

4.3.2 Management Plan Approach

The construction methodology will employ management plans as set out in the proposed EB3C conditions (Appendix 5) and listed in Table 4-4. The proposed conditions detail the objectives of each plan, their required contents and how the plans relate to each other. In addition, the conditions provide a certification process for the Project’s management plans following the confirmation of the designation and the granting of resource consents.

Table 4-4 Construction Related Management Plans

NoR Related Management Plans	Resource Consent Related Management Plans
Construction Environmental Management Plan (CEMP)	
Communication and Consultation Plan (CCP)	Lizard Management Plan (LMP)
Construction Noise and Vibration Management Plan (CNVMP) and associated site-specific schedules	Contaminated Land Management Plan (CLMP)
Construction Traffic Management Plan (CTMP) and associated site-specific plans (ssCTMPs)	Site Specific Erosion and Sediment Control Plans (ssESCPs)
Tree Protection Management Plan (TPMP)	Chemical Treatment Management Plan (ChTMP)
Urban Design and Landscape Plan (UDLP)	Habitat Restoration Plan (HRP)
Historic Heritage Management Plan (HHMP)	Native Fish Capture and Relocation Plan (NFCRP)
	Historic Heritage Management Plan (HHMP) ³¹
	Coastal Works Management Plan (CWMP)

The Construction Environmental Management Plan (CEMP) is an overarching document to manage the potential or actual environmental adverse effects from construction of the Project. The purpose of the CEMP is to set out an overarching framework and construction methods to be undertaken to avoid, remedy or mitigate any adverse effects associated with the construction of EB3C and EB4L, so far as reasonably practicable.

The CEMP sets out measures including management methods, controls, and reporting standards to be implemented to meet the legislative requirements relating to construction activities associated with both packages. It also provides an overview of the different environmental aspects associated with the construction programme, while setting out a comprehensive framework for the management of actual and potential adverse environmental effects. The CEMP will be fully integrated with that for EB2 and EB3R to ensure a consistent approach is taken corridor wide during the construction of the Project.

AT, with its delivery partner EBA, has developed a suite of environmental management plans for EB2 and E3R as detailed in Figure 4-19. The Project will update these management plans (either by way of a schedule or an update to the relevant plan in its entirety) to include the additional scope of EB3C and EB4L. Updating the proposed and existing draft management plans will provide for consistency in the environmental management approach across the Project, ease of administration and through monitoring of the performance of the plans it will allow for continuous improvement opportunities to be realised as the Project’s construction progresses.

³¹ The HHMP will be imposed under both the NoR and resource consent conditions for EB3R given that the historic heritage extent of place is located both landward and seaward of MHWS.

The process for updating these management plans to address EB3C and EB4L is explained further below.

The CEMP and sub-management plans may be updated throughout the duration of the Project to reflect changes to construction techniques or the physical environment. Any amendments to a certified management plan that may result in a materially different outcome will require certification by Auckland Council (the Council). The process for this is outlined in the proposed condition sets for both EB3C and EB4L.

Further to the management plan framework that has been proposed for the Project, EB3C will also employ a Historic Heritage Management Plan (HHMP). The HHMP will, as far as reasonably practicable, avoid, remedy, or mitigate adverse effects relating to the construction works within the historic heritage extent of place in proximity to Bridge B.



Figure 4-19 EB2/ EB3R Construction Environmental Management Plan Framework

4.3.3 Construction Programme

An indicative programme has been prepared for the Project. As detailed in Section 1 of this AEE, EB3C is one of four main proposed packages across the entire Project footprint. The indicative construction programme is approximately for 42 months and commencing late 2024, subject to obtaining the required RMA approvals.

4.3.4 EB3C Construction Phasing

The construction phasing of EB3C will be dependent on the methods of procurement, land acquisition, and the availability of resources (such as materials and construction equipment). Finalised phasing for this stage of the Project will be confirmed and managed through the Project’s various management plans, including both the CEMP and CCP.

4.3.5 Coastal Construction Methodology

The construction of structures in the CMA, including bridges and stormwater outfalls will involve temporary structures. These structures and staging are required to provide access for construction plant and equipment and is part of standard construction practice in a coastal location, with Figure 4-20 providing an example of such staging. For EB3C, the following temporary coastal structures are proposed:

- Approx 60 x 700mm diameter temporary piles for Bridge A. Their approximate driven length will be 20m
- Approx 30 x 700mm diameter temporary piles for Bridge B. Their approximate driven length will be 20m.

Once construction of the bridges is complete, the deck and structural steel of the temporary structures will be removed, and every effort will be made to remove the piles. However, if the piles are too heavily imbedded, they will be cut off below ground level to avoid becoming a navigation hazard.



Figure 4-20 An Example of Typical Temporary Staging within the CMA

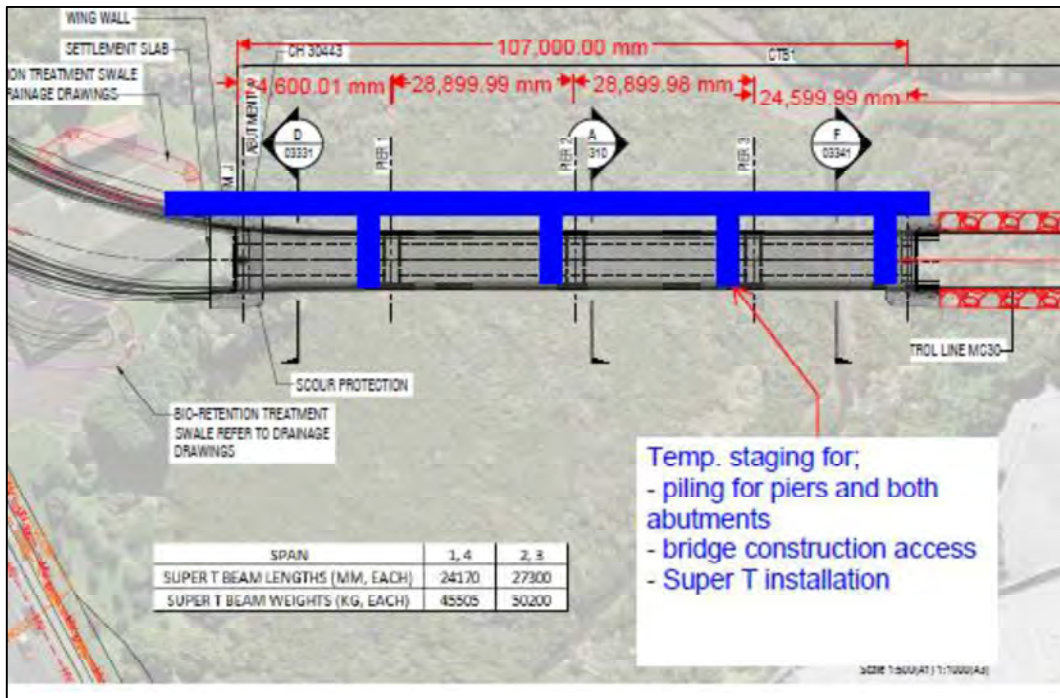


Figure 4-21 - Indicative Temporary Staging shown alongside Bridge B

4.3.5.1 Coastal Construction Phasing

Upon the establishment of the construction access structures, the construction of the permanent bridges will occur. The bridges will be largely constructed from precast concrete components that will be reinforced in-situ. In practice, this includes precast concrete girders, concrete piers/columns and reinforced concrete bored piles. Bridge abutments will feature MSE walls with deck end spans resting upon them. The key steps include:

- Construction of permanent stormwater infrastructure. The outfalls will likely include an area of rip rap to prevent erosion
- Construction of a permanent retaining wall between 242 and 254 Ti Rākau Drive (RW304), which is 2m high with approximately 4m³ of fill
- Construction of MSE embankment at the northern end of Bridge B behind Chinatown, which will partially fall within the CMA. The embankment will have wick drains installed below the embankment to provide a passive drainage path to accelerate settlement of the existing ground
- Construction of bridge foundations, including
 - 8no, 1.5m diameter Bridge A piles
 - 3no, 1.8m diameter Bridge B piles
 - Scour protection around the bridge piles (if required)
 - Part of the scour protection to the eastern abutment of Bridge A that is within the CMA
 - Part of the scour protection to the northern abutment of Bridge B that is within the CMA.

These bridging works will be subject to the controls imposed through the proposed Coastal Works Management Plan (CWMP).

4.3.6 Coastal Reclamation

Two areas of coastal reclamation are proposed for EB3C. The first of these is for the construction of retaining wall (RW304) and associated fill required for the new busway which will occupy an area of approximately 4m² of the CMA between 252 and 254 Tī Rākau Drive. The second is for the reinforced embankment³² at the northern end of Bridge B being two areas of approximately 211m² and 338m², which will occupy a total area of approximately 549m² of the CMA. This reclamation will involve sheet piling to isolate work areas from tidal flows, followed by the laying of new fill to create new stable land. All reclamation works will be subject to the CWMP and related ssESCPs.



Figure 4-22 Bridge B Proposed Reclamation

4.3.7 Utilities Protection and Relocation

As previously detailed, the Project is located within a brownfield environment, with numerous network utilities present within and crossing through EB3C's alignment. These utilities range in scale, regional significance, and age. The key services within EB3C's alignment are:

- High voltage transmission overhead lines
- High voltage transmission underground cables
- High pressure gas mains
- Water transmissions, bulk water supply and wastewater infrastructure
- Fibre optic communication cables and telephone lines
- Electricity and gas distribution
- Stormwater drainage.

EBA has engaged with the network utility operators of these infrastructure assets, as further discussed in Section 8 of this AEE. Key matters discussed include whether these infrastructure assets require protection during EB3C's construction, as well as whether relocation is warranted. While the final methodology of individual network utility works is being developed, it is anticipated that these works will rely on a mix of trenching and directional drilling.

A summary of works relevant to each of these network utility types is provided below.

³² Which includes imported fill, and permanent wick drains.

4.3.7.1 High voltage Electricity Transmission

As with EB2 and EB3R, there are high voltage transmission lines within EB3C’s footprint that are operated by Transpower New Zealand Limited (Transpower). These transmission lines are present as both underground (220 kV) and aboveground (110 kV) transmission corridors as shown in Figure 4-23 and Figure 4-24³³.

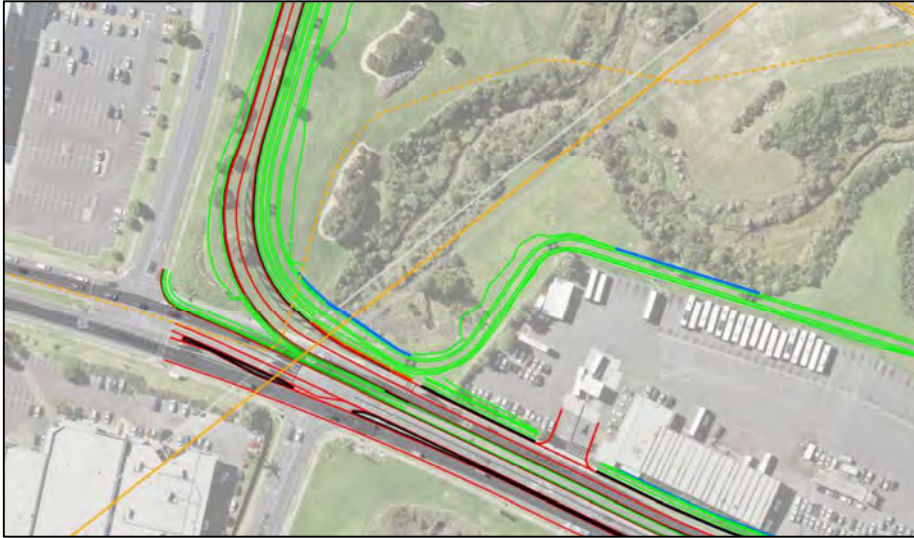


Figure 4-23 High Voltage Transmission Lines at Burswood Reserve (shown in yellow – both dotted and lines)



Figure 4-24 - High Voltage Transmission Lines at Pakuranga Creek (shown in yellow – both dotted and lines)

The New Zealand Code of Practice for Electrical Safe Distances (NZECP:34) specifies minimum approach distances to all overhead power lines for construction activities and permanent road alignments. EB3C’s design will avoid overhead and underground transmission lines and cables wherever possible. However, there are locations where the overhead and underground lines are affected by both construction activities and permanent works. For example, works are required to realign the span between affected towers and increase the clearance under conductors by raising the height of the transmission towers.

³³ Continuous lines on these figures indicate aboveground lines, while discontinuous ones indicate underground lines.

4.3.7.2 Electricity Distribution

The majority of electricity distribution infrastructure within EB3C is underground. The distribution network is operated by Vector Limited (Vector), including low (400 V), medium (11 kV) and high voltage cables (33 kV). EB3C’s construction will involve the relocation of some substations and transformers associated with local electricity distribution network. In addition, EBA proposes to underground some distribution lines where they conflict with common service trenches and other parts of EB3C. EBA is in consultation with Vector regarding these works.

4.3.7.3 Gas Pipelines

There is a gas main that is located underneath Tī Rākau Drive (Figure 4-25Figure 4-25). EBA has sought to avoid any works on this infrastructure. There are also a number of low to medium pressure gas mains, as well as a DRS gas cabinet within the EB3C area³⁴. Any affected services will be relocated or protected during construction. EBA is in continued consultation with Vector Limited regarding the proposed works and any impacts on their gas infrastructure, including maintaining minimum approach distances.



Figure 4-25 – Gas Mains (Shown in dark green)

4.3.7.4 Water and Wastewater Infrastructure

Given its brownfield location, there are numerous potable water and wastewater infrastructure assets situated within the EB3C works footprint. EBA is undertaking continued consultation with Watercare Services Limited (Watercare) regarding these assets. This includes the identification of assets that require relocation, removal and/or construction protection.

4.3.7.5 Fibre Optic Communication Infrastructure

There are a series of conflicts with existing underground fibre and copper telecommunication cables that have been identified by EBA. These infrastructure assets are owned by several providers, including Chorus Limited (Chorus), Vector and Vodafone New Zealand (Vodafone). New service

³⁴ DRS gas cabinets are “District Regulating Stations”, which regulate gas pipeline pressure.

ducting will be constructed by EBA to house relocated telecommunication cables, with this work undertaken in agreement with the various operators.

4.3.8 Construction Support Areas (CSAs)

As detailed in the ITA, the bulk delivery of construction materials and the removal of construction waste will be from the three construction support areas (CSAs). These CSAs will act as centralised hubs for EB3C, receiving waste and distributing construction materials for EB3C, as required. The Integrated Transport Assessment (ITA) (Appendix 14) details the various construction access arrangements for EB3C works, including the CSAs at:

- Burswood Esplanade Reserve
- 242 Tī Rākau Drive
- 254 Tī Rākau Drive.

A series of small short-term satellite yards will be located along EB3C's alignment. These yards will occupy sites that have been previously demolished and/or cleared for the Project. These smaller construction yards will be largely transitory and will be disestablished once the land is required for permanent Project related infrastructure or once the adjacent construction is completed.

The construction and satellite yards may contain the following (or similar) activities:

- Temporary site buildings – workers' facilities, site offices and meeting rooms
- Plant and equipment maintenance facilities
- Fuel storage and minor refuelling facilities in accordance with Hazardous Substances and New Organisms (HSNO) Act 1996 (HSNO) (20ft max bunded containers)
- Material laydown areas including stockpiling of materials and spoil
- 10 ft, 20 ft, and 40 ft material storage containers
- Wheel washing and cleaning facilities
- Lighting/fencing/security temporary mesh panels 1.8m high/hoarding
- Staff parking
- Plant and equipment parking.

These construction and satellite construction yards will also be subject to the various construction phase management plans proposed by EBA. This includes:

- The CEMP
- The CTMP (and site-specific CTMPs)
- The CNVMP (and schedules)
- The ESCP (and site-specific ESCPs)
- The CLMP (where needed).

4.3.8.1 Burswood Esplanade Reserve CSA

This construction support area (CSA) will be located at the corner of Burswood Drive East and Tī Rākau Drive, within Burswood Reserve (Figure 4-26). The CSA will also be used as a satellite office with on-site car parking and as a transfer station for the wider construction works in EB3C. Temporary access points will be constructed off Burswood Drive (east). This CSA is estimated to be occupied from mid-2024 for a period of 42 months, upon which it will be removed to make way for a section of the busway.

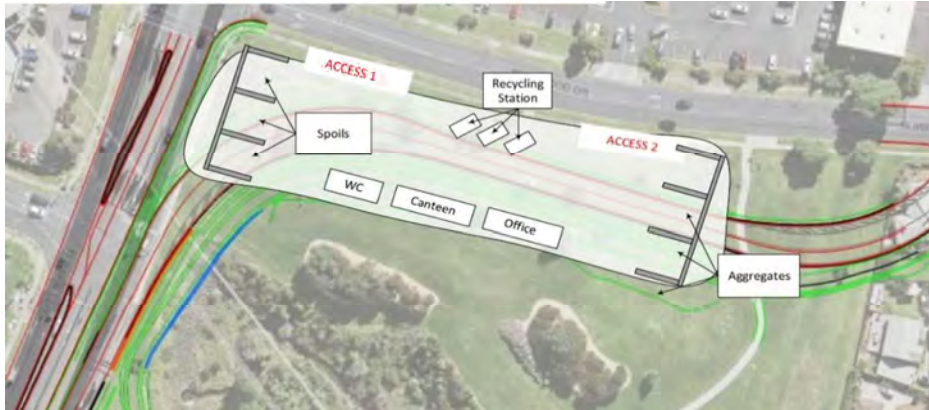


Figure 4-26 Indicative Layout of CSA at Burswood Reserve

4.3.8.2 242 Tī Rākau Drive Construction Yard

This CSA is located on land currently occupied by a service station and will be used once the site is vacated by the current service station operator. It will act as a satellite office with on-site car parking, as well as acting as a staging location for the construction of Bridge A. Access will be off Tī Rākau Drive and the CSA will be operated from Mid-2024 for a period of 42 months.

4.3.8.3 254 Tī Rākau Drive

Although not part of the CSA at 242 Tī Rākau Drive, it is intended that the Pet Stop property at 254 Tī Rākau Drive will also be acquired by AT to serve as a staging area for the construction of Bridge B. It will also form part of the permanent bridge footprint.

4.3.9 General Construction Traffic Management

As detailed in the ITA, the bulk delivery of construction materials and the removal of construction waste will be from the two primary construction yards. These construction yards will act as centralised hubs for EB3C, receiving waste and distributing construction materials for EB3C, as required. Traffic movements associated with the movement of materials and waste to and from the construction yards will be controlled by the CTMP. The CTMP will include restrictions on heavy vehicle movement times. Some materials, like retaining wall blocks, will be delivered directly to work areas.

Some construction traffic movements will be scheduled for night-time hours of operation³⁵. This is primarily where these deliveries would be impractical during daytime traffic, such as the delivery of precast bridge beams. Again, these movements will be governed by the CTMP, as well as the CNVMP.

In all instances, these general traffic movements will avoid using Dulwich Place, Tullis Place or Heathridge Place for construction access.

4.3.9.1 Site Access Points (SAP's) and Construction Fencing

Each construction yard and site egress point will have a site-specific Site Access Point (SAP) management plan and will also be managed through the Project's CTMP(s) as detailed in the proposed conditions. SAPs are a common construction management tool, which act to control the interface between construction activities and the general public. In general, a SAP provides for:

³⁵ Nighttime construction hours are between 18:00 to 07:00 the next morning.

- The construction of construction access facilities (e.g., pull-off lanes, turning bays, signalled intersections, driveway crossings (amongst others))
- A temporary traffic management access and egress points of the site.

These access arrangements are used as authorised entry/exit check points, as well as help co-ordinate the deliveries and road worthiness of existing vehicles. SAPs will be one of the first items established on site, along with safety and security fencing around works areas and compounds. The fencing will provide a physical barrier between the works and public and will be maintained for the duration of construction works (as required by the proposed conditions associated with the CEMP).

The SAPs will consist of:

- Either a permanent or temporary traffic management setup
- Sealed entry way off the adjacent carriageway
- Lockable gate and perimeter fencing around the circumference of the compound or works area
- A sign-in/sign-out station, including safety and environmental protocols within
- Wheel washing facilities.

While the final locations of SAPs may change depending on the final construction methodology and sequencing of the works, they are likely to include the following locations:

It is expected that three additional SAPs will be established to assist in the construction of the offline busway behind Chinatown, as well as between Burswood Drive (west) and (east). Two of the SAPs will be located along Burswood Drive (west) on either side of the proposed Burswood Drive (west)/Busway intersection and one SAP at the proposed Burswood Drive (east)/Busway intersection. Figure 4-27 and Figure 4-28 show the SAPs along Burswood Drive.

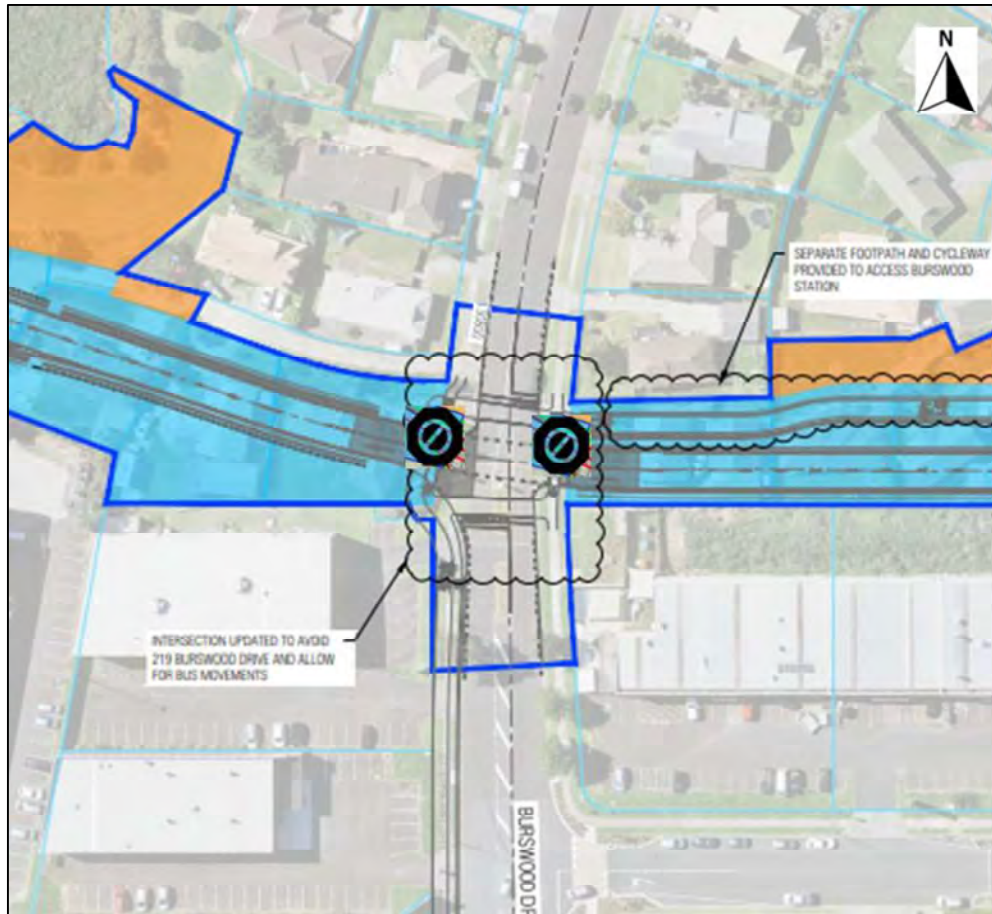


Figure 4-27 Burswood Drive (west) SAPs



Figure 4-28 Burswood Drive (east) SAP

4.3.10 General Construction Activities and Hours

In general, construction works will take place between 0700 and 1800 Monday to Friday, and 0700 to 1500 on Saturdays. It should be noted that construction shift arrivals and departures will

occur outside of these hours, as will the setup and pack up of construction traffic management measures (e.g., road cones and temporary barriers).

The exception to the standard work hours for EB3C is occasional works during night-time, Sundays and public holidays. These work times, while limited, will be necessary where works could cause congestion, disruption to local businesses/residents or safety risks to EBA workers if they were carried out during the day on weekdays.

It is anticipated that some night works will be undertaken to minimise the disruption to the public, businesses, and traffic. Night works will be intermittent and will not be continuous in a single location or activity for more than one month. These works will be controlled in part by the Project’s conditions, include those associated with noise and vibration.

Night works are not currently planned along the Burswood section of the EB3C alignment, with the exception for the house relocation works. Night works are planned along Bridge A and Bridge B, and on the Tī Rākau Drive section of EB3C. Night works will only take place when works cannot practicably take place during the day.

All night works will be managed through the CTMP, CNVMP, CCP and site-specific measures. This includes clauses of those management plans that require engagement with neighbouring residents and businesses as detailed in the proposed conditions (Appendix 5).

4.3.11 Earthworks

The approximate earthworks area and volume are detailed in Table 4-5 below. All earthworks will be subject to the ESCP, which will be prepared in accordance with Auckland Council’s Guidance Document 05 “*Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region*” (GD05) or subsequent amendments. The erosion and sediment controls for EB3C are further discussed in Section 9.4.4, with the related proposed conditions provided in Appendix 5.

There may be the need to manage potential ground contamination and ensure that any imported fill is brought in from appropriate sources. As detailed in Section 6 and the Contaminated Land Effects Assessment (Contaminated Land Effects Assessment Appendix 16), there are potential sources of ground contamination within the EB3C area. These sources include old commercial sites along Tī Rākau Drive. If and as required, the earthworks for EB3C will be subject to a CLMP prepared in accordance with relevant standards. The proposed condition sets include requirements for appropriate soil testing, reporting and certification of its disposal.

An accidental discovery protocol will be employed to address the disturbance of any previously unknown contamination.

Table 4-5 Summary of Approximate Earthworks Required for EB3C

Extent	Approximate Cut Material m ³	Approximate Fill Material m ³	Approximate Earthworks Area m ²	Approximate Earthworks Duration
Bridge A to Bridge B (including works for 4m ² reclamation)	2,600	250	7,100	2-3 weeks
Bridge B Northern Abutment (note the abutment fill includes an area of coastal reclamation)	Negligible	11,000	2,000	3-4 weeks (noted staged works)

Burswood Drive Busway (CH30670 – CH30788)	1,400	300	9,100	2-3 weeks
Burswood Bus Station	5,000	800	1,600	2-3 weeks
Burswood Reserve Busway	6,000	200	5,200	3-4 weeks
Service relocations and installations	Negligible	Negligible	Negligible	Trenching operations sequenced through project
MSE Wall Construction	Negligible	5,000	Negligible	Operations sequenced through project
Milling Volumes	4,650	NA		
Total	15,000 (excluding milling)	17,550	25,000	

There is a scheduled historic heritage site (McCallum Brothers Wharf) and recorded archaeological sites in the vicinity of the project. All proposed earthworks at this location, including coastal works (refer to below), will be controlled through the HHMP. This management plan will include the measures for cultural monitoring, the recording of any uncovered archaeological sites and reporting requirements.

There is a possibility that basalt may be encountered within the alignment during earthworks. This would most likely be removed using an excavator with a rock breaker attachment. Should blasting be required, the works will be controlled through the CNVMP, schedules and blast specific conditions. This includes a maximum noise limit of 120 dB (measured 1m from the façade of any occupied building), a requirement to comply with the nationally accepted “German Industrial Standard DIN 4150-3:1999 Structural vibration – Part 3 Effects of vibration on structures” and a prohibition on blasting during night-time hours.

4.3.12 Vegetation Alteration and Removal

4.3.12.1 Tree Removals

The construction of EB3C will require removal of and alteration to existing vegetation. An Arboricultural Effects Assessment has been undertaken for EB3C which has identified the following tree works that would ordinarily require resource consent (Table 4-6), those that would not require resource consent (Table 4-7) and found that there are no works proposed to notable trees or protected trees³⁶.

For EB3C, there are 213 trees within the project footprint, or with canopies/rootzones that extend into the footprint. 110 trees are to be retained and 26 trees are to be relocated to another location within the project footprint. Trees that require removal or likely require removal have

³⁶ EB3C’s NoR addressing those matters that would trigger land use consent under section 9(3) of the RMA.

been identified as a worst-case scenario for EB3C. There are no Notable Trees identified under Schedule 10 of the AUP(OP) within the footprint of EB3C.

Table 4-6 Tree Works that would ordinarily require resource consent

Location	Remove	Retain	Relocate	Total
Road Reserve	4	8	-	12
Reserve (Open Space Zone)	30	62	9	101
Total	34	70	9	113

Table 4-7 Tree Works that would not require resource consent (permitted activity)

Location	Remove	Retain	Relocate	Total
Road Reserve	1	2	-	3
Reserve (Open Space Zone)	5	2	-	7
Private (Business/Residential Zones)	37	36	17	90
Total	43	40	17	100

4.3.12.2 Vegetation Clearance within the CMA and Coastal Margins

In addition to the above tree removals, vegetation requiring removal (i.e., mangroves and within coastal margins) will be required for the new and upgraded stormwater outfalls and structures within the CMA.

Overall, loss of marine vegetation during construction (both temporary and permanent) will total approximately 1,180m² (0.118ha), including 100m² for each of the stormwater outfalls (400m² in total), 710m² for the construction of bridge structures³⁷, 70m² for the temporary works associated with the retaining wall (RW304).

Overall, permanent loss of marine vegetation will total 782m² (0.0782ha); loss of 25m² for each stormwater outfall structure (100m² in total), 678m² for the permanent bridge piers, reclamation, and abutments³⁸ and 4m² permanent loss for the reclamation supported by the retaining wall (RW304).

Table 4-8 Summary of Vegetation Clearance for EB3C Bridges and Stormwater Outfalls in CMA

Location	Permanent Occupation for Structures within CMA (m ²)	Temporary Occupation for Structures within CMA (m ²)	Vegetation Clearance for permanent and temporary structures within CMA (m ²)	Footprint of deck over the mangroves (m ²)
Tī Rākau Drive Bridge (Bridge A)				
Bridge A permanent piles	14 (8 piles)	0	7 (4 piles)	0
Bridge A permanent scour protection (if required)	147 (4 piles)	0	0	0

³⁷ This includes vegetation clearance for abutments, piles and scour protection and 549m² of reclamation for Bridge B (two areas of 211m² and 338m² each) and vegetation clearance associated with the construction staging bridges.

³⁸ This calculation includes the 549m² reclamation for Bridge B.

Location	Permanent Occupation for Structures within CMA (m ²)	Temporary Occupation for Structures within CMA (m ²)	Vegetation Clearance for permanent and temporary structures within CMA (m ²)	Footprint of deck over the mangroves (m ²)
Bridge A permanent eastern abutment (including scour protection)	30	0	50	0
Footprint of permanent Bridge A deck over the existing mangroves	0	0	0	830
Bridge A temporary (during construction) staging piles	0	23	10	0
Footprint of the temporary construction staging platforms (excluding the temporary staging piles) for Bridge A over the existing mangroves	0	0	0	360
Total for Bridge A	191	23	67	1190
China Town Bridge (Bridge B)				
Bridge B permanent piles	8 (3 piles)	0	8	0
Bridge B permanent rip rap abutment B	64	0	64	0
Footprint of Permanent Bridge B deck over the existing mangroves	0	0	0	903
Bridge B temporary (during construction) staging piles	0	22	22	0
Footprint of the temporary construction staging platforms (excluding the temporary staging piles) for the Bridge B over the existing mangroves	0	0	0	800
Total for Bridge B	72	22	94	1703
Bridge B Permanent embankment (reclamation) at the northern end of 262 Tī Rākau Drive				

Location	Permanent Occupation for Structures within CMA (m ²)	Temporary Occupation for Structures within CMA (m ²)	Vegetation Clearance for permanent and temporary structures within CMA (m ²)	Footprint of deck over the mangroves (m ²)
Area of permanent reclamation required within the CMA	549	0	549	0
Permanent retaining wall (reclamation) between 242 and 254 Ti Rākau Drive (RW304)				
Retaining wall (RW304) ^[1]	4	70	70	0
Stormwater Infrastructure (new or upgraded)				
New Outfall 01-A-1	25	100	100	0
Existing Outfall MCC_108479 (SAP ID 200029871)	25	100	100	0
New Outfall 09-1	25	100	100	0
Existing Outfall MCC_108409	25	100	100	0
Total for Stormwater Infrastructure	100	400	400	0
Overall Total for EB3C CMA Permanent and Temporary Works	916	515	1180	2893

Vegetation clearance (above MHWS) is required for the EB3C alignment and to allow construction of the cycleway within the Burswood Reserve as detailed in Table 4-9 below. Approximately 0.372 ha of permanent vegetation loss under the EB3C alignment and 0.421 ha of temporary vegetation clearance under the construction footprint is required for EB3C. Permanent loss includes all exotic, mixed native and exotic, and planted vegetation loss under the EB3C alignment and around stormwater outfalls. Temporary loss includes exotic, mixed native and exotic, and planted vegetation within the EB3C construction footprint (including stormwater outfalls).

^[1] Construction of the permanent retaining wall RW304 is between 242 and 254 Ti Rakau Drive.

Table 4-9 Areas of landward³⁹ permanent and vegetation clearance for EB3C

Location	Area of Permanent Vegetation loss (m ²)	Area of Temporary Vegetation Clearance ^[2] (m ²)
EB3C		
EB3C Alignment (including bridge works and cycleway within Burswood Reserve)	3645	3910
Stormwater Infrastructure		
Existing Outfall MCC_108482 (SAP ID 2000380606)	25	75
Existing Outfall MCC_496129 (SAP ID 2000507038)	25	75
Existing Outfall MCC_988531 (SAP ID 2000295186)	25	75
New network (pipeline 36) proposed to connect upstream to the existing manhole (MCC_71866)	0	75
Total	3720	4210

These vegetation works will be subject to a range of controls and mitigation as required by AT’s proposed conditions.

This vegetation clearance will be offset by a variety of mitigation plantings, as shown in the LEAM plans drawings, including:

- Landscape planting
- Replacement planting of all temporary vegetation loss
- Lizard habitat restoration planting as compensation for loss of lizard habitat (1.75ha). This will result in a net gain of ecological value of approximately 10%. Detailed within the Habitat Restoration Plan
- Coastal vegetation planting – pest plant control and revegetation with native coastal edge habitat (0.5ha).

This is further detailed in Section 9.4.5 and the proposed conditions. The purpose of this mitigation planting is to provide replacement habitat for native species and in particular, native reptiles. This planting forms part of the Project’s Lizard Management Plan (LMP), as does lizard capture and relocation.

It is noted that the restoration planting will also be subject to a habitat restoration plan (HRP) and riparian planting, as detailed in the proposed conditions. In addition, the removal of pest plants

³⁹ Landward of the CMA boundary

^[2] Temporary vegetation clearance is an area of vegetation that will be replaced post construction.

and rubbish from the coastal margins directly affected by the Project is also proposed as part of EB3C's conditions.

4.4 EB4i

Before EB4L is implemented, EB4i will allow for the transition of the online running busway in EB3C to the proposed bus lanes on Tī Rākau Drive between the proposed Guys Reserve and Te Irirangi Drive intersections. Buses will continue along Tī Rākau Drive towards the Botany Town Centre bus station via the Tī Rākau Drive / Te Irirangi intersection. Buses will then travel along Te Irirangi Drive on the existing road network.

EB4i will be within the current road corridor. Works associated with EB4i can be undertaken as permitted activities in the AUP(OP).

4.5 EB4L Design and Operation

EB4L involves the establishment of an 'off-line' dedicated two-way busway through Guys Reserve and Whaka Maumahara Reserve before terminating at the intersection of Te Irirangi Drive and Town Centre Drive.

As with the other Project packages, EB4L includes new cycling/walking facilities, minor retaining walls, new or upgraded stormwater infrastructure and open space upgrades.

EB4L works will take place in Guys Reserve, Whaka Maumahara Reserve, existing road reserve and within Botany Town Centre.

The following description of the proposal has been split into two sections:

- Design and operation
- Construction.

To avoid repetition, only those aspects of EB4L which differ from EB3C (e.g., specific design elements) have been included in the following description of its design and operation. A full set of EB4L's general arrangement drawings is provided as Appendix 8. Appendix 4

4.5.1 Busway

The bidirectional busway will continue along an offline alignment through Guys Reserve and Whaka Maumahara and will for most of this section run along a bridge (Bridge C). At its western end, it will interface with EB3C and EB4i as discussed above.

Bridge C in EB4L will likely be a super T structure, with two abutments (each abutment has two piles), 14 piers/piles (a total 18 piles) and approximately 350m long (Figure 4-29 and Figure 4-30).

The busway will initially run below the adjacent car park and loading zone for The Hub (451 Tī Rākau Drive). The busway will sit upon engineered fill and retaining given the sloping topography of Guys Reserve. At its eastern end the busway will connect with the Te Irirangi Drive/Town Centre Drive intersection.

The western, northern, and southern approaches at the Te Irirangi Drive/Town Centre Drive intersection will remain largely unchanged.

The eastern Town Centre Drive approach will be widened to provide a left-turn slip lane, a short bus lane, a full length shared through and right-turn lane and a full length right-turn lane. The slip lane on the northern approach will be retained. To improve pedestrian safety on these slip lanes, raised platforms will be provided.

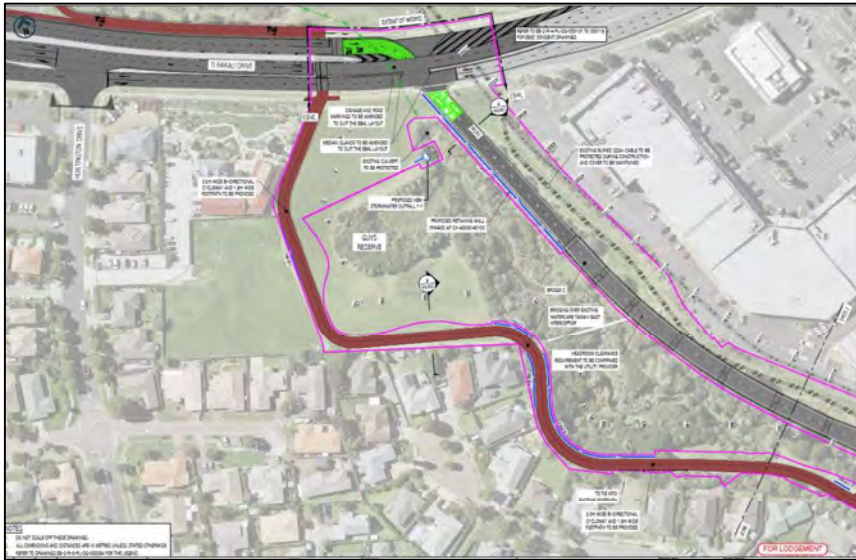


Figure 4-29 EB4L from Tī Rākau Drive



Figure 4-30 EB4L at Te Irirangi Drive

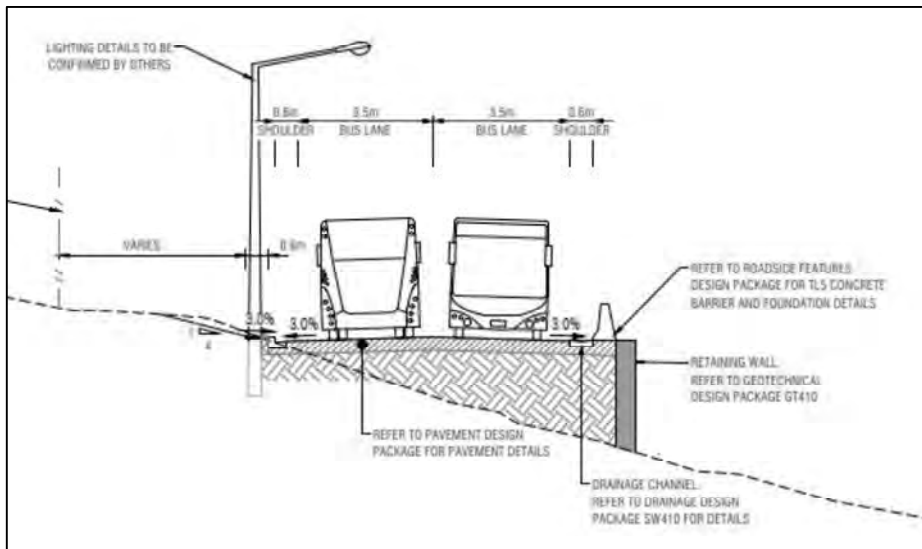


Figure 4-31 Typical Cross Section of EB4L Retaining and Fill

4.5.2 Cycleway

As with other Project packages, EB4L will include new walking and cycling facilities. Given the underlying topography of both Council reserves, as well as a desire to minimise land disturbance and permanent structures, the cycling and walking facilities for EB4L will not directly adjoin the busway. Instead, the cycleway will follow the western and south boundaries of the Council reserves. The cycleway will be bidirectional and will sit upon minor amounts of engineered fill (Figure 4-32). A 1.8m footpath will run beside the length of the cycleway.

The existing pedestrian pathway in the Guys Reserve and Whaka Maumahara will be realigned and will maintain access for residents at Cottesmore Place and Kirikiri Lane. A new dedicated footpath and cycleway will be provided along the western boundary of the Guys Reserve and Whaka Maumahara. At the western end the facilities will connect to the shared crossing at the new Tī Rākau Drive/Guys Reserve intersection as discussed above. At the eastern end the facilities will curve northward along the western side of Te Irirangi Drive and terminate at the Te Irirangi Drive/Town Centre Drive intersection.

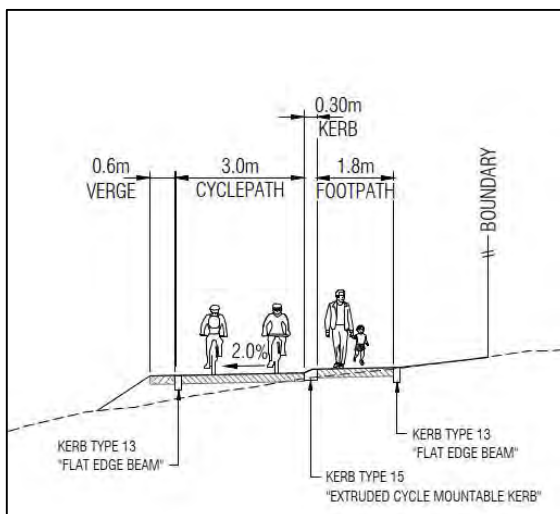


Figure 4-32 Typical Cross Section of EB4L Walking and Cycling Infrastructure

These facilities will tie into existing walking and cycling infrastructure, including footpaths and a shared path through the eastern half of Guys Reserve (Figure 4-33).

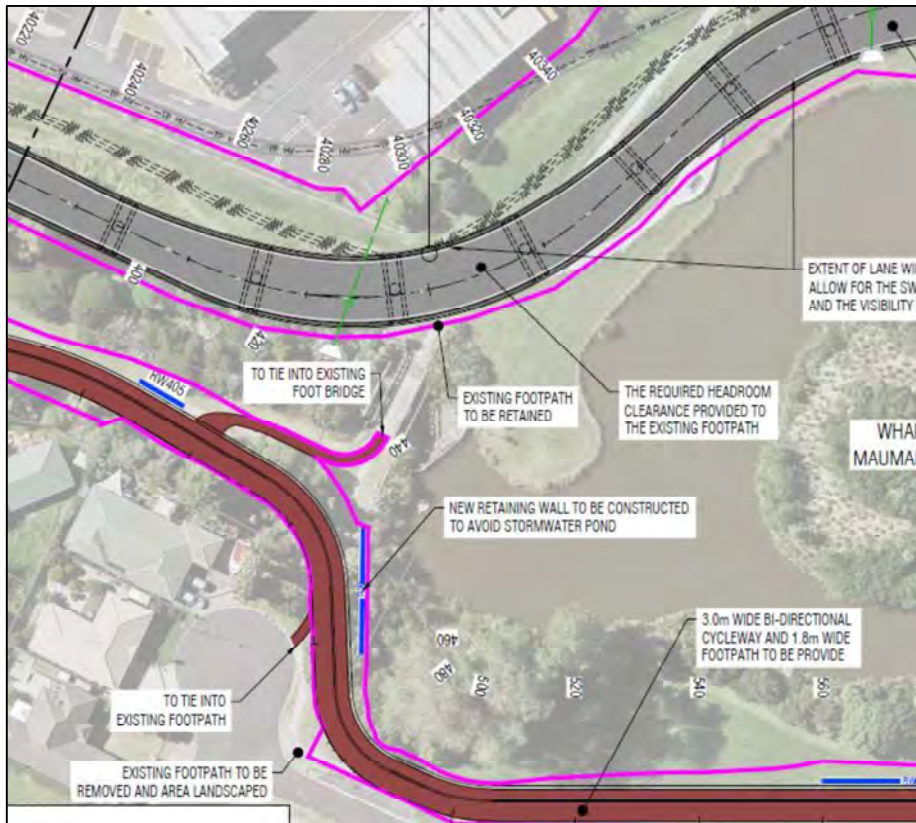


Figure 4-33 EB4L Tie-Ins to Existing Footpaths

4.5.3 Landscaping

EB4L’s landscaping design is focused on integrating the Project with the existing environment and enhancing the public realm, particularly given its location within the Guys Reserve and Whaka Maumahara Reserve.

In a practical sense, this will involve the use of native floral species⁴⁰ that are representative of the vegetation that would have been present before the local area was cleared. The use of trees, shrubs and groundcover species will provide an attractive layered planting layout, which will help to screen views of the busway.

EB4L will involve a mixture of amenity and ecological focused mitigation plantings. As with EB3C, EB4L’s landscaping design, as shown in the LEAM plans, will be subject to certification as part of the UDLP, and a HRP. These mitigation actions are also required by AT’s proposed conditions.

A copy of the EB3C and EB4L LEAM plans are provided as Appendix 9, with excerpts from these drawings shown below as Figure 4-34 and Figure 4-35, noting that the finalised landscaping design will be subject to certification as part of the UDLP. The LEAM plans for EB4L include new specimen trees and revegetation planting within the reserves.

Upgrades to the Te Irirangi Drive/Town Centre Drive intersection, will involve vegetation removal (within Botany Town Centre). These improvements will include features such as traffic signals, signs, pedestrian crossings, lane markings and new kerb alignment and pavement widening in Town Centre Drive to allow for an additional left turn lane. A separate landscape plan will be prepared for the Te Irirangi Drive/Town Centre Drive Intersection and will be developed in collaboration with Botany Town Centre.

⁴⁰ Subject to detailed design and further engagement with mana whenua.



Figure 4-34 Excerpt of EB4L Landscape Drawings



Figure 4-35 Excerpt of EB4L Landscape Drawings

4.5.4 Open Space Improvements

A range of open space improvements are proposed for EB4L within Guys Reserve and Whaka Maumahara, while further mitigation may be undertaken at Haven Park (Figure 4-36) and Huntington Park (Figure 4-37). While AT is still in ongoing discussions with the Council regarding the final design of open space mitigation

at these reserves, this mitigation will be required to be an enhancement to existing facilities present at the reserves. At Guys Reserve and Whaka Maumahara, mitigation will include:

- Landscaping
- Park furniture
- Improved walking and cycling infrastructure.

While further landowner and stakeholder engagement is required for any works at Haven Park and Huntington Park, the following may be provided:

- Haven Park (34R Haven Drive)
 - Outdoor seating/tables
- Huntington Park
 - Improved play elements to cater for all abilities and ages
 - A better planned, welcoming space for the community
 - Upgrading of the 3-on-3 basketball court
 - Wayfinding.

These works will be subject to certification via the UDLP, while related consultation in the development of this mitigation is required via the CCP and mana whenua framework. Further discussion of these works is provided in sections 9.6 and 9.7 of this AEE.



Figure 4-36 Location of Haven Park



Figure 4-37 Location of Huntington Park

4.5.5 Stormwater Management

The design philosophy for EB4L is the same as that employed for other sections of the Project (section 4.2.5).

EB4L will rely on one existing outfall at Whaka Maumahara⁴¹ and one new outfall within Guys Reserve, with both outfalls discharging into a permanent freshwater environment.

Upstream stormwater works include new pipework and the upgrading of existing stormwater infrastructure to address new stormwater volumes. These works are detailed in Table 4-10 and Table 4-11, while stormwater treatment details are provided in Table 4-12.

Table 4-10 Summary of Outfalls proposed to receive discharges from EB4L stormwater

Outfall	Existing Outfall	Discharges to CMA or Stream	New Outfall in CMA	New Outfall in Stream or Wetland	Comment
New Outfall 1-1	✗	Stream	✗	✓	A new outfall in the stream in Guys Reserve is proposed on the stream bank.
Outfall MCC_480841	✓	Wet Pond/Stream	✗	✗	The connection point is the last manhole (SAP PI 2000061181) before the existing outfall. No work is proposed to the last pipe section or the outfall.

Table 4-11 Stormwater Network Improvements

Network Name/Location	Details
New Outfall 1-1	Serves approximately half of EB4L’s busway. It will be constructed adjacent to the inlet of Culvert 12A.
Outfall MCC_480841	Serves a large residential and commercial catchment to the east. The project network will service the eastern half of the link road bridge and connect to an existing manhole (SAP ID 2000061181). No work is proposed to the last pipe section or the outfall.

⁴¹ No works are proposed to the last section of the pipe or this outfall.

Table 4-12 Summary of Proposed EB4L Stormwater Devices

Outfall	Treatment Devices	Comment
New Outfall 1-1	GPT	Busway treated by GPT that can remove at least 50% TSS.
Outfall MCC_480841	GPT	Busway treated by GPT that can remove at least 50% TSS.

Further detail of the stormwater design, including the location of stormwater works is in Appendix 11.

4.5.6 Lighting

EB4L will feature a mix of lighting types and designs appropriate to location and purpose. All new street lighting and footpath will meet AT roading standards.

4.5.7 Noise Barriers

An assessment of EB4L's operational noise effects has been undertaken and is provided as Appendix 12. Given the existing noise environment, the existing boundary barrier at Piccolo Park Early Childcare Education (415 Tī Rākau Drive) and the modelling undertaken for the Operational Noise and Vibration Effects Assessment, no new noise barriers are proposed.

4.5.8 Retaining Walls and other Stabilisation Structures

As detailed previously some retaining and stabilisation works will be required given the sloping topography of EB4L. Several retaining walls are required along the alignment of busway and shared pathway, as well as a new retaining wall for the Town Centre Drive intersection works. These are shown on the general arrangement plans (Appendix 8).

A post and panel (precast concrete) retaining wall will be constructed along the west embankment of the busway which is approximately 90m in length from Tī Rākau Drive with a maximum height of 3.5m.

4.6 EB4L Construction

The following section details the construction of EB4L, with further detail and context provided in Appendix 30, where EB4L differs from the construction activities described for EB3C.

4.6.1 Management Plan Approach

As with EB3C, EB4L will be subject to a range of management plans during its construction to address its potential adverse environmental effects. The requirements for these management plans are set out in the proposed conditions of consent and will be prepared as an addendum or update to the Project's management plans for certification by Auckland Council. However, unlike EB3C, EB4L will not be subject to a CWMP given that it does not involve any works in the CMA.

4.6.2 Construction Programme

An indicative construction programme has been prepared for the whole Project. As detailed in Section 1 of this AEE, EB4L is one of four main proposed works packages across the Project footprint.

4.6.3 EB4L Construction Phasing

The general working arrangement will typically be carried out from Ti Rākau Dr towards Te Irirangi Drive. Works will generally be carried out during standard construction hours (i.e., no night works) except for those activities that can only occur at night (bridge concrete pours, oversize deliveries, traffic signal works etc).

The proposed construction sequencing is summarised below.

- Site Establishment works including traffic management, fencing, erosion and sediment controls, earthworks)
- Protection and/or relocation of existing network services
- Bridge C Structure
 - Build abutment A and post and panel retaining wall
 - Install Piles and falsework for supporting the bridge
 - Install span and pour concrete
 - Build abutment B and piles
 - Remove falsework
 - Install concrete barriers and joints
 - Remove temporary staging and temporary retaining wall
 - Complete abutment and slabs.
- Pavement works
 - Drainage and ducting
 - Complete pavement works and surfacing
 - Urban design and landscaping including street lighting and signage.
- Cycling and Pedestrian facilities
 - Drainage and ducting
 - Retaining walls
 - Pavement
 - Lighting and street furniture.
- Dis-establishment
 - Removal of any site establishment/construction laydown areas.

4.6.4 Utilities Protection and Relocation

The Project is located within a brownfield environment, with numerous network utilities present. These utilities range in scale, regional significance, and age.

EBA has been engaging with the network utility operators of these infrastructure assets, as further discussed in Section 8 of this AEE. Services will be either protected or relocated to the relevant provider's standards and where possible located within dedicated service corridors. Services will be constructed and tested in the realigned position to enable a short switch-over timeframe with minimal disruption to users.

Construction methodologies for each service will be developed in consultation with each operator. Service relocations are typically done as early works to ensure that service is maintained during construction.

4.6.5 General Construction Hours

In general, construction works will take place between 0700 and 1800 Monday to Friday, and 0700 to 1500 on Saturdays. It should be noted that construction shift arrivals and departures will occur outside of these hours, as will the setup and pack up of construction traffic management measures (e.g., road cones and temporary barriers).

The exception to the standard work hours for EB4L is occasional works during night-time, Sundays and public holidays. These work times will be limited to when works could cause congestion, disruption to local businesses/residents or safety risks to EBA workers if they were carried out during the day on weekdays.

Having regard to night works, early morning concrete pours are proposed for EB4L as part of construction of Bridge C. Other night works will only take place when works cannot practicably take place during the day. Night works may be necessary due to traffic constraints, safety constraints and quality assurance requirements. Any night works for EB4L will be limited and managed through the CTMP, CNVMP, CCP and site-specific measures. This includes clauses of those management plans that require engagement with neighbouring residents and businesses. Further discussion of these matters is provided in Section 9.

4.6.6 High Voltage Underground Cables

There is two major electricity transmission lines, owned and operated by Transpower New Zealand Limited located in the Guys Reserve and Whaka Maumahara Reserve. Figure 4-38 provides an aerial with an overlay of the underground 220kV voltage cable to convey electricity between the Pakuranga substation and substation at Brownhill Road. It also contains a buried fibre optic cable and power cables. Due to the critical and sensitive nature of these transmission lines, protective measures will be implemented to ensure safe digging practices and prevent damage. Industry best practices for working near underground cables will be followed, and approval will be sought from Transpower to guarantee the safety of the cables and ensure that the works can progress without incident. Prior to undertaking any works within the electricity transmission designation, a section 176 approval will be sought from Transpower.



Figure 4-38 Location of Transpower Corridor

4.6.7 Site Clearance

EB4L does not require the removal of any dwellings or commercial premises. Site clearance will involve the removal of vegetation, park furniture, waste, and debris, along with existing structures such as fencing. Some vegetation clearance will be required and will involve specialized tools and equipment, such as chainsaws, brush cutters, stump grinders and excavators. This equipment has been accounted for in the Construction Noise and Vibration Effects Assessment (Appendix 15).

4.6.8 Construction Support Areas (CSAs)

The main construction laydown area will be established within Guys Reserve, adjacent to Tī Rākau Drive and 47C Huntington Drive. A second laydown area will be established in Whaka Maumahara Reserve between the existing stormwater pond and Te Irirangi Drive.

The main construction laydown area within Guys Reserve will be temporarily occupied to serve as a site compound (CSA 1). It is expected that this CSA will be used as a satellite office with on-site carparking and a staging area for Bridge C construction from the north. Access is expected to be gained from Tī Rākau Drive. This CSA is expected to be occupied for an indicative duration of 24 months. Figure 4-39 shows the indicative location of CSA 1 (red outline) and the SAP at Guys Reserve in EB4L.



Figure 4-39 Indicative location of CSA 1 and SAP at Guys Reserve (red outline)

A further CSA is located at the second laydown area, beside the road frontage of Whaka Maumahara with Te Irirangi Drive (CSA 2). Like CSA 1, CSA2 will be used as a satellite office with some carparking and a staging area for Bridge C construction from the south. Access is expected to be gained from Te Irirangi Drive and will be occupied for an indicative duration of 24 months. Figure 4-40 shows the indicative location of CSA 2 (red outline) and the SAP at Whaka Maumahara in EB4L.

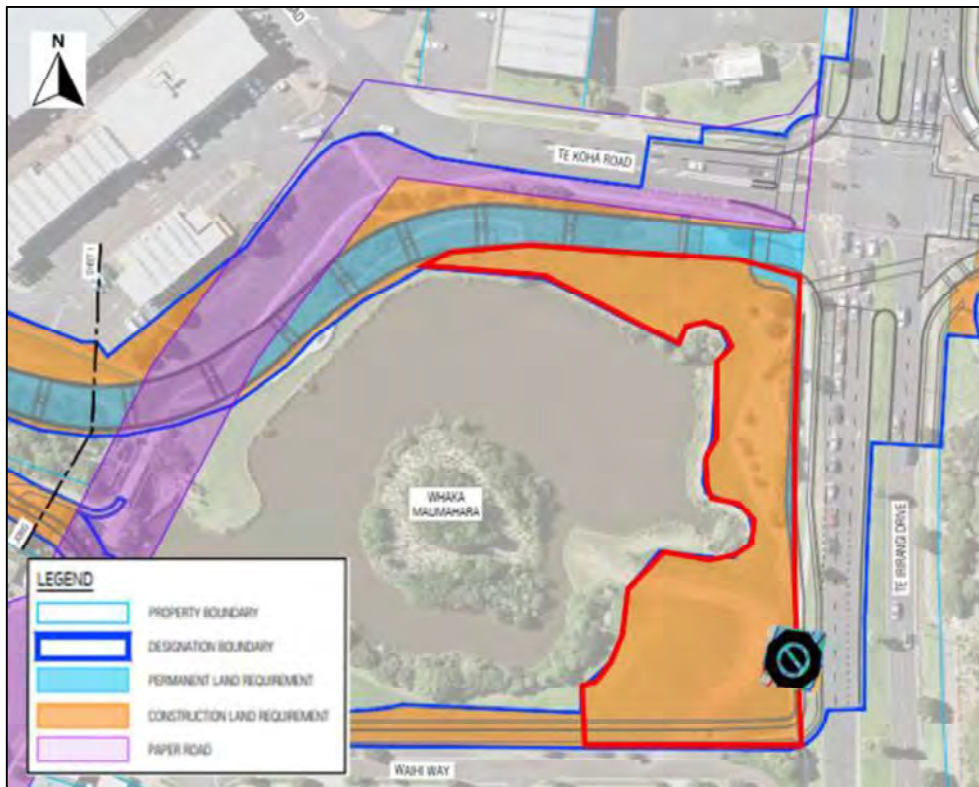


Figure 4-40 Indicative location of CSA 2 and SAP at Whaka Maumahara (red outline)

4.6.9 Earthworks

EB4L earthwork operations includes approximately 1,150m³ of cut to fill over the EB4L project footprint of approximately 0.9ha, as detailed in the Erosion and Sediment Control Effects Assessment (Appendix 17). In addition, approximately 21,330m³ of temporary hardfill is proposed to construct the site yards, retaining walls and site access with an additional construction footprint of approximately 1.5ha. The works are to occur on generally flat to sloping existing site contours through Guys Reserve and Whaka Maumahara Reserve.

The earthworks are predominantly a fill operation either side of proposed Bridge C to form the new busway. Any cut material will be excavated and removed directly off site. The imported fill material will be primarily aggregate (regarded as a stabilised product), ensuring exposed (erodible) areas are minimised at any given time. The fill operation primarily occurs at the northern end of the works area just south of Tī Rākau Drive and is associated with the retaining wall structure. A small quantity of earthworks is required to form the footpath and cycle path located through Guys Reserve and Whaka Maumahara Reserve.

To facilitate the construction of EB4L and Bridge C, a temporary access track will be required to provide personnel and machinery with access to the site. The access track will likely involve the construction of a temporary embankment and some retaining walls constructed from imported hardfill. The exact design of which will be determined through detailed planning and is subject to feasibility assessments. Once EB4L is completed, the temporary works will be removed from above ground level, and the affected area will be remediated.

The tie-in with Tī Rākau Drive and Te Irirangi Drive/Town Centre Drive intersection works are hard fill and surfacing operations that require only minor earthworks. The works will include marking a

pedestrian crossing, lane marking, new kerb alignment and pavement widening (which will require removal of a portion of landscaping). These works primarily involve milling and resurfacing of the existing road surfaces. The approximate earthwork areas and volumes are detailed in Table 4-13.

Table 4-13 Approximate Earthwork Area and Volumes for EB4L

Area	Cut Material m ³	Fill Material m ³
Busway (including Bridge C)	200	2,960
Shared pathway and retaining walls along the southern and western boundaries of Guys Reserve and Whaka Maumahara Reserve	200	620
Temporary Access Embankment	0	17,000
Temporary construction laydown areas	500	500
Te Irirangi Drive/Town Centre Drive intersection works	250	250
Total	1,150	21,330

All earthworks for EB4L will be subject to the ESCP, which will be prepared in accordance with Auckland Council’s Guidance Document 05 “Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region” (GD05). Similarly, EB4L’s earthworks will be controlled by a CLMP, which will be prepared in compliance with relevant New Zealand standards. This is due to its proximity to contaminated sites. The proposed condition set (Appendix 6) includes requirements for appropriate soil testing, reporting and certification of its disposal.

An accidental discovery protocol will be employed to address the disturbance of any previously unknown contamination, while a HHMP will address any potential effects on disturbed archaeological or heritage items/sites.

4.6.10 Vegetation Alteration and Removal

A range of vegetation alterations and removal will be necessary for EB4L’s construction. An Arboricultural Effects Assessment (Appendix 18) has been undertaken for EB4L which has identified the tree works that would ordinarily require resource consent (Table 4-14), those works that would not require resource consent (Table 4-15) and recognising that no works are proposed to notable trees^{42,43}. Seventy-six trees or groups of trees have been identified within EB4L designation boundaries, including trees with canopy or root zones extending into the Project’s footprint. Of the 76 trees within the project footprint, 23 trees are to be retained and 6 are to be moved to another location within the project footprint. 47 trees are to be removed, 32 of which would ordinarily trigger requirements for resource consent under the AUP(OP). Other tree works, including the removal of trees on business zoned sites are permitted activities and can be undertaken without resource consent or mitigation.

Most of the vegetation requiring removal for the EB4L section of works consists of native revegetation planting, rather than specimen trees. There are also four mature exotic trees, those being three Lombardy poplar and one macrocarpa, growing in amongst the native revegetation which require removal. This strip of native vegetation and the exotic trees require removal to establish the busway within the northern aspect of Guys Reserve.

⁴² EB4L’s NoR addressing those matters that would trigger land use consent under section 9(3) of the RMA.

⁴³ Notable trees are identified in the AUP(OP) and discussed further in Section 6.22.

The proposed shared pathway which leads around the western and southern portion of Guys and Whaka Maumahara Reserves initially passes through an open grassy area. Approximately 130m into the reserve, the new shared pathway will meet an existing path which will be replaced and widened. The shared pathway passes to the rear of several residential properties at Cottesmore Place and Guys Road. To widen the path and construct the associated retaining walls, a strip of native revegetation planting will require removal.

The end of Guys Road adjoins the southern boundary of Guys Reserve where a footpath leads north-east into the Reserve. The path into the Reserve diverges at approximately 25m with one path continuing north-east and the other path travelling north-west along the south-western boundary of the Reserve. The path also extends a short distance (approximately 25m) south-east along Waihi Way. Within this area, a group of vegetation requires removal behind 175 Guys Road, where the path deviates from the current alignment and ‘sweeps’ up around to Guys Road Reserve. A group of Ngaio trees also requires removal where the path passes through the Guys Road and back into Guys Reserve. Also within this area of Guys Reserve is a group of large poplar trees which are set back from the proposed construction area sufficiently that they can be retained.

A group of trees growing adjacent to the VTNZ site will require removal to allow construction of the busway. Some of the trees are within Guys Reserve and some are within the VTNZ site. Five of the trees are pōhutukawa of an age and size that makes them suitable for being relocated. A group of early-mature specimen trees will require removal within the north-eastern corner of Guys Reserve, as well as two pōhutukawa street trees from Te Irirangi Drive for the busway and associated works to the intersection.

The busway will connect to Te Irirangi Drive, following improvements to the existing intersection of Te Irirangi and Town Centre Drive. These works will take place in the existing road reserve and Botany Town Centre Land for the intersection improvements on Town Centre Drive. As part of those works it is proposed to create an additional left turning lane out of the Town Centre Drive onto Te Irirangi Drive and carry out alterations to the left turn lane from Te Irirangi Drive into Botany Centre Drive. The works for the left turn lane out of the centre will require the removal of a group of trees, including three early-mature Liquidambar trees growing in a grass berm, and several early-mature native trees (pōhutukawa, titoki and coprosma) growing within a landscaped area. The alterations to the layout of the left turn into the centre will require the removal of a poorly formed pōhutukawa and a liquidambar growing within the grass berm.

Table 4-14 Tree Works that would typically require resource consent

Location	Remove	Retain	Relocate	Total
Road Reserve	7	11	-	18
Reserve	25	8	2	35
Total	32	19	2	53

Table 4-15 Tree Works that would not ordinarily require resource consent

Location	Remove	Retain	Relocate	Total
Road Reserve	-	-	-	-
Reserve	1	-	-	1
Private (Business/Residential Zones)	14	4	4	22
Total	15	4	4	23

LEAM plans showing proposed mitigation planting have been prepared as part of the application. A comprehensive UDLP will be prepared (as required by conditions) that includes a replacement planting strategy. Replacement planting will be carried out in general accordance with the LEAM plans and the UDLP. A separate Landscaping Plan for Town Centre Drive is also required to be prepared in consultation with Botany Town Centre. As with EB3C, the tree works for EB4L will be subject to a TPMP, as detailed in section 4.3.12 of this AEE.

Vegetation clearance is required for the EB4L alignment and associated stormwater works. This is approximately 0.552ha of permanent vegetation loss, and 0.355ha of temporary vegetation loss. Permanent loss includes all mixed native and exotic tree land and planted vegetation loss under the EB4L alignment and the stormwater outfall. Temporary loss includes all mixed native and exotic, and planted vegetation within the EB4L construction area and around stormwater outfalls.

Table 4-16 Areas of landward permanent and temporary vegetation clearance for EB4L

Location	Area of Permanent Vegetation loss (m ²)	Area of Temporary Vegetation Clearance (m ²)
EB4L		
EB4L Alignment (including Bridge C works and Te Irirangi Drive/Town Centre Drive intersection improvement works)	5491	3478
Stormwater Infrastructure		
New Outfall (1-1) (including rip rap and pipeline) at Tī Rākau Drive	25	75
New Pipeline (37-3) at Te Irirangi Drive	0	0
Total	5,516	3,553

These vegetation works will be subject to a range of controls and mitigation as required by AT’s proposed conditions. This vegetation clearance will be offset by a variety of mitigation plantings, as shown in the LEAM plans drawings, including landscape planting and replacement planting of all temporary vegetation loss.

Temporary loss of vegetation (EB4L – 0.355ha) associated with the construction of stormwater outfalls (both existing and new) and temporarily occupied areas for construction will be addressed through landscape planting and is considered to be an embedded control. There is an anticipated permanent loss of approximately 0.251ha of potential lizard habitat under the EB4L alignment including stormwater infrastructure.

EB4L’s vegetation clearance around the watercourse and stormwater pond is shown in the LEAM drawings. The total minimum planting required to compensate for lizard habitat loss within EB4L will occur within EB3C. The combined EB3C and EB4L lizard habitat compensation is 1.75ha. Landscape planting includes the replanting of suitable native planting mixes for the Auckland Region (including provision of lizard refugia where possible). Planting specifications are detailed in the LEAM plans as detailed in the proposed conditions.

In addition, EB4L will require habitat restoration. This will be controlled through an HRP, Lizard Management Plan (LMP) and Native Fish Capture and Relocation Plan (NFCRP) which will be same in purpose and content as the HRP prepared for the remainder of the Project. The purpose and proposed content of the HRP is detailed further in Section 4.3.12.

5 Assessment of Alternatives

5.1 Notice of Requirements

Section 171(1)(b) of the RMA requires that when considering a NoR (and any submissions received), the territorial authority must, subject to Part 2 of the RMA, consider the effects on the environment of allowing the requirement. In so doing it must have “particular regard” to whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if:

- *The requiring authority does not have an interest in the land sufficient for undertaking the work; or*
- *It is likely that the work will have a significant adverse effect on the environment.*

While much of the work will be undertaken within AC owned land, road reserve under the management of AT and land acquired by AC, AC does not own all of the land required for undertaking the work and therefore does not have an interest in all of the land sufficient for undertaking the work. The properties which AC does not have an interest in are outlined in Section 6.6 of this AEE and the NoRs.

The effects of EB3C and EB4L on the environment are considered in Section 9 of this AEE, with overall effects on the environment considered to be acceptable. It is therefore unlikely that the work will have a significant adverse effect on the environment for the purposes of s171(1)(b).

Given that AT does not have an interest in all of the land required for undertaking the work, consideration has been given to alternative sites, routes, or methods of undertaking the work.

5.2 Resource Consents.

Schedule 4 of the RMA requires that an assessment of alternatives is undertaken in specific instances, namely:

- *“Where it is likely that an activity will result in any significant adverse effect on the environment, alternative locations or methods for undertaking the activity must be described (Clause 6(1)(a)); and*
- *Where the activity includes the discharge of any contaminant, any possible alternative methods of discharge, including discharge into any other receiving environment must be described (Clause 6(1)(d)(ii)).”*

In terms of the first, as noted in Section 11 of this AEE, EB3C and EB4L will not result in any significant adverse effects to require assessment of alternative locations or methods under clause 6(1)(a).

The latter requirement aligns with the requirement under section 105 of the RMA, under which the consent authority in considering an application for a discharge or coastal permit must, in addition to the matters in section 104(1), have regard to any possible alternative methods of discharge, including discharge into any other receiving environment.

For the resource consent applications (including discharge permit applications), the available choice of locations or methods is constrained by the presence of utilities and working within the existing landform. As such, the alternatives to be considered in relation to both the designations

and resource consents must align. Detail on the proposed methods for discharges are contained within the Stormwater Effects Assessment and the Contaminated Land Effects Assessment (Appendix 11 and Appendix 16 respectively) supporting this AEE.

5.3 Route Alignment Alternatives

5.3.1 AMETI Project History

The AMETI project has a long history of development with various forms and options considered, which is described at Section 2 of the AEE. This history included the following stages:

- Eastern Suburbs Transport Corridor Planning 1955 – 2004
- AMETI Eastern Busway 2006 – 2014
- AMETI Eastern Busway 2014 – 2018.

The previous options assessments are described in detail in the Eastern Busway Options Assessment Report attached at Appendix 19. Of note, key investigations informing the EBA assessment of Alternatives were undertaken by AT between 2014 and 2018 and included:

- AMETI EB3 Further Options Assessment 2017/2018
- AMETI EB3 Further Options Assessment
- AMETI EB3 Further Options Addendum Report 2018.

The options assessed in these reports were considered through an MCA process. These MCA's informed and were replicated by AT and the EBA in subsequent options assessments.

5.3.2 AMETI EB3 – Further Options Assessment 2017/2018 (Tonkin and Taylor)

As part of the AMETI EB3 Scheme Assessment Update Report (drafted in 2017 and finalised in 2018) prepared by Tonkin and Taylor, further options were considered through an MCA process.

The 2017/2018 Further Options Assessment (FOA) concluded that the preferred commercial section option was Short List Option SLT6 (Central) (Scheme Design) identified in the 2017 Draft Scheme Assessment Update Report completed by Tonkin and Taylor. The Scheme Design, as it is described in the Scheme Assessment Update Report, involved:

- A bidirectional centrally running busway, separate from general traffic
- A designation envelope requiring partial land take on both sides of the existing corridor in the commercial section, between Pakuranga Creek and Botany Town Centre
- Segregated walking and cycling facilities along the length of the corridor.

5.3.3 AMETI EB3 Further Options Assessment (AECOM) 2018

In June 2018 AT and AECOM, in association with Boffa Miskell, undertook an alternative options assessment for AMETI EB3 commercial section (titled *Eastern Busway 3 Commercial Section – Further Options Assessment* (FOA Report)). The purpose of the FOA Report was to provide an assessment of alternative options and deliver guidance on how EB3C should be progressed. The FOA Report was a continuation of the previous MCA process undertaken by Tonkin and Taylor Ltd in 2017⁴⁴.

Building upon the Tonkin and Taylor assessment, a further three options for EB3C were developed to consider if improvements to performance and safety of the existing Scheme Design could be

⁴⁴ The Tonkin and Taylor report was finalized in 2018.

made, and to address additional bus operational requirements identified by AT since the Scheme Design was completed.

New alignment options were developed to:

- Accommodate the required bus movements from Harris Road
- Reduce the impact on adjacent properties
- Better maintain existing access arrangements along the corridor
- Improve reliability, travel times and capacity for bus services.

The following options were considered as part of this design refinement.

5.3.3.1 EB3 Developed Scheme Design (Developed Scheme Design)

The Developed Scheme Design involved an at-grade, widened corridor (comparative to the Scheme Design), with a central running busway. This option accommodated additional bus routes and capacity that the Scheme Design didn't provide for. This design included an at-grade busway, which interacted at five key intersections over approximately 1.3 kilometres.

The Developed Scheme Design followed the lane configuration of the Scheme Design. However, walking and cycling facilities were changed to provide a bidirectional cycle way, as well as a footpath on the northern side of the corridor and a shared path on the southern side.

The at-grade solution required a wider corridor than first anticipated by the Scheme Design, particularly at intersections (to accommodate additional turning movements). Given this, the design required additional land take from commercial businesses along the corridor than previously identified.

5.3.3.2 EB3 Viaduct Option 1 (Viaduct Option 1) / EB3 Elevated Public Transport (Elevated PT)

This option involved a narrowed corridor, when comparative to the Scheme Design, with a central running busway located on a viaduct. This involved raising the busway approximately 10 metres above the road on a viaduct from the eastern side of Pakuranga Creek to Te Koha Road. The viaduct busway included two elevated bus stops in each direction. Two off and on ramps to the viaduct were also proposed to ensure access to the busway for bus routes on Harris Road, as well as to enable access to the bus depot at 380 Tī Rākau Drive.

This option sought to minimise the impact on the adjacent commercial properties, to allow access across Tī Rākau Drive to maintain current access arrangements where possible and to improve travel time and reliability for bus services along Tī Rākau Drive.

It also provided for a bidirectional cycle way and footpath on the northern side of the corridor, with a shared path on the southern side. The raising of the busway above the road corridor reduced the corridor width significantly compared to the Developed Scheme Design and provided significant transport benefits.

5.3.3.3 EB3 Viaduct Option 2 (Viaduct Option 2) / EB3 Short Elevated Public Transport (Short Elevated PT)

This option narrowed the corridor (comparative to the Scheme Design) with a central running busway on a viaduct structure.

Similar to Viaduct Option 1, this option involved raising the busway approximately 10 metres above the road on a viaduct. However, Viaduct Option 2 terminated at Huntington Drive, avoiding

the need for an elevated bus station directly adjacent to the Guys Homestead (415 Tī Rākau Drive). In addition, it did not include access ramps to and from the Howick and Eastern Bus Depot.

Given these design differences, the elevated busway would have included only one elevated bus stop in each direction, as well as one on/off ramp into Harris Road (for bus route access). Viaduct Option 2 also included provided a bidirectional cycle way and footpath on the northern side of the corridor, with a shared path on the southern side.

Raising the busway above the road corridor reduced the corridor width significantly compared to the Developed Scheme Design and provided significant transport benefits, while shortening the viaduct minimised effects on historic heritage and amenity values.

The MCA did not result in a clear outcome or preferred option between the Developed Scheme Design and Viaduct Option 2. This was because the potential adverse impacts on urban form of an elevated structure and the potential property and accessibility impacts of the at-grade option were finely balanced with the positive transport outcomes. As such the FOA recommended that further design and investigation into the risks, costs and benefits of the remaining alternative options was undertaken.

5.3.4 Addendum to EB3 Further Options Assessment – August 2018

The purpose of the EB3 FOA Addendum 2018 was to present an assessment of more detailed risks, costs and benefits of the Developed Scheme Design and the Short Elevated Public Transport (Viaduct Option 1) which were not addressed in the June 2018 MCA. The Addendum aimed to make a final recommendation of which option should be taken forward into the Specimen Design phase for EB3C.

The addendum assessed the at-grade Developed Scheme Design and Short Elevated Public Transport (Viaduct Option 1) options for EB3C against further matters of assessment. The report identified that both the Developed Scheme Design and Short Elevated Public Transport options had a number of consenting risks.

The addendum report concluded that both options met the Project outcomes. The Short Elevated Public Transport option could be seen to have additional benefits when comparing travel time and reliability and property impacts, while the Developed Scheme Design had considerably less construction and operational costs.

Based on the above matters, the Developed Scheme Design was recommended as the preferred Option.

5.4 EBA Assessment Process – EB3 Commercial

5.4.1 EBA Assessment Process

With the establishment of the EBA, a further round of option assessment for EB3 was undertaken in 2020. The purpose of the review was to assist in further developing a range of options to be assessed and identify those that should be taken forward in the design process. Figure 5-1 provides an overview of the assessment process that has been undertaken for EB3C by the EBA since late 2020.

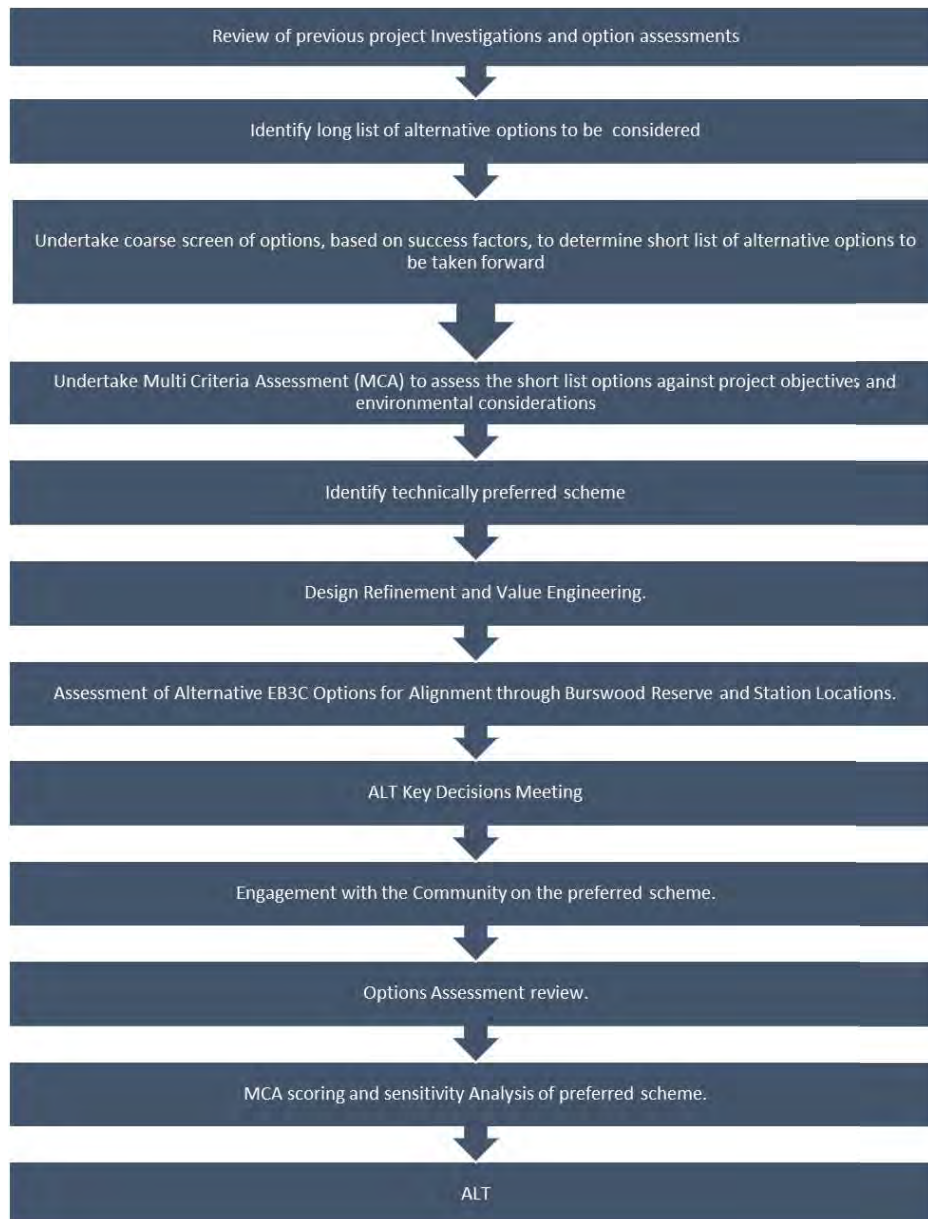


Figure 5-1 Overview of the EBA Assessment Process for EB3

5.4.2 Long list of Options

A review of previous investigations and option assessments was undertaken by EBA in 2020. The purpose of the review was to assist the development of long list options for EB3. The long list of options developed was drawn from the 2018 specimen design. As such, the 2020 long list was different to the long list from 2018. Options previously discounted were not reconsidered as part of the 2020 long list.

The 2020 long list identified a total of 27 options, 15 for EB3R, and 12 for EB3C. The outcome of the long list assessment determined the options to be taken forward for further development/refinement.

5.4.3 Short List

As a result of the sifting of the long list options, 4 short list alternative options were identified, two each for EB3R and EB3C. Table 5-1 details the two EB3C options, with further detail provided in the following sub-sections.

Table 5-1 EB3C Short List Option Details

Components	Online	Offline
Busway	<ul style="list-style-type: none"> Centre running busway along Tī Rākau Dr Stations near Trugood Dr and Burswood Dr 	<ul style="list-style-type: none"> Offline busway behind commercial area Offline stations behind commercial area and in Burswood Reserve
Walking and Cycling	<ul style="list-style-type: none"> Unidirectional (1.5m) cycleways with possibility for wider passing bays Pedestrian crossings on all approaches to signalised intersections 	<ul style="list-style-type: none"> Unidirectional (1.5m) cycleways with possibility for wider passing bays Pedestrian crossings on all approaches to signalised intersections
Safety	<ul style="list-style-type: none"> 50km/h posted speed for Tī Rākau Dr 50km/h posted speed for busway (30km/h at stations) Signalisation and crossing improvements at intersections 	<ul style="list-style-type: none"> 60km/h posted speed for Tī Rākau Dr 50km/h posted speed for busway (30km/h at stations) Signalisation of side road/busway intersections

5.4.3.1 EB3C Short List Online Option Description

The online busway option was described as an at grade central running busway along Tī Rākau Drive. The busway would occupy the existing westbound traffic lanes, with new traffic lanes provided immediately to the south of the existing roadway. Property acquisition, most of which would be only partial acquisitions would be required from land located on both sides of Tī Rākau Drive to accommodate the widened road corridor.

5.4.3.2 EB3C Short List Offline Option Description

The offline busway option positioned the busway to the north of Tī Rākau Drive, behind the existing commercial development and south of the Burswood residential area. Going west to east (from Pakuranga Creek to Huntington Drive), the busway alignment would depart from Tī Rākau Drive at the intersection with Trugood Drive, crossing the CMA on a new bridge.

The busway would be routed behind Chinatown, running east across Burswood Drive West (west end) and then to the rear of Torrens Road’s commercial properties. The busway would follow this alignment and then cross Burswood Drive (West) and enter Burswood Esplanade Reserve.

The busway would continue to traverse Burswood Esplanade Reserve, running directly behind the Howick and Eastern Bus Depot before re-joining Tī Rākau Drive at the intersection with Huntington Drive. The busway would then continue along the centre of Tī Rākau Drive towards Botany Town Centre.

5.5 Multi Criteria Analysis

5.5.1 MCA Process and Outcomes

The two short listed options for EB3C were assessed using an MCA framework.

The MCA assessed each option against the Project objectives and environmental factors. The performance of each option against the objectives and environmental factors was scored, without weighting, using an 11-point scale. A workshop was held with technical assessors on 4 February 2021 to fully explore the options to ensure that assessment was based on consistent and commonly understood information. The scoring for each option was confirmed after the MCA workshop.

The options were assessed using the same MCA framework developed for the Project and were assessed in relation to Project Objectives and environmental factors. The combination of the Project Objectives and environmental factors was considered to provide a balanced assessment framework for the options.

The MCA showed, without weighting being applied, that both options scored positively in relation to the Project objectives. This was expected as both options aligned with the Project Objectives.

When considering environmental factors, all options had positive effects in relation to permanent transport and social impacts. The EB3C online option had positive effects in relation to urban design outcomes. The landscape and visual effects of both options were neutral.

From a consenting and statutory perspective, the online option had a positive score. The offline option was provided with a neutral score, reflecting potential risks associated with CMA and freshwater environment impacts.

The environmental factors for both options had neutral or negative score for acoustics, air quality, marine ecology, freshwater ecology, terrestrial ecology, temporary traffic and transport effects. Negative effects were identified in situations where the option was brought closer to or directly impacted sensitive receptors, such as the CMA, streams and residential zones.

Both options had negative effects upon existing properties, given the need for acquisition of private land. The online option had the highest impact due to its impacts on commercial properties.

The MCA scoring generally showed that all options were similar in terms of how they relate to the Project Objectives and their potential environmental effects. There were no significant differences in scores provided by assessors between the options, with most scores being within 1 or 2 points of each other. As an outcome from the MCA, the EB3C online option scored marginally higher than the offline option, with little differentiation between the options.

The MCA showed that the options considered did not present significant adverse impacts that may be particularly challenging to get approved under the RMA. It was also recognised that mitigation could be incorporated into the design that could appropriately address the individual adverse effects of different options.

5.5.2 Consideration and Recommendations

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

In addition to the outcome of the MCA, the ALT also considered the following matters in the process of selecting a preferred option:

- KRA's (A Collaborative Culture, Safe and Well, Legacy, Sustainability, Customer Experience, Communities and Partners)⁴⁵
- Cost (Construction and Property)
- Suitability of residual land for redevelopment
- Safety.

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

The ALT identified the offline option as the preferred option for the following reasons:

- Affordability - cheaper than the online estimate for design and construction costs given fewer complex intersections involved in the design and being able to construct offline (e.g. less complicated Construction Traffic Management).
- Reliability – better travel reliability than the online option as busway crosses fewer intersections
- Increased exposure/catchment – the bus stations for the offline option would be closer to the Burswood Residential Area, increasing the catchment of potential bus users
- Property strategy – fewer properties/partial acquisitions and less tenants to negotiate with.

It was acknowledged by the ALT that there were some risks associated with the EB3C offline option:

- Mitigation of impacts upon Burswood Esplanade Reserve – consideration to the design of structures within the reserve and/or the option to accommodate the alignment of the busway within the Howick and Eastern Bus Depot. This would require redesign of the depot and possibly more reserve land to meet the operational needs of the depot
- Proximity of the option to wetlands
- Engagement with key stakeholders and the community
- Landowners and occupiers had yet to be engaged and views were not known.

The IPAB considered the recommendation made by the ALT on 11 February 2021. The IPAB agreed with the ALT recommendation for the EB3C offline option, subject to more detailed consideration of design, mitigation and consentability of the option in relation to potential impacts to the wetlands within Burswood Esplanade Reserve.

⁴⁵ The purpose of the Key Result Areas (KRA's) and the associated Key Performance Indicators (KPI's) is to drive outstanding performance to achieve the broader project objectives, benefits and outcomes.

Based on the above, the IPAB endorsed the EB3C offline option (and the EB3R online) as the preferred scheme and it was taken forward for design development.

5.6 Design Development

5.6.1 Design Risks

Following selection of the preferred scheme, the EBA undertook further design development on the EB3C alignment in April 2021. This design development identified a number of risks associated with this scheme. In particular, it was identified that there was a significant risk that the technically preferred scheme was more challenging to implement than initially thought through the previous option assessment phase for the reasons below.

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

While the design team were of the view that there may be opportunities to minimise this cross-section further, there were concerns that:

- There could be insufficient space to safely construct the busway immediately adjacent to existing residential properties
- Construction noise and vibration could lead to unacceptable disturbance to the adjacent residents
- The long-term legacy of the busway within a metre of residential properties may be unacceptable to the community.

Further risks were identified in relation to the inwards and outwards goods delivery area for the adjacent commercial activities at 320 Tī Rākau Drive (Bunnings Warehouse), specifically:

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

5.6.2 Design Development – Burswood Esplanade Reserve

As a result of the design development process and previously identified constraints within Burswood Esplanade Reserve, potential changes to the alignment of the EB3C section within the Burswood Esplanade Reserve area were identified by the design team for consideration by EBA. The alignment options were developed to respond to specific constraints within the reserve itself, such as:

- The location of streams and the wetlands
- Position and location of high-power voltage cables
- Maximum length of bridge spans, without the need to place piers within streams and wetlands
- Suitable connections between the busway and bus depot.

As detailed at Section 10.2 of the Options Assessment Report five alternative options were identified to address these constraints:

- A. Pricing Package Alignment
- B. Further West Alignment
- C. Northern Alignment
- D. Technically preferred, optimised for bridges
- E. Online Arrangement.

The five alternative options were considered by the EBA to be consistent with the Project objectives and similar in scope to the options considered within the February 2021 MCA.

Options A and B were determined to have significant design constraints and were discounted from further consideration by the EBA.

Based on the assessments undertaken through additional workshops held by the EBA⁴⁶, Option E was identified as the preferred option by the majority of the technical assessors. This was due to:

- A lower consenting risk given its footprint within the reserve, as well as fewer adverse effects relative to the other options on ecology and other infrastructure
- Achieving positive integration with existing land uses
- Providing increased operational flexibility for the busway compared to Options C and D
- Reduced land take from the reserve, resulting in more of the open space remaining for community use and enjoyment.

It is noted that the constructability and property acquisition assessments did not identify Option E as the preferred option. However, these assessments did not, on balance, prevent Option E from being the preferred alignment given the benefits listed above. These findings were considered by the EBA Key Decisions Team in June 2021, who, based on the reasons detailed above, endorsed proceeding further with Option E.

5.6.3 Design Development – Intermediate Station location

The technically preferred station location was part of the scheme considered in the EB3C MCA. The technically preferred scheme involved two stations, one on each arm of Burswood Drive. Following confirmation of this technically preferred option by the IPAB, design refinement, potential scope adjustment opportunities and value engineering was undertaken by the design team.

The design team identified the following risks and opportunities associated with the provision of two bus stations:

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

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

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

⁴⁶ The details of this workshop are described at Section 11.2 of the Options Assessment Report at Appendix 19

The design development resulted in an alternative single centrally located intermediate station and two alternative station locations being developed for consideration by the EBA, as shown below.⁴⁷



⁴⁷ Section 10.3 of the Options Assessment Report attached at Appendix 19 describes the Station Location design refinement in detail.



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

The EBA determined that the single station option (i.e. Option 3 above) was preferable because of the ability to create a well-designed hub that would be central to the community. This option could also be provided at a lower cost, provide for improved travel times, for only a marginal reduction in catchment coverage.

Overall, the EBC station options were found to be relatively comparable, particularly from an operational perspective. Based on the technical assessment undertaken, the following benefits and issues of a single station option (Option 3) were identified:

Table 5-2 Benefits and Issues for a Single EB3C Bus Station

Benefits	Issues
Results in a more compact urban form, providing the catalyst for future urban intensification.	A greater number of existing residents displaced due to land requirement.
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.	All single station options will result in increased land acquisition costs when compared to a two-station option. The likely land acquisition costs are \$12 to \$14M.
Less impact on Burswood Esplanade Reserve through the removal of the station at this location	Community consultation had not been undertaken.
The central location of the single bus station would result in new linkages being formed between the Burswood residential area and the Tī Rākau Drive commercial area.	
From a construction perspective, a single station would require less resources than the two-station option.	
The single station, alignment option C, was preferred from a construction perspective as it provided the maximum distance between construction activities and residential properties.	

5.6.4 Consideration and Recommendations from Design Development

At the ALT meeting in June 2021 the ALT confirmed the following changes to the EB3C design:

- Have a single bus station located between Chinatown and Burswood
- A shift in the busway alignment from the Technically Preferred scheme, which required property acquisition from predominantly commercial properties to the residential area requiring predominantly residential property acquisition.

This design was progressed by the EBA and was called the Reference Design.

5.7 Options Assessment Review

Following further consideration of the Options Assessment process, the EBA identified that while the Options Assessment was comprehensive there was a gap in the assessment which was that the one-station option (i.e., the Reference Design) should have been scored using the MCA criteria against the technically preferred scheme (the commercial offline option) and the commercial online option.

The EBA undertook an MCA evaluation of the Reference Design against the Commercial online and Commercial offline EB3C options⁴⁸. The MCA evaluation followed the same process as that undertaken for the online and offline options previously discussed above at section 3.4.

⁴⁸ Detailed at Section 14 of the Options Assessment Report attached at Appendix 19.

A difference between the scoring of the updated MCA and its first tranche is that the Project objectives were scored individually in the MCA update. This was done to provide more granularity in respect of the objectives and was identified by the EBA as a gap in the initial MCA. This involved the Technical Assessors reassessing the Project objectives for EB3C’s online and offline option, as well as the Burswood residential option. A sensitivity analysis was also undertaken using the same methodology as that undertaken in the first tranche of the MCA.

When weighting was applied, the Burswood residential option performed better than other options across transport benefits, effects, and equal weighting scenarios. The offline option performed best when costs were weighted, while the online option performed better when the environmental weightings were applied. These results are summarised below.

Table 5-3 Updated Sensitivity Analysis for EB3C

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

Sensitivity analysis was also undertaken to apply weighting to the assessment criteria used for the MCA. The raw scores showed a preference for the Commercial Burswood Offline option.

The provision of weighting shows that, in most circumstances, the best performing option is the Commercial Burswood offline. In particular, the Burswood offline option performed better when weighting was applied in transport benefits and effects. The Commercial Burswood offline option ranked second when cost weightings were applied, but the difference in score compared to the 1st ranked Commercial Online option was small.

Scoring the EB3C options of Online, Offline Bund and Commercial Burswood offline indicated that the Burswood Option performed well against the Project Objectives and other MCA criteria and supported the earlier assessment of EB3C options through the design development stages of the Project.

5.8 Tī Rākau Drive Bridge

To accommodate the busway, the crossing of Pakuranga Creek requires widening to allow for four general traffic lanes (two in each direction) and two lanes for the busway. An options assessment for the Tī Rākau Drive Bridge was undertaken (Appendix 34), with a range of technical specialists providing input into the process. The methodology employed was consistent with previous MCAs for the Project and is detailed within the Options Assessment Report attached at Appendix 19 and is summarised below.

5.9 Previous option assessments related to Tī Rākau Bridge

As described above, numerous investigations have been undertaken in the development of the Project. In particular, the AMETI Eastern Busway 3 – Further Options Assessment (March 2017) considered different options for Tī Rākau Bridge.

alternative that reduced the costs and disruption while minimising any reduction of the Project’s benefits. This review resulted in an alternative EB3C alignment for Tī Rākau Drive Bridge (the Reference Design). The EBA’s Reference Design includes the duplication of the Tī Rākau Drive Bridge on the northern side of the existing bridge.

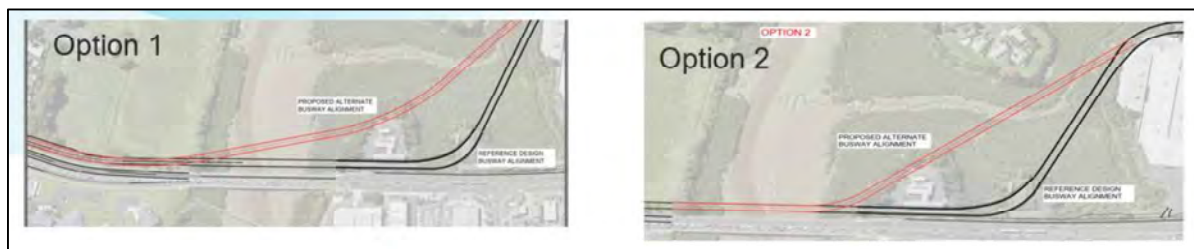
The Reference Design was identified as having the following benefits compared to the previous technically preferred scheme:

- A \$30M reduction in cost
- Smaller number of property acquisitions required
- Improved travel time for buses by removing the need for buses to pass through the Trugood Drive/Tī Rākau Drive intersection and providing a dedicated separated busway
- Improved reliability for buses by removing the need for buses to pass through the Trugood Drive/Tī Rākau Drive intersection
- Improved travel time for general traffic by removing buses from the Trugood Drive / Tī Rākau Drive intersection
- Improved active transport facilities by providing a bidirectional cycleway and footpath on the new busway and active transport bridge across Pakuranga Creek
- Provision of a bidirectional cycleway from Pakuranga to Botany, which was not achievable with the technically preferred alignment
- Improved safety for vulnerable users by providing off road cycle facilities
- Less disruption to businesses along Tī Rākau Drive
- Improved water quality outcomes with the incorporation of stormwater treatment measures
- Reduced construction impacts to the travelling public, with most of the construction of the northern alignment off-line.

EBA engaged with Mobil New Zealand in November 2021 given the severance of their property (242 Tī Rākau Drive) caused by the Reference Design. Mobil informed the EBA that their preference was to maintain the service station and requested the EBA undertake further option assessments of alternative designs that did not require the full acquisition of the property. This further assessment is detailed below.

5.9.3 Further Options Assessment for Pakuranga Creek Crossing

Three alternative designs were developed in January 2022, based on a desire to avoid the full acquisition of the property at 242 Tī Rākau Drive and are shown below along with the reference design.



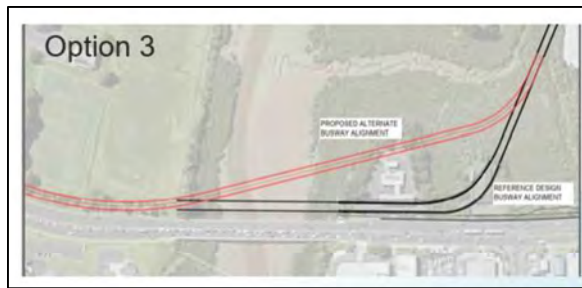


Figure 5-3 Further Pakuranga Creek Crossing Options

These options were discussed with mana whenua at a hui on 27 January 2022. The combined view of mana whenua was that retention of the Reference Design was preferred given its smaller environmental footprint. However, mana whenua also understood the rationale for the other options but stipulated the need to see the detail of mitigation through the design process if any of the options were to be progressed. This response from mana whenua was not considered by the EBA to be a fatal flaw.

At this preliminary stage of the assessment the EBA did not engage with AC or the Local Board with respect to acquiring/occupation of the esplanade reserve, given the conceptual nature of the designs.

5.9.4 Outcomes of the MCA for Pakuranga Creek Crossing Options

The MCA for the Pakuranga Creek crossing options was discussed between EBA and key participants in April 2022 and an MCA Assessment was undertaken in May 2022. The MCA process and evaluation is described in detail at sections 4 and 5 of the Ti Rākau Bridge Options Assessment Report attached at Appendix 19.

Initially the EBA considered the options in relation to the existing environment to determine if there was a preferred option to compare with the Reference Design. Options 1 and 3 were taken forward to compare with the reference design as the best performing of the options. Subsequent to this Option 1A was developed and was considered by the Technical Specialists to be comparable to Option 1.

Option 1A (Figure 5-4) Figure 5-4 Pakuranga Creek Crossing Option 1A is an alternative that would not require any property acquisition from 242 Ti Rākau Drive. This is represented by the orange line in Figure 5-4, with the blue line indicating the potential location of the walking and cycling connection.

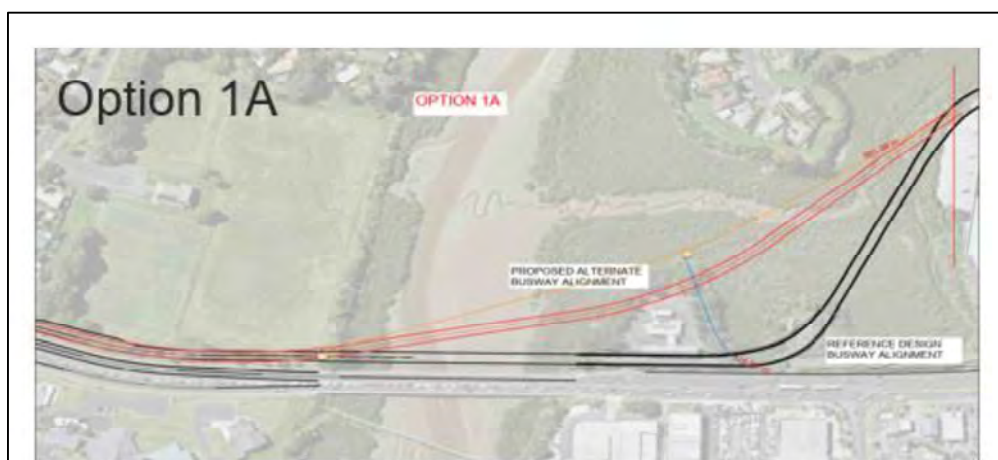


Figure 5-4 Pakuranga Creek Crossing Option 1A

The ALT recognised that the Options 1/1a and Option 3 had merits when considering affordability and the construction programme. In addition, it was recognised that, despite benefits from an urban design and active transport perspective, these options:

- Did not landlock the Ti Rākau Drive facing sites
- Provided for potential cost savings
- Avoided the need to address potential land contamination at 242 Ti Rākau Drive (being a service station site).

Following further consideration of the options benefits and issues, the ALT determined that Option 1a should be progressed given its constructability and affordability benefits. The ALT acknowledged the issues raised during the MCA regarding urban design outcomes, connectivity, impact on the CMA, landscape and visual issues.

The ALT presented a preliminary Ti Rākau Drive Bridge options assessment paper to the IPAB in May 2022 which included the recommendation to progress with Option 1a. The IPAB agreed ‘in principle’ to progress with Option 1a, subject to further investigation of the design that avoided acquisition of the Mobil site. The IPAB also sought further information in relation to:

- Walking and cycling connections
- Feedback from partners including mana whenua and AC
- Construction and cost
- Future proofing and risks.

The EBA updated Mobil in June 2022 with the results of MCA and shared the direction of IPAB to:

- look at options that did not require land
- look more closely at walking and cycling connectivity
- discuss the bridge options with AC
- further engage with mana whenua.

5.9.5 Development and assessment of Walking and Cycling Variations

5.9.5.1 Walking and Cycling Variations

Eight additional variations to the Further Options previously shared with the IPAB⁴⁹ were developed by the EBA to address walking and cycling and connectivity issues raised by the IPAB as described above.

Variation 1a and 1g were progressed for further MCA analysis with the reference design and are shown below in Figure 5-5 and Figure 5-6.

⁴⁹ i.e., Beyond the further options and the Reference Design.