



# Appendix A

Connection to Te Ara Tupua



8 February 2022

# Thorndon Quay and Hutt Road The Connection

SSBC Addendum

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## 1 Introduction

The scope of this addendum involves the consideration of options for improving the interface between two shared path projects to be constructed in the near future, the Let's Get Wellington Moving Thorndon Quay and Hutt Road project (TQHR), and the Waka Kotahi Ngā Ūranga ki Pito-one (Ngauranga to Petone) shared path. The two paths will connect together, but the current configuration will not cater for the increased number of users. The assessment has been undertaken utilising the business case approach in order to understand the key problems to be addressed, and the relative performance of each of the options.

Currently the scope excludes the consideration of urban design, crime prevention through environmental design, and accessibility elements. These will be included in the scope for the following phase to ensure that 'The Connection' aligns with the overall vision for Te Ara Tupua, and meaningfully engages with mana whenua through the partnership mechanisms in place through the Let's Get Wellington Programme, and the Ngā Ūranga ki Pito-one delivery alliance.

The Thorndon Quay and Hutt Road project is being delivered under the Let's Get Wellington Moving programme and will deliver corridor improvements for bus public transport and active mode travel to and from the central city. The Hutt Road section of the project starts at the Ngā Ūranga (Ngauranga) intersection just before where the entrance to the Ngā Ūranga ki Pito-one (Ngauranga to Petone) shared path would be created. The current estimated construction start date for the Thorndon Quay and Hutt Road project is 2022.

At the eastern side of the Ngā Ūranga intersection is the start of the Ngā Ūranga ki Pito-one shared path, currently being designed and delivered by the Te Ara Tupua Alliance. The shared path provides for a new foot / cycle bridge across the rail corridor to access the shared path on the seaward side of the rail line. Construction for this project is estimated to be completed in 2025.

The purpose of this Addendum is to consider 'The Connection' between the two projects, as currently the two active mode paths in each project connect to each other, but the standard of the access will not accommodate the forecast user demand. The location under consideration is shown in Figure 1. It includes parts of the scope area for the Thorndon Quay and Hutt Road project and the Ngā Ūranga ki Pito-one shared path where they will interface. The wider importance of 'The Connection' for these shared paths is illustrated in Figure 2.

Figure 1: Scope area



Figure 2: Project Interface with the Thorndon Quay and Hutt Road (labelled Wellington to Ngā Ūranga) and Ngā Ūranga ki Pito-one projects



## 2 Context

### 2.1 Thorndon Quay Hutt Road Project

The Thorndon Quay and Hutt Road Single Stage Business Case (SSBC) has considered the best options for the corridor to facilitate growth in bus and active mode travel to / from and through the central city, whilst also accommodating the many people who live and work in the area. Thorndon Quay and Hutt Road is a critical commuter route; it's the busiest bus route

outside of the city centre and the busiest cycle route in the city with more than 10,000 bus passengers and up to 1,300 cyclists on an average weekday.

The Thorndon Quay and Hutt Road project (TQHR) begins just north of the Lambton Quay bus interchange on Thorndon Quay and runs for approximately 1km north to the intersection with Tinakori Road where Hutt Road begins. Hutt Road runs parallel to State Highway 1 and the railway corridor for approximately 4km to the bottom of the Ngā Ūranga Gorge where State Highway 1 and 2 splits (Ngā Ūranga intersection).

With growing numbers of people living and working in Wellington City, the northern suburbs and Hutt City, more people will soon be using Thorndon Quay and Hutt Road to commute by bus / public transport, active modes, and private vehicles. Within the next 30 years, another 130,000 to 200,000 people are forecasted to live in the Wellington Region.

The key objectives for the Thorndon Quay and Hutt Road project include:

- Improving the level of service for bus public transport and providing capacity for growth
- Improving the level of service and reducing the safety risk for people walking and cycling along and across Thorndon Quay and Hutt Road
- Reducing the frequency and severity of crashes
- Improving the amenity of Thorndon Quay to support the current and future place aspirations for the corridor / area
- Maintaining similar access for people and freight to and from the ferry terminal.

## 2.2 Te Ara Tupua

Te Ara Tupua consists of upgraded walking and cycling facilities between Wellington and Melling in Hutt City and will enable more people to walk and cycle along the Hutt Valley and Wellington transport corridor. The key projects include the walking and cycling upgrades along Thorndon Quay Hutt Road, the new shared path from Ngā Ūranga to Pito-one, and the Pito-one to Melling cycle path (Figure 2).

The improvements along Thorndon Quay and Hutt Road will play a part in helping connect the central city from the Ngā Ūranga interchange area for active modes and bus public transport. With the forecasted growth in cycling (facilitated further through the evolution of e-bikes), walking, micro mobility devices such as e-scooters, and bus public transport use over the next 30 years, the changes to Thorndon Quay and Hutt Road will facilitate the additional capacity for active modes and public transport to accommodate this growth in population and commuting trips. This project will also help to achieve Let's Get Wellington Moving's vision of moving more people with fewer vehicles.

The Ngā Ūranga to Pito-one section of Te Ara Tupua will be built on the harbour's edge from Ngā Ūranga to Honiana Te Puni Reserve in Petone connecting to the Pito-one to Melling section (currently under construction) with a new foot / cycle bridge crossing over the rail lines north of Ngā Ūranga interchange. Funding has recently been approved, and Te Ara Tupua Alliance has been formed to design and construct the project. The project is forecast to be open by 2025.

By 2035, it is estimated that there will be on average over 2800 trips undertaken by bike on the path each weekday, as well as 465 walking or running trips and around 290 trips on e-scooters or other devices. By 2050 it is estimated that there will be on average over 3,800 trips by bike on the path each weekday, 630 walking or running trips and 500 trips on e-

scooters or other devices. Recreational use will see even more people walking, running and enjoying the path at weekends. The growing use of e-bikes is expected to contribute additional users classed as cyclists using the shared path due to e-bikes being used for longer commuting trips and the tendency for e-bike owners to bike longer distances and take more trips per week (compared with conventional cycle owners).

### 2.3 The Connection between Ngā Ūranga ki Pito-one and TQHR

Linking the Ngā Ūranga to Pito-one section with the upgraded active mode facilities proposed on Hutt Road is key to ensuring a safe and seamless transition between the two projects. The interface between the two projects when completed will not be of a standard to cater for the increased number of users.

Once Ngā Ūranga to Pito-one is constructed and the changes to Thorndon Quay and Hutt Road are implemented, there will be several significant changes to how people travel through the area. The shared path will permit two-way travel by pedestrians and cyclists along Hutt Road, and Ngā Ūranga to Pito-one. This will significantly reduce any demand for cyclists to travel along SH2 north/southbound using the shoulder. It also means that the current configuration which only provides for southbound cyclists to enter Hutt Road will be a significant constraint for a two-way continuous shared path.

### 2.4 Current Location Configuration

The area where the two active mode paths will join is complex as shown in Figure 3. Currently the separated cycle path alongside SH2 south exits alongside the SH2 southbound offramp and people cycling can continue along Hutt Road along the existing shared path or must negotiate the junction area to travel to the shared path that runs along the highway to the north.

The lane configuration from SH2 is a single exit off ramp that then splits into three lanes. These lanes pass under the overbridge with the left lane providing a dedicated free left turn onto Hutt Road. The other two lanes end at a signalised intersection allowing traffic to enter SH1 northbound towards Johnsonville, Jarden Mile and/or back onto SH2 towards Petone.

Located off Hutt Road and near to the SH2 southbound offramp, is the entrance to a stock effluent disposal facility. The facility is available for disposing of stock effluent, and effluent from self-contained campervans. An underpass provides access to the effluent disposal facility on the seaward side of the state highway(s). Vehicles using the facility then circle back to the SH2 southbound offramp. It is a popular facility as it is the only effluent disposal site in Wellington, and is used prior to accessing the ferries, or the port.

Ngā Ūranga is a key industrial and commercial land-use area. Due to demand, a bus stop is located immediately beside the stock effluent disposal facility entrance on Hutt Road (southbound) and the Ngā Ūranga train station is located on the seaward side of the stock effluent disposal facility site. This bus stop is serviced by both Wellington northern suburbs and Hutt Valley to Wellington City services. The train station is serviced by the Hutt Valley and Melling train services.

No parking is available at the Ngā Ūranga Station. Pedestrians need to access the station by following the existing Hutt Road shared path, under SH2 / alongside the SH2 Ngauranga southbound offramp. The path extends to a subway that provides access to the station platform underneath the up main rail line.



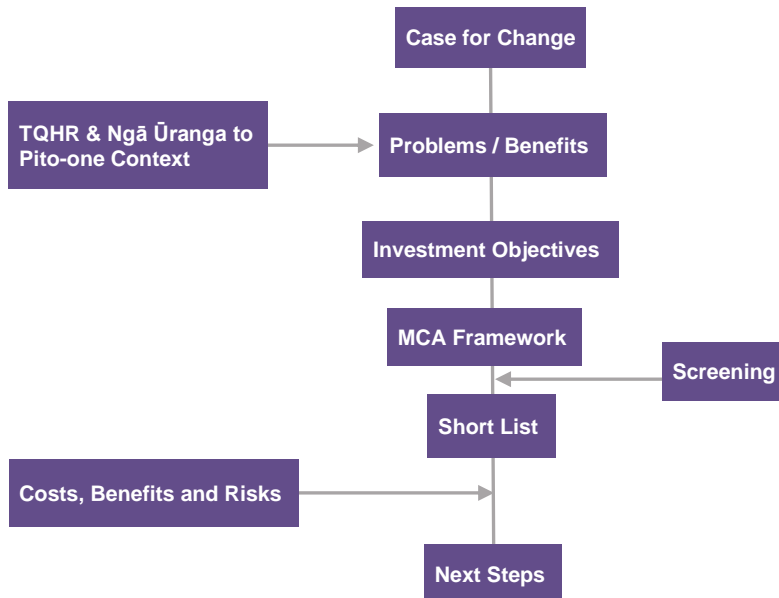
Figure 3: Current Site Arrangement



## 2.5 Process

The process for undertaking this business case assessment is outlined below in Figure 4.

Figure 4: Process Chart



## 3 The Connection Problems, Benefits and Project Objectives

### 3.1 Key Problems

Three key problems were initially identified with the Let's Get Wellington Moving Technical Advisory Group to be addressed for 'The Connection': These identified problems with reduced active user demand resulting from the poor state of the facility, increased safety risk due to the

difference in speed between people cycling and pedestrians, and safety risks with the conflicting uses in the project area. These three problems had similar characteristics that ultimately impacted active mode user demand and so they were consolidated into a single problem statement:

**Key Problem** - The current state of the existing active mode facility combined with the variability in speeds between active modes and vehicle access results in increased conflict between users, increases real and perceived safety risk and limits attractiveness to increase volumes of active mode users.

The evidence supporting this problem statement is summarised below.

**a. Current Standard of the facility**

A review of the Crash Analysis System data for the previous five years that showed one on-road minor injury crash involving a person cycling on the road in the area. There was one other recorded non-injury active mode crash within the area of ‘The Connection’ on the current path, or the shared path along Hutt Road. It is expected that incidences could be higher due to under-reporting for crashes on these facilities.

The area linking the Thorndon Quay and Hutt Road shared path and the Ngā Ūranga to Pito-one shared path is a significant constraint for the forecasted volumes of users. The existing path under the SH2 overbridge at Ngā Ūranga is too narrow for bi-directional travel of high volumes of people cycling with an effective width less than 2.5 metres due to the retaining wall and the traffic lanes running parallel to the path (Figure 5).

For a regionally significant shared path with anticipated high future use, the current effective width is significantly less than the typical widths specified in the Austroads standards of between 3.0m and 4.0m and wider where the numbers of cyclists and pedestrians are very high or there is a high probability of conflict between users (e.g., people walking dogs, in-line skaters etc).

This constraint escalates the perceived and real risks of using the shared path to connect and maintain a continuous shared path. The risk has the potential to limit the attractiveness of the facility for new users.

Figure 5 also shows the constraint on the northeast side of the overbridge. A path previously located on the northwest side of the overbridge has been closed and removed because of the safety risks. The safety risk was exacerbated by the narrow width between the kerb and the wall on the northeast side of the overbridge. This width constraint is a key consideration in the identification of suitable options as this will limit the extent to which lane width can be configured under the overbridge.

Figure 5: Width Constraints Under SH2 Overbridge



### b. Difference in Speeds

Due to the range of users that will be permitted to use the shared paths, the constrained area along 'The Connection' will create a significant risk for different users on the shared path. The mix of users will result in a speed range averaging for pedestrians at 4-5km/h, cyclists at 15-35 km/h depending on ability, e-bikes and other micro mobility devices such as e-scooters and e-skateboards at 20-40 km/h, and mobility scooters at 12-15 km/h. These speed differentials, combined with the constrained environment at the Ngā Ūranga intersection increases the perceived and real safety risk of the existing narrow path, that may discourage future users.

### c. Conflict Areas

The area is complex and is a high conflict area noting the forecast number of users of the new shared paths and vehicles travelling through to access key destinations. The key destinations include the stock effluent disposal facility, the existing bus stop (Figure 6), Ngā Ūranga Station, Jarden Mile businesses and for KiwiRail work vehicles requiring access to the sidings along the Hutt Valley Line, in addition to the SH1 / SH2 interchange. With the forecast growth in users along the shared paths, the level of conflict will increase with the exposure risk for active modes increasing.

The evidence highlights the complex nature of the area around 'The Connection', as well as the key changes to be implemented through changes to the shared paths. This complexity results in a significant amount of conflict that could deter new users and impact the safe and

efficient use of the shared paths at 'The Connection' point between Hutt Road and the Ngā Ūranga to Pito-one project.

Figure 6: Bus Stop, Entrance and Exit for the Stock Effluent Disposal Facility



### 3.2 Benefits

The key benefit of successfully investing to address these problems with 'The Connection' have been identified as:

- Improved safety and perception of safety for all users, which is a catalyst for increased active mode users, and thus active mode share.

In achieving this benefit two following benefits aligned to the Thorndon Quay and Hutt Road, and Ngā Ūranga to Pito-one projects will also be enhanced:

- Health benefits from increased active mode share.
- Resilience benefits from creating an additional transport link (additional to the existing road and rail modes) that could also be used in emergencies.
- Access to Public transport (rail via Ngā Ūranga station and bus stops on Hutt Road) between the Hutt Valley, Wellington CBD and locations further north via the Ngā Ūranga Gorge.

## 4 Evaluation Criteria

### 4.1 Investment Objectives

In order to effectively assess the different options available for 'The Connection' the following investment objectives were developed:



**Investment objective 1:** To increase the number of active mode users between Wellington and the Hutt Valley by improving the level of service and perceived safety for active modes;



**Investment objective 2:** Improve Safety for all users;



**Investment objective 3:** To improve the connections and integration of active mode infrastructure to public transport and the strategic cycling and walking networks.

These align with the objectives for the Thorndon Quay Hutt Road project:



### 4.2 Critical Success Factors

In developing and assessing the options for 'The Connection' several critical success factors were identified. These were considered alongside the Investment Objectives as outcomes to progress further for assessment.

- Maintain access to the stock effluent disposal facility and Ngā Ūranga Station area.
- Ensuring that the queue length of the SH2 southbound offramp does not reduce the safety for vehicular drivers.
- Ensure the timing of improvements to 'The Connection' is coordinated with other wider network improvements, such as Aotea Quay Roundabout, Te Ara Tupua etc, as the network will be operating differently on their completion.

### 4.3 Other Criteria

To ensure consistency of evaluation with the LGWM programme the following additional criteria were included in the evaluation:

- Social, environmental and economic effects.
- Feasibility / delivery / operational characteristics.

### 4.4 MCA Scoring Methodology

To assess the merits of each option, a multi-criteria analysis was undertaken scoring all the related criteria against identified options. For this assessment a scoring scale of -5 to +5 was used with the guidance in Figure 7 provided to inform the score. Where the benefits truly are

marginal and not differentiators, then a score of 2 across options was justified. Scores were then moderated in a workshop to ensure consistency.

Figure 7: MCA scoring guidance

Score	
5	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / permanent benefits
4	High extent of benefits and confidence of benefit being realised and/or medium - long term benefits
3	Good benefits and/or medium term
2	Low or localised benefits and/or short term
1	Very low benefits and/or very short term
0	No change in benefits, impacts or difficulties from current situation
-1	Few difficulties, very low cost or low impact on some resources/values and/or very short term
-2	Minor difficulties, low cost or minor impacts on resources/values and/or short term
-3	Some difficulties, moderate cost or some impact on resources/values and/or medium term
-4	Clear difficulties, high cost or high impact on resources/values and/or medium - long term
-5	Substantial difficulties, very high cost or substantial impact on resources/values and/ long term / permanent

## 5 Options Development

### 5.1 Options Identification

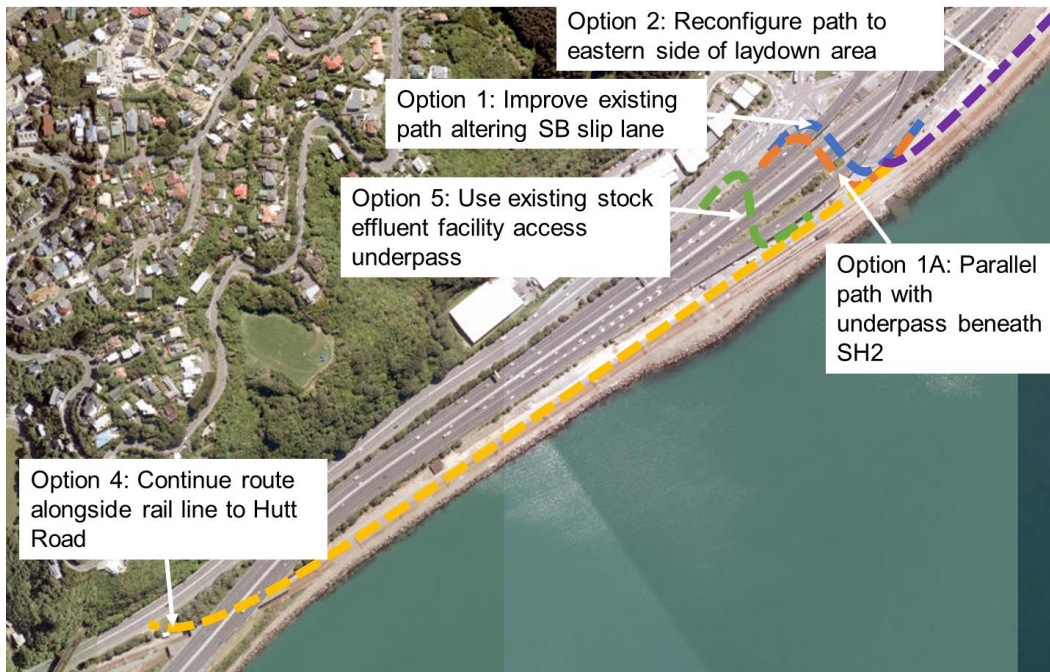
An initial longlist of options was considered, noting that significant changes to the Ngā Ūranga to Pito-one section of Te Ara Tupua were excluded as it has been consented based on its current design. The Do Minimum option for this project was leaving the current link unchanged, or a 'do nothing' option. The options are summarised in Table 1 and shown in graphically in Figure 8.

Table 1: Options considered

Option	Description
Option 1	Improve existing path through altering the existing SH2 southbound offramp slip lane onto Hutt Road
Option 1A	New parallel shared path with underpass beneath the state highway
Option 2	Proposed shared path on the eastern side of the laydown area with tie-in into the Ngā Ūranga to Pito-one overbridge, and either the improved existing path on the southbound slip lane (Option 1), or the underpass beneath the state highway (Option 1A).
Option 4	Continue proposed shared path alongside rail line to Hutt Road

Option 5	Use existing stock effluent disposal facility access
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Figure 8: Options considered



Within these five initial options different permutations for the alignment and facilities were considered (refer to Appendix A). These were generally considered as a different sub-option in order to understand the benefits and risks for each sub-option.

Common elements of all options include:

- Adopt a 4m safety zone running parallel to, and measured from, the centre of the closest rail line plus a 3m wide maintenance track for KiwiRail maintenance vehicles.
- That the existing KiwiRail laydown area will remain operational. This laydown area provides KiwiRail with land within the rail designation to store materials, equipment etc for rail activities. This is shown in Figure 9.
- Have lighting to P3 standard, which is similar to the lighting of SH2, with pole heights in keeping with Te Ara Tupua, Petone to Melling shared path projects and the Thorndon Quay Hutt Road project.
- Provision for CCTV to ensure safety for people using the area.

Figure 9: KiwiRail Laydown Area



## 5.2 Options Assessment

### 5.2.1 Multi-criteria Analysis

To undertake the multi-criteria analysis a Lead Assessor and Subject Matter Experts were assigned to each of the assessment criteria. The assignment of the Lead Assessor and Subject Matter Experts were based on their expert knowledge for the assessment criteria, and knowledge of the project area. The people engaged were drawn from Let's Get Wellington Moving, Waka Kotahi, Greater Wellington Regional Council, Wellington City Council, as well as the Beca and AECOM consultant team.

Key considerations for scoring each assessment criteria were provided for guidance. This was to ensure consistency of approach when scoring, but also to highlight what key considerations could affect the scores assigned to each option. The scores assigned to each of the options is included in Appendix A.

The multi-criteria criteria analysis was undertaken using several steps:

1. A meeting was held with all assessors to brief them of the project and the requirements for scoring.
2. The assessors then went and scored the options independently.
3. A workshop was held for the assessors to discuss the scoring, the reasons why they gave that score and to seek other feedback from the representation at the workshop to moderate and finalise the score.

The moderation workshop was held with representatives from Let's Get Wellington Moving, Waka Kotahi, Greater Wellington Regional Council, Wellington City Council, KiwiRail, Mana Whenua, Beca, and AECOM on the 1<sup>st</sup> September 2021. The purpose of the workshop was to obtain a moderated score across the different criteria for the options being considered.



Taking both the Lead Assessors and Subject Matter Expert’s scoring into account by averaging the score between them for each category and each option, gave the following ranking shown in Table 2 using the overall score from highest to lowest.

Table 2: Multi-criteria analysis ranking

Rank	Option	Score
1 <sup>st</sup>	Option 1 Lane space reallocation	8
2 <sup>nd</sup>	Option 1A New shared path underpass	3
3 <sup>rd</sup>	Options 2 and 2A Shared path on the eastern side of the KiwiRail laydown area	-10
4 <sup>th</sup>	Option 4 Continue route alongside rail line to Hutt Road	-11
5 <sup>th</sup>	Option 1C Slip Lane remains open. (a sub-option of Option 1 reducing cost of slip road retaining wall alterations).	-12
6 <sup>th</sup>	Option 5 Use existing stock effluent disposal facility access	-35

### 5.2.2 Fatal Flaws Assessment

As part of the assessment of the various options the partners to the business case identified fatal flaws in some of the initial options, which excluded them from further assessment. The options where fatal flaws were identified are summarised in Table 3.

Table 3: Options Excluded

Option	Reason for exclusion
<b>Options 2 and 2A Shared path on the eastern side of the KiwiRail laydown area</b>	Options that generally impacted the KiwiRail laydown area, either through a reduced area for operation, or impedance for KiwiRail equipment and vehicles were considered a fatal flaw. KiwiRail indicated that separation of their laydown area from the rail tracks by the cycleway was not acceptable operationally and for land ownership reasons.
<b>Option 4 Continue route alongside rail line to Hutt Road</b>	This option would require use of the tunnel at the southern end to connect shared path users with Hutt Road. However, on the basis of KiwiRail wanting to use the tunnel at the south end for bringing together the upmain and downmain lines, the conflict with shared path users would be too great to overcome and was discounted.
<b>Option 5 Use existing stock effluent disposal facility access</b>	This option was not considered feasible. The current geometry of the underpass is too narrow to safely accommodate both heavy vehicles and campervans, and shared path users. These safety concerns were considered too great to overcome unless the stock effluent disposal facility was moved to an entirely new location, which is also considered to be unfeasible due to the extreme difficulty in finding a new location suitable for this type of facility.

### 5.2.3 Short-list Options

On the basis of the MCA analysis, and the views of KiwiRail on the impacts on their operations, two short-list options were identified, being Options 1 and 1A. During the cost estimating process of these options, a third option (Option 1D) was identified, which was a variation to Option 1, resulting in a reduction in cost to Option 1.

i. Options 1 – SH2 southbound offramp lane space reallocation

The reallocation of lane space on the SH2 southbound offramp (reference Option 1) would provide additional width for a bi-directional shared path connection with the Ngā Ūranga to Pito-one shared path through the closure of the dedicated left-hand turn lane on the SH2 southbound offramp. This lane area would be reallocated to shared path users, increasing the current effective width under the overbridge to meet current standards. Some widening would be required for the existing cycle path in order to accommodate the width for a bi-directional shared path. The existing egress from both the stock effluent disposal facility, and the KiwiRail laydown area would be consolidated into a single lane egress.

ii. Option 1A – New shared path underpass

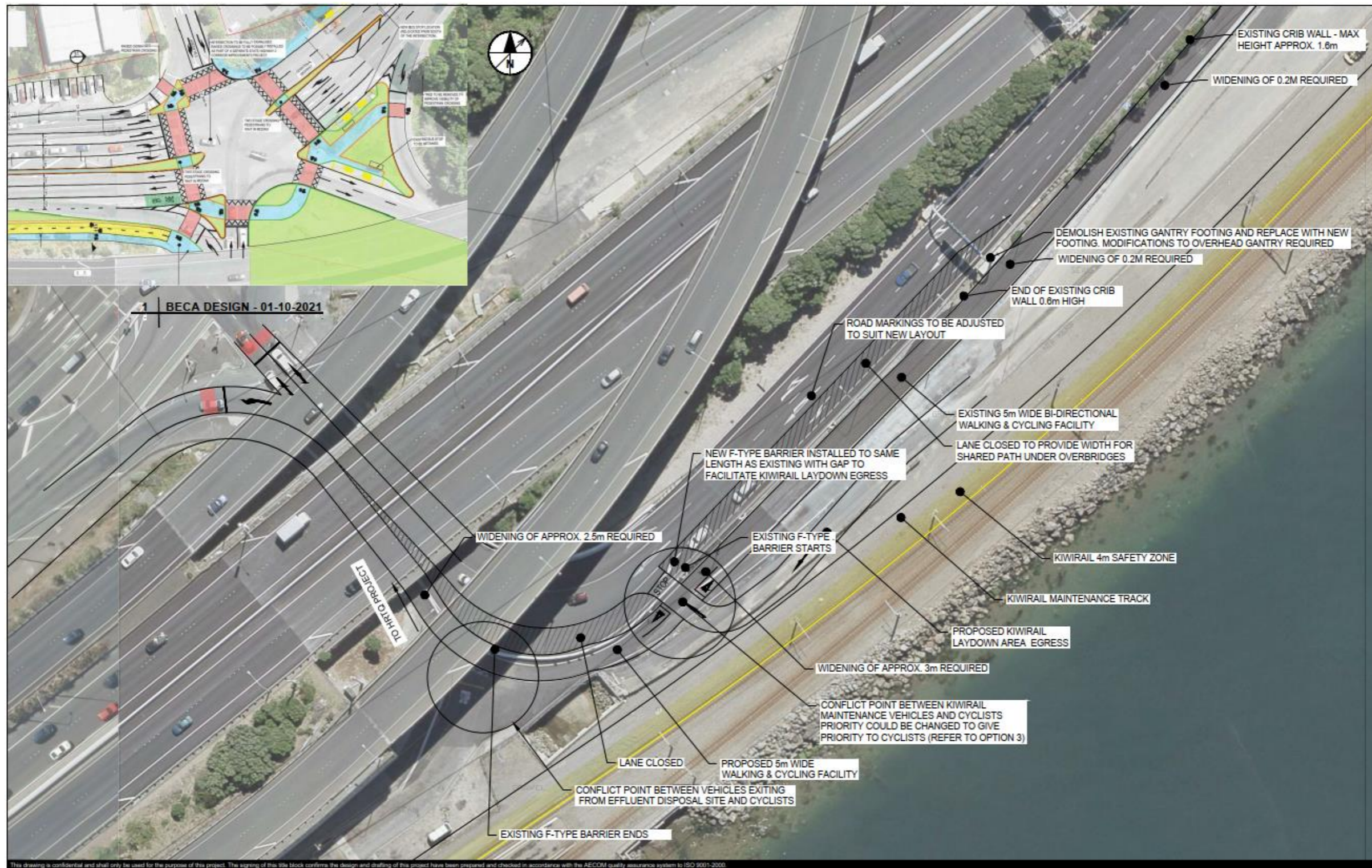
The second option (reference Option 1A) would install a new underpass beside the existing path under the state highway overbridges for connecting the shared paths. Some widening on the rail side would be required to the existing SH2 cycle path, adjacent to the SH2 southbound offramp, in order to accommodate the width of a bi-directional shared path. The egress for the KiwiRail layover area would be moved to the southern end of the site. The existing lane configuration on the SH2 southbound offramp would remain unchanged.

iii. Option 1D – Lane space reallocation

Option 1D is a variation to Option 1 in that the space required for widening the existing path adjacent to the SH2 southbound offramp would come from land on the rail side of the existing path, thereby negating the need to relocate an existing gantry and to re-build an existing retaining wall. Closure of the dedicated left turn lane on the SH2 southbound offramp would still be required.

The concept drawings for Option 1, Option 1A and Option 1D are shown below in Figure 10, Figure 11, and Figure 12. These concept drawings can be viewed in more detail in Appendix C.

Figure 10: Option 1 - Improve existing path altering SB slip lane



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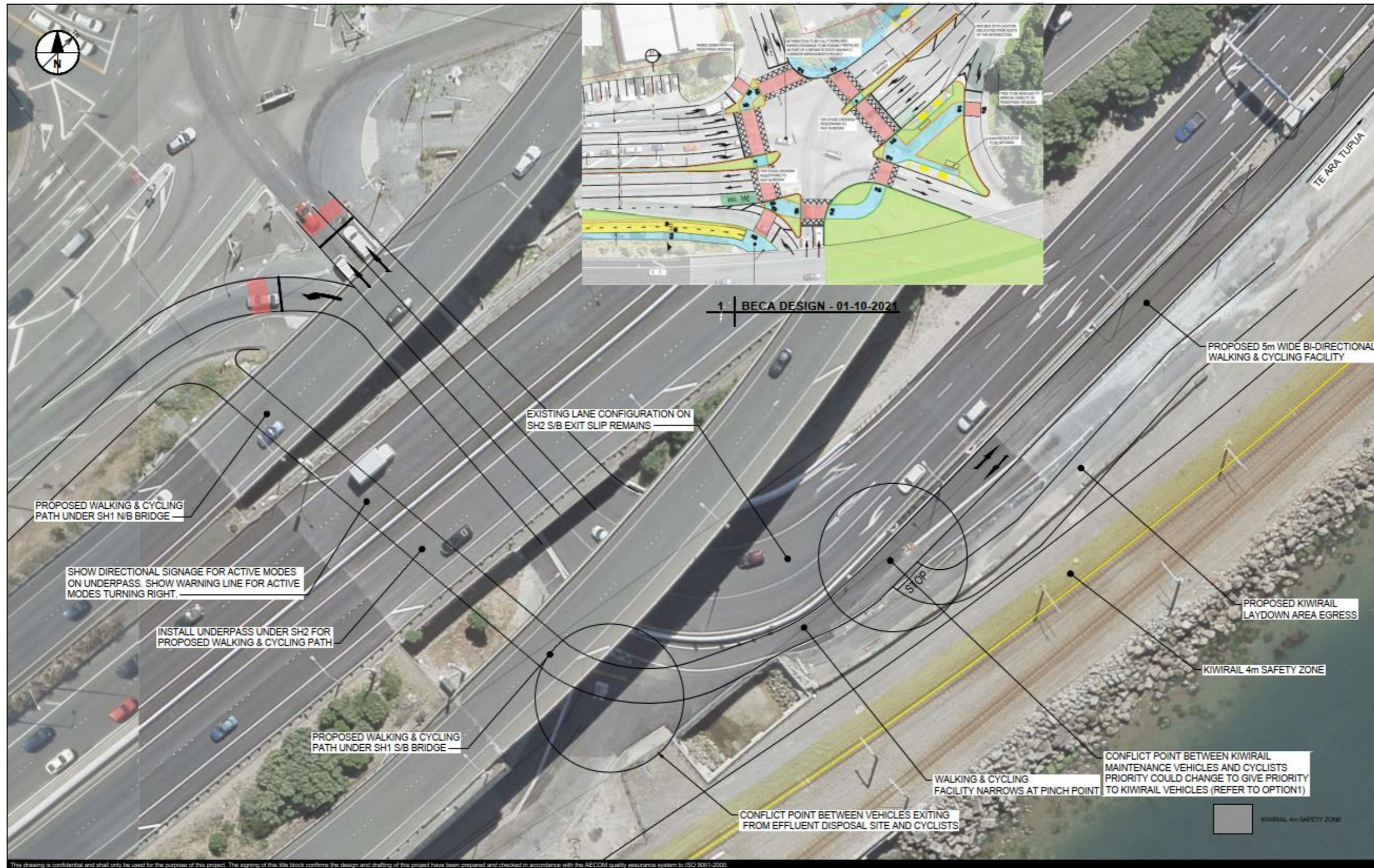
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PROJECT MANAGEMENT INITIALS		
GD	TR	AA
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ISSUE/REVISION	
D	28.01.2022 REVISIONS FOR ISSUE
C	15.09.2021 NOTES FOR RISK WORKSHOP
B	25.08.2021 KIWRIL AMENDMENTS
A	Aug-21 FOR DISCUSSION
SR	DATE DESCRIPTION

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Figure 11: Option 1A Parallel Path with Beneath SH2 Overbridge



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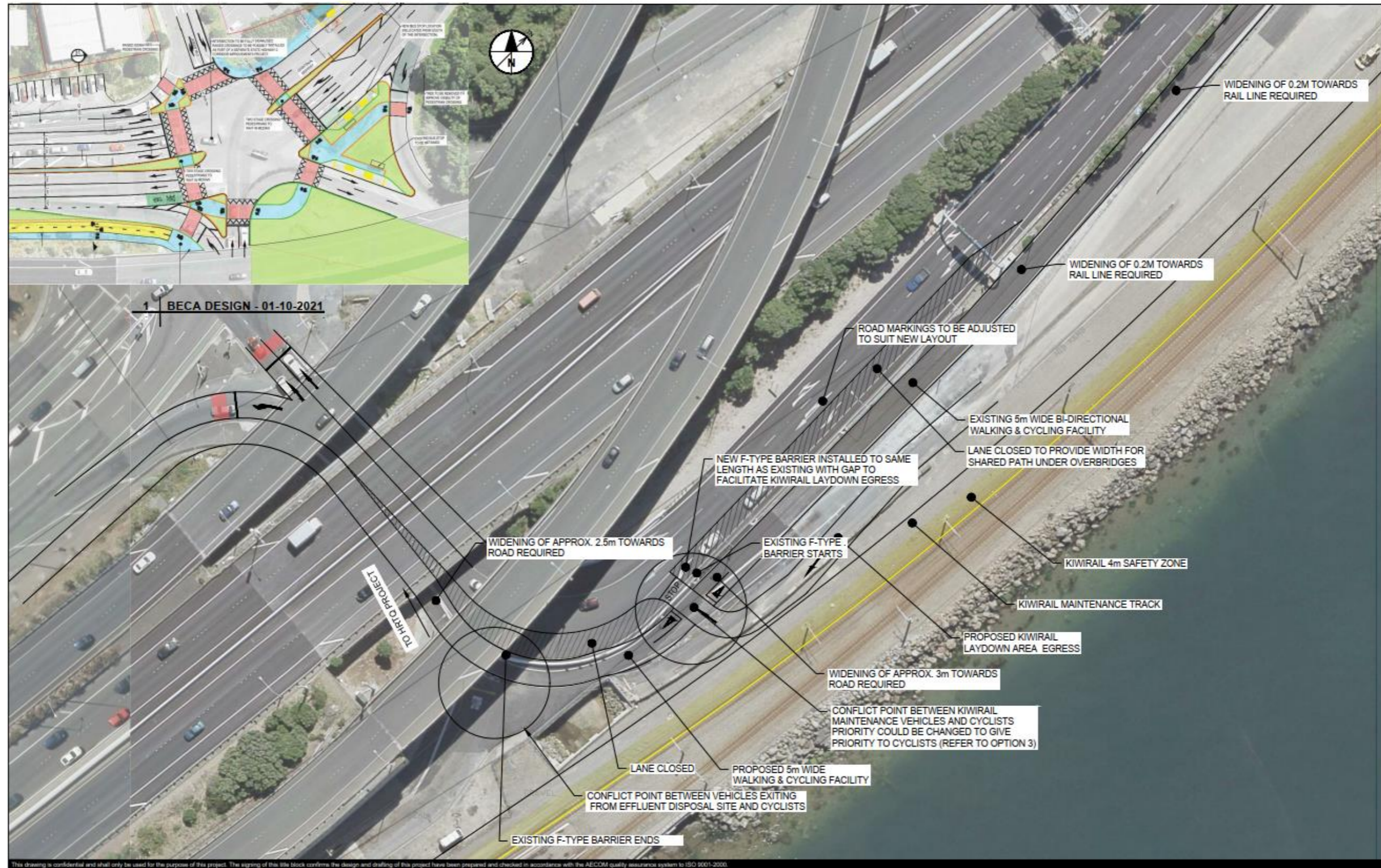


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Figure 12: Option 1D - Variation to Option 1 to Improve Existing Path Altering SB Slip Lane



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## 5.3 Short-list Options Assessment

### 5.3.1 Costs

Indicative Outturn Cost Estimates for Option 1, 1A and 1D were prepared following the Waka Kotahi Cost Estimate Manual SM014:

- Option 1 - Lane space reallocation - \$4,750,000
- Option 1A - New shared path underpass - \$12,880,000
- Option 1D - Lane space reallocation - \$3,468,000.

Out-turn costs for the indicative estimates include property costs, consultant costs and fees and client managed costs for the remaining phases of work. The SM014 cost estimates can be referenced in Appendix D. The cost estimate informing Option 1A has been derived from the parallel cost estimate.

The parallel cost estimate noted that further engineering inputs are to develop the cost estimate for Option 1A. The inputs are required to understand the complexity of the tunneling below the state highway without major disruption, and the location of the underpass to the existing crib walls and abutments.

### 5.3.2 Benefit Cost Ratio

Preliminary health benefits for 'The Connection' project have been estimated based pro rata on the length of the Te Ara Tupua economics for Option 1 (and by inference Option 1D), and Option 1A. The pro-rata length of 'The Connection' is 400 metres, with the new active mode users derived from the estimated users of the Ngā Ūranga to Pito-one section to Hutt Road. Table 4 shows that the estimated NPV benefits and disbenefits for each option.

Health benefits are similar for both Options 1 and Option 1A. This is based on the length of the facility, and the number of new users that are anticipated as a result of its construction.

Disbenefits for each option are different across the benefit categories. Option 1A being the underpass has a neutral benefit against Travel Time and Safety costs for traffic, but the monetised disbenefit for Traffic Disruption is based on the likely length of closure of the motorway in order to construct the facility. Option 1 has a neutral impact on traffic disruption, but instead has disbenefits for traffic and safety. Traffic will have some additional delays through queuing resulting from the removal of the left-turn slip lane. Safety disbenefits are associated with a higher incidence of rear-end crashes through the increased length of queues.

Table 4: Net present value (NPV) health benefits

Option	Health Benefits (NPV)	Travel Time	Safety	Traffic Disruption
Option 1 – lane space reallocation	\$ 10.9M	-\$ 7.24M	-\$ 0.2M	-
Option 1A – new underpass	\$ 10.9M	-	-	-\$ 5.6M

The costs, benefits and disbenefits for the two options have been evaluated and combined with the BCR analysis for the TQHR project. The combined BCR is summarised below in Table 5. The overall BCR is similar with the difference between the overall costs and benefits for the two options.

Table 5: TQHR and The Connection Combined Options BCR

Option	NPV Benefits	NPV Costs	BCR
TQHR + Option 1 – lane space reallocation	\$ 96.1M	\$ 59.6M	1.6
TQHR + Option 1A – new underpass	\$ 101.6M	\$ 63.3M	1.6

The two options are expected to have no significant impact on the overall BCR for the Wellington to Hutt Valley / Te Ara Tupua facility. An initial analysis against the Wellington to Hutt Valley / Te Ara Tupua economics for the two options result in no change to the BCR of 1.1.

Intrinsically however ‘The Connection’ will further the key benefits of the Te Ara Tupua facility. These include providing a high quality shared path for people of all ages and abilities to use, promoting healthy lifestyles, and more sustainable and affordable transport choices. Supporting increasing numbers of users will further contribute to shifting people from vehicles to walking and cycling reducing traffic congestion and emissions. For the economy a high-quality facility supports tourism-related cycling and boosts the Wellington regional economy.

### 5.3.3 Traffic Impacts

The impacts on traffic for the lane space reallocation options (Options 1 and 1D) were considered through traffic modelling using SIDRA. The two options involve the closure of the left-hand slip lane of the SH2 southbound offramp, with the reallocation of the lane space to shared path users. It was necessary to understand at this stage what the impact for queue lengths on the offramp could be with the left-hand slip lane being closed to traffic.

A summary of the modelling assumptions and results are included in Appendix E.

The SIDRA modelling shows a reasonable probability of lane spill from the SH2 southbound offramp into the main SH2 lanes occurring out to 2031. Lane spill from queuing during the peak period has the potential to exacerbate existing delays along SH2 southbound in peak periods. The corridor is sensitive to disruption, and impacts can be potentially severe for motorists commuting during the peak periods in additional delay, and safety risk. The average queues will remain within the length of the slip lane, but the modelling shows the potential for brief periods when the back of the queues beyond the length of the slip lane, and into the SH2 southbound lane.

The modelling assessment was carried out on pre-Covid traffic volumes and didn’t consider the Thorndon Quay and Hutt Road project as modelling was still underway. In addition, further assessment is being carried out on the freight movements by a third party and this was not available at the time. The traffic impacts need to be considered in the next phase when all modelling work is finalised. This will help to understand the impacts on different types of users including bus public transport, and freight travelling to the ferries from SH2. In particular, the freight movements to Aotea Quay will be influenced by the changes proposed by TQHR to remain on the state highway reducing these demands on the slip lane.

The extent to which safety impacts can be managed or mitigated will be considered in the next phase. Additional modelling will be able to define more accurately the frequency and impact of queues extending in the SH2 southbound lanes from the lane closure option, combined with optimisation of the intersection. The management or mitigation of these safety risks can then be considered alongside the general impacts for vehicle travel times, and the broader objectives for mode shift and emissions reduction that Te Ara Tupua is looking to achieve.

#### **5.3.4 Risk Assessment and Safety in Design**

A Risk Workshop and a Safety in Design (SiD) Workshop was held on 20<sup>th</sup> September 2021 attended by subject matter experts from Let's Get Wellington Moving, Waka Kotahi, Greater Wellington Regional Council, Wellington City Council, KiwiRail, the Te Ara Tupua Alliance, Beca and AECOM.

The following risks were identified in Table 6 and Table 7, assessed for likelihood and consequences and mitigation actions suggested. The full risk register is attached in Appendix B.



Table 6: Critical Risks

Risk Description	Likelihood Pre mitigation	Consequence	Risk Level	Mitigation Actions
There is a threat that a reduction in the 3 lanes on the off ramp to 2 causes queueing back onto the State highway creating unmanageable safety concerns, or travel time delays.	Likely	Severe	Critical	Construct new underpass if funding available. Alternative is to monitor and manage the slip road. Undertake further modelling. Consider extending VMS on SH2. Consider reducing speed limit on off ramp.
There is a risk that the speed differential on the slip lane will be large leading to increase in crashes.	Likely	Severe	Critical	Maintain 3 lanes if possible. Enforce speed limits to reduce speed. Look at separation between cyclists and pedestrians. Consider different types of signage. Manage as demand grows.
There is a risk that there is a level of uncertainty about what the future traffic patterns will be.	Likely	Severe	Critical	Undertake further modelling. Monitor traffic once COVID restrictions lifted
There is a risk that construction of the underpass under the State highways is not feasible due to construction restraints, or significant risks around the length of state highway closure.	Likely	Extreme	Critical	Obtain As-Built information from Waka Kotahi archives. Consider jacked installation and ground freezing, use steel cables to lubricate jacking and hand auger. Use existing path. Look at compromise solution.
There is a risk of unforeseen obstacles to construction of the underpass (e.g.) MSE behind the crib wall.	Likely	Severe	Critical	Obtain As-Built information from Waka Kotahi archives. Undertake Geotechnical site investigation
There is a safety risk around using the existing facility (blind corner on the western side).	Likely	Severe	Critical	1) Design with good geometrics 2) Waka Kotahi and Austroads design guidelines. 3) Markings (Yellow double line). 4) Second tunnel (one bound direction per tunnel). 5) Wayfinding signs. 6) Information signs
Covid19 impacts on supply chains and construction price	Likely	Severe	Critical	Considered in the next phase where the impacts can be more fully determined based on the design, and where the allocation of risk can be considered in the commercial, financial and management cases.

Table 7: Safety in Design Risks

Safety Risk Description	Likelihood Pre mitigation	Consequence	Risk Level	Mitigation Actions
There is a threat that the level of service for cyclists would be significantly decreased during the construction phase.	Possible	Moderate	High	1) Ensure some cycling facility during the construction phase. 2) Monitor and manage.
There is a risk that a large amount of construction will happen in the small area during the same time.	Possible	Severe	High	1) Need to check the swept paths for HCVs as part of the construction considerations. 2). Expected that the construction for Option 1/1D takes a couple of months. Option 1A will have a longer construction period. Need to avoid cyclists mixing with trucks and buses. 2) Construction could be as part of the Alliance contract.

## 6 Recommendations and Next Steps

Based on the assessment it is recommended that both the emerging preferred Option 1/1D providing lane space reallocation under the overbridge to the shared path through closure of the left slip lane, and Option 1A providing the new underpass through the SH2 embankment be investigated further in parallel.

These options were ranked the highest based on the average scores between Lead Assessors and the Subject Matter Experts, and they are acceptable to KiwiRail. The next phase for TQHR is the Pre-Implementation phase and the recommendation is that both options for 'The Connection' are progressed further as part of this contract until any potential fatal flaws for the options are closed out and the preferred option confirmed.

The following should be included in the scope of the Pre-Implementation phase for further investigating the options:

1. Additional modelling will need to be undertaken incorporating the changes to traffic movements after the opening of Transmission Gully, and a normalised post-covid traffic volume through the area has been established. The traffic modelling will provide a better understanding of the options impacts, in particular the queue delays for the slip lane based on Options 1 and 1D. The modelling will allow for optimisation of the intersection and approaches to be assessed, as well as the management or mitigation of any safety and travel time impacts resulting from queues extending into the southbound SH2 lanes.
2. Design considerations in the Pre-Implementation will consider the impact of both options for transport users. Design considerations include managing sightline constraints, potential conflicts between different users such as mobility scooters, urban design, and assessing the land requirements needed for path widening beside the rail corridor and the existing road carriageway.

Sightline constraints and visibility will be assessed for each option at the interface with Hutt Road. The Pre-Implementation will need to consider the design measures

each option can provide for improving sightline visibility along Hutt Road from the shared path. Improving sightline visibility will provide safety benefits for all users of the shared path with differences in speed of travel.

The design concept plans note areas where space constraints require attention, including potential widening of 0.2 metres for the existing cycling path for Options 1 and 1D. These will be confirmed in the detailed design.

3. Feasibility of different construction methodologies for Option 1A, the underpass, should be further investigated due to the significant structural and constructability constraints for the option. Currently anticipated closures of the motorway are based on standard cut and cover methods for underpass installation. Examples of alternative more innovative construction methodologies could include ground freezing and thrusting techniques which have the potential for minimising closures and therefore lessening impact on motorway users.

Continuing the investigation of the underpass in parallel with Option 1 will maximise the time available prior to Te Ara Tupua opening. Sequencing of the changes around 'The Connection' need to align with the opening of the TQHR, and Ngā Ūranga to Pito-one projects that are forecast to be completed in 2024 and 2025 respectively. This time will be maximised by developing the design, construction methodology and time to construct for the underpass due to any fatal flaws in Option 1 being identified.

4. A key objective for 'The Connection' is to contribute to the overall increase of active mode users attracted to Te Ara Tupua. To understand the impact of each option sensitivity testing of the benefits from 'The Connection' will be assessed.
5. A temporary lane closure on the SH2 southbound offramp should be trialed in the next phase to better understand the traffic impacts on the southbound offramp, and queues. The trial should be undertaken once the Transmission Gully project is open to traffic and traffic movements have become consistent. The trial can incorporate traffic signal changes at the intersection to inform the approach to optimisation.
6. The delivery mechanism for 'The Connection' will be considered as part of the Commercial and Management cases. A number of different mechanisms for constructing 'The Connection' are available, including aligning with either the delivery of TQHR, the Alliance delivering Ngā Ūranga ki Pito-one, the Wellington Transport Alliance maintenance contractor, or alternatively a separate procurement approach for delivery. The advantages and disadvantages of the different approaches would be investigated, and an approach to delivery recommended.



# Appendix A

## Workshop MCA Scores and Rankings

	Option 1 - Lead Assessor	Option 1 - SME	Option 1A - Lead Assessor	Option 1A - SME	Option 1C - Lead Assessor	Option 1C - SME	Option 2 - Lead Assessor	Option 2 - SME	Option 2A - Lead Assessor	Option 2A - SME	Option 4 - Lead Assessor	Option 4 - SME	Option 5 - Lead Assessor	Option 5 - SME
Overall Score	+3	+17	-3	+13	-3	-7	+5	-7	-1	-3	-6	+3	-25	-47
Overall Score based on average between Lead and SMEs	+8		+3		-12		-10		-10		-11		-35	
Ranking based on average between Lead and SMEs	1		2		6		3		3		5		7	
Ranking after fatal flaws identified	1		2		NA		NA		NA		NA		NA	

NA = Not applicable



# Appendix B

## Risk Register

Project/Contract Description	Thorndon Quay Hutt Road - The Connection	NZTA Lead	Hannah Hyde
Contract ID	To be inserted	Supplier Lead	Graeme Doherty
Contract Value	Up to \$10M	Supplier Risk Management Specialist (if applicable)	Adam Ashford

Contract Risk Register

Risk Identifier	Date raised (dd/mm/yyyy)	Risk Description (include whether this is a threat or an opportunity)	Risk Cause(s)	Risk Consequence(s)	Risk Owning Organisation	Risk Owner	Controls	Current Risk Likelihood	Current Risk Consequence	Consequence Category	Current Controlled Risk Level	Level of risk acceptable, when compared to	Planned Risk Treatment Actions <i>Note: If more than one treatment action, either:</i>	Treatment Owner(s)	Planned Treatment Implementation	Risk Treatment Progress Updates	Residual (Target) Risk Likelihood	Residual (Target) Risk Consequence	Residual (Target) Risk Level	Risk status	Comments
2	3/17/2020	There is a threat that approvals take longer than planned	The cause of the threat is that the TWG and/or OIMS have a large number of projects requiring input and the TQHR project engagement is less than ideal.	The consequence of the threat is additional effort to chase TWG & OIM's, additional engagement, poor feedback or inputs, wrong decisions made, poor benefits / outcomes	LGWM	Hannah Hyde	17/04/20 - TWG / OIMS spreadsheet setting out workshops and deliverable reviews so that TWG and OIMS can manage their workload 1/12/20: TWG and OIM's now have a comments prioritisation register	Unlikely	Moderate	Delivery	Medium					20/7/7 - HH has been proactively managing input from OIM's and TWG. Raised today that there is a possibility of a new group called 'TAG' which may have approval rights. 1/12/20: There is now a TAG group, but we don't need their formal endorsement.	Unlikely	Moderate	Medium	Live-Treat	20/6/7 - risk description updated
10	3/17/2020	There is a threat of a cost increase for the project and whole of life costs	The cause of the threat is changing the funding priority (Covid, etc); market uncertainty (Covid), people availability, high post lockdown gear-up constraints, change of market forces (reduced construction resources in the market due to increased shovel ready programme), change in political funding decisions...	The consequence of the threat is some aspects not having adequate funding, project does not proceed, increased costs, programme delays, benefits not realised, reputational impacts, safety benefits not realised	LGWM	Hannah Hyde	25/05/20 - Robust business case methodology with input from stakeholders and partners. Knowledge of market costs. Contractor relationships	Likely	Minor	Cost	Medium		01/05/20 - ACTION: Eric Whitfield to speak with QS team, to understand market forces impact on business case economic case. SSBC to consider and document possible impacts	Eric Whitfield	6/30/2020	20/7/7 - feedback is that market remains competitive, shovel-ready and other stimulus projects are slow to come to market.	Unlikely	Minor	Low	Live-Treat	16/04/20 - Linked to RID6, RID10, RID59 1/12/20: this risk will be reviewed for whole of project costs at next risk workshop 12/05/20 - RID6, RID59 combined 20/7/7 - residual risk likelihood reduced
16	3/17/2020	There is a threat the preferred option is not aligning with the Placemaking Framework and Amenities Strategy / Urban Design	The cause of the threat is that placemaking has not been given priority and the project options have an engineering focus, rather than aligning with city aspirations. Recognition of different areas of character in different ways, the various projects do not have a consistent placemaking and amenities strategy, poor comms, poor decision making, poor engagement, strategy not used	The consequence of the threat is public complaints, difficulty for approval, benefits not realised, future network impacts and maintenance issues, programme delays, costs, reputational impacts, cultural and community amenities benefits not realised	Beca / WAM	Shannon Joe	25/05/20 - Engagement with partners on placemaking strategy. Urban design and placemaking input at early in options development	Almost certain	Moderate	Cost	High		02/03/21 - ACTION: Develop with Key stakeholder engagement, the placemaking/urban design framework for TQHR, Feed into the Prelim Design	Eric Whitfield & Shannon Joe		20/7/7 - Shannon Joe has met with WCC urban design team to discuss placemaking and amenity on the project. WCC support short list options. Further engagement necessary during recommended option development	Almost certain	Moderate	High	Live-Treat	16/04/20 - Linked to RID17 08/05/20 - RID16, RID17 combined 20/06/07 - changed owner to project team 1/12/20: no agreed placemaking strategy, 'amenity' costs included in cost estimates. Category changed to cost
38	3/17/2020	There is a threat of lack of coordination with other regional projects having an effect on the programme progression of the corridor.	The cause of the threat is the wider effects in the area of the reassignment traffic to other/alternative routes during the gorge lane closure.	The consequence of threat is programme delays, complaints, reputational impacts, safety impacts for road users	LGWM	Hannah Hyde	25/05/20 - Coordination with other Waka Kotahi and partner programmes.	Possible	Moderate	Delivery	Medium		02/03/2021 - Progress C&E with other project s/ programmes; share information and design outcomes early, assess journey outcomes implications	Eric Whitfield	5/30/2021		Unlikely	Moderate	Medium	Live-Treat	12/05/20 - Risk owner changed from Tim Brown to Hannah Hyde as per Eric Whitfield instructions Linked to Risk 117
41	3/17/2020	There is a threat of other project changes having an impact of final results.	The cause of the threat is the possible changes to the Interisland ferry terminal, change in government funding / priorities post Covid, lack of clarity re other capital projects scope and interdependencies to TQHR, Kwiirail/Centreport Future Developments, Lambton bus interchange, WCC coordination with Wellington Water, roading maintenance, GasCo, TelCo, etc, mis-communication re maintenance programmes	The consequence of the threat is public complaints and reputation damage. Redesign needed, additional effort & work, programme delays and cost impacts, benefits not optimised or realised.	LGWM	Hannah Hyde	25/05/20 - Coordination with LGWM and partner programmes.	Likely	Moderate	Stakeholders	High						Unlikely	Moderate	Medium	Live-Treat	17/04/20 - Duplicate Risks combined RID29, RID35, RID40, RID41, RID43, RID45, RID47, RID83 20/6/7 - owning org changed to LGWM
55	3/17/2020	There is a threat the business case justification does not meet expectations of all LGWM partners	The cause of the threat is inadequate data analysis, lack of detailed (deep dive) investigations, lack of site or ground investigations at the correct phases, in accurate data, data gaps	The consequence of the threat is the business case is not based on sound information, incorrect assumptions are made, the project outcomes / benefits are not realised, additional effort and rework, cost & programme impacts, reputational impacts, potential RMA breaches, property acquisitions issues	LGWM	Hannah Hyde	25/05/20 - Follow the Waka Kotahi business case development process. Engagement with partners, OIMs, IQA 08/07/2020 - Ongoing data analysis, stakeholder engagement, Strategic Case approved, IQA	Unlikely	Moderate	Delivery	Medium		1/5/20 - ACTION - Neil Trotter to define the extent of any additional data requirements for the SSBC 1/12/20: manage scope to established process. Note need to satisfy TWG	Neil Trotter	6/30/2020	20/7/7 - project team continue to follow the published guidance.	Unlikely	Moderate	Medium	Live-Treat	16/04/20 - Linked to RID54, RID56, RID57, RID58 08/05/20 - Related risks combined and closed, RID55 open
62	3/17/2020	There is a threat the Marae parking arrangements does not meet the user requirement	The cause of the threat is informal parking arrangements with WCC would be affected by the project, the new facilities are not designed to user requirements, insufficient funds to provide all user requirements (compromises), gaps in requirements data, lack of stakeholder engagement with both Iwi and Councils and Roading authority	The consequence of threat is unhappy stakeholders and complaints, infringement notices, harm to users, future remedial works (cost and programme), reputation	Beca	Nathan Baker	09/07/20 - SEB Bishop LGWM leading Iwi engagement, including Pipitea Marae	Likely	Minor	Stakeholders	Medium		25/05/20 - ACTION: engagement with iwi and the council (progressing) 1/12/20: we need to determine what their requirements are	Nathan Baker	7/30/2020		Possible	Moderate	Medium	Live-Treat	17/04/20 - Transferred from Rachel Dahlberg to Nathan Baker 1/12/20: likelihood changed to high, consequence minor
65	3/17/2020	There is a threat of a delay to the programme due to poor engagement with Iwi.	The cause of the threat is a lack of engagement with Iwi in early stages of the programme; delay in engagement with Mana Whenua, due to being slower than other stakeholders; Pipitea Marae is on the corridor as well as existing relationships with WCC.	The consequence of threat is programme delay and key engagement information is lacking. Also public complaints, design may not include engagement from Mana Whenua - redesign required	LGWM	Hannah Hyde	25/05/20 - comms and engagement plan developed and implemented 09/07/20 - Seb Bishop LGWM leading Iwi engagement, including Pipitea Marae	Unlikely	Moderate	Stakeholders	Medium		1/12/20: there has been meeting with Iwi partnership working group				Possible	Moderate	Medium	Live-Treat	16/04/20 - Linked to RID63, RID64 17/04/20 - Transferred from Zoe Thompson to Nathan Baker. Duplicate risks - Combined RID63, RID64, RID65 20/6/7 - risk description updated 6/7/21: likelihood lowered as LGWM now involved in engagement, assessed options against mana whenua values
67	3/17/2020	There is a threat of RMA / construction delays	The cause of the threat is a lack of engagement with Heritage NZ & Iwi, lack of archaeological & iwi expertise impacts into business case & early investigations, key significance areas not identified (including notable trees, and features around Mulgrave Street, cultural areas, historical features)	The consequence of the threat is a delay to the programme, breach of RMA, Waitangi commitments not met, cultural friction, rework of C&E and investigations, cost and programme delays, reputational impacts	LGWM	Hannah Hyde	25/05/20 - RMA considerations in options assessment	Unlikely	Severe	Environmental	Medium		08/05/20 - ACTION - Emily Alleyway to speak with Mark Lindsey at WCC regarding the RMA requirements to support the development of the business case 20/7/7 - ACTION - update social and env screen in Stage 2, for recommended option	Eric Whitfield	5/30/2020	20/7/7 - social and env screen completed on short list options. No significant RMA issues are expected at present. Detailed assessment will be completed on recommended option.	Unlikely	Moderate	Medium	Live-Treat	16/04/20 - Linked to RID67 12/05/20 - RID 66 Combined 1/12/20: review at beginning of stage 2, next risk workshop
70	3/17/2020	There is a threat of the corridor not being adequate for the specialist users of the corridor (Wellington Free Ambulance and Fire Station, Over width vehicles, police, accident response etc)	The cause of the threat is the corridor does not provide sufficient width for various vehicle user types, lack of stakeholder requirements gathering, lack of data, not captured in BC, not captured in design development	The consequence of threat is safety issues for road users, compounding access issues, complaints, costs to remedy, ongoing future issues, reputational impacts	LGWM	Hannah Hyde	25/05/20 - use of industry practice design standards.	Unlikely	Severe	Stakeholders	Medium		25/05/2020 - ACTION - Engagement with emergency service providers	Hannah Hyde	7/30/2020	20/7/7 - continue to engage with emergency services during the development of a recommended option.	Unlikely	Moderate	Medium	Live-Treat	16/04/20 - Linked to RID68, RID69
87	3/17/2020	There is a threat of community and stakeholder expectations are not met or unrealistic	The cause of the threat is a lack of consideration of previous information and engagement, focus on only opportunities, and problems not being confirmed, lack of or too much engagement, certain stakeholders have a greater influence than most (loudest voice), extent of engagement doesn't follow AP2 principles.	The consequence of threat is a time delay to the programme, and information being duplicated, higher costs, problems and opportunities not being accurately identified, not meeting the expectations/needs of all stakeholders - retailers high risk; public confusion, long term options not suitable	LGWM	Hannah Hyde	25/05/20 Review of previous engagement processes and outcomes and incorporation into the project comms and engagement plan and strategic case 09/07/20 - Engagement strategic progressing with LGWM to support July shortlist public engagement activity	Likely	Moderate	Public/Media	High					20/7/7 - There is a plan in place for the upcoming engagement round, including the type of and scale of information to be included, as well as visualisations 20/2/11 - shortlist option engagement delayed until March/April 2021 1/12/20: there are ongoing discussions about engagement strategy and material with partners	Possible	Moderate	Medium	Live-Treat	16/04/20 - Linked to RID78, RID79, RID80, RID81, RID84, RID85, RID86 17/04/20 - Transferred from Zoe Thompson to Nathan Baker. Duplicate risks combined RID78, RID79, RID80, RID84, RID84, RID85, RID86, RID87

Project/Contract Description	Thorndon Quay Hutt Road - The Connection	NZTA Lead	Hannah Hyde
Contract ID	To be inserted	Supplier Lead	Graeme Doherty
Contract Value	Up to \$10M	Supplier Risk Management Specialist (if applicable)	Adam Ashford

Contract Risk Register

Risk Identifier	Date raised (dd/mm/yyyy)	Risk Description (include whether this is a threat or an opportunity)	Risk Cause(s)	Risk Consequence(s)	Risk Owning Organisation	Risk Owner	Controls	Current Risk Likelihood	Current Risk Consequence	Consequence Category	Current Controlled Risk Level	Level of risk acceptable, when compared to	Planned Risk Treatment Actions <i>Note: If more than one treatment action, either:</i>	Treatment Owner(s)	Planned Treatment Implementation	Risk Treatment Progress Updates	Residual (Target) Risk Likelihood	Residual (Target) Risk Consequence	Residual (Target) Risk Level	Risk status	Comments
89	3/17/2020	There is a threat that the extent of stakeholder engagement is not as planned	The cause of the threat is that not all groups have been represented, and there has been a lack of engagement with a number of groups - eg, advocacy groups not invited to PRG, engagement fatigue, engagement approach not reaching the intended audience	The consequence of threat is public complaints and programme delay due to the design not being fully informed, missed opportunities for user improvements - quick wins "great journeys" and urban design	LGWM	Hannah Hyde	25/05/20 - comms and engagement plan developed and implemented. Engagement with LGWM comms team re strategy. 09/07/20 - progressing strategy with LGWM, Public engagement planned for July	Unlikely	Moderate	Public/Media	Medium		25/05/20 - Continue to monitor the situation re COVID-19, ongoing engagement with LGWM comms team, consider online events	Eric Whitfield	Ongoing	20/7/7 - There is a plan in place for the upcoming engagement round which will be public, plus a stakeholder briefing. 20/2/11 - shortlist option engagement delayed until March/April 2021	Unlikely	Moderate	Medium	Live-Treat	16/04/20 - Linked to RID71, RID72, RID88, RID90 17/04/20 - Transferred from Zoe Thompson to Nathan Baker. Duplicate risks combined RID71, RID72, RID88, RID89 20/7/7 - residual likelihood reduced to possible due to scale of upcoming engagement 1/12/20: likelihood changed to possible
91	3/17/2020	There is a threat of opposing feedback and a delay to the programme.	The cause of the threat is that residents or stakeholders are not supportive of the design solutions EG: parking, bus stop and bus shelters, Not in My Back Yard (NIMBY)/ Negative Public Reaction; Objections to the Cycleway outside Businesses; issues outside the project influence (bus routes); loss of car parking; the design solution does not accommodate easy access into businesses	The consequence of threat is public complaints and reputation, reconsult, redesign, delays to programme, additional funding / costs, solutions not aligned to need (louds voices win), community support reduced/lost reputational impacts, loss of trade for local business owners along the corridor wider area	LGWM	Hannah Hyde	25/05/20 - comms and engagement plan developed and implemented. Engagement with LGWM comms team re strategy. Review of and incorporation of previous community support reduced/lost reputational impacts, loss of trade for local business owners along the corridor wider area	Likely	Moderate	Public/Media	High		25/05/20 - ACTION: Implement engagement as per comms and engagement plan.	Eric Whitfield	Ongoing	20/7/7 - undertake engagement as per plan and reassess risk following engagement feedback 20/2/11 - shortlist option engagement delayed until March/April 2021. This increases the risk of opposing feedback	Likely	Moderate	High	Live-Treat	16/04/20 - Linked to RID76, RID14, RID73, RID91, RID13, RID77 20/04/20 - Transferred from Zoe Thompson to Nathan Baker. Duplicate risks combined 1/12/20: likelihood changed to likely. 6/7/21: consequence lowered. There is currently a risk of JR from TQ Collective
92	3/17/2020	There is a threat of negative stakeholder and public feedback from mismanagement of project information	The cause of the threat is that project information is not released in a timely manner to other projects and the public, incorrect information or confidential information being released, property acquisition information not managed correctly, OFIR's not managed within legislated requirements	The consequence of the threat is reputational impacts, property acquisition issues - additional costs, benefits lost, scope and solution confusion, OIR breaches	LGWM	Hannah Hyde	25/05/20 - Existing procedures regarding the control and release of official information. Comms and engagement team review	Possible	Moderate	Public/Media	Medium		25/05/20 - ACTION - Comms and engagement team review of information	Hannah Hyde	7/30/2020	20/7/7 - procedures are in place. No OIA's received to date. Engagement will commence end of July which could trigger requests for information	Possible	Severe	High	Live-Treat	17/04/20 - Transferred from Hannah Hyde to Eric Whitfield 12/05/20 - Transferred from Eric Whitfield back to NZTA (They release information for OIA Process) 1/12/20: consequence changed to moderate
99	12/1/2020	There is a threat that the current recommended option does not proceed	The cause of the threat is project cost exceeds programme budget expectations	Project does not proceed or is scaled down	LGWM	Hannah Hyde		Rare	Severe	Stakeholders	Low		1/12/20: peer review of the costs, value engineering prior to pre-imp if required				Possible	Moderate	Medium	Live-Treat	
103	3/2/2021	There is a threat Utilities / Underground services are not identified	The cause of the threat is due diligence not completed, inaccurate As Built data, new assets included over course of project delivery	The consequence of the threat is design rework for new assets to "accommodate" UC services, relocation of services to accommodate design requirements, lost costs, reduces safety benefits of a compromised solution, reputation, delays to programme	LGWM	Hannah Hyde	02/03/21 - Services investigations progressing with design development	Likely	Moderate	Cost	High		02/03/21 - ACTION: LGWM Team to provide data, and then progress further assessments as design progresses	Blaise Cummins	5/30/2021	28/06/2021 - Services information still pending	Possible	Moderate	Medium	Live-Treat	
104	3/2/2021	There is a threat of conflict access points onto the corridor	The cause of the threat is the number and nature of business driveway / accesses on the corridor cross over other modes - conflict of modes	The consequence of the threat is vehicle / ped / cycle crashes as business owners access their premises cross in the path of cyclists	LGWM	Hannah Hyde	02/03/2021 - Corridor and access ways design reviews, HSID reviews - identify access way clashes to design safe access solutions	Possible	Moderate	Delivery	Medium		02/03/21 - ACTION: Progress design HSID access to design solution access points that do not clash with other modes such as Peds / cycle / bus	Blaise Cummins	5/30/2021		Unlikely	Moderate	Medium	Live-Treat	
105	3/2/2021	There is an opportunity to improve the Hutt Road and Thorndon Quay Egress / access	The cause of the opportunity is to gain landowners agreement to combine business accessways	The consequence of the opportunity is reduced access points, improved safety for other modes, improved traffic flows	LGWM	Hannah Hyde		Possible	Minor	Delivery	Medium		02/03/21 - ACTION: Progress assessment of area, progress improved design solutions for access way points	Blaise Cummins	5/30/2021		Likely	Moderate	High	Live-Treat	Linked to RID 70 Specialist users access on corridor (Fire, Ambulance, first responses, wide vehicles)
106	3/2/2021	There is a threat the solution does not enable safe access / egress to existing key assets/facilities (pump stations, fire station) for maintenance and emergency response	The cause of the threat is the lack of investigation, stakeholder engagement / feedback, lack of HSID design assessment, poor design solutions	The consequence of the threat is the restriction of access to key facilities; time / costs to move assets (pump stations or the like), rework designs to accommodate assets; programme delays and costs, reputation, poor safety outcomes	LGWM	Hannah Hyde	02/03/21 - Early identification of key assets / facilities; HSID design reviews, stakeholder engagement	Unlikely	Severe	Delivery	Medium		02/03/21 - ACTION: Progress design investigations for facilities on the corridor; investigate "future consented" new assets / buildings that may be built on the corridor between now and future construction	Blaise Cummins	5/30/2021		Unlikely	Moderate	Medium	Live-Treat	Linked to RID 70 Specialist users access on corridor (Fire, Ambulance, first responses, wide vehicles)
108	3/2/2021	There is a threat the intersection design approach / philosophy changes	The cause of the threat is the intersection modelling identifies design issues that require late design changes	The consequence of the threat is incorrect design assessments in the model, future design phases incorrect, additional late costs for rework or construction, unsafe solutions on the corridor, reputational impacts	LGWM	Hannah Hyde	02/03 - Design approach in review, pending outcome / decision	Unlikely	Severe	Delivery	Medium		02/03/21 - ACTION: Review the intersection design model, design approach is agreed / compliance to required standards within limited corridor widths - gain approvals	Blaise Cummins	5/30/2021		Rare	Moderate	Low	Live-Treat	
109	3/2/2021	There is a threat of data gaps - such as lack of survey data; Ped counts; Business economics data Metrics	The cause of the data gaps is insufficient information provided to the project team from external sources, lack of budget to fund investigations / on site surveys at the Prelim stage of delivery, old / historic data provided no longer relevant.	The consequence of the threat is the design does not tie-in with the existing on-site reality; incorrect assumptions made in the business case, designs incorrect or does not meet demands; later costs to correct during construction & additional construction costs	LGWM	Hannah Hyde		Possible	Moderate	Delivery	Medium		02/03/21 - ACTION: progress investigations / source required information; document information gaps & assumptions made: identify in future project phases	Blaise Cummins	5/30/2021		Unlikely	Minor	Low	Live-Treat	
111	3/2/2021	There is an opportunity to improve the Jardin Mile area outcomes	The cause of the opportunity is to improve the urban design solution to the design process	The consequence of the opportunity is improved safety outcomes for users and amenity usability	LGWM	Hannah Hyde		Possible	Minor	Stakeholders	Medium		02/03/2021 - ACTION: Review the Jardin Mile area to assess further urban design and safety requirements to increase amenity outcomes	Blaise Cummins	5/30/2021		Likely	Moderate	High	Live-Treat	
113	3/2/2021	There is a threat critical heritage buildings, places of significance, cultural, protected flora / fauna species are not identified & managed	The cause of the threat is lack of cultural investigations, lack of council plans inputs / assessments or data provided, lack of user requirements assessments, lack of archaeological investigation during design phase	The consequence of the threat is breach of consents, / regulations / legal requirements; impact of value of buildings; cultural value impacts to key stakeholders; loss of critical historical values; loss of historical earth deposits of significance in key locals, reputation & cost impacts, delays to safety outcomes	LGWM	Hannah Hyde	GIS Model layer to ringfence heritage, cultural values, Social and environment screening, heritage assessment in scope	Possible	Moderate	Legal/Compliance	Medium		02/03/21 - ACTION: Investigate the shared path - does this now go on the southern side of Hutt Road towards the Onslow Rd connection? Investigate historic horse trough that juts out into the road berm at this point on the northern side - and is quite rare. Investigate archaeological authority to modify the wall around it or the trough itself. Review historic images of the trees and street views to understand setting and space around the buildings (curtilage) for design inputs Investigate further any historic deposits turn up during earthworks - e.g. archaeological or cultural material for design inputs or future consenting requirements	Eric Whitfield	5/30/2021		Rare	Moderate	Low	Live-Treat	Linked to RID 89 - lack of stakeholder engagement for specialist groups Note: We can mitigate this to a large extent by doing assessments of historic, archaeological and cultural heritage once we have a preferred option/alignment and earthworks design. But can't totally mitigate the unknown in-ground materials that may turn up along the old shoreline here. That's why we will likely need an archaeological authority for the project so the earthworks can be monitored.
114	3/2/2021	There is a threat the current corridor configuration will change before design & construction completed	The cause of the threat is changing assets on the corridor including changes to quake prone buildings, new buildings / infrastructure already consented is built	The consequence of the threat is late corridor design changes; impacts to asset owners; cost; reputation; programme delays	LGWM	Hannah Hyde		Possible	Moderate	Delivery	Medium		02/03/21 - ACTION: Review known information for new asset plans, quake prone building changes; speak with councils & source any new building / asset information on proposed corridor Investigate additional GIS layer in model to identify clashes / impacts on design	Blaise Cummins	5/30/2021		Unlikely	Moderate	Medium	Live-Treat	
115	3/2/2021	There is a threat other transport mode requirements are omitted from the project	The cause of the threat is lack of stakeholder engagement and user requirements, poor design investigations, changes of requirements during design stages	The consequence of the threat is different user types can not use the corridor safely, complaints, costs and delays to remediate design, potential construction cost increases	LGWM	Hannah Hyde	02/03/21 - Survey of "access requirements" completed	Unlikely	Severe	Public/Media	Medium		02/03/21 - ACTION: Progress further investigations to corridor solutions accommodate other transport modes	Blaise Cummins	5/30/2021		Rare	Minor	Low	Live-Treat	
116	3/2/2021	There is a threat the Cost Estimates for Business Case not accurate to support funding application	The cause of the threat is insufficient design to inform costs / lack of investigation & stakeholder engagement to confirm requirements, lack of agreed solutions, increased owner / access	The consequence of the threat is incorrect funding / business case decisions, design solutions compromised to reduce costs late in the design process, reputational impacts	LGWM	Hannah Hyde	02/03/21 - design development and stakeholder requirements feeding into funding case	Unlikely	Severe	Cost	Medium		02/03/21 - ACTION: Progress further investigations to manage cost estimate to the level of accuracy required for the business case	Blaise Cummins	5/30/2021	Costings based on preliminary design, risk items have been discussed and considered	Unlikely	Moderate	Medium	Live-Treat	Linked to RID 10 - Project and whole of life funding
121	9/20/2021	There is a threat that the funding isn't available	The cause of the threat that funding has yet to be approved for the project and there is a shortage of funding from the NLTf.	The consequence of the threat is we don't get funding from the project or it is delayed and the benefits from the project do not eventuate or are delayed and opens after Te Ara Tupua.	LGWM	Hannah Hyde	Waka Kotahi funding assessment and funding prioritisation procedure.	Likely	Severe	Delivery	Critical		Ensure robust evidence is available for IQA purposes to support funding application. Consider funding from Te Ara Tupua as a variation.	Graeme Doherty			Possible	Severe	High	Live-Treat	



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Contract Value	Up to \$10M	Supplier Risk Management Specialist (if applicable)	Adam Ashford

Contract Risk Register

Risk Identifier	Date raised (dd/mm/yyyy)	Risk Description (include whether this is a threat or an opportunity)	Risk Cause(s)	Risk Consequence(s)	Risk Owning Organisation	Risk Owner	Controls	Current Risk Likelihood	Current Risk Consequence	Consequence Category	Current Controlled Risk Level	Level of risk acceptable, when compared to	Planned Risk Treatment Actions <i>Note: If more than one treatment action, either:</i>	Treatment Owner(s)	Planned Treatment Implementation	Risk Treatment Progress Updates	Residual (Target) Risk Likelihood	Residual (Target) Risk Consequence	Residual (Target) Risk Level	Risk status	Comments
123	9/20/2021	There is a risk that the improved connectivity to the rail station is not achieved even though it was a project objective.	The cause of the threat is that it may not have been included in the scope off the project scope. And funding is constrained	The consequence of the threat is that the Connection project objective of improved PT connectivity is not achieved and demand for Te Ara Tupua is reduced.	AECOM	Graeme Doherty	PT Rail station design guidance. Project scope definition	Possible	Moderate	Cost	Medium		It is assumed that all options would include improvements to PT connectivity. This needs to be shown on the drawings and included in the option cost estimates.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
124	9/20/2021	There is a threat that a reduction in the 3 lanes currently on the off ramp to 2 causes queueing back onto the State highway. Also AOTEA and TC (Hannah)	The cause of the threat is that the traffic on the right two lanes is pretty much saturated through the lights every phase. There has been an increase in demand especially in the evening peak between the Hutt area and the Petone area since COVID. If left turners are included in the two lanes it reduces the saturation and increases the queue length.	The consequence of the threat is an increase in safety risks due to the risk posed by queues onto the Expressway.	AECOM	Graeme Doherty	Waka Kotahi and Austroads design guidelines.	Likely	Severe	Health & Safety	Critical		Construct new underpass if feasible and funding is available. Alternative is to monitor and manage the slip road. Undertake strategic modelling. Depends on intersection treatment of pedestrians and cyclists. To reduce flow breakdown on SH2 consider extending VMS through to Petone. Could speed limit be reduced on slip road? Use technology (Speed cameras) to enforce.	Graeme Doherty			Possible	Severe	High	Live-Treat	
125	9/20/2021	There is a risk that the speed differential on the slip lane will be large.	The cause of the threat is that in the evening the inbound flow into Wellington is much higher speed. At the moment the in lane flares to 3 lanes and the queue is rarely long enough to block the left turn lane. We understand SH68 improvements not going to take pressure off this route.	The consequence of the threat is reduced safety due to higher speed differentials.	AECOM	Graeme Doherty	Waka Kotahi and Austroads design guidelines.	Likely	Severe	Health & Safety	Critical		Maintain 3 lanes if possible. Ways to minimise injuries. Make people go at speed limit. Consider separated facilities. Make sure there are good sightlines. Keep left signs. Road humps. Short high narrow humps. Narrow. Centrelines work well. Manage as demand grows.	Graeme Doherty			Possible	Severe	High	Live-Treat	
126	9/20/2021	There is a risk that there is a level of uncertainty about what the future traffic patterns will be.	The cause of the threat is that the modelling is based on assumptions about the future which may turn out to be incorrect.	The consequence of the threat is future demand is uncertain.	AECOM	Graeme Doherty	AIMSUM Modelling allows us to look at the effect of assumptions and what may happen. SIDRA modelling has been done. Some risk that outputs aren't reliable - depends on the inputs.	Likely	Severe	Health & Safety	Critical		Undertake further modelling. Monitor traffic once COVID restrictions lifted	Graeme Doherty			Possible	Severe	High	Live-Treat	
127	9/20/2021	There is a threat that people wouldn't use the connection if the LOS was poor and that the poor safety and reputation would mean cyclists stay on SH	The cause of the threat is if The Connection has poor LOS then the user experience would be poor.	The consequence of the threat is some people (about ~50 users per day) might stay on the State highway and the anticipated volumes of users would be less. It is also not a good look having made a substantial investment. Safety could reduce and reputation could suffer.	AECOM	Graeme Doherty		Possible	Moderate	Cost	Medium		In terms of width Pinch points or use existing facility. Put up physical barriers, fencing. Is it feasible with KiwiRail Access. Bridge takes cyclists onto slip road.	Graeme Doherty			Possible	Minor	Medium	Live-Treat	
128	9/20/2021	There is a threat that the Te Ara Tupua and TQHR lane markings lines may not be consistent.	The cause of the threat is that Te Ara Tupua assumes pedestrians on seaward side. TQHR assumes pedestrians are on the east side. Doesn't tie in with the design which assumes that all the southbound users were on the east side and all the northbound users are on the West side.	The consequence of the threat is there is a safety issue which will flow on into lower uptake of the cycleway.	AECOM	Graeme Doherty		Possible	Moderate	Health & Safety	Medium		Need crossovers between modes to be limited in final design.	Graeme Doherty			Likely	Minor	Medium	Live-Treat	
129	9/20/2021	There is a risk that in the future there might be a need to do some kind of physical separation of the mode in the future	The cause of the threat is that Accessible Streets is considering a default national speed limit on shared paths, and if that goes ahead then we may need to have a separation between the modes in order to allow cyclists to travel at higher than the standard shared path speed limit of might be 25 kph might be 30 kph. Which will be low enough to be safe for shared paths in general and low enough to be discouraging for long distance cycle commuters	The consequence of the threat is more width may be required to accommodate physical separation or if the higher speeds are not dealt with there may be a safety issue, leading to a reputation issue and lower uptake.	AECOM	Graeme Doherty		Likely	Moderate	Health & Safety	High		Physical separation between modes including tactile markings. Keep pedestrians on one side of path. Is there detail - different surfaces. Separation. Hutt Road has asphalt. TAT asphalt throughout. Tactile delineator. Plastic extruded? AT detail has been agreed with Disability Sector. Markings used to help visually impaired people? Hutt Road trial - was too slippery. Need at least 5m to do that - 3m Cycling, 2m Pedestrians.	Graeme Doherty			Possible	Minor	Medium	Live-Treat	
131	9/20/2021	There is a risk around who gives way at the intersection between the shared path and KiwiRail vehicles in the laydown area	The cause of the threat is that the give way priority is shown differently in the two options. If KiwiRail vehicles have priority their speed may be unsafe at the intersection.	The consequence of the threat is there is a potential for collisions at the intersection.	AECOM	Graeme Doherty		Possible	Severe	Health & Safety	High		Correct drawings to show Give Way priority to shared path users	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
132	9/20/2021	There is a risk that construction of the underpass under the State highways is not feasible.	The cause of the threat is that disruption to traffic caused by construction may not be acceptable or that geotechnical conditions such as presence of MSE straps means may be feasible.	The consequence of the threat is delays to the construction of the underpass and cost increases. Or it may not be possible to construct it all.	AECOM	Marcus Brown		Possible	Extreme	Cost	Critical		Consider jacked installation and ground freezing, use steel cables to lubricate jacking and hand auger. Use existing path. Look at compromise solution.	Graeme Doherty			Unlikely	Extreme	High	Live-Treat	
133	9/20/2021	There is a risk of unforeseen obstacles to construction of the underpass (e.g.) MSE behind the crib wall	The cause of the threat is lack of Structures As Built information	The consequence of the threat is an increase in cost	AECOM	Graeme Doherty		Likely	Severe	Cost	Critical		Obtain As Built information from Waka Kotahi archives. Undertake Geotechnical site investigation	Graeme Doherty			Possible	Severe	High	Live-Treat	
134	9/20/2021	There is a risk that construction is delayed and cost increase about unknown services.	The cause of the threat is lack of As Built information about existing services e.g. Substation, Water main.	The consequence of the threat is an increase in cost	AECOM	Graeme Doherty		Likely	Moderate	Cost	High			Graeme Doherty			Possible	Moderate	Medium	Live-Treat	
135	9/20/2021	There is a safety risk around using the existing facility (blind corner on the western side).	The cause of the threat is the existing blind corner at the western side of the underpass, which leads to conflict points.	The consequence of the threat is that it puts stress on people and increases the chances of head-on crashes.	AECOM	Simon Kennett		Likely	Severe	Health & Safety	Critical		1) Design with good geometrics 2) Waka Kotahi and Austroads design guidelines. 3) Markings (yellow double line). 4) Second tunnel (one bound direction per tunnel). 5) Wayfinding signs. 6) Information signs.	Graeme Doherty			Possible	Severe	High	Live-Treat	
136	9/20/2021	There is a risk that the existing Hutt Road facility on the eastern side pathway will provide an inadequate Level Of Service.	The cause of the threat is the existing pathway is too narrow and cannot accommodate the future level of pedestrians, cyclists, scooters and etc.	The consequence of the threat will lower the user experiences of the pathway. Pedestrians, cyclists, scooters and etc cannot go through the pinch point simultaneously, which can cause safety issues (bumping and knocking over).	AECOM	Simon Kennett		Likely	Moderate	Health & Safety	High		Markings could be used. Second tunnel could separate north and south bound users. Use self explaining design. Follow desire lines. Wayfinding signs. Will people use it. Depends on where signs are placed. Is it in a high cognitive space? Petone Ngauranga users. Will they be tempted to use existing path? .	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
138	9/20/2021	There is a threat that cyclists would not use this new cyclist facility	The cause of the threat is due to the potential poor connections of the new cycle facilities to other facilities and destinations.	The consequence of the threat is that it could cause cyclists to avoid this new cycle facility and use other routes that provide better connections. This could also negatively affect the community acceptance of funding for cycling facilities as few cyclists would be using this new facility.	AECOM	Sharleen Hannon		Possible	Severe	Public/Media	High		Ensure there is a good standard of cycling facility during the construction phase. Ensure high level of service is provided for the Connection consistent with Te Ara Tupua and TQHR	Graeme Doherty			Possible	Moderate	Medium	Live-Treat	
139	9/20/2021	There is a risk around the level of usage of the KiwiRail maintenance yard by vehicles.	The cause of the risk is that dependant on the use of the KiwiRail maintenance yard (staging of construction, storing materials and etc) the maintenance area's traffic volume could change.	The consequence of the threat is that it could increase the traffic volume of the area increasing conflict with cyclists and pedestrians using the Connection.	AECOM	Shaun Bullard		Possible	Moderate	Health & Safety	Medium		Liaise with KiwiRail regarding the maintenance yard.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	

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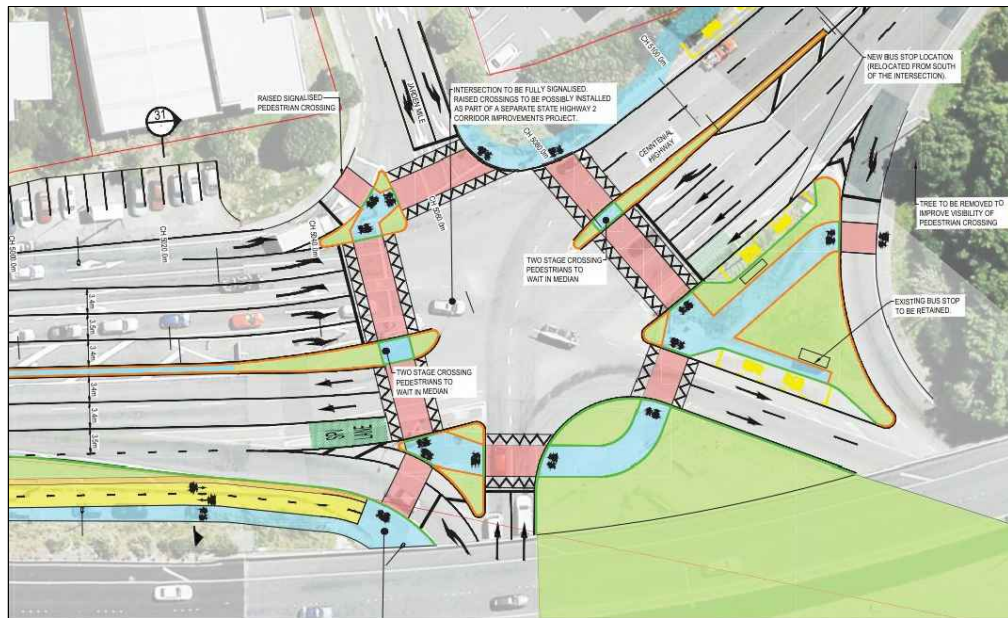
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Risk Identifier	Date raised (dd/mm/yyyy)	Risk Description (include whether this is a threat or an opportunity)	Risk Cause(s)	Risk Consequence(s)	Risk Owning Organisation	Risk Owner	Controls	Current Risk Likelihood	Current Risk Consequence	Consequence Category	Current Controlled Risk Level	Level of risk acceptable, when compared to	Planned Risk Treatment Actions <i>Note: If more than one treatment action, either:</i>	Treatment Owner(s)	Planned Treatment Implementation	Risk Treatment Progress Updates	Residual (Target) Risk Likelihood	Residual (Target) Risk Consequence	Residual (Target) Risk Level	Risk status	Comments
140	9/20/2021	There is a risk of using the existing cycleway due to light levels that could impair the vision of cyclists.	The cause of the threat is cyclists travelling between light and dark areas (underpass and the two shared areas). The existing pedestrian hold bar is also obstructing cyclists.	The consequence of the threat is that it could be a safety hazard causing collisions. In addition, this pedestrian hold bar also increases the risk of collision with cyclists.	AECOM	Kylie Hook		Likely	Moderate	Health & Safety	High		1) Design with good geometrics 2) Waka Kotahi and Austroads design guidelines. 3) Monitor and manage.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
141	9/20/2021	There is a threat that there could be sun strike early in the morning.	The cause of the threat is due to the direction of travel in the morning.	The consequence of the threat is that it could impair the vision of cyclists and become a safety hazard.	AECOM	Graeme Doherty		Possible	Moderate	Health & Safety	Medium		1) Design with good geometrics 2) Waka Kotahi and Austroads design guidelines. 3) Monitor and manage.	Graeme Doherty			Possible	Minor	Medium	Live-Treat	
142	9/20/2021	There is a threat that the sightlines are below standard	The cause of the threat is the geometry of the site which can affect the sightlines for active mode users.	The consequence of the threat is that it could negatively affect safety and cause conflicts.	AECOM	Lorelei Schmitt		Possible	Moderate	Health & Safety	Medium		1) Design with good geometrics 2) Waka Kotahi and Austroads design guidelines. 3) Monitor and manage.	Graeme Doherty			Possible	Minor	Medium	Live-Treat	
143	9/20/2021	There is a threat that there might be a conflict between PT and active mode movement.	The cause of the threat is conflict in movement between the people exiting the tunnel and people travelling along the footpath outside the tunnel's exit (e.g. people getting off the bus stop and along Hutt Road).	The consequence of the threat is that it could become a safety hazard as people exiting the tunnel could collide with the people travelling along.	AECOM	Graeme Doherty		Likely	Moderate	Health & Safety	High		1) NZTA public transport design guideline (still in draft version). 2) Maintain good sightlines. 3) Road marking to reduce speed (e.g. keep left, slow down and centre lines). 4) Monitor and manage.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
144	9/20/2021	There is a threat that the existing bus shelter could conflict with the sightlines.	The cause of the threat is due to the location of the bus shelter and stop. The bus stop is also potentially in the way of the cycle lane.	The consequence of the threat is that the bus shelter could conflict with the sightlines and therefore become a safety hazard. The existing bus stop is a pull in bay which is also a safety hazard for cyclists that will use the cycle lane.	AECOM	Alex Campbell		Likely	Moderate	Health & Safety	High		NZTA public transport design guideline (still in draft version). The intent will be to design the bus shelter consistent with the latest public transport design guidance incorporating bus stop bypass designs. This includes working with the relevant SME's (e.g. Simon Kennett/Lorelei Schmitt) and GW to check design risks are well managed in the detailed design.	Graeme Doherty			Unlikely	Minor	Low	Live-Treat	
145	9/20/2021	There is a threat that the level of service for cyclists would be significantly decreased during the construction phase.	The cause of the threat is that the existing cycling facility (e.g. existing on-road cycle lane) will be removed to accommodate for construction traffic during the construction phase.	The consequence of the threat is it will reduce the demand for existing cyclists.	AECOM	Matt Shipman		Almost certain	Moderate	Health & Safety	High		1) Ensure some cycling facility during the construction phase. 2) Monitor and manage.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
146	9/20/2021	There is a threat of stormwater flooding issues on the western side.	The cause of the threat is that the grading of the intersection tends to be towards one side of the intersection and can cause flooding issues during a heavy storm.	The consequence of the threat is that the puddling from a heavy storm can become a safety hazard for vehicles drive through it.	AECOM	Kylie Hook		Possible	Moderate	Environmental	Medium		Using CCTV to identify the issue.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
147	9/20/2021	There is a threat of unplanned parking on the berm on the western side.	The cause of the threat is that some people tend to be parking on the berm on the western side and crosses the road unsafely.	The consequence of the threat is that people are crossing the road unsafely and becoming a safety hazard for others.	AECOM	Graeme Doherty		Possible	Moderate	Health & Safety	Medium		1) Existing parking up south Hutt Road. 2) Yellow line marking to enforce no parking. 3) Create parking on KiwiRail maintenance yard	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	Issue for TQHR to address if outside The Connection area / scope.
148	9/20/2021	There is a threat of funnelling of the wind through the tunnel.	The cause of the threat is that cyclists could experience extreme wind conditions when cycling through the tunnel.	The consequence of the threat is that the extreme wind may cause cyclists to lose control.	AECOM	Hannah Hyde		Possible	Moderate	Health & Safety	Medium		1) Warning system for high wind (VMS, social media and etc). 2) Wind break structure.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	
149	9/20/2021	There is a threat of northwestern wind going through the tunnel.	The cause of the threat is the occasionally northwestern wind going against the cyclists when cycling through the tunnel.	The consequence of the threat is that the northwestern makes it challenging to cycle through and can cause cyclist to lose control.	AECOM	Hannah Hyde		Possible	Moderate	Health & Safety	Medium		1) Warning system for high wind (VMS, social media and etc). 2) Wind break structure.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	
150	9/20/2021	There is a threat of sea level rise.	The cause of the threat is that global warming causes the rise of sea level.	The consequence of the threat is that the rise of sea level could flood the tunnel.	AECOM	Adam Ashford		Possible	Moderate	Environmental	Medium		Design to Ministry of Environment suggested future sea level.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	
151	9/20/2021	There is a threat that the tunnel attracts unsavoury activities to the area.	The cause of the threat is that the area becomes a pleasant and enclosed area and therefore may attract unsavoury activities.	The consequence of the threat is that people start to feel unsafe crossing through the area.	AECOM	Lorelei Schmitt		Possible	Minor	Health & Safety	Medium		1) Strong lighting. 2) CCTV. 3) Design for passive surveillance. 4) Maintenance. 5) Place making. 6) Graffiti Guard.	Graeme Doherty			Rare	Minor	Low	Live-Treat	
152	9/20/2021	There is a risk that the use of the Effluent station going to be changed.	The cause of the threat is that the use of the Effluent station may change.	The consequence of the threat is that more traffic might be generated in the area.	AECOM	Graeme Doherty		Unlikely	Moderate	Cost	Medium		Liaise with the Effluent station operators.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	
153	9/20/2021	There is a threat that motorised vehicles will be using the connections.	The cause of the threat is that access for motorised vehicles is not controlled.	The consequence of the threat is that it could become a safety hazard for other active mode users.	AECOM	Graeme Doherty		Possible	Moderate	Health & Safety	Medium		1) Enforce by-laws. 2) Road marking. 3) Geometrics.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	
154	9/20/2021	There is a risk that trail bikes will be access the Connection as seen in the Hutt River area.	The cause of the threat is the use of trail bikes around the Hutt area.	The consequence of the threat is that it could become a safety hazard for other active mode users.	AECOM	Matt Shipman		Possible	Moderate	Health & Safety	Medium		1) Enforce by-laws. 2) Road marking. 3) Geometrics.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	
156	9/20/2021	There is an opportunity to bring iwi Mana Whenua urban design into the project.	The cause of the opportunity is that there is currently a lack of urban design in the area.	The consequence of the opportunity is that it can increase the overall experience when using the facility and bring in the rich history of the past.	AECOM	Hannah Hyde		Possible	Moderate	Stakeholders	Medium		Consider Opportunities to improve design with mana whenua representatives .	Graeme Doherty			Possible	Moderate	Medium	Live-Treat	
157	9/20/2021	There is a threat that the current channel level is not sufficient.	The cause of the threat is that the channel level has changed over the years and the current channel level is unknown.	The consequence of the threat is that the current channel level cannot accommodate the stormwater and cause flooding in the area.	AECOM	Kylie Hook		Unlikely	Moderate	Health & Safety	Medium		Survey the channel level and make improvements if needed.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
158	9/20/2021	There is a threat that the water can leaks from the flyover overhead.	The cause of the threat is that there appears to be leakage from the joints of the flyover.	The consequence of the threat is that it could cause flooding in the area.	AECOM	Adam Ashford		Unlikely	Moderate	Health & Safety	Medium		Investigate the flyover leaks overhead and maintain	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
159	9/20/2021	There is a threat of conflicting travel modes and movement in the area.	The cause of the threat is that a range of different modes (e.g. traffic, pedestrians, cyclists and etc) use that area to get to a range of different places (e.g. stations, bus stops and etc) and therefore, can conflict with each other.	The consequence of the threat is that the conflict moving and difference in speed could cause crashes with each other.	AECOM	Hannah Hyde		Likely	Moderate	Health & Safety	High		1) Road marking (slow down, double yellow lines, keep left). 2) Design with good geometrics 3) Waka Kotahi and Austroads design guidelines.	Graeme Doherty			Possible	Moderate	Medium	Live-Treat	
160	9/20/2021	There is a risk that the existing footpath kerb is being hit by vehicles and some places are damage.	The cause of the threat is that vehicles are hitting and damaging the existing footpath kerb.	The consequence of the threat is that it will damage vehicles and the footpath kerb will need more frequent maintenance. It is also not safe for cyclist cycling next to the kerb.	AECOM	Graeme Doherty		Unlikely	Severe	Health & Safety	Medium		1) Reduce speed. 2) Wider width. 3) Redirective kerbs.	Graeme Doherty			Unlikely	Severe	Medium	Live-Treat	
161	9/20/2021	There is an increased risk of crashes during the maintenance of the slip road.	The cause of the threat is that some road sections will be closed down due to maintenance of the road.	The consequence of the threat is that it could disrupt traffic and cause safety hazards.	AECOM	Graeme Doherty		Possible	Moderate	Health & Safety	Medium		1) maintenance at night time. 2) Sweeping.	Graeme Doherty			Unlikely	Moderate	Medium	Live-Treat	
163	9/20/2021	There is a risk that a large amount of construction will happen in the small area during the same time.	The cause of the threat is a range of project construction (TAT and the connection) that could be happening in the small area during the same time.	The consequence of the threat is that it could increase the safety risk for the road users and construction workers in the area.	AECOM	Graeme Doherty		Possible	Severe	Health & Safety	High		1) Need to check swept paths for HCVs. Option takes a couple of months. Option 1A a bit longer. Need to avoid cyclists mixing with trucks and buses. 2) Built in alliance. 3) Build into contract.	Graeme Doherty			Possible	Severe	High	Live-Treat	
164	9/20/2021	There is a threat that requiring path users to give way to vehicles coming out of the KR land may be illegal.	The cause of the threat is that it may be illegal to require path users to give way to vehicles coming out of the KR land. By law, a driver entering or existing a driveway must give way to road users on a footpath cycle path or shared path.	The consequence of the threat is that the intersection is not approved	AECOM	Graeme Doherty		Possible	Moderate	Stakeholders	Medium		Update drawings to show KR vehicles and effluent vehicles giving way.	Graeme Doherty			Rare	Moderate	Low	Live-Treat	



# Appendix C

Option 1, 1A and 1D Drawings



1 BECA DESIGN - 01-10-2021



This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the AECOM quality assurance system to ISO 9001-2000.



CONSULTANT  
AECOM Australia Pty Ltd  
A.B.N 20 093 846 925  
www.aecom.com

PROJECT  
**WALKING & CYCLING  
CONNECTION BETWEEN  
HUTT ROAD & TE ARA  
TUPUA**



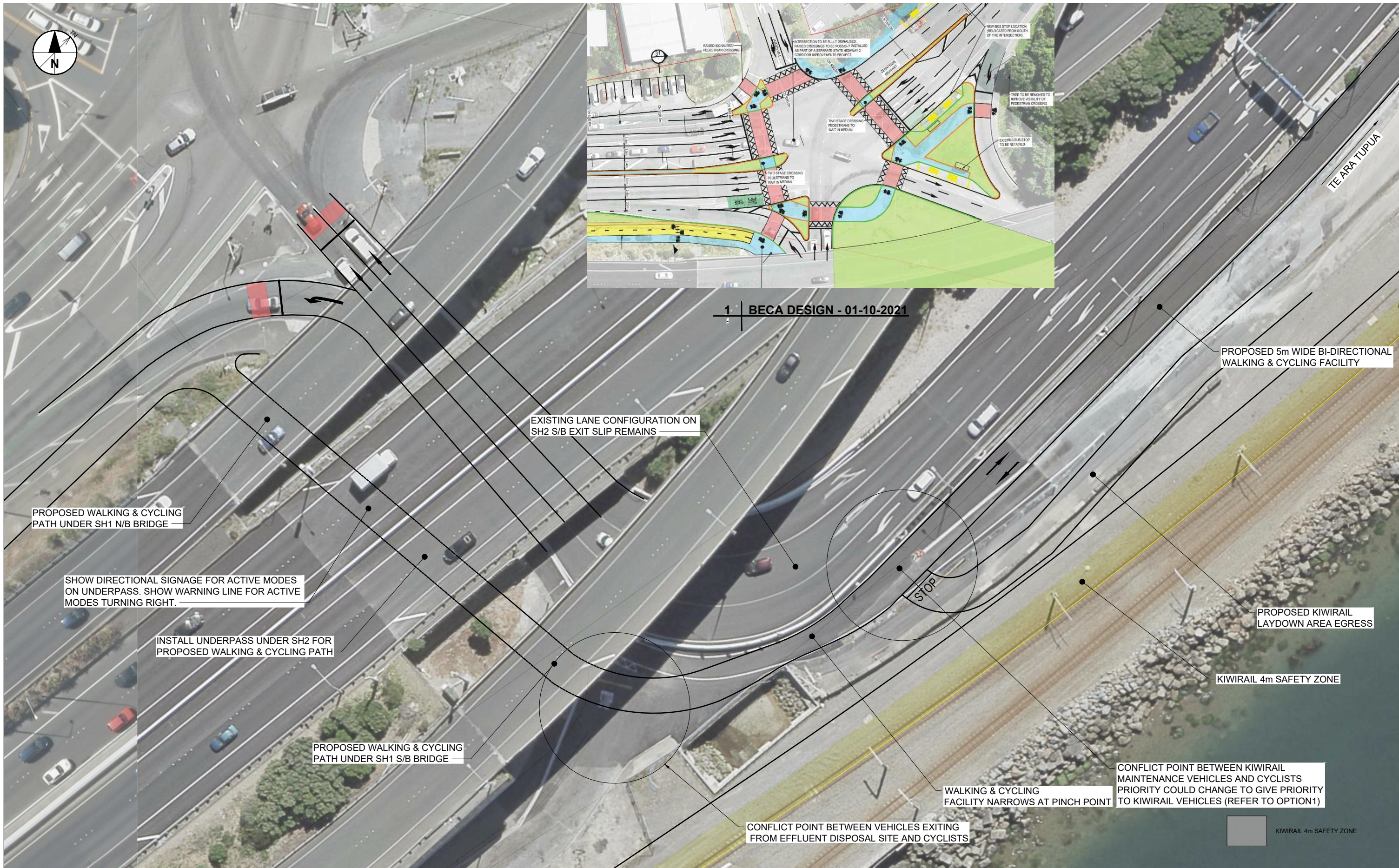
PROJECT MANAGEMENT INITIALS		
GD	TR	AA
DESIGNER	CHECKED	APPROVED

ISSUE/REVISION		
IR	DATE	DESCRIPTION
D	26.01.2022	REVISIONS FOR ISSUE
C	15.09.2021	NOTES FOR RISK WORKSHOP
B	25.08.2021	KIWIRAIL AMENDMENTS
A	Aug-21	FOR DISCUSSION

PROJECT NUMBER  
60623852

SHEET TITLE  
CONCEPT PLAN OPTION 1

SHEET NUMBER  
CI-0002



1 | BECA DESIGN - 01-10-2021

PROPOSED WALKING & CYCLING PATH UNDER SH1 N/B BRIDGE

SHOW DIRECTIONAL SIGNAGE FOR ACTIVE MODES ON UNDERPASS. SHOW WARNING LINE FOR ACTIVE MODES TURNING RIGHT.

INSTALL UNDERPASS UNDER SH2 FOR PROPOSED WALKING & CYCLING PATH

PROPOSED WALKING & CYCLING PATH UNDER SH1 S/B BRIDGE

EXISTING LANE CONFIGURATION ON SH2 S/B EXIT SLIP REMAINS

CONFLICT POINT BETWEEN VEHICLES EXITING FROM EFFLUENT DISPOSAL SITE AND CYCLISTS

WALKING & CYCLING FACILITY NARROWS AT PINCH POINT

CONFLICT POINT BETWEEN KIWIRAIL MAINTENANCE VEHICLES AND CYCLISTS PRIORITY COULD CHANGE TO GIVE PRIORITY TO KIWIRAIL VEHICLES (REFER TO OPTION1)

PROPOSED 5m WIDE BI-DIRECTIONAL WALKING & CYCLING FACILITY

PROPOSED KIWIRAIL LAYDOWN AREA EGRESS

KIWIRAIL 4m SAFETY ZONE

KIWIRAIL 4m SAFETY ZONE

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**AECOM**

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PROJECT  
WALKING & CYCLING CONNECTION BETWEEN HUTT ROAD & TE ARA TUPUA

CLIENT



PROJECT MANAGEMENT INITIALS

GD	TR	AA
DESIGNER	CHECKED	APPROVED

ISSUE/REVISION

IR	DATE	DESCRIPTION
C	26.01.2022	REVISIONS FOR ISSUE
B	25.08.2021	KIWIRAIL AMENDMENTS
A	Aug-21	FOR DISCUSSION

PROJECT NUMBER

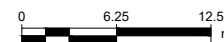
60623852

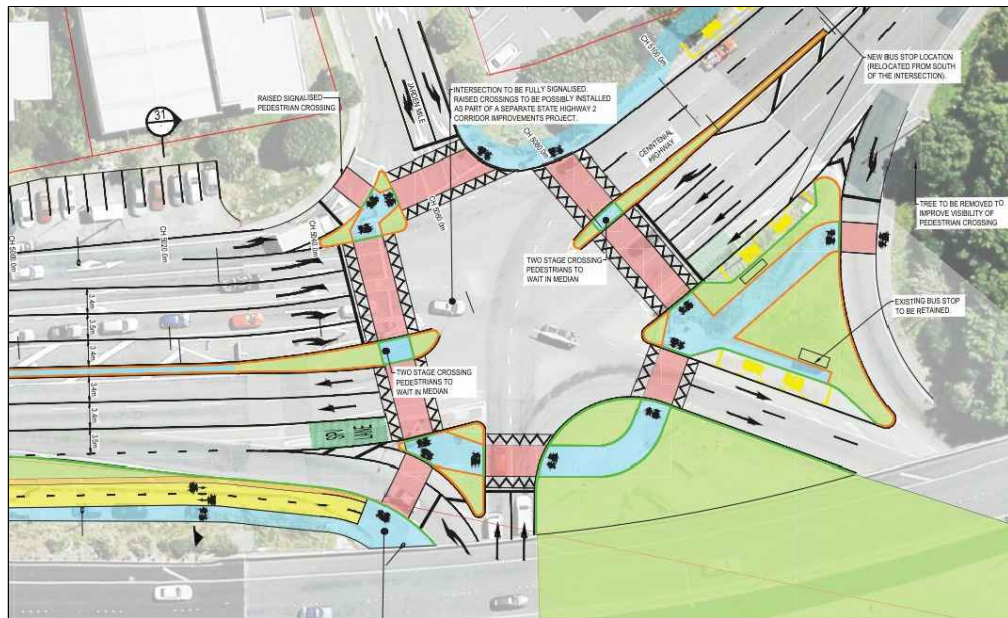
SHEET TITLE

CONCEPT PLAN OPTION 1A

SHEET NUMBER

CI-0003





1 BECA DESIGN - 01-10-2021



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TUPUA



PROJECT MANAGEMENT INITIALS		
GD	TR	AA
DESIGNER	CHECKED	APPROVED

ISSUE/REVISION		
B	26.01.2022	REVISIONS FOR ISSUE
A	Sept-21	FOR DISCUSSION
1/R	DATE	DESCRIPTION

PROJECT NUMBER  
60623852  
SHEET TITLE  
CONCEPT PLAN OPTION 1D  
SHEET NUMBER  
CI-0009



# Appendix D

Cost Estimates and Parallel Cost Estimate

# Project Estimate Form C

# DBE

Thordon Quay Hutt Road SSBC - The Connection Option 1

Detailed Business Case Estimate

Item	Description	Base estimate	Contingency	Funding risk
<b>A</b>	<b>Nett project property cost</b>	<b>110,000</b>	<b>16,500</b>	<b>11,000</b>
	<b>Project Development Phase</b>			
	- consultancy fees	nil	nil	nil
	- the NZTA-managed costs	nil	nil	nil
<b>B</b>	<b>Total Project Development</b>			
	<b>Pre-implementation Phase</b>			
	- consultancy fees	225,000	67,500	112,500
	- the NZTA-managed costs	180,000	54,000	90,000
<b>C</b>	<b>Total Pre-implementation</b>	<b>405,000</b>	<b>121,500</b>	<b>202,500</b>
	<b>Implementation Phase</b>			
	- Implementation fees	99,000	29,700	49,500
	- consultancy fees	100,000	30,000	50,000
	- the NZTA-managed costs	100,000	30,000	50,000
	- consent monitoring fees	5,000	1,500	2,500
	<b>Sub-total base Implementation Fees</b>	<b>304,000</b>	<b>91,200</b>	<b>152,000</b>
	<b>Physical works</b>			
1	Environmental compliance	15,000	7,500	4,500
2	Earthworks	209,040	104,520	62,712
3	Ground improvements	0	0	0
4	Drainage	106,625	53,313	31,988
5	Pavement and surfacing	328,910	164,455	98,673
6	Bridges	0	0	0
7	Retaining walls	210,000	105,000	63,000
8	Traffic services	461,700	230,850	138,510
9	Service relocations	110,000	55,000	33,000
10	Landscaping	7,500	3,750	2,250
11	Traffic management and temporary works	240,000	120,000	72,000
12	Preliminary and general	779,388	389,694	233,816
13	Extraordinary construction costs	0	0	0
14	<b>Sub Total Base Physical Works</b>	<b>2,468,163</b>	<b>1,234,081</b>	<b>740,449</b>
<b>D</b>	<b>Total for Implementation Phase</b>	<b>2,772,163</b>	<b>1,325,281</b>	<b>1,632,898</b>
<b>E</b>	<b>Project Base Estimate (A+C+D)</b>	<b>3,287,163</b>	<b>1,463,281</b>	<b>1,846,398</b>
<b>F</b>	<b>Contingency (Assessed/Analysed) (A+C+D)</b>		<b>1,463,281</b>	
<b>G</b>	<b>Project Expected Estimate (E+F)</b>		<b>4,750,444</b>	
	Nett Project Property Cost Expected Estimate		126,500	
	Project Development Expected Estimate		Nil	
	Pre-Implementation Expected Estimate		526,500	
	Implementation Expected Estimate		4,097,444	
<b>H</b>	<b>Funding risk (Assessed/Analysed) (A+C+D)</b>			<b>1,846,398</b>
<b>I</b>	<b>95th percentile Project Estimate (G+H)</b>			<b>6,596,841</b>
	Nett Project Property Cost 95th percentile Estimate			137,500
	Project Development 95th percentile Estimate			Nil
	Pre-Implementation 95th percentile Estimate			729,000
	Implementation 95th percentile Estimate			5,730,341

<b>Date of estimate: Sept 2021</b>	<b>Cost index (Qtr/Year)</b>
<b>Estimate prepared by: Marc Cilliers</b>	<b>Signed</b>
<b>Estimate internal peer review by: Graeme Doherty</b>	<b>Signed</b>
<b>Estimate external peer review by</b>	<b>Signed</b>
<b>Estimate accepted by the NZTA</b>	<b>Signed</b>

Note: (1) These estimates are exclusive of escalation and GST.



# Project Estimate Form C

# DBE

Thordon Quay Hutt Road SSBC - The Connection Option 1D

Detailed Business Case Estimate

Item	Description	Base estimate	Contingency	Funding risk
<b>A</b>	<b>Nett project property cost</b>	<b>110,000</b>	<b>16,500</b>	<b>11,000</b>
	<b>Project Development Phase</b>			
	- consultancy fees	nil	nil	nil
	- the NZTA-managed costs	nil	nil	nil
<b>B</b>	<b>Total Project Development</b>			
	<b>Pre-implementation Phase</b>			
	- consultancy fees	225,000	67,500	112,500
	- the NZTA-managed costs	180,000	54,000	90,000
<b>C</b>	<b>Total Pre-implementation</b>	<b>405,000</b>	<b>121,500</b>	<b>202,500</b>
	<b>Implementation Phase</b>			
	- Implementation fees	99,000	29,700	49,500
	- consultancy fees	100,000	30,000	50,000
	- the NZTA-managed costs	100,000	30,000	50,000
	- consent monitoring fees	5,000	1,500	2,500
	<b>Sub-total base Implementation Fees</b>	<b>304,000</b>	<b>91,200</b>	<b>152,000</b>
	<b>Physical works</b>			
1	Environmental compliance	15,000	7,500	4,500
2	Earthworks	178,005	89,003	53,402
3	Ground improvements	0	0	0
4	Drainage	125,650	62,825	37,695
5	Pavement and surfacing	328,910	164,455	98,673
6	Bridges	0	0	0
7	Retaining walls	0	0	0
8	Traffic services	139,750	69,875	41,925
9	Service relocations	110,000	55,000	33,000
10	Landscaping	72,900	36,450	21,870
11	Traffic management and temporary works	240,000	120,000	72,000
12	Preliminary and general	403,065	201,532	120,919
13	Extraordinary construction costs	0	0	0
14	<b>Sub Total Base Physical Works</b>	<b>1,613,280</b>	<b>806,640</b>	<b>483,984</b>
<b>D</b>	<b>Total for Implementation Phase</b>	<b>1,917,280</b>	<b>897,840</b>	<b>1,119,968</b>
<b>E</b>	<b>Project Base Estimate (A+C+D)</b>	<b>2,432,280</b>	<b>1,035,840</b>	<b>1,333,468</b>
<b>F</b>	<b>Contingency (Assessed/Analysed) (A+C+D)</b>		<b>1,035,840</b>	
<b>G</b>	<b>Project Expected Estimate (E+F)</b>		<b>3,468,119</b>	
	Nett Project Property Cost Expected Estimate		126,500	
	Project Development Expected Estimate		Nil	
	Pre-Implementation Expected Estimate		526,500	
	Implementation Expected Estimate		2,815,119	
<b>H</b>	<b>Funding risk (Assessed/Analysed) (A+C+D)</b>			<b>1,333,468</b>
<b>I</b>	<b>95th percentile Project Estimate (G+H)</b>			<b>4,801,587</b>
	Nett Project Property Cost 95th percentile Estimate			137,500
	Project Development 95th percentile Estimate			Nil
	Pre-Implementation 95th percentile Estimate			729,000
	Implementation 95th percentile Estimate			3,935,087

<b>Date of estimate: Sept 2021</b>	<b>Cost index (Qtr/Year)</b>
<b>Estimate prepared by: Marc Cilliers</b>	<b>Signed</b>
<b>Estimate internal peer review by: Graeme Doherty</b>	<b>Signed</b>
<b>Estimate external peer review by</b>	<b>Signed</b>
<b>Estimate accepted by the NZTA</b>	<b>Signed</b>

Note: (1) These estimates are exclusive of escalation and GST.



LET'S GET WELLINGTON MOVING: THORNDON  
QUAY AND HUTT ROAD – THE CONNECTION

PARALLEL ESTIMATE

17 January 2022

# CONTENTS

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## CONTACT

1	INTRODUCTION	1
2	FINANCIAL SUMMARY	2

## APPENDICES

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	APPENDIX A: IBC ESTIMATE SUMMARY	
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# CONTACT

DETAIL	DESCRIPTION
Name of Company/Trading Name	WTP NZ Infrastructure Limited
Name of Representative	Luke Donnelly
Position	Director
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Telephone	+64 3 365 7669
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Email	Luke.donnelly@wtpartnership.co.nz

DOCUMENT STATUS	NAME	DATE
PREPARED BY	Filip Lalovich	01.12.21
REVIEWED BY	Luke Donnelly	17.01.22
E-SIGNATURE APPROVED	Luke Donnelly	17.01.22

REVISION NO.	REVISION DATE	DRAFT.FINAL
00	01.12.21	FINAL
01	21.12.21	FINAL
02	17.01.22	FINAL

# 1 INTRODUCTION

WT Infrastructure (WT) have been commissioned by Let's Get Wellington Moving to provide a parallel estimate for The Connection between the Thorndon Quay to Upper Hutt Cycleway and the Ngā Ūranga to Pito-one Cycleway. The works entail the construction of an underpass below SH2 and cycleway works to link between the two projects.

We were provided with the following documents which helped form the basis of this updated budget estimate.

- *The Connection Draft Final SSBC addendum 37* by Aecom
- *The Connection Draft Final SSBC addendum 33* by Aecom
- *SH1N\_10679\_Original Construction Drawings 1982* drawing pack of the original structures
- *SH1N\_10679\_Original Construction Drawings 1982* drawing pack of the original structures
- *SH1N\_10679\_Original Construction Drawings 1982* drawing pack of the original structures

## 2 FINANCIAL SUMMARY

The following table provides a summary of the cost estimate included in Appendix A, along with a comparison to the Aecom Estimate. Please refer to our assumptions, clarifications and exclusions listed later in the document.

Item	Description	WT	Aecom	Variance
1	Project Base Estimate	8,465,114	5,753,321	2,711,793
2	Project Expected Estimate	11,973,346	8,449,681	3,523,665
3	95th percentile Project Estimate	14,270,679	11,775,773	2,494,906

### 2.1 VARIANCES

We have only been provided with the Aecom estimate summary, so we cannot comment on any detailed rates variances, but we have highlighted any discrepancies between the two estimates below:

- Pre-implementation fees = +\$980k. We have allowed 14.5% for consultancy fees and 8.4% for NZTA managed Costs, which is in line with the agreed allowances for the wider Thorndon Quay and Upper Hutt project.
- Implementation Phase Fees = +\$600k. We have allowed 8.4% for consultancy fees and 6.5% for NZTA managed Costs, which is in line with the agreed allowances for the wider Thorndon Quay and Upper Hutt project.
- Physical Works = +\$800k. It is difficult to analyse the exact variances as we only have the Aecom cost summary and it is unclear which costs are captured under each element. Given the limited design information available to produce the estimates, differences are inevitable based upon the assumptions made.
- Project Contingency = +\$800k. Please refer to the contingency section of the report for our allowances.
- P95 Contingency = -\$1m. Please refer to the contingency section of the report for our allowances.

## 2.2 CONTINGENCY

We have used the General Approach to contingency and have applied the following percentages to each element:

Element	Project Contingency	P95 Contingency
Property Cost	30%	25%
Pre-implementation Phase	30%	25%
Implementation Fees	30%	25%
Environmental Compliance	40%	25%
Earthworks	40%	25%
Ground Improvements	50%	30%
Drainage	40%	25%
Pavement and Surfacing	40%	25%
Bridges & Tunnels	50%	30%
Retaining Walls	50%	30%
Traffic Services	40%	25%
Service Relocations	40%	25%
Landscaping	40%	25%
Traffic Management and Temporary Works	50%	30%
Preliminary and General	40%	25%
Extraordinary Construction Costs	50%	30%
Contractor's Offsite OH&P	40%	25%

## 2.3 METHODOLOGY

For the purposes of developing this estimate, we have assumed the following methodology for the installation of the underpass:

- The underpass will be installed open cut through the existing embankment.
- The works will be split into 2 stages to allow one-way traffic to be maintained on SH2. It is assumed the traffic travelling in the other direction will be diverted off SH2 earlier and re-directed on past this intersection.
- We have allowed to sheet pile down to 12m and excavate to subgrade.
- We have allowed for a 5m x 4m concrete culvert, with all construction details assumed.
- We have assumed a raft foundation and no allowance is included for piling.
- We have assumed that the full extent of crib wall on each side of the embankment will need to be replaced.

## 2.4 ALTERNATIVE METHODOLOGY & COST

The methodology described in 2.3 above will be very disruptive to traffic on SH2. The Aecom drawings referenced the works being completed under the Kiwirail line at Petone Station and indicated a similar methodology here. We believe that the works here are more complex than what we have seen of the Petone crossing due to the existing crib walls and abutments in close proximity to the works. As such we believe that these works would take longer than the 10 days indicated. It may therefore not be feasible to disrupt the SH2 traffic for this length of time.

However, without further engineering inputs, we are unable to develop a cost estimate for an option which effectively 'tunnels' below the SH without major disruption. We would suggest for budgeting purposes that a base estimate allowance of between **\$10m** and **\$15m** is carried to allow for this.

We therefore recommend that the value carried forward for budgeting reflects this higher cost. The table below uses the base estimate including contingency as the *Project Expected Estimate* and carries the alternative methodology costs as the *95<sup>th</sup> Percentile Estimate* (reflected as a 100% mark-up on the expected estimate).

Item	Description	\$
1	Project Base Estimate	7,571,025
2	Project Expected Estimate	12,884,841
3	95th percentile Project Estimate	25,800,000

## 2.5 GENERAL ASSUMPTIONS, EXCLUSIONS AND CLARIFICATIONS

As part of our estimate we have assumed the following:

- We have used the same Land Purchase costs as Aecom but are unsure what these are based on.
- Project Development fees are excluded
- Development contributions are excluded
- Temporary works to the existing bridge and flyovers is excluded
- We have allowed for 30% of excavated material to be contaminated.
- We have allowed for a signalised cycleway / pedestrian crossing to the south of the underpass
- GST is excluded
- We have included an allowance of night works for 10 days
- We have included an allowance of \$150k for urban design upgrades, to allow for etching or patterns to the new abutment retaining walls and the inside concrete face of the underpass
- Traffic management allowances are assumed based upon SH2 being shut in one direction for approximately 2 months in total.



**APPENDIX A**  
IBE Estimate Summary



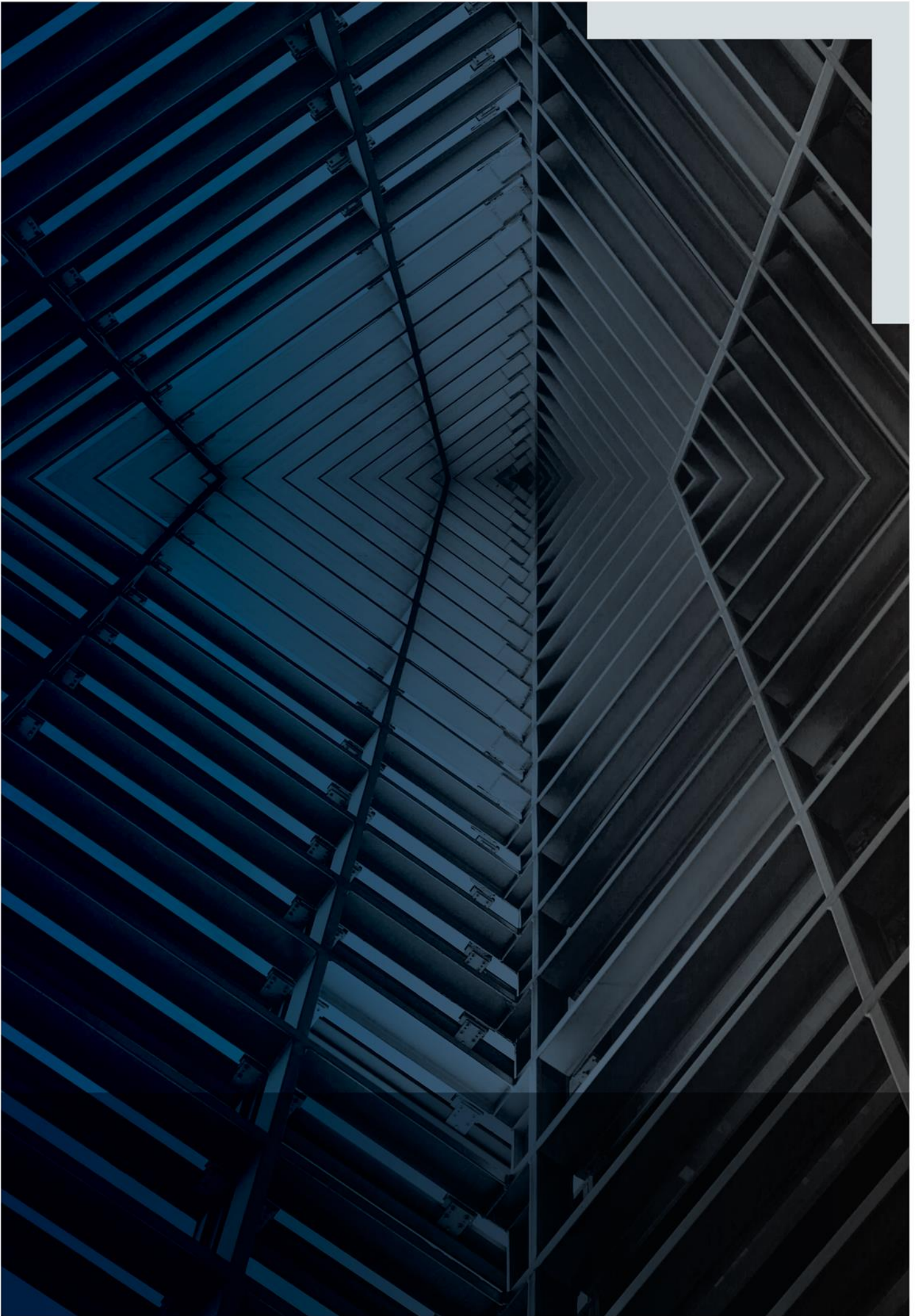
# Project Estimate - Form B

# IBE

Project Name: LGWM - Thorndon Quay - The Connection

## Indicative Business Case Estimate

Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	<b>Nett Project Property Cost</b>	<b>110,000</b>	<b>33,000</b>	<b>27,500</b>
B	<b>Project Development Phase</b>			
	- Consultancy Fees	Excluded	Excluded	Excluded
	- NZTA Managed Costs	Excluded	Excluded	Excluded
<b>Total Project Development</b>		<b>0</b>	<b>0</b>	<b>0</b>
C	<b>Pre-Implementation Phase</b>			
	- Consultancy Fees	877,338	263,201	219,334
	- NZTA Managed Costs	510,080	153,024	127,520
<b>Total Pre-implementation</b>		<b>1,387,418</b>	<b>416,225</b>	<b>346,855</b>
D	<b>Implementation Phase</b>			
	<b>Implementation Fees</b>			
	- Consultancy Fees	510,080	153,024	127,520
	- NZTA Managed Costs	391,742	117,522	97,935
	- Consent Monitoring Fees	0	0	0
	<b>Sub Total Base Implementation Fees</b>	<b>901,822</b>	<b>270,547</b>	<b>225,455</b>
	<b>Physical Works</b>			
	1 Environmental Compliance	82,337	32,935	20,584
	2 Earthworks	224,750	89,900	56,188
	3 Ground Improvements	57,969	28,985	17,391
	4 Drainage	68,882	27,553	17,221
	5 Pavement and Surfacing	177,108	70,843	44,277
	6 Bridges & Tunnels	1,929,132	964,566	578,740
	7 Retaining Walls	624,000	312,000	187,200
	8 Traffic Services	175,000	70,000	43,750
9 Service Relocations	50,000	20,000	12,500	
10 Landscaping	150,000	60,000	37,500	
11 Traffic Management and Temporary Works	660,000	330,000	198,000	
12 Preliminary and General	818,852	327,541	204,713	
13 Extraordinary Construction Costs	350,000	175,000	105,000	
14 Contractor's Offsite OH&P	697,844	279,138	174,461	
<b>Sub Total Base Physical Works</b>	<b>6,065,874</b>	<b>2,788,460</b>	<b>1,697,524</b>	
<b>Total for Implementation Phase</b>	<b>6,967,696</b>	<b>3,059,006</b>	<b>1,922,979</b>	
E	<b>Project Base Estimate (A+B+C+D)</b>	<b>8,465,114</b>		
F	<b>Contingency (Assessed/Analysed) (A+B+C+D)</b>		<b>3,508,232</b>	
G	<b>Project Expected Estimate (E+F)</b>		<b>11,973,346</b>	
Nett Project Property Cost Expected Estimate			Excluded	
Project Development Phase Expected Estimate			0	
Pre-implementation phase Expected Estimate			1,803,644	
Implementation Phase Expected Estimate			10,026,702	
H	<b>Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)</b>			<b>2,297,334</b>
I	<b>95th percentile Project Estimate (G+H)</b>			<b>14,270,679</b>
Nett Project Property Cost 95th percentile Estimate				170,500
Project Development Phase 95th percentile Estimate				0
Pre-implementation Phase 95th percentile Estimate				2,150,498
Implementation Phase 95th percentile Estimate				11,949,681
<b>Date of Estimate</b>		4Q 2021		
<b>Estimate prepared by</b>		Filip Lalovic		
<b>Estimate internal peer review by</b>		Luke Donnelly		
<b>Estimate external peer review by</b>		N/A		
<b>Estimate accepted by NZTA</b>				





# Appendix E

## Traffic Modelling Summary

Traffic volumes for the SIDRA analysis were derived from pre-Covid traffic volumes. Currently, due to Covid-19 the number of trips into and out of the city has changed. Traffic has gone back to 10% lower in December 2021 and may increase further to pre Covid levels in near future. The changes to travel patterns due to Covid-19, combined with changes through the opening of the Transmission Gully project, will become clearer through ongoing monitoring. As monitoring establishes a normalised travel pattern, further video review work will be undertaken to confirm the traffic baseline.

The modelling analysis assumed:

- A 10% growth rate to 2031 at 1% per annum
- Sensitivity tests based on a 15% growth rate to 2031

The results of the initial modelling analysis undertaken showed that:

- Volumes on SH2 are regulated by upstream constraints at the southbound Petone entry slip lane, which is beneficial for the performance of the options as this regulates traffic reaching the SH2 / Jarden Mile / Centennial Highway (Ngā Ūranga) intersection, so mitigating to some extent the impact of the reduced capacity of the two options.
- Historic data has shown that the future growth on the corridor is likely to be focused on the shoulders of existing peak travel times.
- The table shows the modelled average and 95% number of metres to the back of queue for both Option 1 and 1D. Cells highlighted in green indicates queue lengths are less than 400 metres (approximately the total length of the Hutt Road southbound off ramp slip lane) and cells highlighted in orange indicate queue lengths are greater than 400 metres.

Modelled SH2 southbound offramp queue lengths

	AM		PM	
	Average queue (m)	95% back of queue (m)	Average queue (m)	95% back of queue (m)
2021 Existing	73	118	222	362
2031 Existing	98	160	233	380
2031 Existing (Sensitivity Test)	114	185	257	419
2021 Option	118	193	227	370
2031 Option	154	251	300	490
2031 Option (Sensitivity Test)	170	277	346	565

- The predicted outcomes of the 95% back of queue for the 2031 scenario and both of the 2031 Sensitivity Test scenarios in the PM peak period are greater than 400 metres and therefore could affect the main movement along the SH2 southbound lanes.

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