 Dec 2020

Eastern Busway Alliance

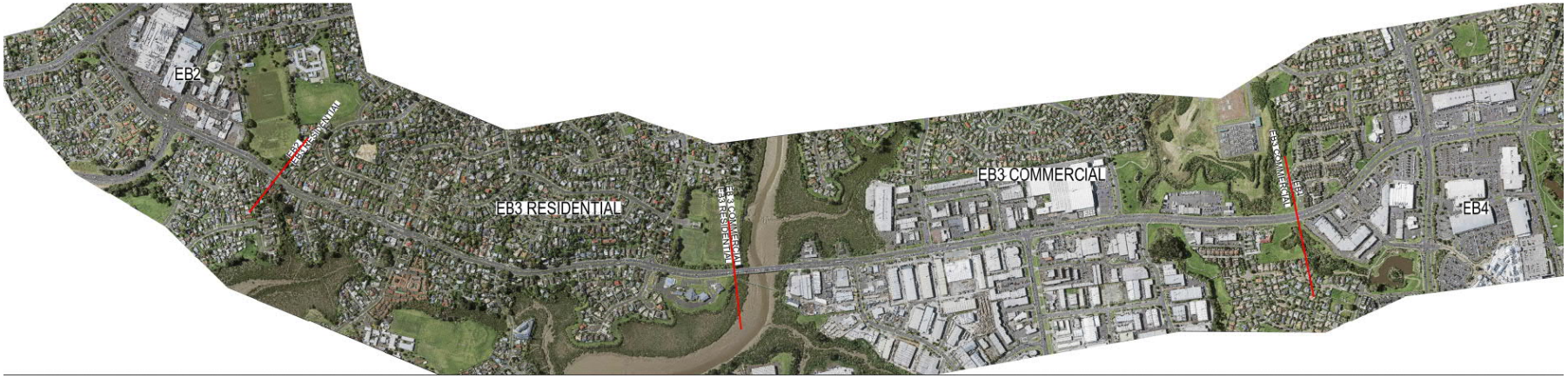
Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

Agenda

- Welcome and introductions
- Background
- Matters of importance to Mana Whenua
- EB2 and 3 option differentiators
- EB2 and 3 draft options
- EB3 and 3 preferred scheme selection process
- EB4 update

Eastern Busway - Background



4 Zones: EB2 EB3 Residential EB3 Commercial EB4

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

Matters of importance to Mana Whenua

- Legacy
- Project environment
- Cultural landscape
- Sites of significance / Natural resources
- Existing features and opportunities
- Issues and constraints

EB 2 and 3 - option differentiators

Does the option:

- achieve an acceptable busway alignment?
- provide a safe environment for all users?
- minimise impacts to property?
- minimise impacts to property access along Ti Rakau Drive?
- have a lesser degree of difficulty for statutory approvals
- significantly improve affordability?

Pakuranga Town Centre

Ti Rakau Drive Residential Section

Ti Rakau Drive, Commercial Section

Draft options

Refer to draft roll-out plans.

Preferred Scheme selection process 2020

Timings for EB2 and EB3

- Options development: 20 Nov – 18 Dec 2020
- Further refinement and assessment: Dec 2020 – Jan 2021
- **MCA workshop: 4 Feb 2021**
  - Draft MCA criteria
  - Cultural induction for project team and specialists?
  - Capturing your comments and feedback?

EB4 update

- Design development behind EB2 and 3
- Two core components – link road and station location
- Separate MCA for EB4

Discussion and Questions

Let's get East Auckland moving

Thank you.

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

Eastern Busway - Pakuranga to Botany

Mana whenua hui – 25 February 2021

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

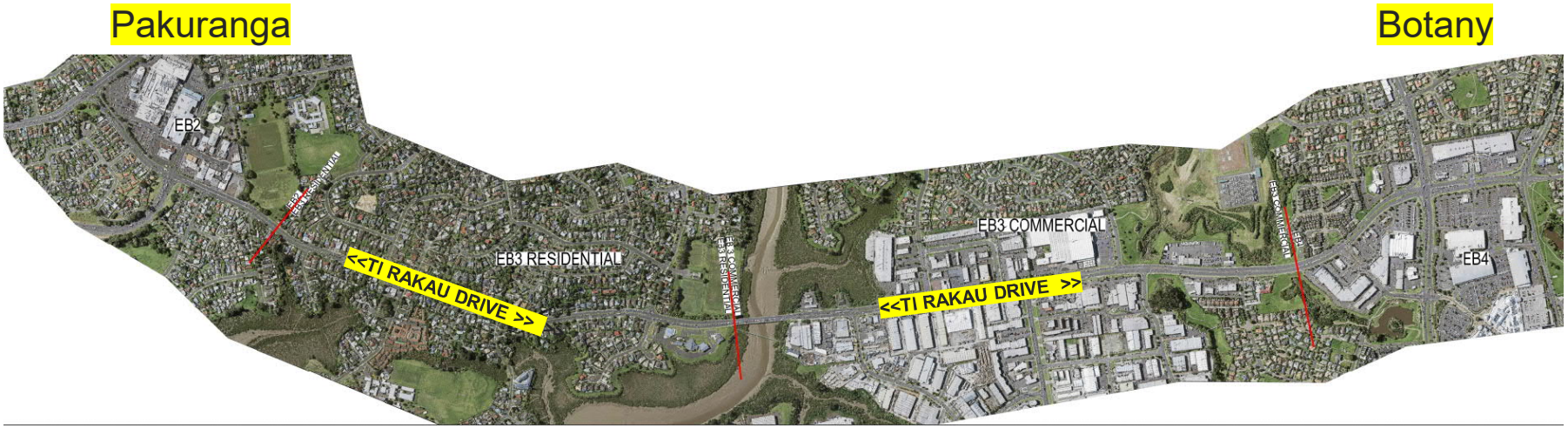
Let's get East Auckland moving

Agenda

- Welcome and introductions – **All**
- Update on progress and forward programme – **Jarrod**
- Future discussion topics – **Sarah**
- Recap of options shared in previous hui (9 December) - **Shane**
- EB2+3 (Pakuranga town centre, residential and commercial zones) - discussion, questions and feedback on emerging technically preferred option - **Jarrod**
- EB4 (Botany town centre) – background, context, broad range of options currently under consideration - **Simon**
- Actions, next steps and close - **All**


City Centre
PANMURE (COMPLETE)
PANMURE TO PAKURANGA (NEARING COMPLETION)
PAKURANGA TO BOTANY (PLANNING AND CONSENTING PHASE)
Te Horeta Road
Panmure Station (now open)
Panmure intersection
Panmure bridge
Panmure to Pakuranga busway
Pakuranga Station
Grade separated intersection
Pakuranga to Botany busway
Pakuranga Creek bridge
Botany Station
TAMAKI RIVER
PANMURE
PANMURE BASIN
MT WELLINGTON
SYLVIA PARK
PAKURANGA
LLOYD ELSMORE PARK
BOTANY DOWNS
PAKURANGA GOLF CLUB
HIGHBROOK
MORIN RD
PILKINGTON RD
ELLERSLIE PANMURE HWY
TE HORETA RD
MT WELLINGTON HWY
PAKURANGA RD
PAKURANGA HWY
REEVES RD
TI RAKAU DR
GOSSAMER DR
TRUGOOD DR
HARRIS RD
TE IRIRANGI DR
1

Pakuranga to Botany project zones



EB2 EB3-Residential EB3-Commercial EB4

Eastern Busway Alliance

Fletcher acciona AECOM Jacobs

Let's get East Auckland moving

Update on progress

- Further refinement of the design options for EB2+3
- Revised project objectives
- MCA process and criteria considered
- Technically preferred emerging outcomes for EB2+3
- Development of EB4

Forward programme

- 10 March 2021 - Multi-criteria analysis for EB4
- Late April 2021 - AT Board approval
- Mid 2021 – Property and community consultation
- Late 2021 – Consenting process
- 2022 – Construction commences
- 2025 – Construction completed

Future discussion topics

- Stormwater
- Urban design
- Future site investigations (e.g. geotechnical)
- Cultural induction for the alliance
- Joint site visit with environmental specialists
- Construction and safe site processes

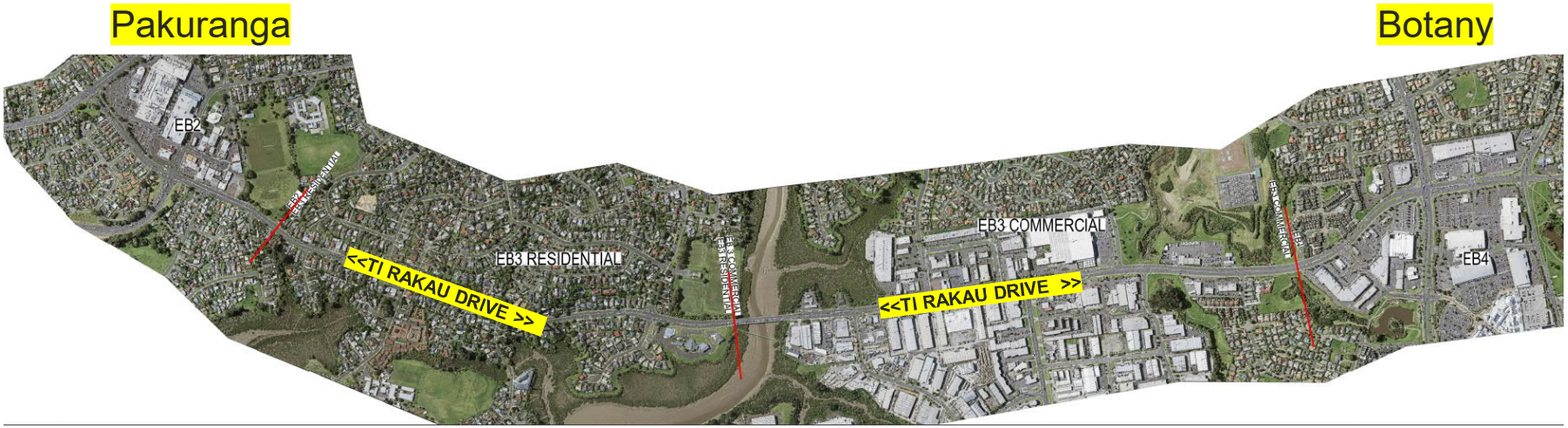
Recap on hui – 9 Dec 2020

Option differentiators

Does the option…

- achieve an acceptable busway alignment?
- provide a safe environment for all users?
- minimise impacts to property?
- minimise impacts to property access along Ti Rakau Drive?
- have a lesser degree of difficulty for statutory approvals
- significantly improve affordability?

EB2 – Pakuranga

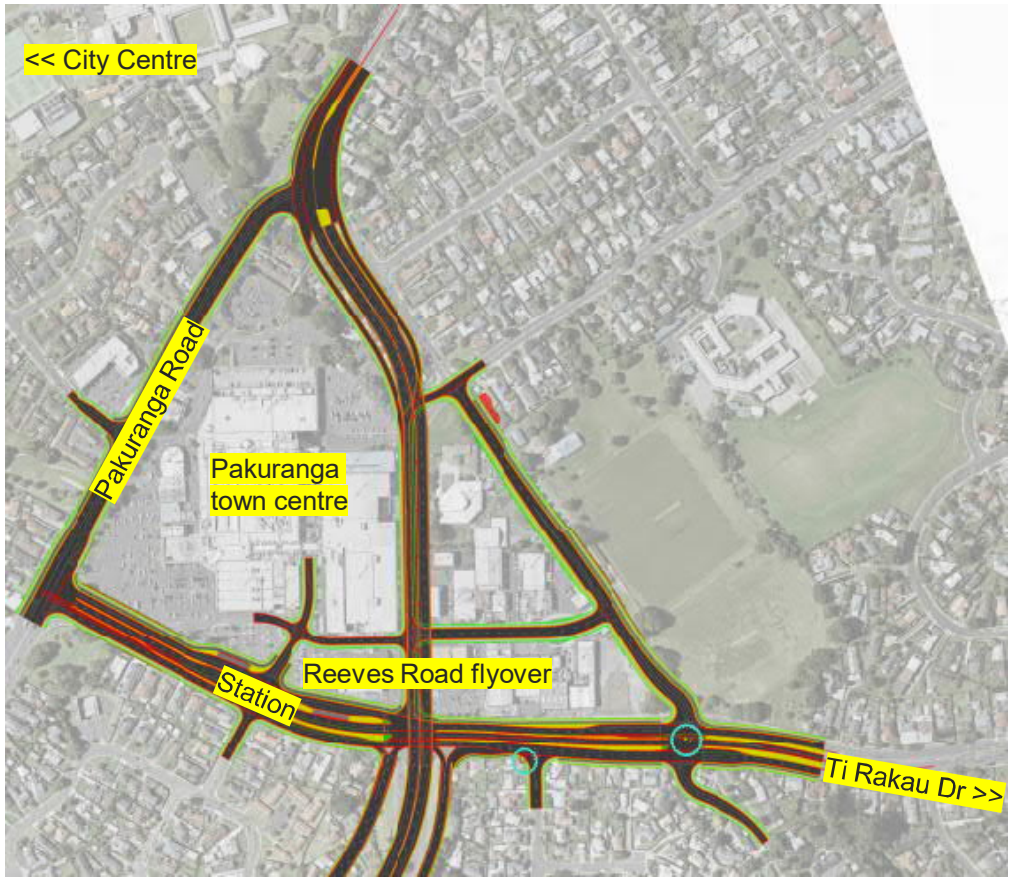


EB2 EB3-Residential EB3-Commercial EB4

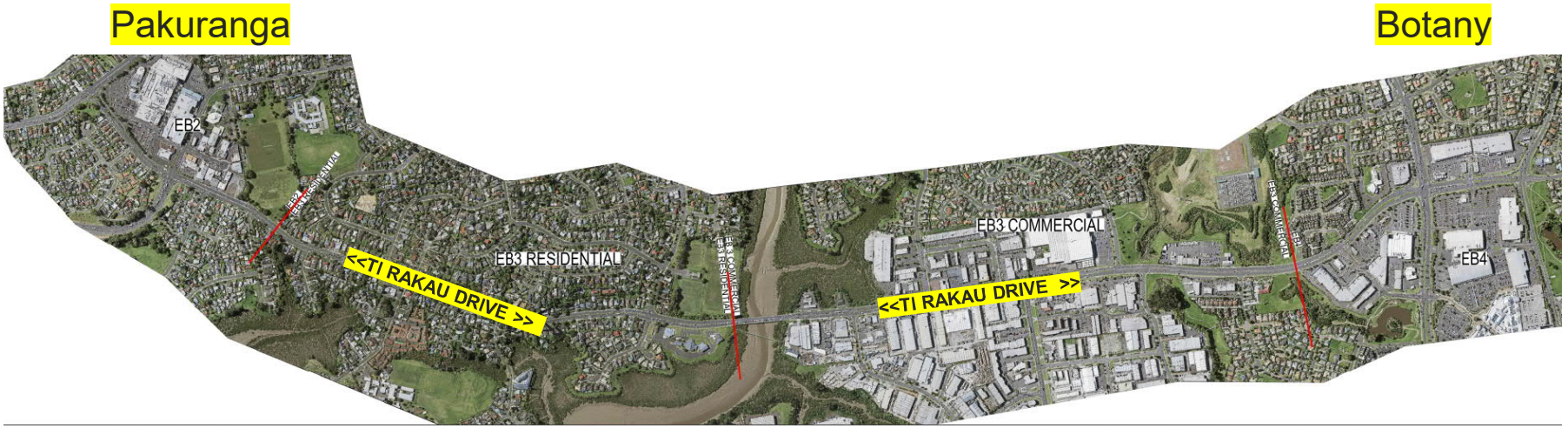
Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving


<< City Centre
Pakuranga Road
Pakuranga
town centre
Reeves Road flyover
Station
Ti Rakau Dr >>

EB3 – Residential



EB2 | EB3-Residential | EB3-Commercial | EB4

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

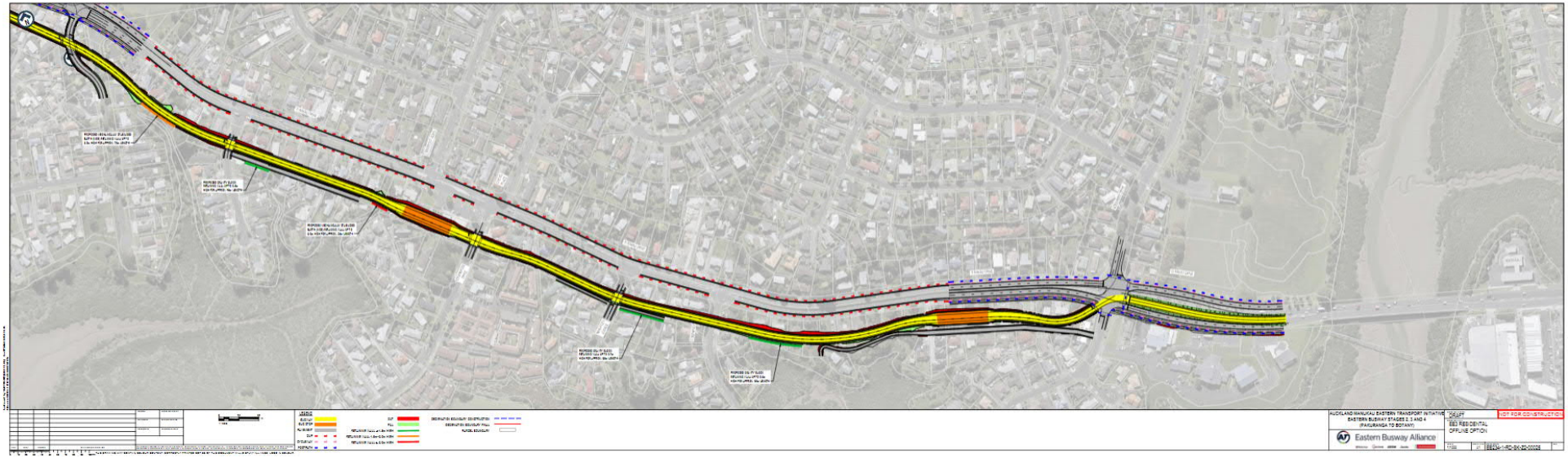
EB3 Residential – online option

Eastern Busway Alliance

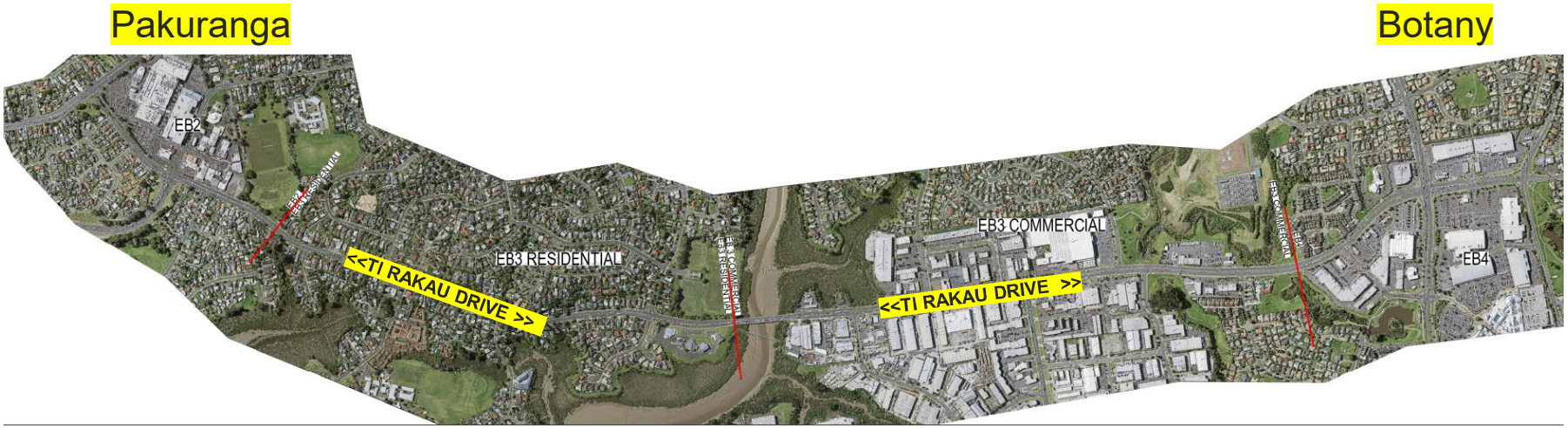
Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

EB3 Residential – offline option



EB3 - Commercial



EB2 EB3-Residential EB3-Commercial EB4

Eastern Busway Alliance

Fletcher acciona AECOM Jacobs

Let's get East Auckland moving

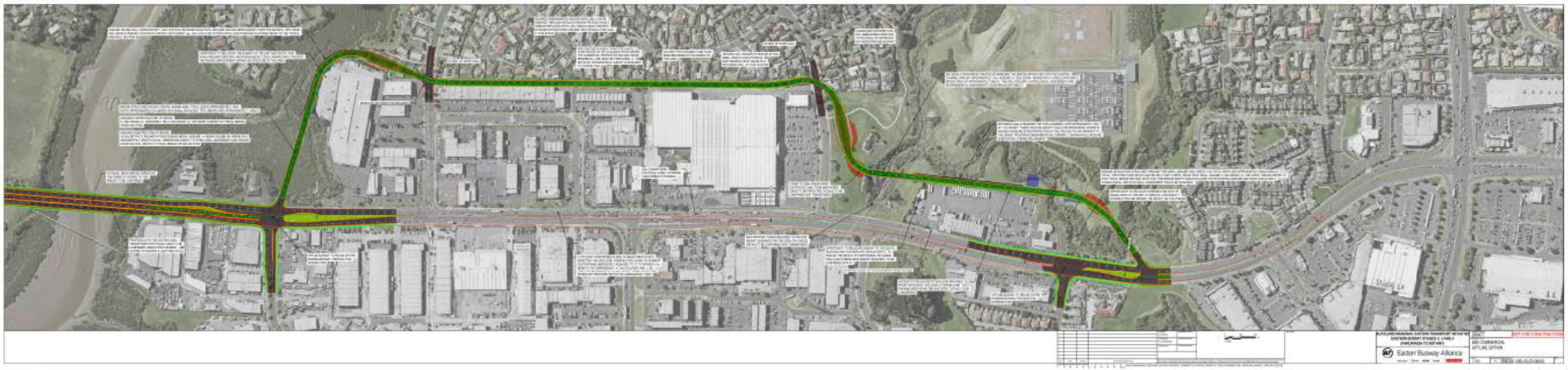
EB3 Commercial – online option

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

EB3 Commercial – offline option



Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

Summary of feedback on EB3 options

- Options were felt to be similar in most cases

Residential

- More property impacts in offline option
- Urban design favoured online option

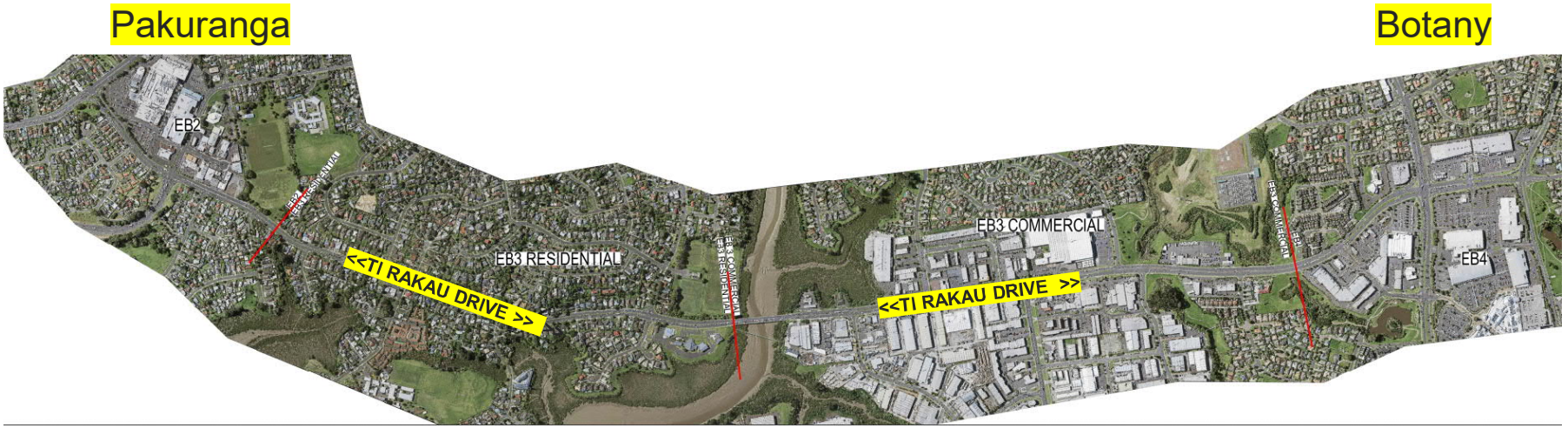
Commercial

- Significant partial property and temp traffic impacts for online option
- Fresh water and terrestrial ecology effects within Burswood Reserve for offline option

Discussion on EB2+3

- Your questions, comments, concerns
- Next steps

EB4 - Botany



EB2 | EB3-Residential | EB3-Commercial | EB4

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

EB4 presentation (Simon to present)

Discussion on EB4

- Process for shortlisting (Jarrod)
- Your questions, comments, concerns
- Next steps – attendance at MCA or separate session?

Next steps and actions

- 10 March 2021 - Multi-criteria analysis for EB4
- Late April 2021 - AT Board approval
- Mid 2021 – Property and community consultation
- Late 2021 – Consenting process
- 2022 – Construction commences
- 2025 – Construction completed

Future discussion topics

- Stormwater
- Urban design
- Future site investigations (e.g. geotechnical)
- Cultural induction for the alliance
- Joint site visit with environmental specialists
- Construction and safe site processes

Thank you.

Eastern Busway Alliance

Fletcher | acciona | AECOM | Jacobs

Let's get East Auckland moving

Appendix 5: Sensitivity Analysis

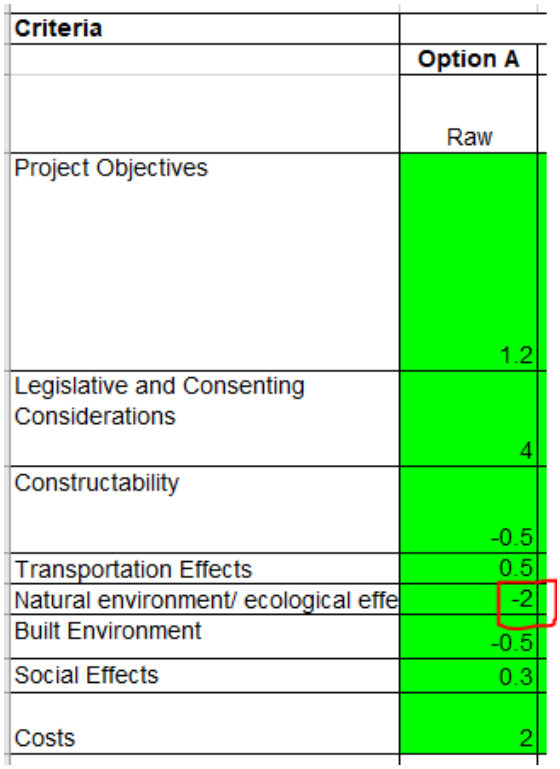
Eastern Busway 3 Commercial
Sensitivity Assessment Methodology

This document describes the sensitivity methodology adopted for assessing the EB3 Commercial section of the Eastern Busway.

The methodology consisted of the following 7 steps:

1. Evaluating each option and giving a raw score between +5 to -5 for each of the MCA criteria (8 as listed below). With +5 representing the highest raw score and -5 representing the lowest raw score.
    a. Project Objectives
    b. Legislative and Consenting Considerations
    c. Constructability
    d. Transport Effects
    e. Natural Environment / Ecological Effects
    f. Built Environment
    g. Social Effects
    h. Costs

2. Criteria with more than one sub criteria were given a raw score equal to the average of raw scores for each of the sub criteria. Sub criteria were assessed using the same +5 to -5 scoring range. For example, a raw score of -2 circled in figure below for Natural Environment/Ecological Effects was calculated as the average of the raw scores for each of the 2 sub criteria that make up the Natural Environment/Ecological Effects criteria.



Criteria	
	Option A
	Raw
Project Objectives	1.2
Legislative and Consenting Considerations	4
Constructability	-0.5
Transportation Effects	0.5
Natural environment/ ecological effe	-2
Built Environment	-0.5
Social Effects	0.3
Costs	2

3. The Criteria for the purposes of the sensitivity analysis were grouped into 4 Categories as shown in table below. The categories were selected to represent key effects/benefits of the project.

Criteria	Category
Project Objectives Transport Effects (Positive Effects)	Transport Benefits
Legislative and Consenting Considerations Natural Environment / Ecological Effects Social Effects	Environment Effects
Constructability Transport Effects (Negative Effects)	Effects
Cost	Cost

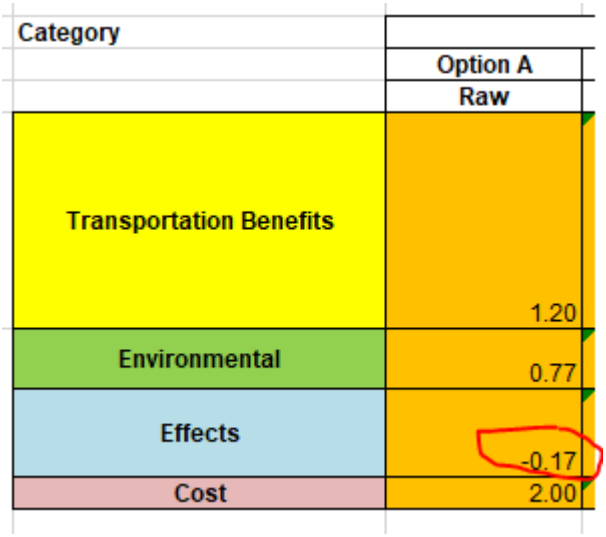
4. Sensitivity scenarios with different weighting for each of the categories were undertaken with weighting for each category provided to reflect a different emphasis / priority for the project. Six scenarios were tested. All weightings for a scenario added to 100. The 'priority' category for each sensitivity scenario was given a weighting of 50 and the remaining weighting of 50 shared equally (almost) between the other three categories.

5. The following six sensitivity scenarios with category weightings were assessed:

Scenario	Category Weightings			
	Transport	Environment	Effects	Cost
Equal	25	25	25	25
Transport Benefits	50	16	17	17
Environmental Effects	16	50	17	17
Effects	16	17	50	17
Cost	16	17	17	50
Other *	45	15	10	30

* Other sensitivity scenario was determined to provide a 'balanced' test.

6. The average of the raw scores for criteria that contributed to a category were calculated. As an example, the raw score for Effects category of -0.17 circled red in figure below was calculated as the average of the raw scores detailed in Step 2 for each of the three criteria (Constructability, Transportation Effects and Built Environment) that make up the Effects category.



Category	Option A Raw
Transportation Benefits	1.20
Environmental	0.77
Effects	-0.17
Cost	2.00

7. The raw score for each category was multiplied by the weighting for each category to determine the weighted score for the category. As an example, in the figure below the weighted score for Transportation Benefits was calculated as the multiplying the category weighting of 25 (Under Equal Weighting Scenario) by the raw score of 1.2 to give a weighted score of 30 for Transportation Benefits. The weighted score for each category was added to provide the total weighted score for the option. In the figure below the weighted score of 95 circled in green was the addition of the weighted scores circled in blue.

Category	Weighting	Option A	
		Raw	Weighted
Transportation Benefits	25	1.20	30.0
Environmental	25	0.77	19.2
Effects	25	-0.17	-4.2
Cost	25	2.00	50.0
	100		95

8. For each sensitivity scenario the total weighted score for each option was compared and ranked from 1 to 3 with the highest ranked option (option with the highest weighted score) given a scenario

ranking of 1 and the lowest ranked option (option with the lowest weighted score) given a scenario ranking of 3. This process was repeated for each of the sensitivity scenarios.

9. A summary of the sensitivity scenarios was performed to identify that option which resulted in the best sensitivity ranking when all scenarios were considered. This was done by adding the scenario ranking for each option under each scenario. The option that resulted in the lowest combined scenario score being the option that performed best when considering all benefits and effects of the option. As an example, in the figure below, Option C has the lowest combined scenario score and is therefore given the Sensitivity Rank of 1 representing the option that performs best when all benefits and effects of the option are considered.

Scenario	Option		
	Option A	Option B	Option C
	Scenario Rank		
Equal	3	2	1
Transport Benefits	3	2	1
Environment	1	3	2
Effects	3	2	1
Cost	3	2	1
Combined Scenario Score (Lower is better)	13	11	6
Sensitivity Rank	**3**	**2**	**1**

Appendix 6: EB3 C – Burswood Esplanade Reserve Assessment

MEMO

19 July 2021

EB3C Burswood Alignment – Further Options Assessment 2021

To:	**Alliance Leadership Team**
From:	**Alisdair Simpson and Jarrod Snowsill**
Subject:	**2021 Further Options Assessment – Burswood Alignment (EB3C)**

Introduction

1. Following the Eastern Busway 3 (EB3) Multi-Criteria Analysis (MCA) in February 2021, design refinement has been undertaken to the busway alignment. As a result of the design refinement, potential changes to the alignment of the Eastern Busway 3 Commercial section within the Burswood Reserve have been identified by the Design team for consideration by the Eastern Busway Alliance (EBA). The alignment options have been developed by the EBA Design Team to respond to specific constraints within the Burswood Reserve area.
2. A total of five alternative options have been identified,
    A. Pricing Package Alignment (26th Feb)
    B. Further West Alignment
    C. Northern Alignment
    D. Technically preferred, optimised for bridges
    E. Online Arrangement
3. All of the alternative options were considered to be consistent with the project objectives for the Project and were of similar scope to the options considered within the February 2021 MCA.
4. Options A and B were determined to have significant design constraints and have been discounted by the EBA Design Team.
5. Alternative Options C, D and E were the focus of the assessment and presented to the relevant Technical Assessors and Auckland Transport Subject Matter Experts on 26 May 2021 for detailed discussion and consideration.

Technical and Environmental Constraints

6. Technical and environmental constraints have driven some aspects of the busway alignment within the Burswood Reserve. They key matters being:
    - Location of streams and the wetland environment within Burswood 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 to the proposed busway alignment and the Howick and Eastern Bus Depot.

Previous EB3C Options Assessment

Eastern Busway EB3 Options Assessment 2021

7. In February 2021 an MCA options assessment was undertaken to determine the preferred alignment of EB3 (which is formed by EB3 Residential and EB3 Commercial sections. EB3 Commercial (EB3C) can be described as the section of the project from Pakuranga Creek to Huntington Drive/ Guys Reserve.

8. Two options were presented at the MCA workshop for consideration, being an online option, contained within the Ti Rakau Drive corridor, and an offline option, generally being situated to the north of Ti Rakau Drive. The offline option resulted in the busway transiting Burswood Reserve.

9. The offline option was confirmed as the preferred option in February by the ALT and Interim Project Alliance Board (IPAB). The preferred alignment of the busway within the Burwood Reserve is shown in Figure 1 below.

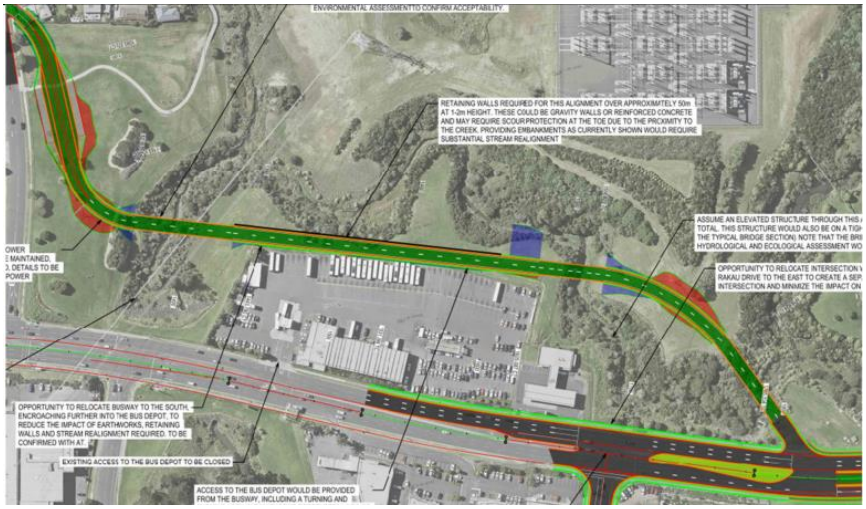


Figure 1 EB3 Preferred Alignment (Feb 2021) – Burswood Reserve

10. Please see the Eastern Busway EB3 Options Assessment 2021 report for further information.

Alternative Options

11. Design refinement has been underway since the preferred option was identified in February 2021. The alternative options are noted below. As noted above, Alternative Options A and B were discounted due to environmental and technical constraints.

Alternative Option C (Northern Alignment)

12. This option would result in the busway alignment being placed further north within the Burwood 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 2 below). The alignment would also require areas of cut adjacent to the Transpower substation (shown in red in figure 2 below).

13. 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 2.

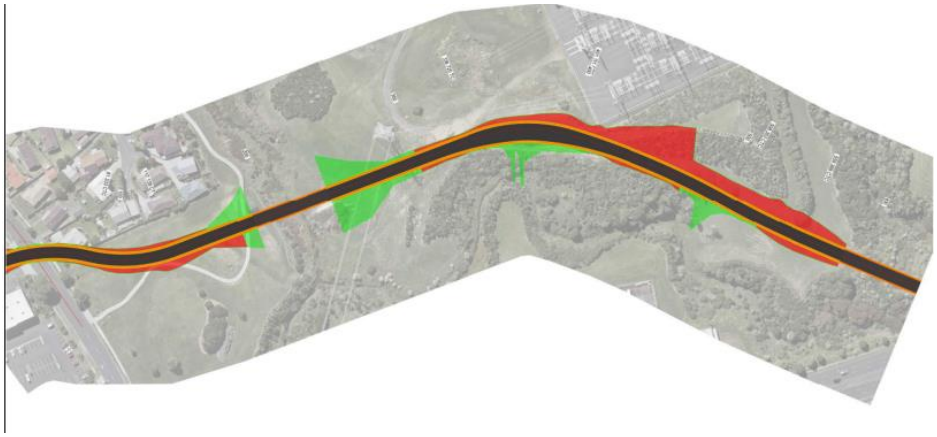


Figure 2 Alternative Option C - Northern Alignment

Alternative Option D (Optimised for Bridges)

14. 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 Reserve, only entering land owned by Transpower at the eastern end of the alignment.
15. 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).
16. Alterative Option D is shown in Figure 3.

Figure 3 Alternative Option D - Optimised for Bridges

Alternative Option E (Online Alignment)

17. This option has a reduced impact upon Burswood Reserve, with the busway being located along the western side of the 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.
18. 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).
19. This option would enable buses to have access to and from the Howick and Eastern Depot, using the existing site entrance. It is recognised that 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 4.

Figure 4 Alternative Option E - Online Alignment

Technical Assessors

20. Based on the potential effects that may be generated by the alternative options, the following technical assessors have participated in the options assessment. Table 1 below notes the technical assessors and their area of consideration.

Table 1 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

21. 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.

Assessment of Alternative Options

22. 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.

Legislative and consenting

23. 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 Reserve.

24. Options C and D place the busway within the Burswood 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.

25. 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.

26. 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.

Ecological considerations

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

28. Option C has two stream crossings, located on the western and eastern sides of the 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.

29. Due to the change in alignment from the MCA preferred option, Option C being position 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.

30. 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 National Policy Statement for Freshwater Management (NPS-FM). These wetlands are classified as ‘Critically endangered’. Potential impacts, considered to be high, to fish habitat due to construction of the bridge.

31. Option D, which is more closely aligned to the MCA 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.

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

33. 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.

Urban Design

34. For Urban Design, consideration has been taken of how the options perform in relation to the Project Objectives and existing built environment. All three options are considered to provide multi-modal choice.
35. Both Options C and D are considered to have negative impacts when assessed in relation to the built environment. Option C is preferred over Option D as the alignment avoids more of the reserve land, instead being located in land owned by Transpower.
36. Option E is considered to have positive integration with existing land use, with reduced impact upon Burswood Reserve compared to Options C and D. The bus station in Option E is aligned better with Burswood Drive, providing a street frontage.
37. Overall Option E is preferred, then Option C.

Busway Operations and Transport

38. From an operational and transportation perspective, the difference between the options are 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.
39. 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.
40. 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.

Construction

41. 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 required 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.
42. 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.
43. 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.
44. 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.

45. 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.
46. 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.

Property

47. 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.
48. 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 purchases. The land value of the petrol station is considered to be greater than the market value of Reserve land or the adjacent Transpower land.
49. For 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 Reserve. Reserve land will have a lower cost to purchase than land owned by Transpower.
50. As such, from a property acquisition perspective Option D is preferred.

Social impacts and business disruption

51. 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 Reserve, which is an area of green open space avaiable 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.
52. 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.
53. 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.
54. 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.
55. Option E is located along the western edge of the Reserve, keeping a larger area of the reserve free from 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). The option will also potentially impact businesses along Ti Rakau Drive which are currently available for use by the local community.

56. 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.
57. Option E will result in the greater level of business disruption. This option remove 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.
58. 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.
59. 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 Reserve and adjacent Transpower land (assuming the option would be agreed to by Transpower as the land and asset owner).
60. Option E is preferred overall, as it has a reduced impact upon Burswood 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 are considered to be locaised and do not outweigh the benefits of minimizing impacts on Burwood Reserve.

Identified Preferred Option

61. Table 2 below notes the preferred option for each technical assessor, based on the assessment and comments provided above.

Table 2 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	

62. 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 construction, avoiding the need for complex traffic management arrangements. Option D is preferred in relation to property acquisition as it has lower land purchase costs.
63. Taking account of the assessments provided, it is considered that alternative **Option E** is preferred.

Risks and Opportunities

64. Table 3 outlines risk and opportunities that have been identified with the alternative options.

Table 3 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 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.

Recommendations

65. Following the EB3 MCA in February 2021, design refinement has been underway for the busway within the Burswood Reserve area. The EBA Design Team came up with five alternative options for the alignment. Due to significant engineering technical constraints, two of the option were discounted by the EBA Design Team.
66. 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.
67. 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:
68. Likely to have the easiest consenting pathway, as it avoids the majority of the Burswood Reserve and associated ecological environment. This option also avoids interaction with the AUP Designation of the Pakuranga Substation
69. Considered to have positive integration with existing land uses, with the bus station being aligned with the street edge
70. Provide increased operational flexibility for the busway compared to Options C and D
71. Has a reduced impact upon the reserve, resulting in more of the open space remaining for community use and enjoyment.
72. 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.

Outcome

73. The findings of the Options Assessment for the EB3 Commercial Burswood Reserve Alignment was considered by the EBA Key Decisions Team in 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.

Attachment: Technical Assessors commentary

Attachment	Area/ Topic	Assessor
A	Legislative and consenting	Alisdair Simpson
B	Ecological considerations	Caitlin Smith
C	Urban design	Chris Bentley
D	Shane Doran	Busway Operations and Transportation
E	Alex Taefu	Constructability
F	Fenella Fischer	Property acquisition
G	John Daly	Social impact and business disruption

Appendix 7: EB3C Single Station Option Assessment

MEMO

13 July 2021 (V05)

EB3 Commercial – Single station option assessment

To:	**ALT**
From:	**Alisdair Simpson and Jarrod Snowsill**
Subject:	**EB3 Commercial – Station location assessment**

Background

1. A "hotspot" options assessment workshop was held on Friday 30 April 2021 to consider alternative designs for the position of the busway and bus stations for EB3 Commercial (EB3C) section. The technically preferred option includes the provision of two bus stations, as shown in Figure 1 below.

   The options assessment workshop was attended by the following Technical Experts and Auckland Transport Subject Matter Experts:

   Table 1 Technical assessors and AT SMEs

Technical Assessor	Technical Area
Chris Bentley	Urban Design
John Daly	Social Impact and Business Disruption
Shane Doran	Busway Operations and Transport
Fenella Fischer	Property
Andy Gibbard	Construction
Joe Grimes	Noise and Vibration
Simon Jones	Civil Design
Alisdair Simpson	Planning
Jarrod Snowsill	Planning (Workshop Facilitator)
John Williamson	Economics
AT Subject Matter Expert	**Technical Area**
Sujata Singh	Funding Advisor
Amy Thompson	Urban Design
Marcus Williams	Technical Interface Lead

2. The technically preferred station location was part of the scheme considered in the EBC3 area multi-criteria analysis (MCA) undertaken in February 2021. The EB3C area MCA involved input from a range of technical assessors and the technically preferred scheme is shown in Figure 1.

Figure 1 Current preferred option for EB3C

3. Since the confirmation of the technically preferred option design refinement, potential scope adjustment opportunities and value engineering has been undertaken by the EBA design team. This work has resulted in the development of potential alternative station locations. The alternative options all include the provision of a single centrally located bus station, but with three variants of the position of the busway.

Alternative options

4. The three alternative options are:
   - Option A – Commercial Bund Alignment, One Central Station (Figure 2)
   - Option B – Commercial & Residential Alignment, One Central Station (Figure 3)
   - Option C – Residential Alignment, One Central Station (Figure 4)

5. The proposed options were considered to be consistent with the project objectives.

6. A sketch of each option is provided below. A key difference between the options is the amount of land required from either commercial or residential land uses or both.

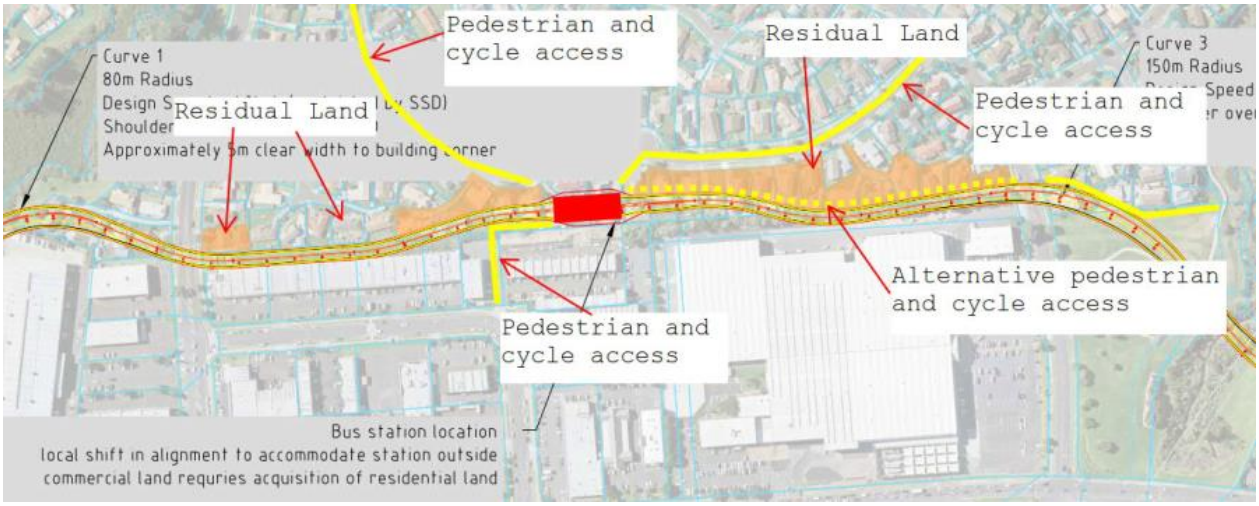


Figure 2 Option A - Commercial bund alignment

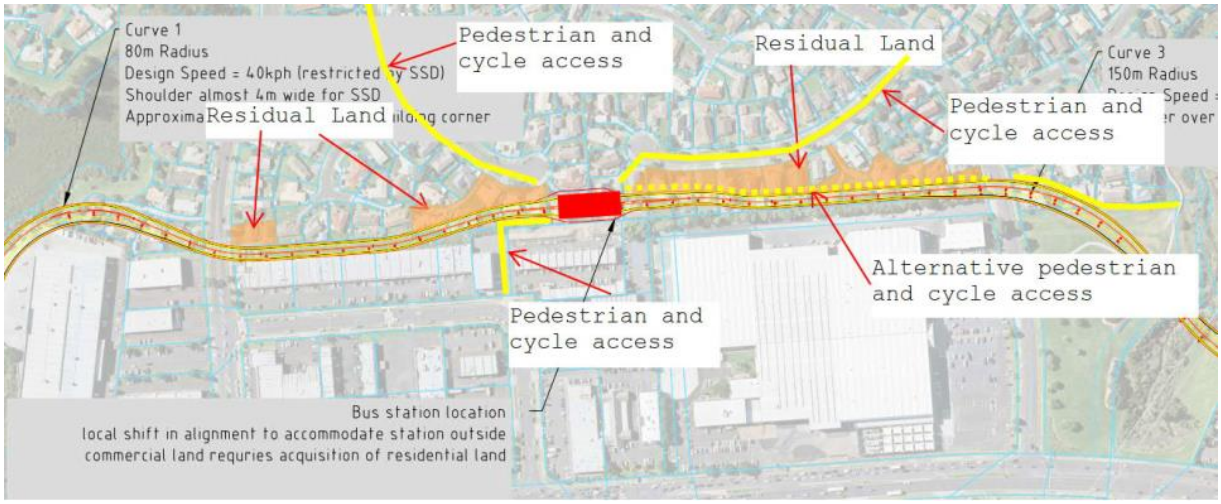


Figure 3 Commercial and Residential alignment

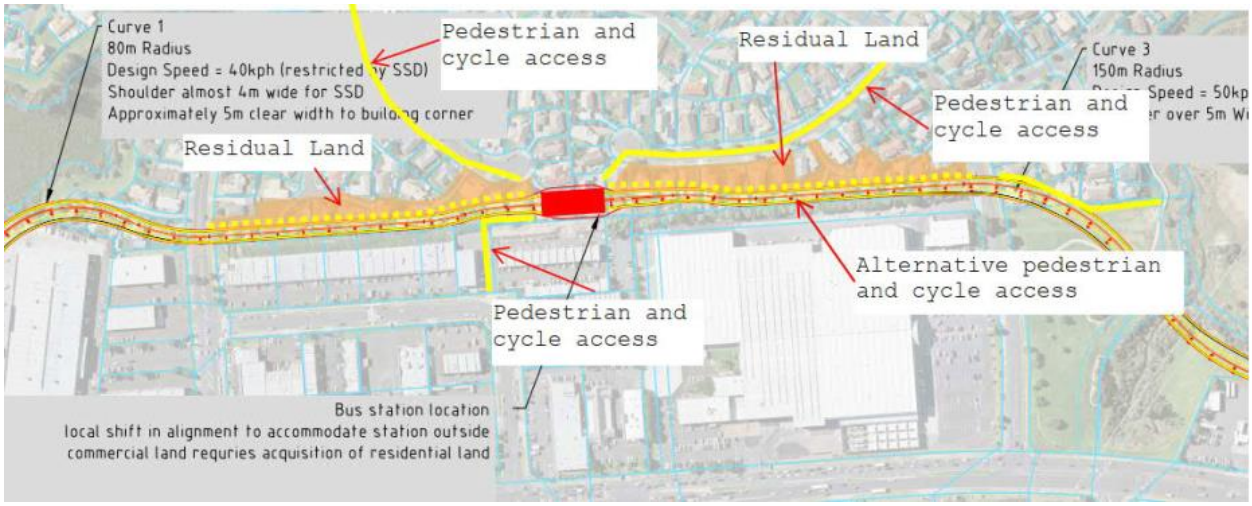


Figure 4 Option C - Residential alignment

7. The proposed options were presented by members of the EBA Design Team for consideration at the options assessment workshop held on the 30th April 2021. Technical assessors were asked to consider and provide feedback on the options in comparison to the technically preferred option (two stations located on the technically preferred EB3 C alignment).

Assessment of Options

8. The following are comments from each of the technical assessors on the proposed options.

Urban Design

9. **Chris Bentley (Urban Design/Visual/Landscape)** considered that a single station in a central location would result in a more compact urban form. A central single station is also considered to be a greater catalyst for future urban intensification. The provision of a single station also removes the need to provide a bus station within a public reserve.

10. Option C provides an appropriate buffer between the busway and remaining properties and also provide increased opportunities for urban intensification and redevelopment. Options A and B are similar however Option C provides for a larger buffer. For Urban

Design/Visual/Landscape Option C provides opportunities to provide a buffer between the busway and remaining residential properties as well as pedestrian and cycleway connections.

Social Impact and Business Disruption

11. **John Daly (Social Impact)** considered that the two station option creates the least amount of residual land, as such, has the potential to reduce the number of displaced residents. It is however noted that more residents will be in close proximity to the alignment and associated disruption during the construction and operational phase. This is unless suitable mitigation can be put in place both during construction and permanently.
12. The single station options will create a greater extent of residual land, and result in the loss of properties along the alignment. However, this will allow for the land to be redeveloped and to incorporate design and acoustic measures to mitigate impacts from the busway.
13. The proposed single station will be located between cul de sacs with slightly more exposure to residential activities compared to the two station option (located on the key access into the Burswood residential area). However, the central location will provide a new linkage between the business and residential areas, and overcome the severance created by the existing bund.
14. There are positive (increased connectivity and accessibility) and negative social impacts with all options. On balance there is a preference for the single station as this will remove residents that would otherwise experience construction and operational impacts in close proximity. There is also greater potential to redevelop land and design properties to respond to these impacts.
15. Option C avoids/minimises direct impacts on the business area. It is assumed that the new linkage can be provided without creating significant business disruption.

Property

16. **Fenella Fischer (Property)** notes that the single station options all result in an increase in property acquisition requirements. Each option is approx. $12 -$14M more than the current preferred two station option.
17. For the purposes of the assessment the Loading Bay of Bunnings/Target have assumed to remain operational without modification.
18. Due to less properties impacted and therefore lower cost of property acquisition, the two-station option is preferred, however the risks that are noted above should be addressed prior to any decision being made. If we require more land and the residential houses are impacted, residences require relocation, there is likely to be some damage from construction to the residential houses and the Bunnings/Target loading bay is not able to operate then we would need to revisit the assessment.

Noise and Vibration

19. **Joe Grimes (Noise and Vibration)** considered there was little difference between the two-station option and one station option. The reason for this is that a similar number of properties will be impacted. It was also noted that the one station options would bring the busway alignment closer to residential properties, and as such suitable screening would need to be implemented. For all options operational noise was not considered to be significant and all potential noise and vibration impacts can be mitigated.
20. For Noise and Vibration the effects are not particularly distinguishable between the options.

Construction

21. **Andy Gibbard (Construction)**. Option C maximises the distance from construction activities including retaining wall, earthworks and pavement construction to adjacent remaining residential properties, as under options A&B, residential buildings remain within 5-10m immediately adjacent to the proposed construction of these works.

22. In addition, a single station option requires less resources for construction and will likely reduce construction timeframes.

Busway Operations and Transport

23. **Shane Doran (Busway Operations)** considers there is little difference between the two station and one station option from an operational perspective. The main advantages of a single station option are improved bus movements to/from Harris Road and a marginal reduction in travel time for services as the buses would only be required to stop at one station and not two as is the case with the two stations arrangement (however dwelling times may increase at the single station, but are anticipated to still be lower than stopping twice).

24. From a passenger perspective the one station offers improved connectivity between services by providing better opportunities for interchanging and consequently offering customers with increased access to employment and residential areas. As a comparison, the 152 service would not connect with the 151 nor the 153 service with the two-station arrangement while all three services will connect at the one station options and therefore offer an improved level of service to customers.

25. The single station option does have a reduced walk up residential catchment of around 200 dwellings based on a 10 minute walk time. The walk time to capture the additional 200 dwellings is in the order of 1 minute and is considered to be a marginal difference. The employment catchment remains the same.

26. Overall, from a bus operations and customer convenience perspective the one station option is considered better.

Future Urban Development Opportunities

27. **Amy Thompson (urban redevelopment)** commented on the options with respect to future opportunities for Urban Development. Urban development includes opportunities for housing, employment growth as well as quality urban design outcomes and placemaking.

28. When analysing the opportunity for Urban Development both within and beyond the project footprint, three key conditions should be considered:

    1. a) Land use zoning to support a mix of uses

       b) Land use zoning to support intensification

       - The introduction of new rapid transit station(s) to this stretch of the alignment under both scenarios will act as a catalyst in itself for land use change. Introduction of the NPS-UD will enable intensification, subject to any qualifying matters. There are no qualifying matters which are likely to limit the density in this area, however more will be known when Auckland Council undertakes a plan change to implement the NPS-UD in 2022.

    2. Land parcels in public ownership – preferably assembled into developable parcels, rather than many smaller parcels in private ownership. Master planning and interventions on publicly

owned land can act as a trigger for the private market to respond, and intensify in a planned way

3. Connections to rapid transit – connections to/from the station; activities within walking distance of station

29. Two station option

Land Use Change

This option with stations at either end of Burswood enables growth as per the NPS-UD and is similar in area to the single station options. At Burswood East the catchment would span significantly across Burswood Reserve and the Transpower Substation (which whilst zoned Mixed Housing Suburban is an integral piece of the power network, and there is no indication that this site is likely to become surplus to requirements). At Burswood West the catchment would span across Pakuranga Creek.

Accordingly, this option would enable growth as per the NPS UD within walking distance of the stations, however much of the benefit of having two stations would be lost to Reserve and Marine environments.

Residual Land and Urban Development opportunity

The parcels of residual land for the two station option at Burswood East/West are marginal, with limited scope for the public sector to trigger a meaningful response from the market. Given the station locations on the periphery of the active commercial and residential areas, the sites are not overly attractive for investment beyond the transport corridor to trigger wider housing growth.

There is limited drive for placemaking interventions given the location of the stations on the periphery of the catchment.

Reference was made in the options session to the existing Chinatown site at Burswood West, and future integrated development opportunity. This opportunity would be enabled in both the single and two station option.

Connections to rapid transit

The presence of the two stations enables good catchment coverage (refer to SD comments). It doesn't introduce new pedestrian connections or overly improve connectivity across the primary catchment, however the main opportunity I see would be strengthening the connection through Burswood Reserve to Golflands residential area to the north east.

30. Single station option

Land Use Change

The single station option enables growth as per the NPS-UD, likely to a similar extent in active land area terms as the two station option. The central location would likely lead to a plan change for the whole of the peninsula to the north, and would also span the commercial land to the south. This is similar in extent to the two station option.

Residual Land and Urban Development opportunity

Depending on alignment the single station option would lead to a linear parcel of residual land along the northern boundary of the busway. It is unlikely that the vision of the NPS-UD could be realised on this land due to the awkward parcel sizes and shallow depth. A development capacity assessment has been undertaken for Option B, Figure 5, which shows 13 units could be accommodated on this land whilst providing good amenity for future occupants.

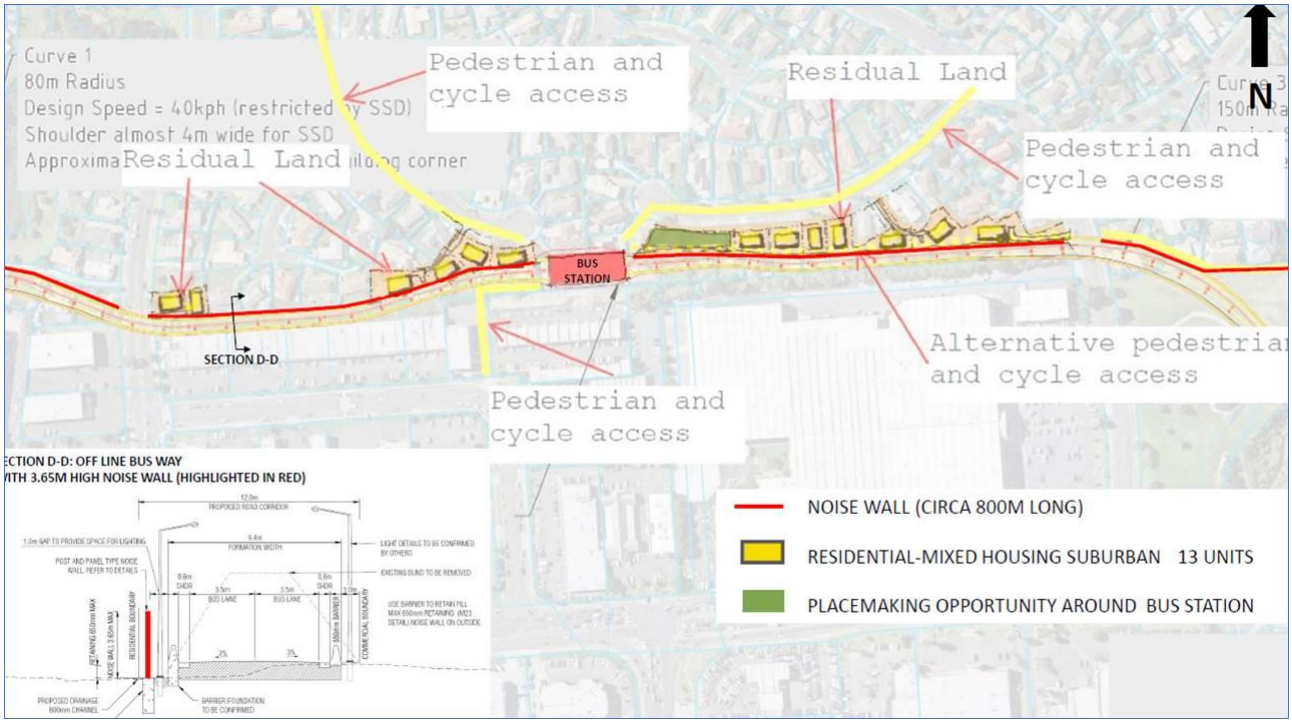


Figure 5.

However, a more comprehensive response to this land is enabled through this option - to look at a wider urban development opportunity. The capacity assessment below (figure 6) incorporates the residual land into a wider parcel, creating a separation from the busway and introducing natural surveillance, making the bus station the focal point of the place with some higher density mixed use development around it.

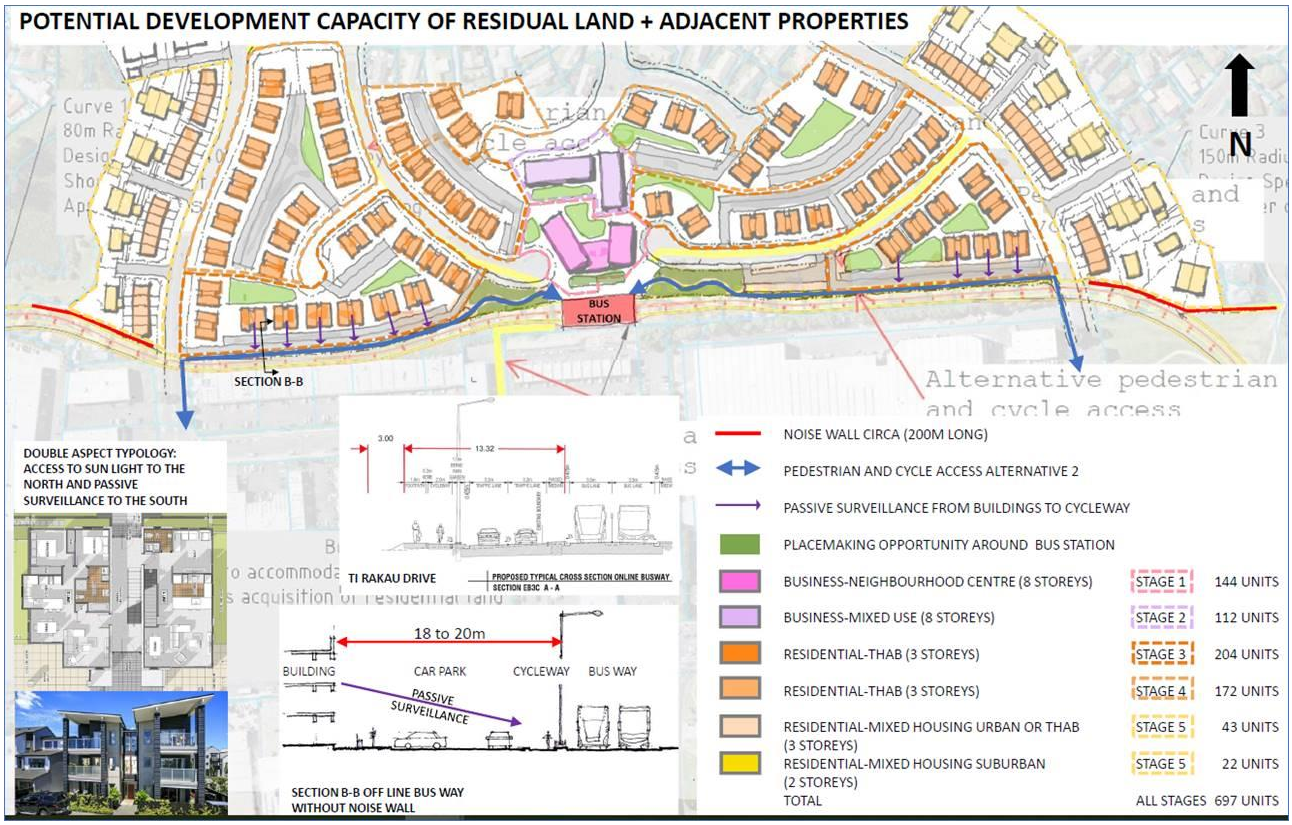


Figure 6

This comprehensive approach creates an opportunity to increase residential units from approx. 115 to approx. 697 units. In qualitative terms, it delivers a medium density place, with rapid transit at the heart, and a mix of uses within walking distance.

Early discussions with Panuku Development Auckland (Thompson/Young) have been positive – Panuku are enthusiastic about the place-making opportunity presented by this alignment. Whilst the discussions with Panuku have been preliminary it is a positive signal that this option presents the better opportunity for urban outcomes.

Connections to rapid transit

The central station option introduces a north/south connection through the commercial area, as well as E/W pedestrian connectivity along Dulwich Place and Heathridge Place. This is a particular strength of this option.

31. On the basis of the above, the single station option presents a good opportunity for Urban Development, with the best opportunity likely presented by Option C.

Risks and Opportunities

32. Each technical assessor, and AT SMEs were asked to identify any risk and opportunities associated with the options.
    - For any option the construction team has identified the former Greenmount Land fill site as a potential location for a construction support area (or other site yet to be determined), meaning the construction support area is common for any option.
    - The technically preferred two station option has increased construction risks due to the narrowness of the corridor available for construction activities and the proximity to residential houses.
    - There is a risk that the preferred alignment will require additional property and potentially relocation of residents during construction.
    - The centrally located options potentially provides better stormwater management opportunities (in residual land).
    - It was noted that the acquisition of residential properties is less complicated than commercial properties.
    - The centrally located options would result in a bus station being provided closer to more residential properties.
    - Suitable screening of buses would be required (for all options).
    - Centrally located options may allow for better integration of noise walls into future redevelopment of residual land (smaller noise walls could be provided the further they are away from the alignment, and new dwellings could include noise attenuation).
    - The two-station option, with the bund alignment would likely result in a noise wall being placed close to existing residential properties, potentially resulting in adverse visual effects requiring mitigation (indicatively a 2.0m - 2.5m high noise wall + 1.0m – 1.5m privacy screens).
    - All bus station options would require lighting. Consideration needs to be taken of the potential effects that bus station lighting may have on adjacent or close by residential properties.
    - Consenting risk (including land owner approvals) associated with locating a bus station in Burswood Reserve.

Recommendations

33. Overall, the consideration of the Eastern Busway 3 Commercial station options were comparable, particularly from an operational perspective. Based on the technical assessment undertaken, the benefits and disbenefits of a single station option have been identified and are noted below.

34. The main benefits of a single station option are:

    - Result in a more compact urban form, and potentially providing the catalyst for future urban intensification.
    - The increased areas of residual land will allow for future urban development that can be specifically designed to manage effects generated by the operation of the busway.
    - Less impact on Burswood Reserve through the removal of the station at this location (noting that the carriage way would remain).
    - The central location of the single bus station would result in new linkages being formed between the Burswood residential area and the Ti Rakau Drive commercial area.
    - From a construction perspective, a single station will require less resources than the two-station option.
    - The Single station, alignment option C, is preferred from a construction perspective as it provides the maximum distance between construction activities and residential properties.

35. Of the 3 centrally located options considered, Option C was preferred by the Urban Design Technical Specialist and AT SME as it presented greater potential for future redevelopment of the area.

36. The main disbenefits of a single station option are:

    - Due to the increased land requirements, a greater number of existing residents will be displaced
    - All single station options will result in increased land acquisition costs when compared to the current preferred two station option. The likely land acquisition costs are **$12 to $14M**.

37. It is noted that consultation with the community regarding the Eastern Busway Commercial 3 design is yet to be undertaken.

38. Both the central and two station options met the Eastern Busway Alliance project objectives. Operationally the two options have been assessed as having marginal differences. The centrally located option is seen to be a better urban design outcome when compared to the two-station location, and the centrally located option has also been assessed as a better option when future urban development opportunities are considered. The Centrally located option was also seen as preferable when considering constructability. However, the increase in cost to acquire the additional land for the centrally located option and the further displacement of residents are substantial negatives.

Outcomes

The findings of the Options Assessment for the EB3 Commercial Station was considered by the EBA Key Decisions Team on the 21 July 2021. For the reasons detailed above the centrally located station within the residential alignment (Option C) was endorsed by the Key Decisions Team to progress as part of the technically preferred scheme.

Appendix 8: EB3C Key Decision Paper

Eastern Busway Alliance Key Decisions Paper

Date: 8 June 2021

To:	**ALT**
From:	**ALT – Key Decision Makers – Andy, Dean, Karyn**
Subject:	**Eastern Busway Project – EB3Commercial changes alignment and busway location**

1 Context and Summary

The EB3C commercial alignment (the technically preferred scheme) has been developed further during the IPAA phase. Through the value engineering process, a number of risks identified by the design and construction teams which have significant impacts on costs, constructability and impacts on adjacent residential and commercial stakeholders. These risks are discussed at section 2.1 of this paper.

Following consideration of these risks on the 08/04/2021, Transport Planning and Design team requested the Alliance consider the following changes to the EB3 Commercial design be investigated:

- Single bus station located between Chinatown and Burswood Drive in place of the current two stations located at Chinatown and Burswood Reserve.
- A shift in the busway alignment from the commercial bund to the residential area

The Alliance investigated the proposed changes. This consisted of consideration of the risks (Design Advice Note 15) and an options assessment workshop held on the 30/04/21. On the 10/6/21 the ALT Operations Meeting made the decision to adopt the design changes. The basis of the decision is set out below.

A copy of the Transport Planning and Design Team Presentation, Design Advice Note 15 and the findings of the Options Assessment are attached at Appendix A.

2 Discussion

Additional risks and opportunities that emerged during the investigation of technically preferred and are set out below:

Residential alignment – risks and opportunities

- increased reputation risk as a number of residential homes are impacted during a housing crisis – this could be perceived as taking the 'easy option' and targeting homeowners and ratepayers, rather than commercial businesses
- greater opportunity for increased housing in medium to long term and enhanced access to busway stations for Burswood and surrounding community and improved walking and cycling experience

Commercial alignment – risks and opportunities

- increased construction challenges and risks as there are likely to be greater vibration, noise and dust impacts with residents living so close
- potential impact to liveability or desirability of homes in the long term with high noise walls and busy busway on back boundary
- enhanced access to busway stations for Burswood and surrounding community

Two stations – risks and opportunities

- perceived increased risk of anti-social behaviour associated with multiple stations on periphery of residential areas
- increased catchment and greater accessibility and transport choice for residents

One station – risks and opportunities

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

The risks identified with the technically preferred option are documented in DAN-CIV-015 dated 28/04/21 as follows:

- Without survey or engagement with the affected stakeholders, it is assumed that the use of the land required for the commercial alignment would not impact on the existing Bunnings and Target operations (specifically the loading dock to each facility) at 320 Ti Rakau Drive.
- The current design and cross section are based on aerial data as survey information is not currently available and there is a risk that once survey is validated additional property will be required for the busway. The commercial bund is circa 12m wide, currently the design assumes approximately 450mm between busway boundary and adjacent property buildings and boundaries. The risk is that the margin of error is significant without survey information.
- Impact on entrance to Bunnings and potential intersection works at the Intersection of Burswood Crescent and Commercial alignment behind Bunnings

Find below further details of the abovementioned risks and potential cost implications:

Risks associated with the current commercial alignment:	**Potential Impact on Costs:**	**Potential Impact of delay:**
Impact of Bunnings and Target Operations. On 28/04/21, the Alliance received further information regarding the truck movement operations for Bunnings, it showed that the existing bund was modified (encroaching into the proposed commercial alignment) to allow for turning vehicle movements for operations to and from the loading docks. (The underlying landownership is common between the bund and the Bunnings site). This widening appears to have been undertaken to allow for new or revised turning movements to and from the loading docks, in a perpendicular manner. This widening leaves a narrow residual sliver of land which is insufficient for the width requirements of the busway. The construction of the busway through this narrowed bund would encroach onto the	The information received on 28/04/21 means that significant modification of the loading area and potential mitigation works which could involve alterations to the existing buildings to maintain operation of the loading Bay. This results in significant risk of compensation to the affected stakeholders. **Property:** Market value for acquired land which will include injurious affection, in addition any loss to the existing operation would need to be mitigated or compensated which could include business loss and disturbance and	The planning programme is currently showing lodgement of the Notice of Requirement (NoR) for EB3C in April 22. The Consenting Strategy proposes direct referral to the Environment Court with a decision anticipated within 12 months of lodgement. The property programme would align to the planning programme, the aim being to have the Environment Court hear both the RMA and any PWA (s23 objections) at the same time. After the decision in November 2023, AT would have 3 months to proceed to take any land under s26 of the PWA, that

loading docks and potentially impact the loading docks' operations. This impact would likely add injurious affection costs to the commercial alignment option.	reconfiguration of the loading bay. **Cost of construction** Potential disturbance claims for the disruption to the operation of the loading bays at the rear of 320 Ti Rakau Drive. This could include the cost to reconfigure and rebuild the loading bay, so they are operational. This may also result in a loss of revenue during this period. This could be substantial. The reconfiguration of the loading bays would likely involve commercial warehouse modifications (e.g. structural and cladding work, plus wind, seismic, fire/life safety, plus new pavements etc) and are estimated to be in the order of $2M - $5m	has not already been secured for the project.
Impact on available construction area based on the accuracy of the level of survey currently available As noted above, the design is based on aerial photogrammetry, in the absence of detailed engineering survey. Given the tolerances that we are designing the busway to within the fixed constraints (such as buildings and structures), there is a risk that the detailed engineering survey identifies insufficient clearance to accommodate the busway.	Survey accuracy for aerials assumed to be circa 1-2m. Best case is that the survey would be accurate and no further properties would be impacted. Worst case scenario is that we would need another 1-2m which impacts the residential properties. We completed high level forecasting on the assumption the bund area was extended into the residential section by 2 m. This impacted approximately 10 full acquisitions and 19 partials at a high level cost of $17.5 million, excluding Environment Court or Land Valuation Tribunal costs.	

	Moving the boundary further into the residential properties would increase the number of properties required with an additional risk that properties may be damaged during construction.	
Impact on entrance to Bunnings and potential intersection works at the Intersection of Burswood Crescent and Commercial alignment behind Bunnings. On the alignment through the commercial bund, the intersection starts to be located very close to the existing driveway access to the Bunnings site. This creates two safety concerns: • Conflicts between drivers intending to turn in to either Bunnings or the Busway and mis-reading the intersection and ending up in the wrong location; and • For pedestrians, the occurrence of two regular carriageways with opposing travel of direction immediately adjacent to each other (unlike a motorway carriageway where the direction is from the left then the right). There have been fatalities for similar installations that have been removed from other jurisdictions to prevent further deaths.	This risk affects both alignments. Impact not assessed as part of the decision making.	

The proposed design changes to address these risks have resulted in a single centrally located station and a residential alignment which needs to be considered as part of the ALT decision. A summary of the key considerations identified by the Alliance workstreams is set out below.

2.1 Transport Planning input:

Both the residential and commercial bund alignments meet the transport planning objectives (Schedule 4 of the IPAA scope) and functionality outlined in Schedule 4 of the EBA minimum requirements.

The residential alignment also allows for a direct pedestrian and cycling connection into Tullis Place and Dulwich Place improving active mode connectivity from the station into the commercial area. Further, the residential alignment improves safety between buses and general traffic particularly at the intersection with Burswood Drive (east) by increasing the distance between the intersection and vehicle access into Bunnings. The width of the commercial bund alignment precludes the provision of cycleway and pedestrian facilities . The residential alignment allows for a high-quality cycleway and footpath parallel to

the proposed busway connecting Burswood Drive east and west providing a safe connection through the project area.

The 2 station option with stations adjacent to China Town and Burswood Reserve has a larger walking catchment area connecting with approximately 100 more residential properties than the 1 station option (which is located between the 2 cul de sacs of Tullis and Dulwich Places). However, the travel time for the 1 station option will be faster and more reliable than the 2 station option with buses only required to stop and start once reducing dwell time.

Further, the provision of 1 station mid block between the intersections with Burswood Drive allows buses to be given a 'green wave' through these intersections providing reduced travel time and improved reliability than the 2 station option where some bus services would be required to stop at these intersections.

The 1 station option improves accessibility by providing a direct connection into Tullis and Dulwich Places. The 1 station option also allows people to interchange between the current 351, 352, 353, 70, 705 and 706 bus services at the one location providing a more integrated transport system and offering customers greater travel choices and destinations and an improved level of service. The linking of these services at one common station location also improves legibility of the system as well as increased customer security with improved passive surveillance.

2.2 Design Input:

In the decision to adopt a single station, there are a number of cost savings that can be identified, due to the reduction in elements that are required for construction:

- One less station
- Lower noise walls and less screening to residential properties thereby providing better amenity outcome
- Fewer concrete crash barriers
- Reduced drainage due to the adoption of drainage swales
- less construction conflict of the cycle facilities due to the removal of the interface between bikeway and utility services along Ti Rakau Drive.

With the revised alignment, the change to the station location provided the following benefits:

- Reduced impact on adjacent residential properties by increasing the distance between the busway and residents with the ability for a buffer zone to be incorporated
- Provision of direct cycleway and pedestrian facilities to the station and improved connectivity into Burswood peninsula
- Provision of direct connection between the station and commercial precinct through to Torrens Road
- Improved legibility for customers and increased customer security with greater passive surveillance
- A more integrated transport system linking all bus services at the one location improving the level of service, travel choices and potential destinations for customers.
- Reduced travel time and improved reliability offering a better service for customers.
- Reduced impact on Burswood Reserve with a reduced busway footprint through this area.
- Improved safety by removing the intersection between the busway and Burswood Drive away from the access into Bunnings

2.3 Construction Input:

Both the residential and commercial bund alignments are constructable however on further development of the construction methodology the commercial bund alignment carries significant construction risks specifically associated with vibration impacts which could potentially cause damage to residential properties adjacent to the commercial alignment. These are discussed further below:

- The proposed alignment includes the construction of noise walls within close proximity of houses.
- The existing ground conditions and geotechnical investigations in the area may include basalt, which potentially could result in extremely hard conditions for foundation of the noise walls.
- Potential vibration effects of activities relating to noise wall construction, drainage and utilities excavation, earthworks and pavement construction
- Preliminary advice from the Noise and Vibration specialists suggested there was potentially high impact and likelihood for noise and vibration to impact adjacent dwellings, particularly given the minimal distance of 1-2m between the proposed noise wall and existing dwellings. The high potential for basalt subsurface conditions increases the impact and likelihood.
- The cross-section space is constrained and therefore the cycleway and footpath were designed to be along Te Rakau Drive rather than following the busway alignment.

Risks associated with the current commercial alignment:	**Potential Impact on Costs:**	**Potential Impact of delay:**
Close proximity of residential properties to the alignment being sensitive to vibration and noise during construction	Dwellings and garages potentially severely impacted by potential construction of retaining wall footings, and erection of noise wall panels	Productivity reduced due to use of small plant to manage/minimise vibration during footing excavation. Safety risk of lifting fence posts and wall panels immediately adjacent existing dwellings.
Potential of Basalt Outcrops along the bund	Basalt outcrops visible along alignment. Excavation of retaining wall foundations, drainage trenches and utilities/ITS conduit trenches could require rock breaking methods	Reduction in productivity due to rock breaking activities required, difficult to manage effects of rock breaking immediately adjacent dwellings including managing noise and vibration
Construction of the cycleway along Ti-Rakau Drive	Additional traffic management staging required to maintain access during construction within Ti Rakau Drive, reduced windows of work during offpeak times in order to access site and manage potential congestion	Additional time, traffic staging and resources required to manage

	Relocation of Utility networks potentially required	

Construction considerations in respect of a two-or 1 station layout are described as follows:

- The reduction in station numbers enables a reduction in resources and programme duration required to construct the original concept of 2 stations.
- Additionally, the original concept design placed both stations in a location that impacted access to adjacent activities – the western station at the access point to the China Town bridge works, the eastern station requiring the footprint of the Burswood material handling yard. Any delays on either activity would impact the commencement of the station in each location

2.4 Environmental Specialists input:

An options assessment workshop was undertaken on 30 April 2021. The findings of this workshop are attached at appendix A and a summary of the recommendations and output are outlined below:

The off line commercial bund alignment was, on the basis of the preliminary analysis, preferred as it minimised impacts on residential property and had lesser social impacts. However, with further analysis of the construction effects, including noise and vibration, on the residential houses that are in very close proximity, the necessary mitigations, such as reducing construction impacts through equipment choice, could not adequately mitigate effects.

Additionally, with the high level survey information to inform the final cross section required for the busway, long term effects on adjacent residential property, including 2-2.5 metre high noise walls and potential privacy screening on top of that would result in a poor long term outcome for those properties especially where the houses immediately abutting the bus way.

On balance the decision to acquire residential property, while more expensive and with some adverse outcomes for the community through the loss of houses and residents, would allow the busway to develop without generating outcomes that would significantly reduce the amenity of the remaining adjoining properties.

2.5 Consultation Input

As engagement with property owners and the community has not taken place on either option, it is difficult to provide an informed position at this stage. Mana whenua have not indicated a clear preference as pros and cons can be seen for both options and feedback has focused on the sustainable use and re-use of homes and infrastructure, whichever option is selected. Elected representatives have also not indicated a preference and can see the challenges and opportunities with both options.

2.6 Costs Input

A high level cost summary setting out the benefits and disbenefits for the residential and commercial alignments, including key assumptions is set out below:

Item	Proposed Commercial (2 Stations)	Option A Commercial/Commercial (1 Station)	Option B Commercial + Residential (1 Station)	Option C Residential (1 Station)
Construction Cost	$4M	$2M Potential savings in construction Lower noise walls Not as constrained	$2M Potential savings in construction Lower noise walls Not as constrained	$2M Potential savings in construction Lower noise walls Not as constrained
Property Costs	$49M 18 Partial, 8 Full, 4 Reserve 30 Total	$66M 10 Partial, 30 Full, 4 Reserve 44 Total	$61M 9 Partial, 31 Full, 4 Reserve 44 Total	$64M 8 Partial, 35 Full, 4 Reserve 47 Total
Total Costs	$53M	$68M	$63M	$66M
Property Risk Due to construction impacts/damage to residential properties	$40M	$10M	$7M	Low
Total Costs incl Risk due to construction impacts/damage	$93M	$78M	$70M	$66M
Station Accessibility	Access to both stations from Burswood Road Only one access to each Burswood West station platform	Access to Burswood Drive would require additional property (corridor too narrow) – access must be provided via land acquisitions on Heathwood Pl, Dulwich Pl and Torrens St Multiple accesses to each platform	Access cannot be provided to Burswood Drive west without additional property (corridor too narrow) – access can be provided via pathway along alignment to Burswood Dr east and via land acquisitions on Heathwood Pl, Dulwich Pl and Torrens St Multiple accesses to each platform	Access provided along corridor to Burswood Drive as well as Heathridge Pl, Dulwich Pl and Torrens St Multiple accesses to each platform

Recommendation:

At the ALT Operations Meeting 10 June 2021, the following key papers, attached, have been considered,:

- EB3 Commercial Alignment Options Presentation EB234-1-TE-PN-23-001 dated 08/04/21
- DAN – CIV -015 – EB3 Commercial Alignment dated 28/04/21
- EB3 Commercial Single Station Option Assessment dated 11/05/21

As a result the ALT confirmed the following changes to the EB3 Commercial design

- Single bus station located between Chinatown and Burswood Drive in place of the current two stations located at Chinatown and Burswood Reserve.
- A shift in the busway alignment from the commercial bund to the residential area

The IPAB was informed on this decision.

3 Appendix A

- EB3 Commercial Alignment Options Presentation EB234-1-TE-PN-23-001 dated 08/04/21
- DAN – CIV -015 – EB3 Commercial Alignment dated 28/04/21
- EB3 Commercial Single Station Option Assessment dated 11/05/21

Design Advice Note

DAN No:	CIV-015

THE INFORMATION HEREWITH MAY BE "PRELIMINARY AND NOT COMPLETE"- See Status/Purpose box

Subject:	EB3 Commercial Alignment				
Element:	Risk associated with the base case design, which currently crosses through land owned and operated by Bunnings and Target				
Location:	Burswood, Auckland, New Zealand				
Zone:	Zone 3	**Cost Element/Work Package:**		**Design Lot Ref:**	RD-300
Prepared By:	Nic Smith			**Date:**	28/04/2021
Reviewed By:	Simon Jones			**Date:**	28/04/2021
For Issue to:	Ida Taefu Sharon Coles Kyle Rolland Tracey Brown				
Attachments:	None				

Status/Purpose/Reason for this Advice:

This DAN is to be read in conjunction with the presentation EB234-1-TE-PN-Z3-0001_Rev A2, which describes the alternative alignment options to the rear of the EB3 Commercial area and addresses the question of replacing two stations with a single one.

The purpose of this DAN is to draw attention to, and document, the specific risk associated with the current base design, which crosses land owned by Bunnings and Target.

Assumptions/Background

From the outset of the Eastern Busway Alliance the offline option for the EB3 Commercial area has entailed an alignment which passes to the north of the commercial properties, between these and the residential properties immediately to the north. The total length between Burswood Drive west and Burswood Drive east is approximately 600m. Refer to the figure below for the current base case design and the general extents of the section in question.

Figure One – Base Design Alignment

The MCA process identified the preferred option as the alignment that traverses along the underutilised land

on the rear of the commercial properties, adjacent to the boundaries with the residential properties. There is a significant risk that the design team has yet to resolve that may mean that this option is ultimately significantly more challenging to implement. This risk has been raised previously, and discussed in several forums, including:

- The Multi Criteria Assessment in February 2021;
- The recent Challenge Team review of the project in March 2021; and
- An "EBA Project Walkthrough Session" with senior AT executives and others on 19 February 2021.

The minimum corridor width between commercial buildings and the boundaries with residential properties is believed to be 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. Refer to the cross section below. Note, there may be opportunities to minimise this cross section further, for example by integrating the lighting column with the barrier and this will be investigated in parallel with addressing comments from the Alliance and AT.

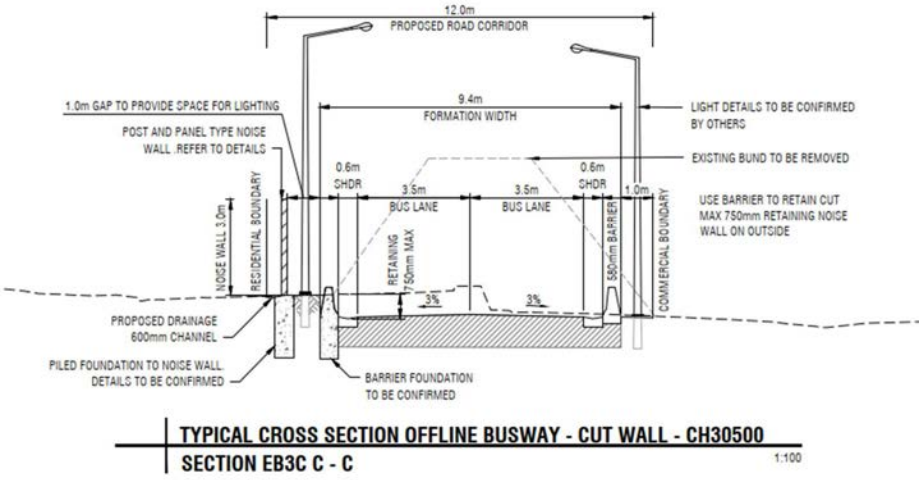


Figure Two – Typical Cross Section

The concerns for this length of the busway therefore are:

- 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 to 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.

These concerns remain valid, but this DAN will not discuss them in further detail, on the assumption that they are widely and well understood, and will be assessed as part of the mini MCA process that is reviewing the most effective alignment along this section of the busway. This DAN will focus on the additional risks associated with this alignment which may not be as widely understood, and specifically the risk associated with the eastern section of this alignment.

Along the western 200m, there is a "commercial buffer" which is an earthen bund in excess of 3.0m in height. This is not understood to serve any function as a noise barrier. The central section comprises a mixture of parking and what appears to be waste land. However, the eastern 200m crosses property understood to be owned by Bunnings, and which is used for deliveries to both Bunnings and also to Target. The figure below illustrates the area in question, with the two particular areas of concern associated with this alignment circled in red.

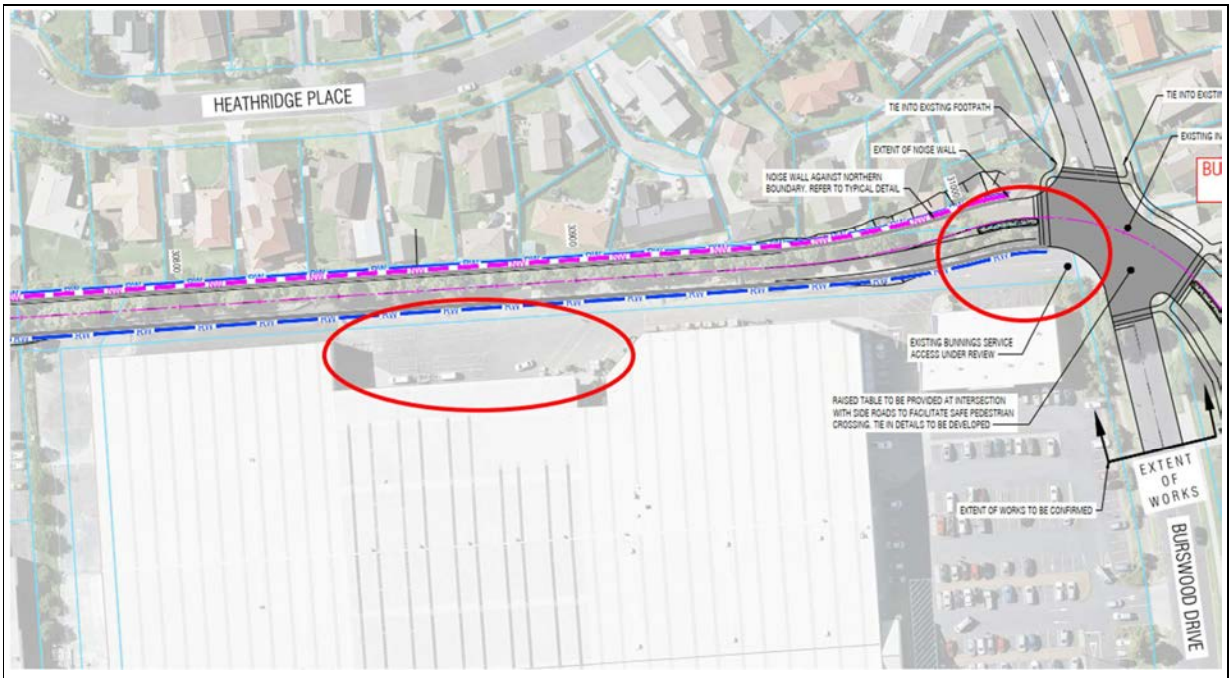


Figure Three – Bunnings Property Risks

The specific issues in this area are 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 Bunnings and Target use this space, and their ability to safely make deliveries.

The first issue can likely be overcome by signalising this intersection, including the access to the delivery yard, although we understand that Auckland Transport will not typically signalise a private access. If the busway intersection were relocated north, to create some separation between this and the Bunnings access, that would be a more robust solution, however it would require the acquisition of residential properties to achieve this.

A resolution for the second issue is however more difficult to identify at this point in time, for the following reasons:

- We do not know the true extents of this area as we have no topographical survey, and are reliant only on aerial photographs which do not show the extent of covered loading docks;
- We do not know how Bunnings and Target currently use this area, with what vehicles and with what regularity;
- We do not know how amenable Bunnings may be to the potential loss of some of this land, and their willingness to work with Auckland Transport to find a mutually acceptable solution; and
- We cannot resolve these questions until Bunnings have been engaged in dialogue, and we can openly discuss this matter, and access the site to carry out a survey.

Consequently, this alignment carries risk which cannot presently be eliminated. The EBA should be fully cognisant of this risk when considering the different alignment options in this area.

However, the following commentary is intended to provide further context, and potential solutions.

- It may be possible to create 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, though this is not shown on some aerial photographs:

Figure Four – One-Way System

- 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 we note that exactly how the area is used is 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, as shown below

Figure Five – Aerial Suggesting Reverse Parking

Figure Six – Aerial Suggesting Parallel Parking

- It is not certain if either aerial photograph reflects the current situation or which is the most recent, though the photograph showing parallel parking is understood to accurately show the entrance to the depot, which has the traffic lanes reversed to permit the left turn in.
- Assuming it is necessary to turn a rigid or articulated truck in this area, then the tracking sketches below illustrate that this is possible for an 11m rigid truck or a 17m articulated truck assuming that there is a minimum of 9m of covered useable area against what is assumed to be a loading dock. This seems plausible as this broadly aligns with the building roof lines. However, without access to this area, it is not possible to confirm this turning movement would work in practice. Furthermore, due to the constrained width between the buildings and the proposed busway alignment, it is apparent that as few as three articulated trucks would be able to park and turn here at any one time.

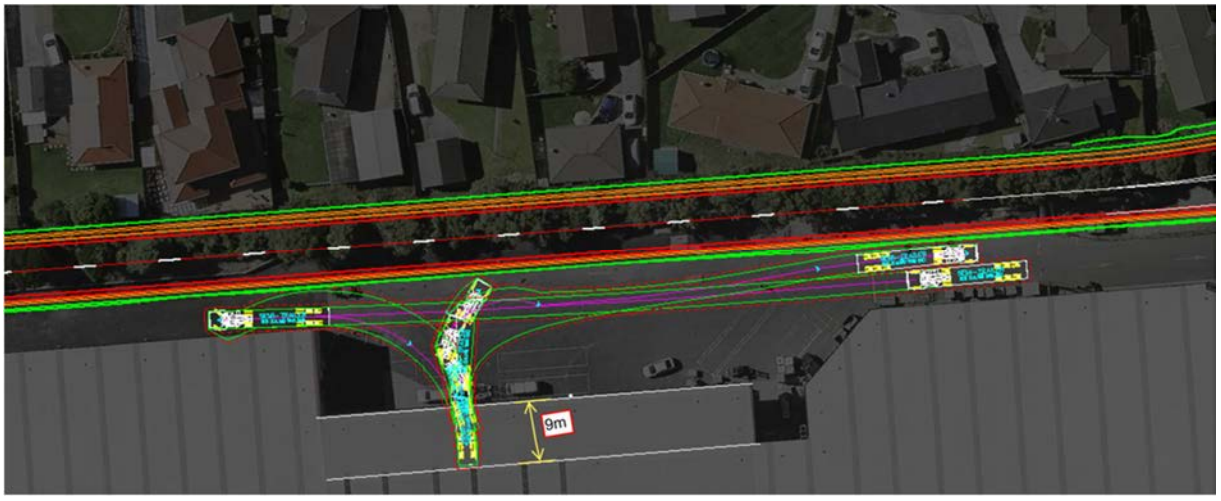


Figure Seven – Articulated Truck Reverse Parking to Assumed Loading Dock

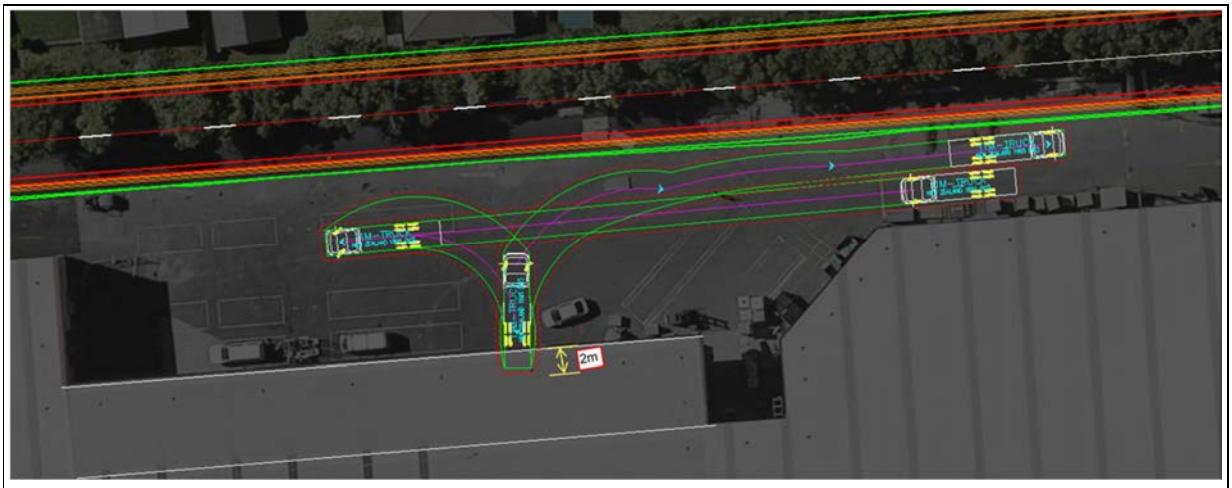


Figure Eight – Rigid Truck Reverse Parking to Assumed Loading Dock

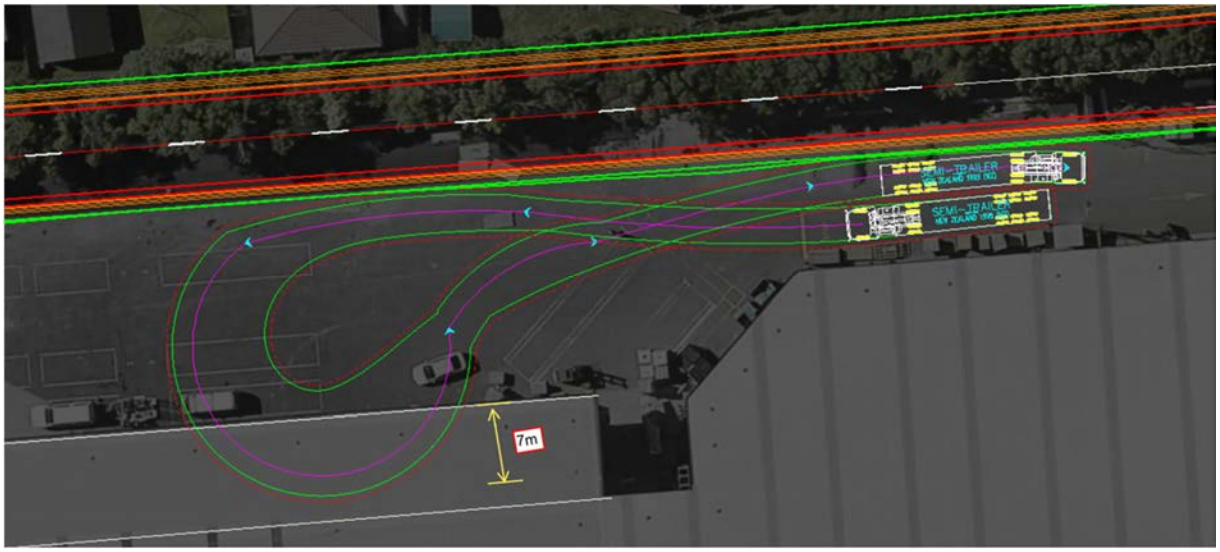


Figure Nine – Articulated Truck U-Turn

- Ultimately, the risk that the busway cannot be accommodated purely within commercial property is addressed within the presentation on the commercial alignment options, with up to $40M of property related risk identified for the current base alignment.

Compliance with Design Standards/ Departures Required:

NA as this area is a private property and not governed by general highway design standards.

Options/Alternatives that could be considered:

None identified

Recommendation:

- The Design Team recommends that this advice is taken into consideration when deciding which alignment to take forward 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.

RISKS & OPPORTUNITIES **associated with this advice (e.g. Qualifications/Uncertainties/Design cases not considered).**

Description	Likely Impact	Suggested Mitigation
Cost and delay associated with moving the alignment from the commercial property to the residential, if ultimately agreement with Bunnings cannot be reached.	Increased cost from purchasing more expensive residential property, increased costs associated with the current alignment due to injurious effects if Bunnings are able to demonstrate their operations are adversely affected, and delay whilst the design is modified.	The least risk approach would likely be to remove the alignment from the commercial properties, despite the projected increase in land costs.
Safety of the Bunnings / Busway / Burswood Drive intersection.	Safety risks caused by the proximity of the busway to the Bunnings delivery yard access.	This risk would be reduced by relocating the busway to the north, though more residential properties would be affected at increased cost.

Safety in Design (SID) & Constructability Considerations:

As discussed, the safe access to and operation within the Bunnings delivery yard is the primary concern. These issues can likely be managed and mitigated, but could be designed out by relocating the busway from the commercial property.

Maintenance in Design considerations (including Whole of Life and O&M):

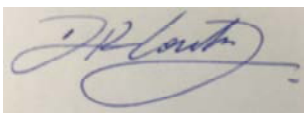
Not directly considered as part of this DAN.

Sustainability Considerations:

NA.

Further Information Required:

None

Actions Designer is taking next:	**When:**
• Await the outcome of the decision on the preferred alignment through EB3 Commercial, and confirmation of the requirement for one station or two.	14/05/2021
Actions we are expecting you to take next:	**By when:**
• Consider this advice and the associated risks when considering which alignment we should proceed with as our base design. • Confirm which alignment we should proceed with as our base design.	In parallel with the Key Decision regarding 1 station or 2
Zone/Design Manager Approval (signature): 	**Date:** 30/04/2021