

Takaanini Level Crossings Detailed Business Case

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Responsibility	Name
Author	Business Case Lead Takaanini
Reviewer	Business Case Discipline Lead Project Lead Takaanini
Approver	Project Lead Takaanini

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Disclaimer

This is a draft document for review by specified persons at Auckland Transport and the New Zealand Transport Agency. This draft will subsequently be updated following consideration of the comments from the persons at Auckland Transport and the New Zealand Transport Agency. This document is therefore still in a draft form and is subject to change. The document should not be disclosed in response to requests under the Official Information Act 1982 or Local Government Official Information and Meetings Act 1987 without seeking legal advice.

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Appendices

Appendix A: Strategic Case (not applicable for this DBC)

Appendix B: Climate Change Response

Appendix C: Options Assessment Report

Appendix D: Technical Assessments (not applicable for this DBC)

Appendix E: Engagement Summary

Appendix F: Urban Design Evaluation

Appendix G: Transport Outcomes Report

Appendix H: Design Report

Appendix I: Property Overview

Appendix J: Cost Report

Appendix K: Economics Assessment

Appendix L: Route Protection Strategy

Appendix M: Risk Register

Appendix N: Staging Consideration (not applicable for this DBC)

Any pedestrian level crossings within the project area i.e., at Takaanini Station, are outside the scope of this business case and are being addressed by Auckland Transport as a separate workstream.

This document focuses on providing the investment case for the recommended option for the Takaanini level crossings for route protection. It also provides details around the recommended route protection strategy. The preparation of the Notice of Requirement (NoR) package(s) will follow the completion of this DBC.

1.3 Why is investment needed?

The current form and function of the transport network is unable to support the projected growth and shift towards low carbon transport modes such as public transport. Thus, it is vital that the transport system supports and shares the scale of the growth proposed, with the projects identified in this DBC forming part of the overall south transport network. The proposed investment will enable the ultimate outcomes sought through a well-planned integrated transport network. If investment does not occur, there will be:

- **Poor land use integration** – the project area is within an existing constrained urban area leading to competing modal priorities resulting in poor urban and transport outcomes. There is a chance now to better plan and provide for the future.
- **Decreased safety** – the existing level crossings are a safety concern, and the issue will only be exacerbated with the four-tracking of the railway and the expected growth especially given the intensification around the train stations.
- **Reduced climate change outcomes and low carbon transport mode shift is compromised** – The actual and perceived safety risks at the level crossings makes it unattractive and discourages active mode uptake. In addition, the North-South rail capacity is limited by the existing level crossings reducing potential public transport capacity and uptake.
- **Reduced reliability** – buses will be delayed in congestion as vehicles queue at level crossings impacting the wider network. Resilience of the rail service is compromised as level crossings present vulnerability in the system with increased risks and faults. Thus, impacting public transport reliability and attractiveness as an alternative to private vehicle use.
- **Limited growth** – it is highly likely that future growth may not be realised as the infrastructure to enable and support this is not in place.

Consequently, it is vital that investment is made such that the following outcomes may be achieved:

- A transport network that is free from deaths and serious injuries.
- Promote and encourage the uptake of low carbon transport modes including walking and cycling.
- Improved economic prosperity in increased accessibility and network resilience inclusive of freight.
- Enable the benefits of the current and future rail upgrades to be fully realised.

Route protection is the first and critical step for ensuring the transport enhancements needed can be provided. The intent of route protection is to identify and appropriately protect the land corridor necessary to enable the future construction, operation and maintenance of the recommended network options.

Route protection provides the mechanism to protect the network in advance as opposed to retrospectively making the transport interventions fit the existing urban form. The key benefits of route protections are that it:

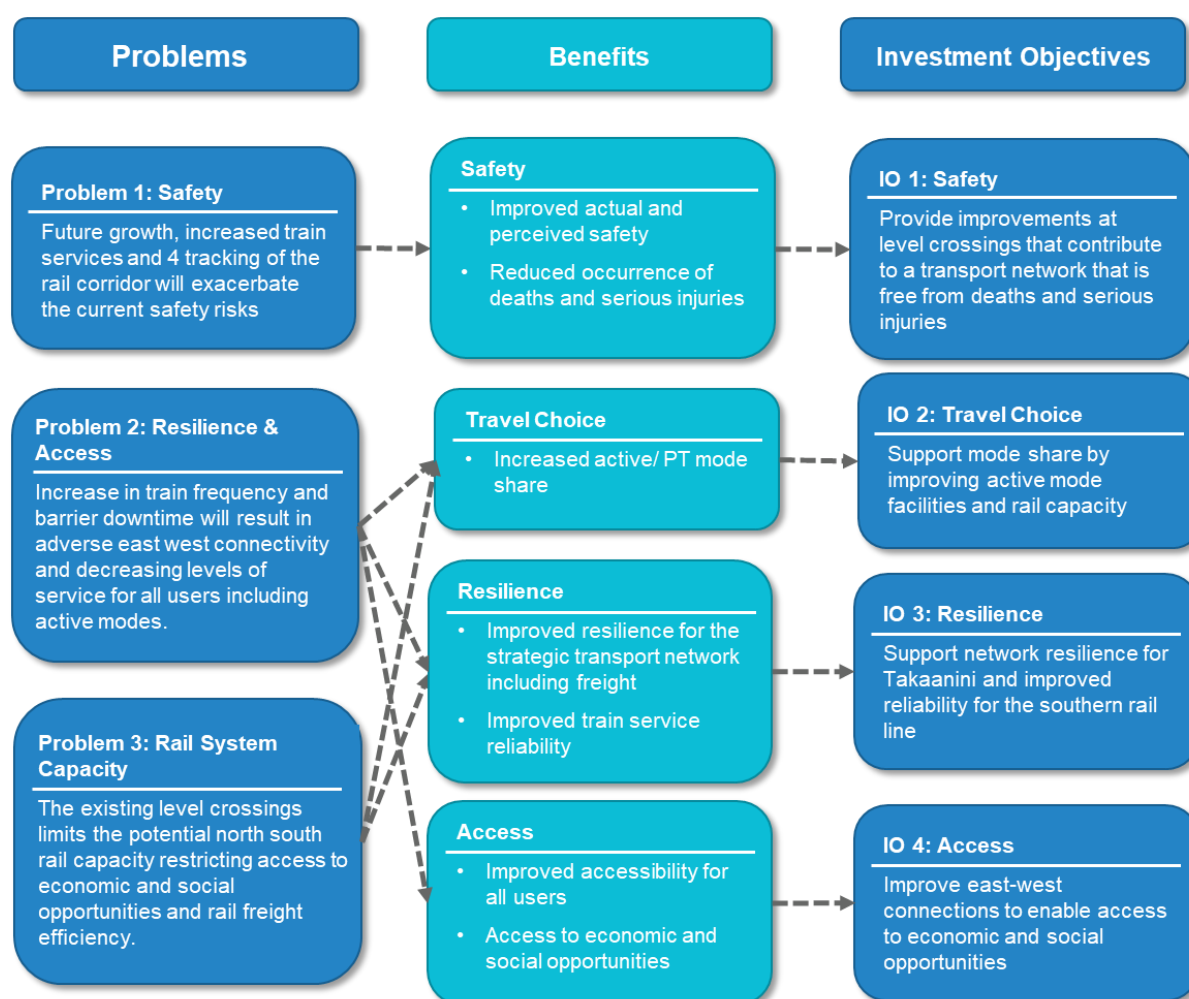
- Provides certainty and direction for future land use. This supports key land use integration measures such as future structure planning processes and intensification around stations and public transport routes.
- Provides a mechanism for AT and Waka Kotahi to plan for future financial investment while retaining flexibility on the detailed development of the recommended future network, enabling it to respond to the pace, scale, and exact location of future urban growth.
- Allows for major infrastructure to be implemented at the right time, integrated with the urban development driving the desired transport and urban outcomes. Reduces future cost risk. If the corridor is protected by either early acquisition or notices of requirement, then there is an opportunity to reduce some land costs.
- Protects project feasibility. Route protection prevents the land from being developed in a manner which makes projects more expensive, has compromised outcomes or in the worst case the project is no longer feasible.

1.4 Problems, benefits and investment objectives

At the commencement of this DBC, six investment areas (access, integration, travel choice, resilience, safety and climate change) were carefully considered to maximise land use and transport integration to align with the Ministry of Transport (MoT) Transport Outcomes Framework and the GPS 2021. As part of this process, the problem statements were developed to reflect the changes since the IBC and the focus of this business case.

Following on from the development of the problem statements, the benefits and key investment objectives were developed and agreed upon with the relevant stakeholders. This is shown in **Figure 1-2**.

Figure 1-2 : Takaanini Level Crossings PBIO



1.5 Recommended option for route protection

The Takaanini Level Crossings recommended option (Figure 1-3) is summarised below:

- The project is no longer recommending a new grade separated crossing/viaduct at **Rangi Road**, as initially recommended in the IBC.
- A new grade separated bridge connection is proposed between **Manuia Road** and Oakleigh Avenue/ Hitchcock Road. The connection will provide direct access to the Takaanini industrial area.
- Existing at grade level crossings at **Spartan Road** and **Manuroa Road** will be fully closed to vehicular traffic but will be replaced by grade-separated active mode bridges.
- Existing at grade level crossings at **Taka Street** and **Walters Road** will also be closed but will be replaced by grade separated bridges which will accommodate all modes.
- Separated walking and cycling facilities will be provided in the bridge footprint at the location where a grade separated crossing is recommended i.e., Manuia Road, Taka Street and Walters Road.

Figure 1-3 : Recommended Option



1.6 Outcomes achieved

Investing in the Takaanini Level Crossings will provide for the future growth and deliver on the outcomes shown below. With the higher frequency rail service (with City Rail Link and four tracking) in the future, the barriers are expected to be down longer. Thus, the project is crucial in maintaining a safe and reliable transport network. It will also positively contribute towards the benefits and outcomes of the key rail upgrades by enabling greater train frequency to occur and thus, support mode share towards low carbon transport modes.

Overall investment outcomes for the Takaanini Level Crossings recommended transport network (2048+)					
Outcomes achieved		Alignment			
Safety	Provide improvements at level crossings that contribute to a transport network that is free from deaths and serious injuries	 Removes 4 level crossings in Takaanini 94 DSIs estimated to be saved over 40 years	 3 new and improved multi-modal east-west connections with safe and separated cycle facilities	 2 new safe active mode connections	
Resilience	Support network resilience for Takaanini and improved reliability for the southern rail line.	 Reduction in level crossing fault incidents. Reduction on impact on rail passenger travel time.	  Improvement in travel time reliability. Reduction in travel time spread to 19 minutes.		
Climate Change	Provide a transport network that reduces reliance on cars and supports mode shift.	 7,090 tonnes reduction of CO ₂ per year. 182,800 tonnes reduction of CO ₂ over 40 years.	  134,900 less vehicle kilometres travelled daily		
Contribution to outcomes					
Travel Choice	Support mode share by improving active mode facilities and rail capacity.	 38% Public transport mode share for trips from Takaanini to north of Manurewa (AM peak)	 Supports rail projects to enable increased train frequency in the future	 26% walk and 1 % cycle for Takaanini local trips (AM peak) 2,600 daily active mode trips across the east-west connections	
Access	Improve east-west connections to enable access to economic and social opportunities.	 336,400 jobs accessible within 45 minutes by PT	 14,700 additional jobs accessible within 45 minutes from west Takaanini by walking	 420,800 jobs accessible within 45 minutes by car	

1.7 Costs and benefits

The overall estimated cost (P50 undiscounted) for the recommended option is **\$436M** of which **\$144M** is associated with property purchase.

The expected Benefit Cost Ratio (BCR) range for the recommended option is shown in **Table 1-1**.

The BCR excluding Wider Economic Benefits (WEBs) is between **1.1** to **4.4** dependent on the 'Do minimum' scenario. If WEBs are included the BCR ranges between **1.2** to **4.6**.

Table 1-1 : BCR for the recommended option

No	Item	BCR excluding WEBs	BCR including WEBs
1	Recommended Network – Do Nothing (at grade crossings)	1.1	1.2
2	Recommended Network – Staged Do Minimum (at-grade crossings then closure)	2.5	2.7
3	Recommended Network – Do Minimum Closure (closure of level crossings)	4.4	4.6

The results are sensitive to the definition of the do minimum, as demonstrated by the different BCRs with respect to the Do Nothing, Do Minimum Closure, and Staged Do Minimum scenarios. These scenarios are discussed in detail later in the business case and in **Appendix D: Economic Analysis**.

Regardless of the do minimum scenario however, the BCR is expected to be over 1. It is also noted that the BCR has been calculated based on an assumed staging and the earliest possible implementation date commencing in FY25/26. The later the implementation date the more benefits there will be, especially traffic benefits, therefore the BCRs presented can be considered conservative.

With the high frequency rail service operating in the future, the barriers are expected to be down for much of the day in the Do Nothing, hence this project is crucial for maintaining safe and reliable network operation.

1.8 Potential staging and triggers

At the time of writing, Auckland Transport is about to commence the Auckland Network Level Crossings SSBC which looks to prioritise level crossings for removal and/ or replacement across Auckland, including the level crossings within this DBC. The SSBC will also confirm staging, prepare a more detailed design and cost of implementation of the level crossings.

For the purposes of this DBC, to indicate potential cashflow requirements, four possible scenarios for staging have been developed. These scenarios intend to respond to the following potential triggers for implementation:

- **Earliest implementation:** CRL Day One operations are likely to require removal of these level crossings to achieve the desired train plan. This is expected to be required by late 2024/ early 2025.

- **Latest implementation:** In time for four-tracking of the NIMT. This is forecasted to occur by 2048.

The four scenarios are:

- **Scenario 1 – Earliest possible implementation:** To respond to the likely CRL Day One requirements, this scenario has been developed to indicate what is considered to be the earliest possible implementation of the recommended option. This scenario would require the addition of resource consents to the current NoR process and an acceleration method would be considered i.e the Covid Fast-Track legislation. Under this scenario, implementation could commence in 2025/26. This scenario does not consider available funding. The recommended option could be delivered by 2030/31.
- **Scenario 1b – Alternative staging to proposed:** This is essentially the same as Scenario 1 except with some projects sequenced rather than in parallel. This has the effect of smoothing out cashflow but extends the overall implementation period. Note: the order in which the Manuia Road and Walters Road are implemented could be swapped with a similar cash flow profile due to their similar costs. This scenario takes some consideration of available funding. The recommended option could be delivered by 2033/34.
- **Scenario 2 – Implementation starting in FY 28/29:** This pushes out implementation to a more realistic date to allow the completion of all planning and design phases in a sequential way. It is likely that the implementation start date could be later or earlier as there are several factors that influences this e.g., appeals could be protracted. Overall staging remains the same as in Scenario 1. The recommended option could be delivered by 2033/34.
- **Scenario 2b – Scenario 2 with a different staging:** This considers both the four tracking of the NIMT and the limited funding under the 2021-2031 RLTP and presents what could be funded under this RLTP. This assumes:
 - Walters Road is implemented within this RLTP, plus forecasted early acquisition costs for other crossings.
 - Implementation property and construction cost for all other corridors is pushed out to the next RLTP.
 - Implementation will be in stages with Walters Road then Manuia Road then Taka Street then the closure of Spartan Road and Manuroa Road and their active mode connections.

Given the current available funding and the route protection strategy, Scenario 2b is the most likely scenario to eventuate. Under Scenario 2b, the recommended option could be delivered by the end of the next RLTP, i.e. 2039/40. Note: depending on timing of four-tracking, this Scenario could be extended into the following RLTP (post-2041), further smoothing cash flow. This has not been modelled due to the high uncertainty associated with four tracking and timing.

1.9 Property and route protection

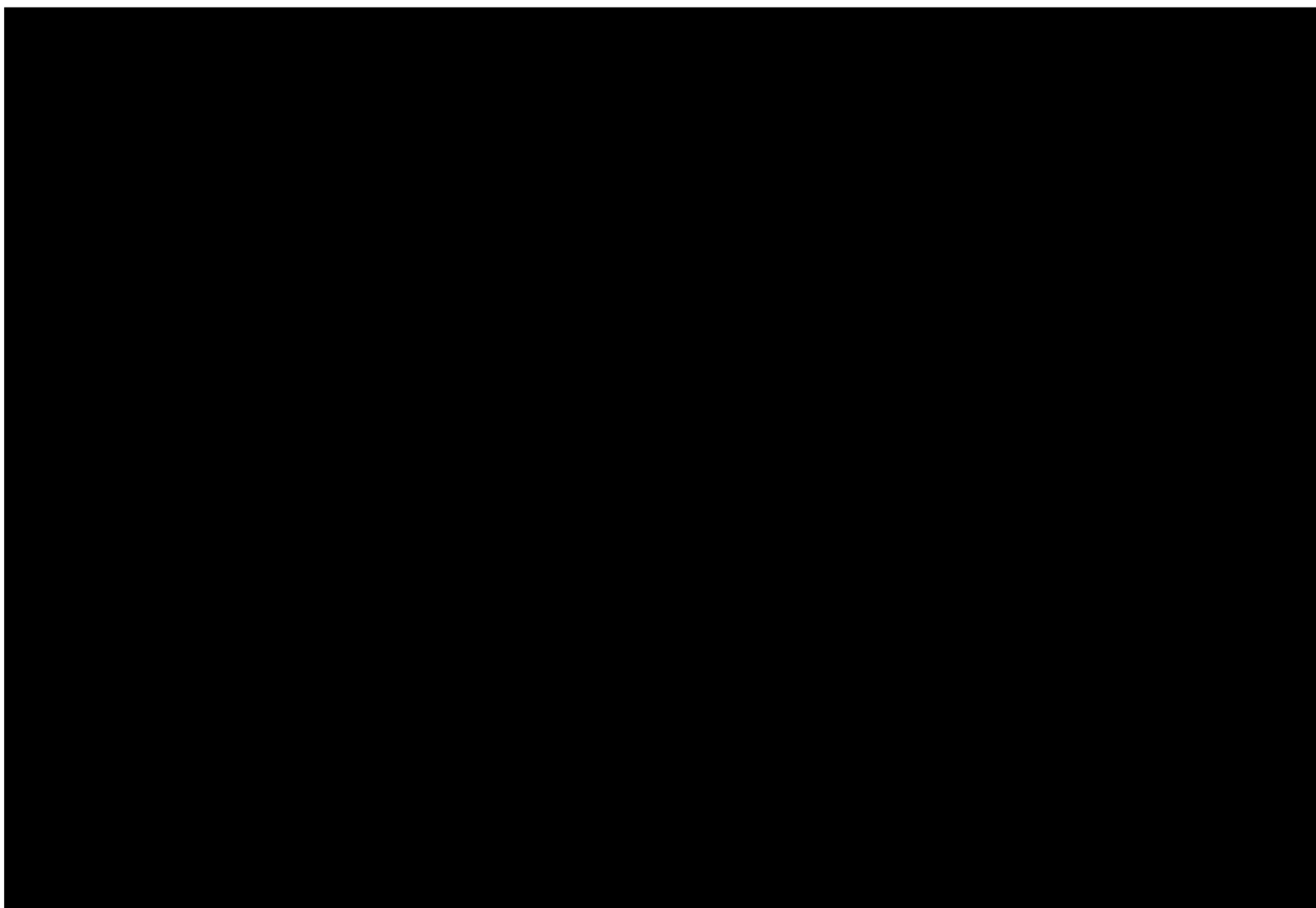
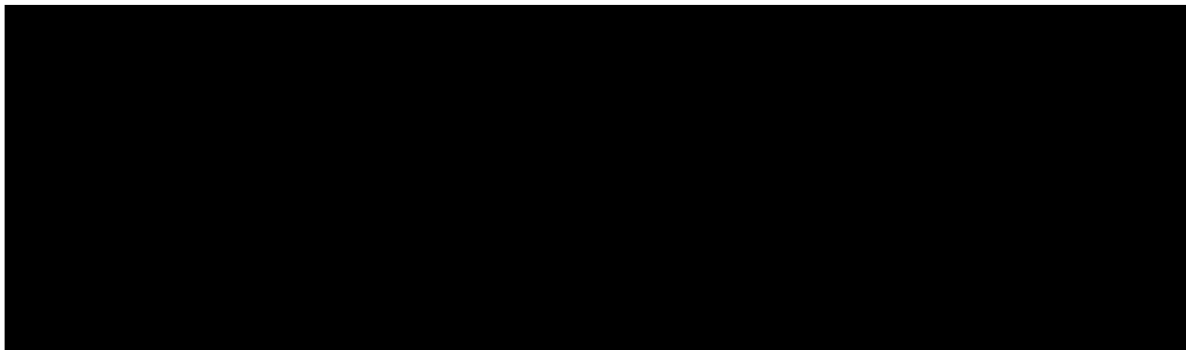
There is a potential property cost implication once the NoR(s) are lodged. While the vast majority of property purchase is typically anticipated in the three years prior to implementation, early property acquisition may occur prior to that.

Route protection costs consists of three components:

- Post lodgement funding for the NoR.
- Early property acquisition – property costs that could be anticipated following NoR lodgement and before the three years prior to implementation.

- Property costs that would be incurred in the 3 years prior to implementation.

The scenarios described for staging and timing are presented below to provide an indication of the potential cashflow. The timing and staging have a significant impact on when the money may be required.

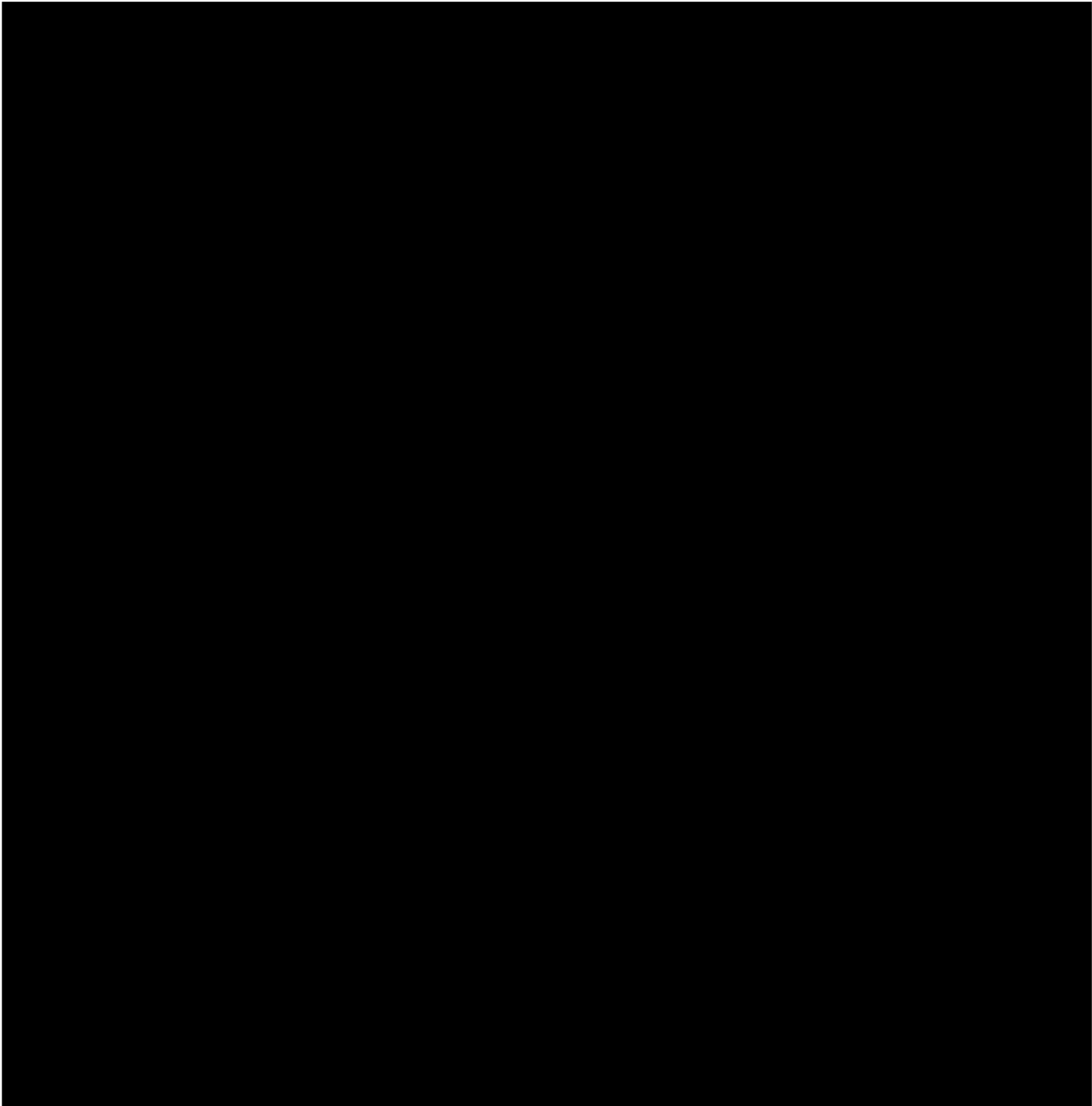


1.10 Overall Cashflow

The financial implications for Waka Kotahi and Auckland Transport can be summarised into the following categories:

- **Cost of route protection** (Post lodgement costs, early property acquisition and property implementation costs).
- **Implementation costs** (Project development, pre-implementation, project implementation).

- **Operations and Maintenance costs**



1.11 Funding share

It is anticipated that the funding for the P50 costs will be from the NLTF which consists of the Waka Kotahi share plus the Auckland Transport FAR share

1.12 Key risks and opportunities

A Risk and Opportunity Management Plan has been developed and endorsed by the Te Tupu Ngātahi governance team. The risk management process is consistent with AS/NZS ISO 31000:2009 and is

consistent with typical risk management processes undertaken by AT and the Waka Kotahi. Key overarching risks and opportunities at a programme-wide level include:

- Affordability and availability of funding.
- Lack of certainty around staging and implementation.
- Impact of climate change policies on project development.
- Ongoing and consistent messaging to stakeholders and property owners to avoid local opposition to proposals.
- Development proceeding without protection, resulting in increased land values, potentially adversarial NoR processes and sub-optimal outcomes in terms of transport and land use integration.
- Property development pressure prior to route protection or implementation.

Specific additional project risks and opportunities include:

- Landowner and community opposition of the recommended option.
- Opportunity to integrate the active mode connection at Manuroa Road with the Takaanini Station as part of the Masterplan study.
- Opportunity to value engineer the design during the SSBC and further design phases to minimise the land impacts and have potential cost savings.

1.13 Next steps

A Route Protection Strategy has been developed to support the DBC and currently recommends route protection as the most efficient method of securing the land required for these projects, with one NoR package for the recommended option. A separate consenting strategy will be prepared as part of the NoR process which will identify consenting pathways and required technical assessment.

The following key next steps for Te Tupu Ngātahi in terms of route protection are:

1. Preparation of documentation for NoR, with the AEE phase currently being underway in parallel with the DBC.
2. Seek approval to lodge the NoR, anticipated in May and July 2023 for AT and Waka Kotahi, respectively.
3. Lodgement of NoR, anticipated post-Board approval, indicatively in July 2023.
4. Post lodgement activities taking place through the remainder of 2023, with hearings indicatively planned for early 2024.

The following next steps are also recommended as part of the development of the Auckland Network Level Crossings SSBC:

- **Further design refinements** – Undertake further design to provide more certainty around property impacts and cost.
- **Confirm staging and triggers** – this will be in the context of the wider Auckland regional priorities and may therefore differ from that proposed in this DBC.
- **Management of property acquisition** – develop overall plan for property purchase and consideration of strategic advance purchases.

1.14 Recommendations sought for approval

The Takaanini Level Crossings DBC for route protection therefore seeks the following approvals:

- 1. Approval of the recommended option for the level crossings.**
- 2. Approval of lodgement and route protection preparation.**
- 3. Approval for funding release for post lodgement activities.**
- 4. Acknowledgement of the potential early property acquisition and associated risk arising from route protection of the recommended option.**

It is acknowledged that this business case is focussed on route protection and that there are funding implications associated with the potential early property acquisition of this route protection. This business case does not seek to resolve issues surrounding the funding required for the delivery of the recommended option.

It is recommended that route protection and the resultant property "liability" should be completed at this time because:

- The very nature of route protection enables the provision of planned infrastructure rather than 'responsive' infrastructure which typically results in infrastructure being retrospectively added into available land that is built-up. This planned approach therefore provides the owners with significant opportunity to front foot and respond to key issues. In addition, with CRL and four tracking occurring, it is important to be as ready as possible for when funding is available for implementation to ensure the benefits of these key projects are fully realised. This will drive the step change for the desired transport outcomes (mode shift, land use integration and accessibility enhancements).
- Implementation will be considerably less difficult (and costly) due to a designation being in place prior to the growth.
- Financially, a small investment now is forecast to save many millions of dollars in property and implementation costs that makes financial sense. Route protection requires some upfront expenditure but is cheaper than acquiring land later due to escalated property prices and underlying growth in land values, rezoning and development.

The most significant risk for route protection now is affordability due to the early property acquisition cost. This can be managed through Programme wide initiatives to address this issue including:

- Having a property team focussed on the Te Tupu Ngātahi programme.
- Developing an agreed position for the programme on the approach and application to betterment.
- Developing and providing programme position on advanced property purchase.
- Provide agreed programme positions outlined above to the Auckland Transport and Waka Kotahi boards for endorsement.

There is also the challenge of funding the implementation of the recommended option given the limited budget under the current RLTP. Whilst not the focus of this business case, it is important that this is considered as part of the SSBC.

2 Introduction

The purpose of the Te Tupu Ngātahi (Supporting Growth) Programme is to recommend a sustainable transport network for route protection to support Auckland's planned future urban growth over the next three decades. Providing access to high quality public transport and attractive walking and cycling options in these urban growth areas will minimise new transport emissions as growth occurs.

The Takaanini Level Crossings Detailed Business Case (DBC) follows on from the solutions and outcomes identified at both the Programme Business Case (PBC) and Indicative Business Case (IBC) stages. It confirms the need for removal and/ or replacement of four existing level crossings in Takaanini for the following reasons which are detailed in the later sections:

- Actual and perceived safety risks which will be exacerbated as growth occurs and the railway is four-tracked.
- Increased train frequency will increase barrier downtime decreasing network resilience and severing urban neighbourhoods.
- The existing level crossings limits the North-South rail capacity affecting access to economic and social opportunities and rail freight efficiency.

It further considers the role these level crossings play in maintaining east-west connectivity in the area, applying a sub-regional lens to achieve an optimum response. This includes consideration of providing east-west connections in alternate locations to the existing level crossings, as per the IBC recommendation.

The DBC:

- Identifies changes since the IBC and the likely impact of these changes
- Reviews and expands on the IBC assumptions, evidence, and findings considering latest information
- Develops and assesses options and confirms a preferred option
- Develops the economic case and measures expected benefits and outcomes, and
- Identifies requirements for the next phase.

2.1 The Southern growth area

The Southern growth area is approximately 20 kilometres south of Auckland's central city and is approximately 30 kilometres in length. It makes up the largest proportion of future growth areas in Auckland (45%). The area includes the large future growth areas of Takaanini, Opāheke Drury, Drury West, Pukekohe-Paerata and Clarks Beach. The bulk of the growth is expected to occur in Opāheke-Drury which will grow from a current population of just over 3,300 to a population of around 64,000 by 2046. Pukekohe-Paerata will grow from a current population of around 23,000 to 56,500 by 2046.

On top of this, the North Waikato is anticipated to grow significantly over the same period impacting the Southern growth area as a large portion of the working age population in these communities will travel to the Auckland region to pursue work opportunities.

For Takaanini this is a total 14,400 dwellings, 18,800 jobs and 41,500 people. A growth of 5,900 dwellings, 12,300 jobs and 13,900 people from 2018 to 2048+.

2.2 South DBC Packages

In response to the planned growth in south Auckland, a South Area Wide Indicative Business Case (South IBC) was undertaken by Te Tupu Ngātahi in 2018 and endorsed by the Auckland Transport (AT) and Waka Kotahi Boards in 2019.

This IBC recommends the South Indicative Strategic Transport Network (ISTN) which covers over 16 separate transport projects between Manukau and Pukekohe. To help simplify the DBC process, components within the ISTN have been separated into separate DBC packages for route protection considerations and to better define the investment story. The DBC packages and corresponding IBC elements are shown in **Table 2-1**.

This DBC is one of the two DBCs under the Takaanini DBC Package (the other being the Takaanini Frequent Transit Network (FTN)) with there being overlaps and dependencies between the two. Any decisions made in one DBC may have an impact on the other in terms of the network impacts and form and function of the corridors. However, they are effectively two separate projects. Therefore, to better inform decisions and outline the case for investment, two separate DBCs have been prepared.

Table 2-1 : DBC Packages in south Auckland

DBC Package	DBC	Projects /IBC elements
Takaanini DBC Package	Level Crossings DBC assessed for removal and/or replacement (this DBC)	• Taka Street • Manuroa Road • Walters Road • Spartan Road • Rangi Road (not an existing level crossings but proposed as a replacement (amongst other functions) in the IBC phase)
	Frequent Transit Network (FTN) (being prepared in parallel with this DBC)	• Great South Road FTN between Drury Central Station and Manukau • South FTN between Drury West Station and Manukau Station • Popes Road and Croskery Road urbanisation
Rail DBC Package	Rail DBC Business case is complete, rail stations component NoRs lodged	• New Drury West Station • New Drury Central Station • New Paerata Station • Additional rail capacity (four tracks between Wiri and Pukekohe)
South Strategic DBC Package	Mill Road South DBC Business case is on hold pending outcomes of NZUP investment in corridor	• Mill Road Corridor upgrades
	Pukekohe DBC Business case is underway	• Alternative route to SH22 between SH1 and Pukekohe • New arterial connections to the proposed Pukekohe
Drury Local	Drury Local Arterials DBC Business case is complete and NoRs lodged and progressed through hearings	• New Drury arterial network

2.3 Level Crossings DBC Scope

This DBC focuses on the level crossings identified as part of the IBC to be assessed for removal and/or replacement as shown in **Figure 2-1**. Any pedestrian level crossings within the project area, i.e. at the Takaanini Station, are outside of the scope of this business case.

The recommendations from the IBC were:

- **Spartan Road** – closure of level crossing:
 - This corridor predominantly serves the industrial traffic within the Takaanini industrial zone.
 - It intersects with Great South Road at the Takaanini interchange with right turns out being prohibited due to the location of the intersection under the interchange.
- **Manuroa Road** – closure of level crossing:
 - Corridor is situated within residential area and as such predominantly serves the surrounding residents. The corridor also provides access for industrial traffic wishing to turn right onto Great South Road, noting the right turn movement restriction at Spartan Road.
 - It forms a full movement cross-intersection at Great South Road with Beaumaris Way and is close to the Takaanini train station.
- **Taka Street** – grade separation over the rail line:
 - Corridor is situated within the residential area and as such predominantly serves the surrounding residents.
 - It forms a full movement cross-intersection at Great South Road with Walter Stevens Drive and is close to the Takaanini train station.
- **Walters Road** – grade separation over the rail line:
 - Corridor predominantly serves residential traffic although noting that there is adjacent retail and nearby recreational activities.
 - It forms a five-legged roundabout at Great South Road.
- **Rangi Road** – new viaduct proposed forming part of the IBC FTN route to Mahia Road and acting as a replacement for the closure of Spartan Road and Manuroa Road level crossings:
 - Currently a cul-de-sac that serves the Takaanini industrial area

A separate DBC, “South FTN DBC” is being undertaken in parallel focusing on developing the strategic FTN routes between Drury and Manukau. Further details may be found in the following section.

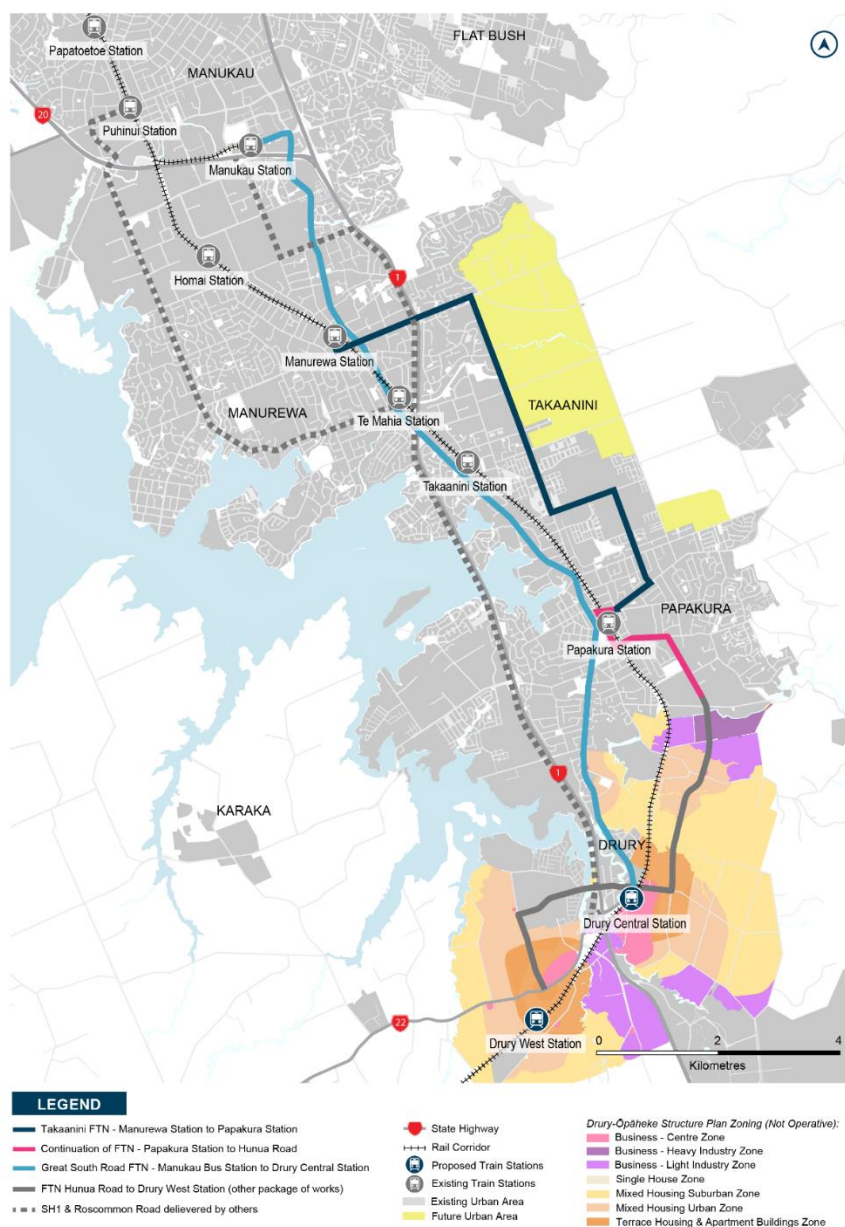
Figure 2-1 : IBC Recommended option



2.4 South FTN DBC

A separate business case is being prepared in parallel with this DBC looks at two FTN corridors, namely the Great South Road FTN and the South FTN between Drury West Station and Manukau Station. At the time of writing, the emerging preferred option has been identified for these FTN routes and is as shown in **Figure 2-2**.

Figure 2-2 : Takaanini FTN DBC corridors



The optioneering for these FTN corridors was undertaken prior to the optioneering for the level crossings. This is because the primary role of the FTNs is to connect to and support rail as the rapid transit spine in south Auckland. Several level crossings are proximate to rail stations, therefore assessing whether the FTN would utilise these influences the assessment of whether a level crossing should be replaced (or not) and what form and function that crossing should have.

From the FTN optioneering, it was determined the main east-west crossing (for the FTN) would be at the existing Alfriston Road, connecting to Manurewa Station. This is a change from the previous IBC recommendation that the FTN would cross east-west at Rangi Road.

No level crossing replacements in this DBC have therefore been identified as part of the FTN routes.

2.5 Structure of DBC

The balance of this document is structured as follows:

Chapter	Details
Strategic Case	- Problems, Benefits, and Investment Objectives (PBIO) - Evidence in support of problems - Approach to partner, stakeholder, and public engagement
Economic Case	- Option development and assessment methodology - Assessment of options to reach a recommended option - Economic analysis for the recommended option
Financial Case	- Capital and operational costs of the recommended option - Funding arrangements
Commercial Case	Procurement, property, and consenting/ route protection arrangements
Management Case	How the recommended option will be delivered and managed

The following appendices in **Table 2-2** are referenced throughout the DBC. Note that a consistent Appendix lettering has been applied across all Te Tupu Ngātahi DBC. Those greyed out are not applicable for this DBC.

Table 2-2 : DBC appendices

Appendix	Summary of purpose
A: Strategic Case	This is not applicable for this DBC as all information is presented within the main body of this report.
B: Climate Change Response	Summary of the climate change assessment and considerations for the DBC.
C: Options Assessment Report	Details the option assessment process undertaken as part of this DBC.
D: Technical Assessments	Not applicable for this DBC. Any technical assessments undertaken have been incorporated within other appendices or within this DBC.
E: Engagement Summary	Summary of the engagement undertaken for the Level Crossings to date.
F: Urban Design Evaluation	Urban design evaluation for the project using the Te Tupu Ngātahi Design Framework principles.
G: Transport Outcomes Report	Specific information on transport aspects including form and function assessments, modelling and transport outcomes.
H: Design Report	Engineering report that documents assumptions and decisions for the recommended option.
I: Property Overview	Assumptions and methodology for the calculation of property costs.

Appendix	Summary of purpose
J: Cost Report	Assumptions and methodology for costing.
K: Economics Assessment	Economic assessment for the project includes assumptions and outcomes.
L: Route Protection Strategy	Strategy to route protect the project.
M: Risk Register	Overall programme risks and project risks.
N: Staging Considerations	Not applicable for this DBC. This is covered in the main body of this DBC.



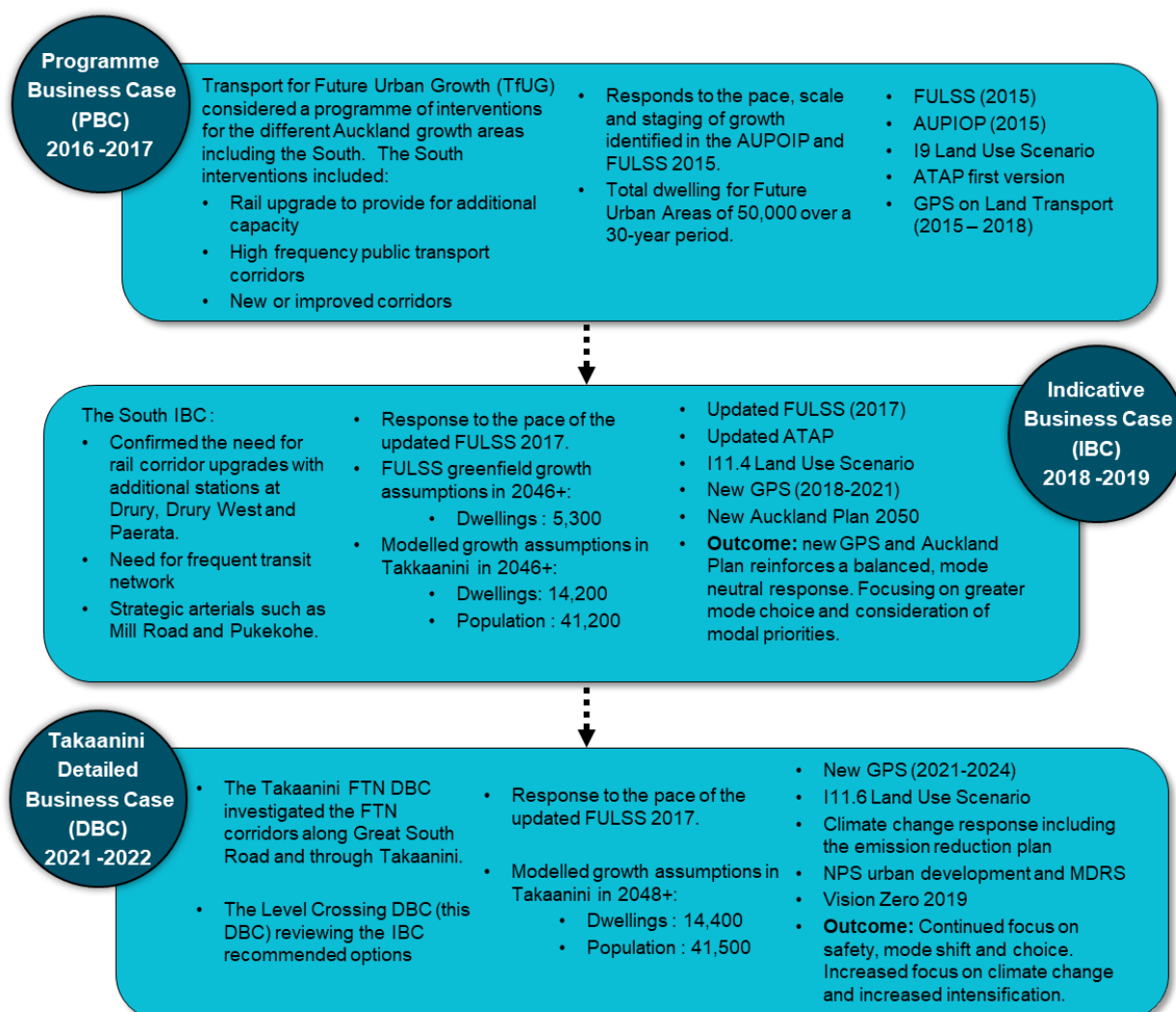
Strategic Case

3 Business Case change history

The history of the Takaanini Level Crossings DBC history is shown in **Figure 3-1**. It summarises the recommended network for each stage, the growth assumptions and the applicable regulatory and planning policies influencing decisions made. The underpinning drivers have remained the same throughout this process:

- **Growth in the South:** Population, households and jobs assumptions have increased throughout the business case stages. There is potential for more growth with the latest National Policy Statement on Urban Development (NPS-UD) and the Medium Density Residential Standards (MDRS) as greater intensification is permitted.
- **Regulatory and planning policies:** Policies have continued to shift away from the single vehicle focus to mode neutral and low carbon transport interventions.

Figure 3-1 : Business Case History



Note: AUPPIP : Auckland Unitary Plan Operative in Part, FULSS : Auckland Future Urban Land Supply Strategy, ATAP : Auckland Transport Alignment Project, GPS : Government Policy Statement, NPS : National Policy Statement, MDRS : Medium Density Residential Standards

4 Why is investment needed?

Auckland is New Zealand's largest city and has the largest economic activity. The current transport network with its high reliance on private vehicle use does not align with New Zealand's climate change objectives.

Over the next 30 plus years, the South is expected to see significant growth, making up 45% of the future growth areas in Auckland. For Takaanini, the total number of dwellings is expected to increase by 5,900 dwellings to 14,400 and an increase in population by 13,900 people to 41,500.

The current form and function of the transport network is unable to support the projected growth and shift towards low carbon transport modes such as public transport. Thus, it is vital that the transport system supports and shares the scale of the growth proposed, with this DBC forming part of the overall south transport network. The proposed investment will enable the ultimate outcomes sought through a well-planned integrated transport network. If investment does not occur, there will be:

- **Poor land use integration** – the project area is within an existing constrained urban area leading to competing modal priorities resulting in both poor urban and transport outcomes. There is a chance now to better plan and provide for the future.
- **Decreased safety** – the existing level crossings are a safety concern, and the issue will only be exacerbated with the four-tracking of the railway and the expected growth especially given the intensification around the train stations.
- **Reduced climate change outcomes and low carbon transport mode shift is compromised** – The actual and perceived safety risks at the level crossings makes it unattractive and discourages its uptake. In addition, the North-South rail capacity is limited by the existing level crossings reducing potential public transport uptake.
- **Reduced reliability** – buses will be delayed in congestion as vehicles queue at level crossings impacting the wider network. In addition, reliability of the rail is compromised as level crossings present vulnerability in the system with increased risks and faults. Thus, impacting public transport reliability and attractiveness as an alternative to private vehicle use.
- **Limited growth** – it is highly likely that future growth may not be realised as the infrastructure to enable and support this is not in place.

4.1 Why route protect?

Route protection is the first critical step for ensuring the transport improvements required can be provided. The purpose of route protection is to identify and appropriately protect the land corridor necessary to enable future construction, operation and maintenance of the preferred option. The benefits of route protection are that it:

- Provides certainty and direction for future land use to support land use integration such as intensification around stations and public transport routes.
- Provides a way for future financial investment while retaining flexibility on the detailed development of the infrastructure, enabling it to respond to the pace, scale and location of the future growth.
- Allows for major infrastructure to be implemented at the right time.
- Reduce future cost risk through early acquisition or notices of requirement which can potentially reduce some land costs.
- Prevents land from being developed in a manner which makes projects more expensive, compromised outcomes or worse, the project is no longer feasible. This is particularly important

with the recent NPS-UD and the MDRS which will allow greater intensification to happen in existing brownfield areas.

With the level crossings being within existing urban areas, there will be increasing development pressures with the NPS-UD and MDRS especially at Manuroa Road and Taka Street which are within the 800m catchment of Takaanini train station. Thus, this further supports the need for timely route protection.

5 What has changed since the IBC?

There have been changes to policy, land use and transport assumptions since the endorsement of the South IBC in 2018 and the preparation of this DBC. **Table 5-1** summarises the key changes and the impacts for this DBC.

Table 5-1 : Summary of Key Changes since the South IBC

Changes Since IBC	DBC Response
Policy and strategic alignment	
New/ updated policy - Ministry of Transport Outcomes Framework - Updated GPS 2021 with a focus on climate change objectives and improving freight connections.	There is a greater focus on projects that provide mode shift and are designed with climate change resilience and intergenerational wellbeing as key. The problems and objectives identified in this DBC are aligned with these outcomes, particularly around mode shift and environmental sustainability. Options for the Takaanini industrial area which will improve freight connections are also a key consideration.
Road to Zero/ Vision Zero New Zealand's road safety strategy for 2020- 2030 sets out a path to achieving Vision Zero where no one is killed or seriously injured. This is guided by the Safe System approach. AT's Vision Zero for Auckland aims for no deaths or serious injuries on the transport system by 2050.	Safety was an outcome sought from the IBC and will continue to be the focus for the DBC with the closure and/or replacement of level crossings.
AT's Future Connect Formally released as a system planning tool in 2021, Future Connect sets out Auckland's long-term transport network plan for the next 10-years It identifies strategic networks for all modes of transport essential to the movement of goods and people.	This business case considers the strategic network set out within Future Connect. However, given the long-term nature of the DBC and with Future Connect only currently considering the next decade, the outcome of this business case is expected to drive the long-term network as agreed with relevant stakeholders.

Policy and strategic alignment	
National Policy Statement for Urban Development 2020 (NPS-UD) The NPS-UD seeks to guide the development of well-functioning urban environments in New Zealand.	The objectives of this DBC are consistent with the objectives and policies of the NPS-UD. The improvements at the level crossings will positively contribute to well-functioning urban environments and enable an increase in development capacity by providing an integrated transport network.
Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 This is designed to improve housing supply in New Zealand's five largest cities by speeding up the implementation of the NPS-UD and medium density homes. This requires Auckland council to adopt the 'Medium Density Residential Standards' (MDRS).	The DBC has considered this change in legislation especially during optioneering as it may have an impact on the urban form as well as the outcomes sought. The closure and upgrade of the level crossing is well aligned with this as it will enable greater growth to occur.
COVID-19	
The impact of COVID-19 on the transport system has three key impacts: • Resilience of public transport operations • Change in funding levels and type • Flexibility in working and the increase in working from home	While COVID-19 has had a direct and immediate impact on public transport and transport demand, it is expected in the longer-term such as that assessed in this DBC, transport demands will return to projected levels. In addition, the normalising of work from home opportunities will have an impact that aligns with the longer-term aspirations for reduced travel demand. Given the long-term nature of this DBC, no specific changes to land use and travel demand assumptions due to COVID-19 are considered necessary.
Climate Change	
The Climate Change Response (Zero Carbon) Amendment Act 2019 supports the contribution to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5-degree Celsius pre-industrial levels. In addition, it allows New Zealand to prepare for, and adapt to, the effects of climate change. Toitū Te Taiao – Waka Kotahi Sustainability Action Plan sets out the environmental sustainability and public health commitments for the land transport sector. This has a long-term outcome of net zero land transport Greenhouse gas (GHG) emissions by 2050. Te Tāruke-ā-Tāwhiri – Auckland's Climate Plan has a target to reduce the region's transport emissions by 64 percent by 2030. This will require future facilities to be highly efficient and emit fewer emissions. The Transport Emission Reduction Pathway (TERP) lays out the steps to get there.	The South IBC was built on the premise of: Transport and land use integration - to provide a transport network supporting land use development and good urban form. Prioritising mode choice – specifically focusing on rapid transit, improved public transport reliability and services and creation of a well-connected active modes network. The result is a recommended transport system that actively reduces the reliance on private vehicles and shifts trips to low carbon alternatives. This is one of the key levers identified to mitigate transport-based emissions. Mode choice is at the centre of this DBC with the outcome sought to influence and reduce vehicle demand through enabling for a high-quality public transport network as well as improving facilities for active modes.

Policy and strategic alignment

Transport Emission Reduction Plan

New Zealand's emission reduction plan, setting the direction for the next 15 years. One of the key actions is to reduce reliance on cars and support people to walk, cycle and use public transport. This will target a reduction in total kilometres traveling by light fleet by 20% by 2035 through improved urban form and providing better travel options.

Transport Emission Reduction Pathway (TERP) sets out how Auckland will reach the regional 64% reduction by 2030.

As mentioned above, mode choice is at the core of this DBC. Though the project itself does not directly respond to the TERP, it supports the key transport actions identified through:

- supporting and enabling greater frequency for the rail
- considering active modes during the optioneering process to ensure that they are provided for. Thus, supporting walking and cycling

Growth and Land Use

Assumptions and uncertainties

- Changes in land use forecast assumptions updated to be consistent with the regional model
- Uncertainties in the land use and growth in the area especially in the FUZ areas

The DBC considers changes in the land use assumptions and utilises the most current land use assumptions available.

Since the completion of the IBC, there has been updates to the growth scenarios used for the Auckland area which is reflected in this DBC. The version i11.6 used is consistent with the regional modelling and no significant changes have been identified when compared with the previous version i11.4 used in the IBC.

The Takaanini growth area is staged to be development ready in the second half of decade three (2043-2047) in FULSS. In addition, the FULSS has identified there are flooding and geotechnical challenges for the area that requires further investigation. This creates uncertainty around when and if the area will be developed and whether there could likely be changes to the surrounding land use.

Given the long-term nature of this DBC, these uncertainties could change the forecast and predictions in growth and how it occurs. These have been taken into consideration as part of the optioneering process.

In addition, sensitivity testing to understand the potential impacts of the uncertainties were also undertaken. These include understanding whether the option will remain valid if the FUZ does not eventuate and / or if the industrial employment growth does not occur as per the projections.

Plan Change 78: Intensification

The proposed plan change responds to the NPS-UD and MDRS to enable greater intensification. This is currently open for submission at the time of writing.

As mentioned above, the DBC has considered both the NPS-UD and the MDRS especially during the optioneering process. Thus, in line with the proposed plan change.

Policy and strategic alignment

Transport Projects

Changes to the IBC South indicative transport network:

- SH1 FTN
- Mill Road

Since the completion of the IBC, the south indicative transport network has had changes. This includes SH1 FTN where special vehicle lanes are currently being investigated for SH1.

Mill Road has been rescoped under NZUP and will deliver a two-lane corridor focussed on safety improvements by 2028 instead of four lanes. There is uncertainty around if and when the long-term vision i.e. the four-laning of the corridor will occur and it is unlikely to be resolved during the timeframe of this DBC.

The uncertainties of these two projects have been considered as part of this DBC when considering the options.

Auckland Rail Programme Business Case (PBC) and Level Crossings Single Stage Business Case (SSBC)

These two business cases are interdependent with the SSBC looking to prioritise level crossings for removal across the Auckland network.

At the time of writing, the PBC is underway and the SSBC has just commenced. Both business cases will confirm the prioritisation of the Takaanini level crossings within this DBC. The SSBC will also confirm staging and cost of delivery with inputs from this DBC.

Regular conversations are also being held between the relevant stakeholders and the DBC Project team to share information and ensure alignment.

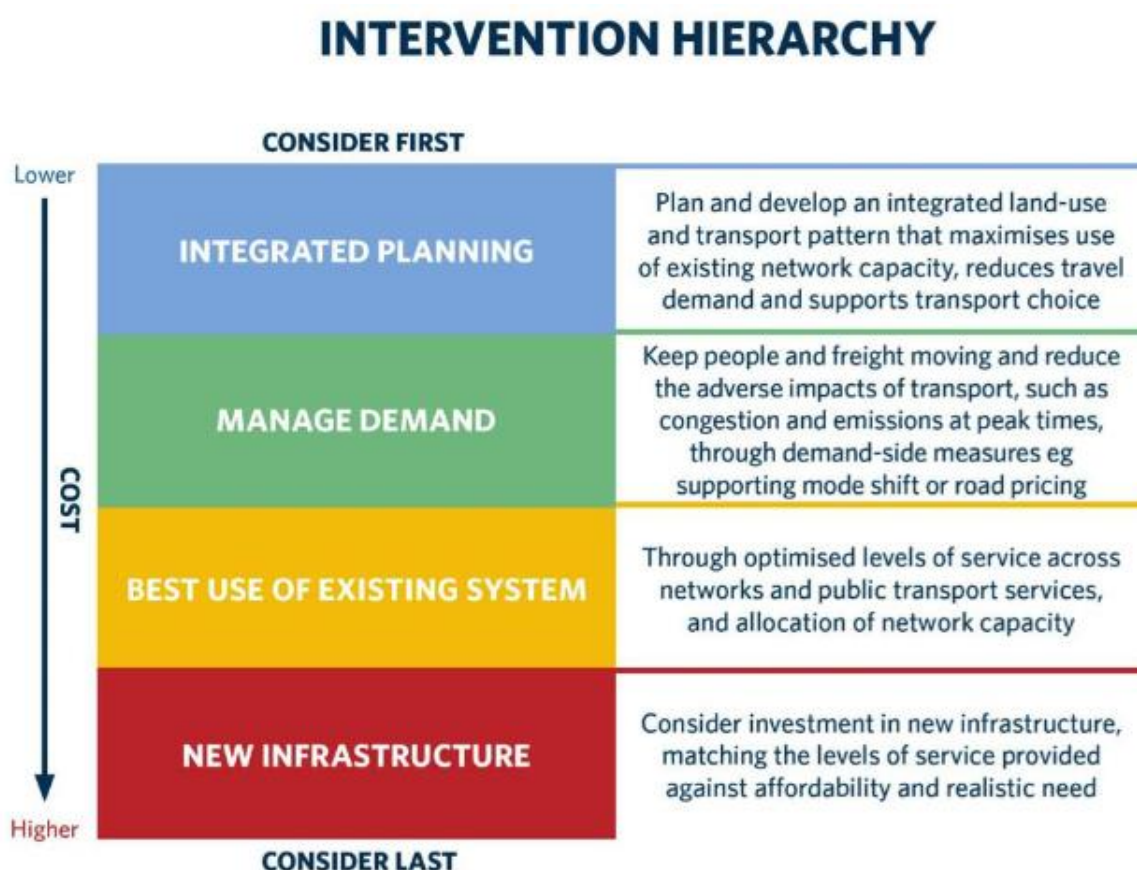
6 Guiding Principles for the South

The DBC has been shaped by a number of key principles and these have been applied throughout the identification and development of the recommended option.

The South IBC followed the intervention hierarchy as shown in **Figure 6-1** when developing the South Indicative Transport Network. This focused on integrating transport and land use first followed by managing demand and making use of the existing system. Lowest in the hierarchy was the consideration of new infrastructure. These intervention principles have been continued and built upon in the development of this DBC.

In addition to the above, the Waka Kotahi Board position on the approach to urban areas is to actively support, enable and encourage quality, mixed-use, compact urban development that efficiently uses land, reduces travel distances and lowers reliance on private vehicles to enhance people's lives.

Figure 6-1 : Transport intervention hierarchy (Source: Waka Kotahi)



With the level crossings being within an existing urban environment, the optioneering process gave consideration to supporting the adjacent land use and managing demand through enabling greater rail capacity to encourage mode shift. Although new infrastructure is required, these have been recommended to provide a step change in transport choice, improve safety and enabling access for the community.

6.1 Te Tupu Ngātahi Urban Design Framework

The development of the DBC has relied strongly on the principles of the Te Tupu Ngātahi Urban Design Framework (UDF). This document provides measurable guidance for land use and transport integration throughout each phase of the programme delivery. The UDF takes a systems approach to how urban areas are organised and understood and pulls these apart in layers spanning history, the natural environment and the built form. The DBC has used the design principles for each of these system layers to understand how the transport networks contribute to the urban system as a whole. Each of the principles describe what 'good looks like' and what to aim for in the design of transport networks that contribute positively to new or planned communities, environments, corridors and the social and economic vitality of Auckland. This framework has also provided spatial definition to some of the themes such as sustainability and integration.

6.2 Land Use integration

The consideration of land use integration is seen throughout the development of the PBC and IBC and is also a key consideration of this DBC. This will continue as the project moves from route protection to implementation in the future.

The land use integration that has been considered and/or discussed with relevant stakeholders such as Auckland Council, Auckland Transport and Waka Kotahi include:

- **Understanding existing and future land use** – specific discussions have occurred which delved into the potential change in land use for the Takaanini Industrial area. This is situated next to Great South Road which has a proposed FTN and is just north of the Takaanini Train Station which is ideal for transit-orient development to support intensified growth. Currently, there are no plans to change its land use and the options considered will support all land use shall any changes be considered later. The options also will not preclude any additional connections to be included shall it be required at a later stage.
- **Uncertainty of the Takaanini FUZ area** - The Takaanini growth area is staged to be development ready in the second half of decade three (2043-2047) in FULSS. The area has also been identified to have flooding and geotechnical challenges creating uncertainty around when and if the area will be developed and whether there could be changes to the surrounding land use. It is considered that although the uncertainty may be high, the impact on the project is low given there are other drivers for investment i.e. safety.
- **Potential impacts of the NPS-UD and the MDRS** – this has the potential to change the urban form of the existing corridor which is considered as part of the optioneering process.
- **Opportunities and challenges with residual land** resulting from the proposed options especially where a new corridor is proposed.
- **Understanding potential impacts on existing facilities and assets** – considered as part of the MCA process and potential mitigation effects are considered.
- Key route refinement decisions such as impacts on competing land uses were considered. This allowed the impacts of transport infrastructure on the existing land uses to be carefully balanced.

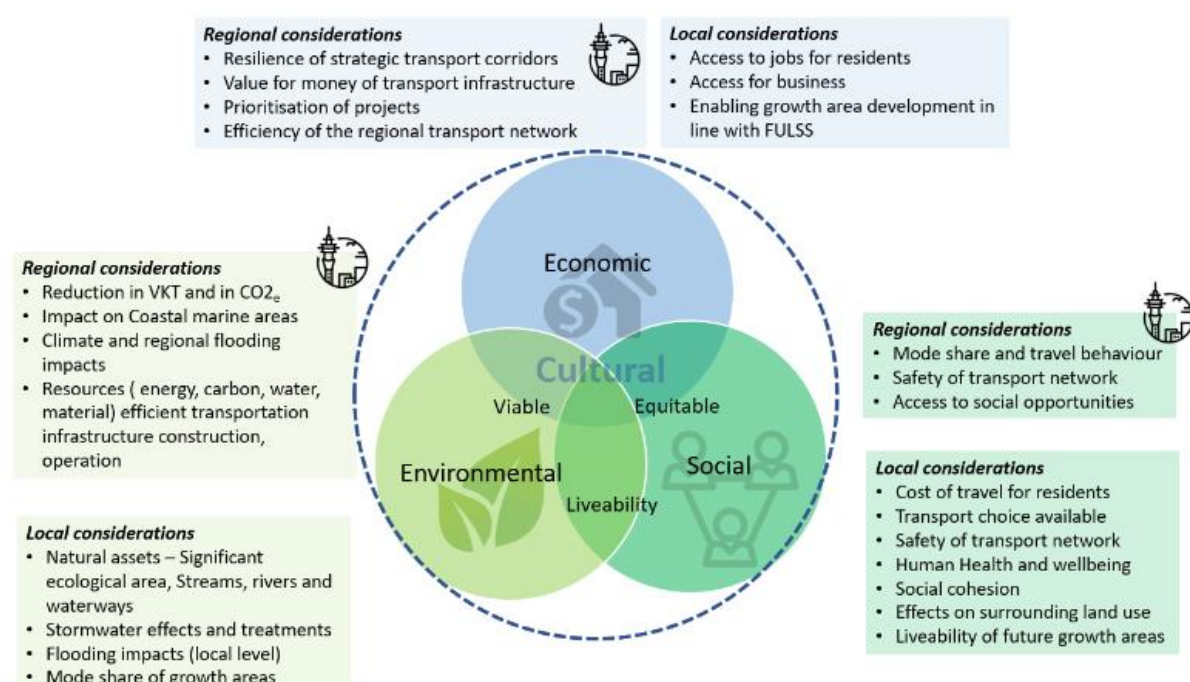
These considerations led to a recommended option which achieves the desired transport outcomes, supports land use integration and placemaking opportunities. Specific land use integration outcomes and opportunities are detailed throughout the DBC and supporting appendices.

6.3 Sustainable outcomes

Sustainability is an overarching principle of this DBC and reflects the core principles of the GPS 2021 to ensure the land transport system is both economically and environmentally sustainable. The Te Tupu Ngātahi Programme has identified four factors that work in partnership to achieve sustainable outcomes as shown in **Figure 6-2**. These pillars of sustainability include:

- Natural Environment: Conserve and enhance the natural environment
- Social: Meet the social and health needs of Aucklanders
- Economic: Foster jobs, growth and economic productivity
- Cultural: Celebrate Auckland's unique cultural identity

Figure 6-2 : Sustainability Principles



A combination of these factors provides the pathway to achieving a thriving, equitable and restorative outcomes. The Te Tupu Ngātahi UDF supports the application and measurement of these concepts.

The outcomes can be achieved at both the local and regional level. The application to this DBC is shown in **Table 6-1**.

Table 6-1 : Sustainability applications in the DBC

Sustainability Factor	Measures	Application to DBC
Cultural	Extent and effects on sites and places of cultural heritage value to Manawhenua and built heritage.	• Regular Manawhenua engagement and feedback including site visits, particularly in the development and assessment of options.
Environmental	Responding to climate change by providing a transport system that supports a reduction in emissions, is responsive to flooding impacts and limits impacts on our key natural assets such as wetlands and ecological habitats.	• Appropriate stormwater treatment and suitable treatment and attenuation. • Priority focus on providing for active modes as part of the recommended option. • Identification of location and quality of wetlands, streams and ecological areas during constraint mapping to inform option selection. • Assessment of reduction of emissions on whole of life basis in the economic analysis for the recommended programme. • Protect and restore the environment across the construction, operation and maintenance of the infrastructure.

Sustainability Factor	Measures	Application to DBC
Social	Transport has key role to improve people's wellbeing and liveability of places.	- The removal of level crossings will improve the safety and liveability for the surrounding community. - Social cohesion and human health are specific MCA assessment criteria, so impacts are considered through the optioneering process. - The DBC has a priority in improving transport choice especially in low carbon transport modes. This is also reflected through the modal priority assessments and in the investment objectives.
Economic	Access to jobs and business and enabling growth. At the regional level this includes resilience of the network, value for money and prioritisation.	- Investment objective and its associated KPIs for the DBC specifically measure improvement in access. - The optioneering assessment explicitly considers the Takaanini Industrial area which is a large employment zone. - Through option development, the future cross-section has considered: <u>Flexibility</u> – the ability to provide for green infrastructure and opportunity to reallocate the available space to provide for what is needed in the future <u>Maintaining the transport outcomes</u> – seeking to balance the land requirements with outcomes achieved i.e. does the additional land provide a step change in outcomes or can the outcomes be maintained with a reduction in cross section and thus less property impacts. - These have been tested with stakeholders and trade-offs clearly discussed to achieve a balanced outcome.

Many of the specific considerations are included as part of the investment case suite of KPI's and measures such as access to jobs, measures of resilience and emission modelling. However other aspects have been considered more broadly as part of a project option assessment process such as during multicriteria analysis (MCA), constraint mapping and option development. Cultural aspects have been considered for all three factors and regular dialogue has been undertaken with Manawhenua throughout the project and especially during the option development process.

Therefore, the principles of sustainable development have been captured through seeking to achieve a balanced decision-making process which considers the sustainability factors as discussed above.

6.4 Climate change response

With a role in development of future infrastructure in Tamaki Makaurau, Te Tupu Ngātahi Supporting Growth has a role in influencing future vehicle kilometres travelled (VKT). Te Tupu Ngātahi is responding to the dual challenges of growth and VKT reduction by encouraging mode shift through each stage of its development processes.

Aotearoa New Zealand has made international commitments to reduce GHG emissions, which the Climate Change Response Act 2002 and the Climate Change Response (Zero Carbon) Amendment Act 2019 directly respond to. These commitments (and the need for climate action) are driving

changes to the social, political, and legislative environment. Transport emissions are a central focus as ongoing changes to legislation and policy on GHG emissions mitigation (and adaptation) continue to evolve in response to the international commitments. Therefore, Te Tupu Ngātahi seeks to apply a good practice approach to climate change mitigation.

6.4.1 Transport Emission Reduction Pathway (TERP)

The TERP released in 2022 provides the pathway to a more liveable Auckland where there are more sustainable forms of transport options that are safe, affordable and accessible for everyone. Through achieving this it aims to reduce transport emissions across the region by 64%. Eleven transformation areas have been identified. Of relevance to this DBC are:

- **Supercharge walking and cycling:** safe, attractive, and accessible pedestrian environments. Provide anyone who wants to cycle with the opportunity to do so.
- **Massively increase public transport patronage:** Increase the performance and attractiveness of the public transport network. Improve the accessibility of the public transport network.

The removal/ grade-separation of the level crossings will enable greater train frequency and reliability and thus contributing towards public transport uptake as performance and attractiveness is increased. The project responds to walking and cycling through consideration of separated walking and cycling facilities along the grade separated corridors and active mode bridges where vehicular closures are proposed. Thus, although the project does not directly respond to the TERP, it supports and enables the outcomes sought.

6.4.2 Considering greenhouse gas emissions

Te Tupu Ngātahi is considering and responding to climate change through its role in route protecting the indicative strategic transport network to support Auckland's growth. Its role in influencing climate outcomes is shaped by three broad categorisations of greenhouse gas (GHG) emissions ("carbon").

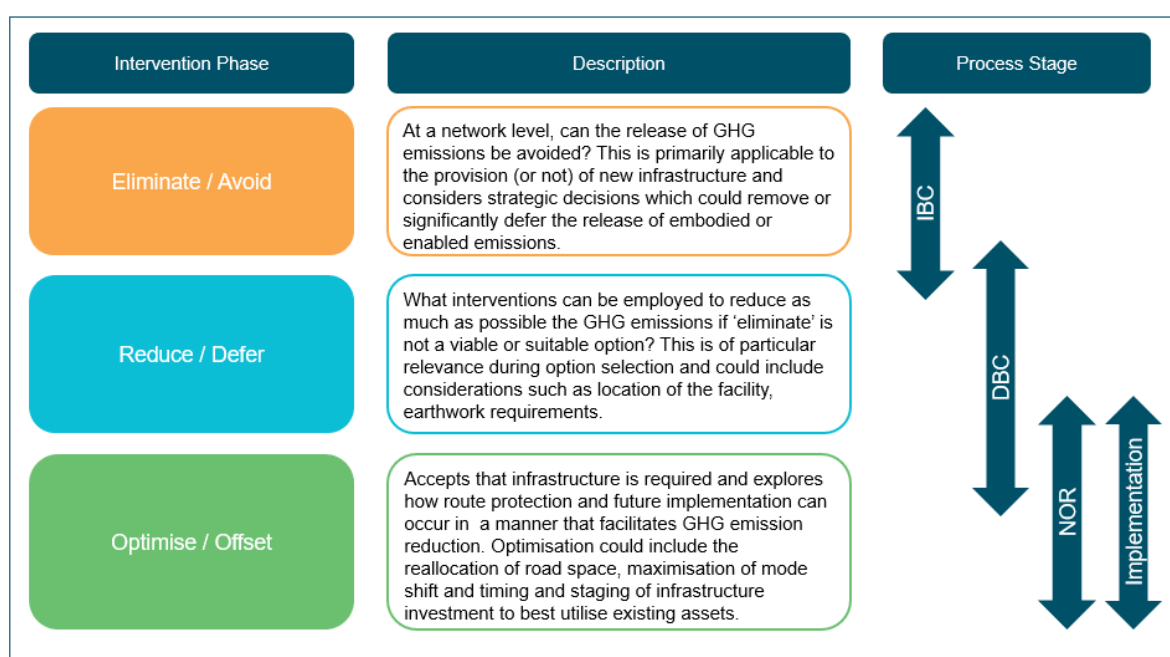
1. **Enabled carbon:** The emissions from individuals and private organisations that are enabled through the planning and implementation of national systems, like Waka Kotahi's strategic network or Auckland's Transport's local transport network. This concept evokes considerations of the systems-level decisions that 'set the scene' for carbon emissions from individuals and organisations interacting with the system – e.g. thinking about climate impacts at a systems level, regional level and national level. Te Tupu Ngātahi uses Vehicle Emissions Prediction Model (VEPM) modelling to consider enabled emissions through Vehicle Kilometres Travelled (VKT).
2. **Construction carbon:** The quantum of carbon from the creation, movement and installation of construction materials. Construction carbon emissions can be measured using emissions factors which translate material quantities into tCO₂e, e.g. tonnes of concrete used into tonnes of carbon dioxide equivalent. Waka Kotahi's Beta Preliminary Emissions Estimation Tool (PEET) is being used to consider construction (including embodied) emissions through the DBC and Notices of Requirement (NoRs) processes.
3. **Land use changes:** The GHG emissions arising from land use changes (i.e. +/- emissions from various land use types such as forestry). Te Tupu Ngātahi can influence better land use through compact urban form, avoiding high sequestering land-uses and encouraging sequestration activity.

6.4.3 Te Tupu Ngātahi intervention framework

Te Tupu Ngātahi has developed an intervention framework (mechanisms & tools) for considering climate change at different stages of the route protection process. The intervention framework is intended to be the basis to interrogate and evaluate the planned networks or projects to identify opportunities for emissions reduction – primarily at the route protection stage that is the focus of the Te Tupu Ngātahi programme. It is a best practicable approach to develop confidence that opportunities have been maximised to reduce GHG emissions at every step of the process. This means considering whole of life emissions (which include emissions associated with the construction of the infrastructure, and with its use, and eventual disposal) at each stage of infrastructure development decisions– from network, to project, to project element.

The intervention approach for considering and responding to climate change at different stages of the business case and route protection process is organised around the *Eliminate – Reduce – Optimise* intervention framework (**Figure 6-3**).

Figure 6-3: Eliminate - Reduce - Optimise framework

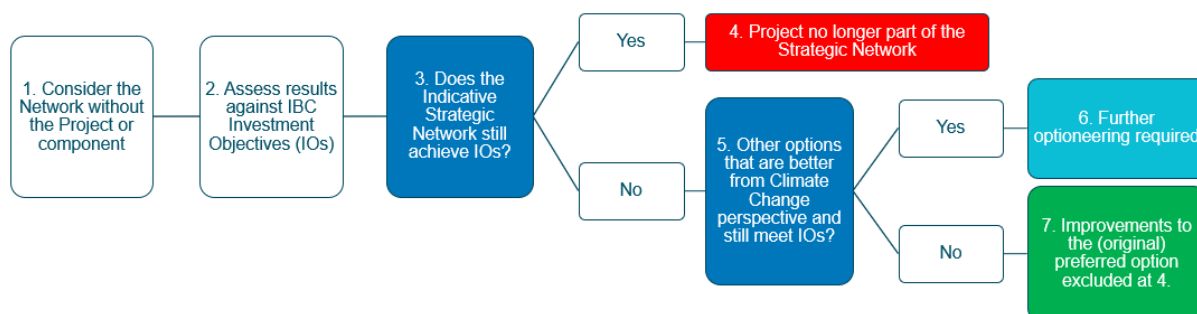


To provide some structure and practical alignment on applying the interventions devised, an intervention framework has been adapted from the Avoid-Shift-Improve (ASI) methodology¹ often used in transportation planning. This is also similar to the approach set out in the publicly available specification PAS 2080:2016². Both follow a hierarchical approach that increases in detail and focus as the development process progresses. In both cases the staged framework imitates the route protection process where the ability to influence and change decreases as projects move from Indicative Business Case (IBC) to Detailed Business Case (DBC) and Notices of Requirement (NoRs).

6.4.4 Climate response implementation methodology

The Eliminate – Reduce – Optimise framework requires considering construction and enabled emissions in both an integrated and sequential way. This means exploring the practical interventions as they apply to whole of life emissions at each stage of infrastructure development decisions and at all levels of engagement – i.e. a network and project view. It also requires sequencing the considerations to prioritise the decisions that will most materially affect carbon outcomes.

Figure 6-4 : Climate response implementation methodology



7 Level Crossings Investment Case

At the IBC phase, problem statements, benefits and investment objectives (PBIOS) were identified for the South growth area.

The South IBC identified key issues that will occur due to the growth in the South and the inability of the existing transport network to cope. These issues were consolidated into two main problems relating to capacity and integration and route protection. These issues include:

- A mismatch between local jobs to the skills of the people living in the area and population increases demand for commuter travel outside of the South area. This is further exacerbated by the imbalance between the number of households and jobs available.
- Limited mode choice in the South reinforces private car use.
- Strategic network resilience risk associated with two main strategic routes, SH1 and NIMT. Over-reliance on these connections compromises its ability to efficiently move people and goods.
- Poorly integrated land use limits opportunities to positively contribute to the liveability, quality urban environment and compromise the land use outcomes sought.
- Transport and policy outcomes are not achieved, i.e. mode shift away from private vehicles towards low carbon modes.
- South Auckland's growth potential is limited.

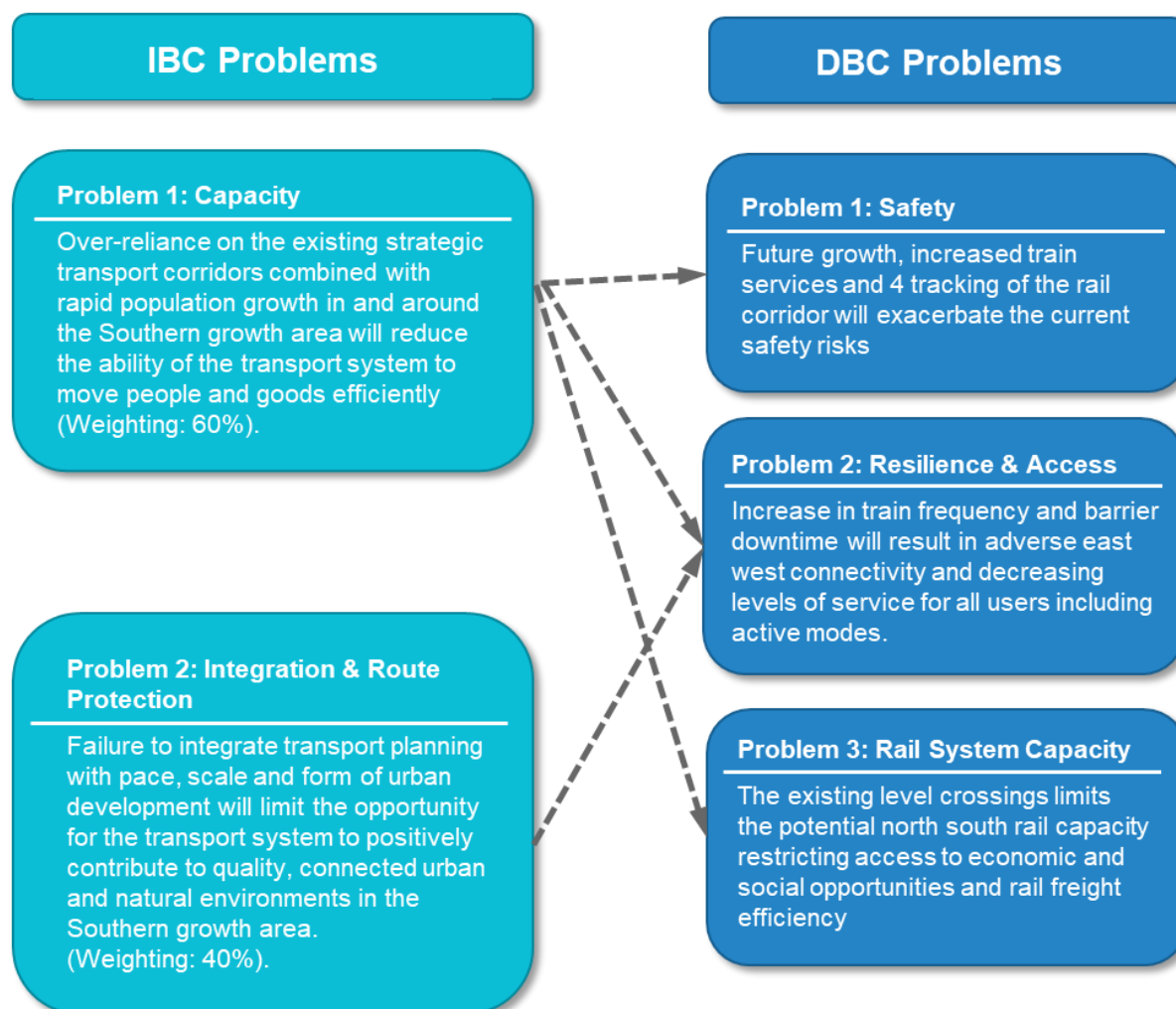
At the commencement of this DBC, six investment areas (access, integration, travel choice, resilience, safety and climate change) were carefully considered to maximise land use and transport integration to align with the Ministry of Transport (MoT) Transport Outcomes Framework and the GPS 2021. As part of this process, the problem statements were developed to reflect the changes since the IBC and the focus of this business case. The problem statements are:

- **Problem 1 - Safety:** Future growth, increased train services and four tracking of the rail corridor will exacerbate the current safety risks.
- **Problem 2 – Resilience and Access:** Increase in train frequency and barrier downtime will result in adverse east west connectivity and decreasing levels of service for all users including active modes.
- **Problem 3 – Rail System Capacity:** The existing level crossings limits the potential north south rail capacity restricting access to economic and social opportunities and rail freight efficiency.

It is noted that the problems statements developed did not specifically reflect the six investment areas such that there were no specific integration, climate change, or travel choice problem statements. They are, however embedded within the investment objectives and are considered as part of the optioneering process.

Figure 7-1 shows there is a correlation between the South IBC problem statements and the DBC problem statement indicating the problems previously identified continue to be valid for this DBC.

Figure 7-1 : IBC and DBC Problem Statements

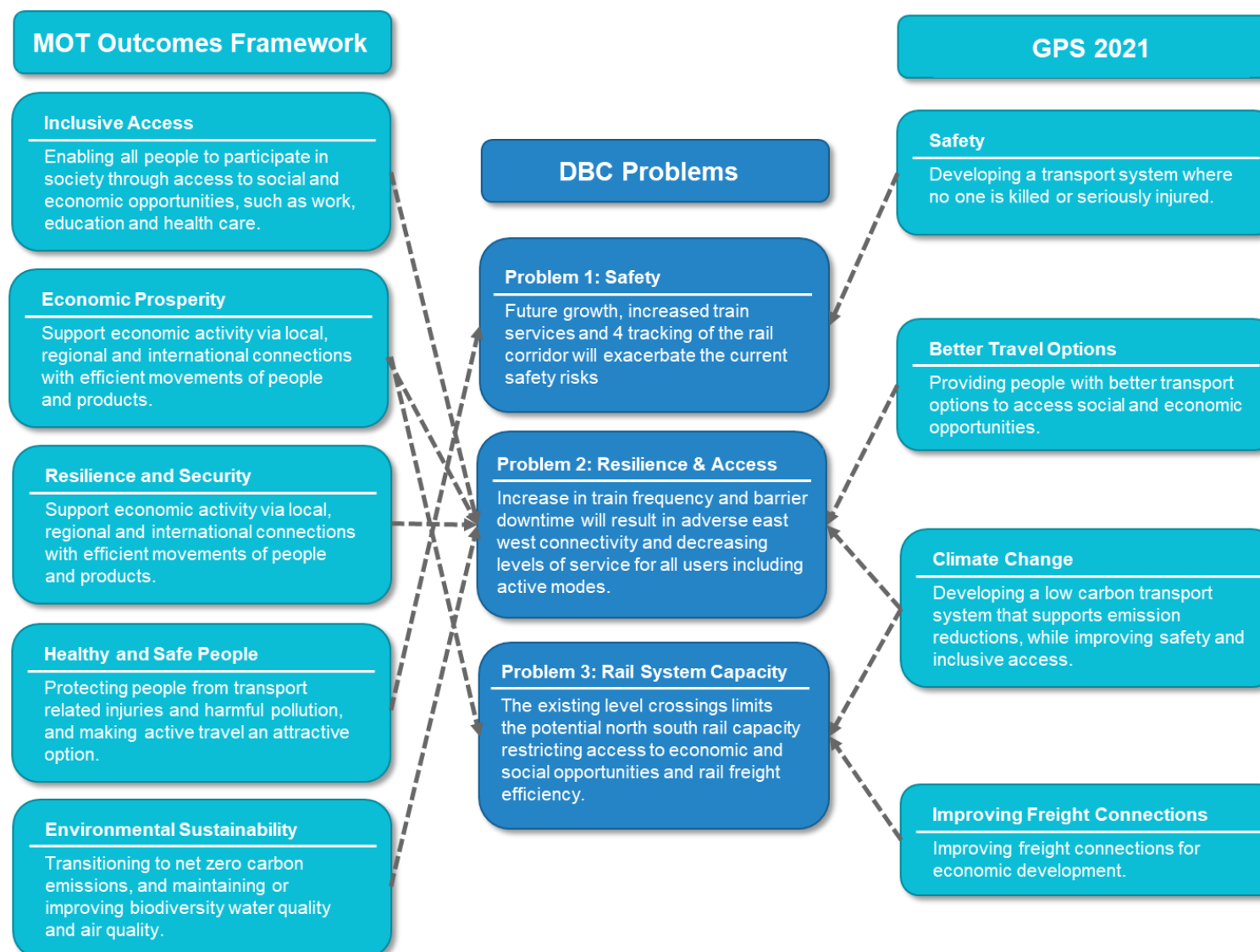


As shown in **Figure 7-2**, the DBC problems are well aligned with the outcomes sought from the GPS 2021 as well as MoT Transport Outcomes. Mapping of the DBC problems against the GPS 2021 shows a clear alignment between the policy direction and the problems identified. Investing in and improving the existing level crossings will lead to a transport network free of death and serious injuries. In addition, enhanced rail capacity and reliability will improve customer experience, accessibility, and freight efficiency. This will further lead to sustainable outcomes and better travel options.

The mapping to the MoT Transport Outcomes Framework also shows clear alignment confirming the investment remains well aligned with the five outcome areas of inclusive access, economic prosperity, resilience and security, healthy and safe people and environmental sustainability.

Further details on the problem statements and supporting evidence is set out in the sections following.

Figure 7-2 : Mapping of DBC Problems to Current Strategic Policy Direction



7.1 Problem Statements

Although, much of the area covered by this DBC is within the brownfield areas, it is worth remembering this DBC has been developed in response to the increasing growth pressures in the South caused by the **planned urbanisation** and subsequently **the increase in transport demand**. Thus, these are the underlying causes across all the problems presented and will exacerbate the existing situations.

The following sections provides detailed evidence for each of the problem statements.

7.1.1 Problem 1: Safety

Future growth, increased train services and four tracking of the rail corridor will exacerbate the current safety risks.

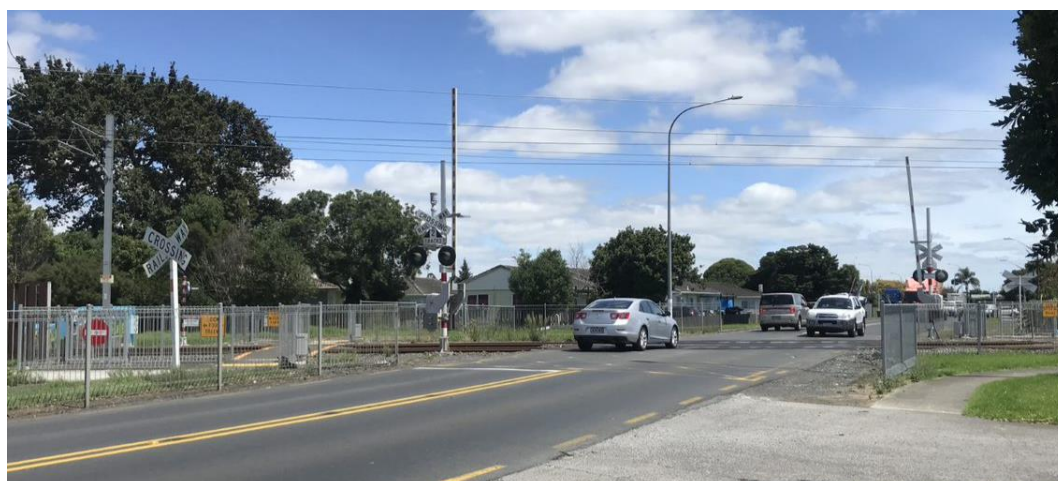
The current form and function of the existing at-grade level crossings inherently poses actual and perceived safety risks for all users of the network. These forms of crossings have been acknowledged internationally as having significant safety concerns.

On average, between 2012 to 2021, 483 incidents¹ occurred at level crossings each year in New Zealand. 49 deaths and serious injury incidents were reported in the five-year period between 2017 to 2021 as reported in Waka Kotahi's rail safety statistics².

Figure 7-3 shows the existing vehicular and pedestrian level crossing on Manuroa Road, which is also representative of the other three level crossings within the project. The current treatments include:

- Active protection through automatic barriers for both vehicles and pedestrians
- Audible warning through flashing lights, and
- Warning signs and markings leading up to and at the level crossing.

Figure 7-3: Manuroa Road Level Crossing



¹ These are occurrences where a train has struck or nearly struck a motor vehicle, pedestrian, cyclist, or other objects. Also includes damage and vandalism to level crossings.

² <https://www.nzta.govt.nz/resources/rail-safety-statistics/>

To assess the risk at level crossings, Kiwi Rail has developed a Level Crossing Safety Impact Assessment (LCSIA) to provide a Level Crossing Safety Score (LCSS). A LCSIA undertaken by Auckland Transport, “*Auckland Metro South Pedestrian Crossing LCSIA*”, (Stantec, October 2018) has indicated the following risk rating for each of the level crossings in question (see **Table 7-1**). The assessment assumes there will be future pedestrian growth and applied a 4% increase per annum at Walters Road given its surrounding land use and 2% for all other locations. It is also noted that at the time of writing, a networkwide update of the LCSIA is currently being undertaken.

Table 7-1 : LCSIA Risk Rating and C³

Level Crossing	LCSS Risk Band ¹
Spartan Road	Low
Manuroa Up Pedestrian Crossing	Medium
Manuroa Down Pedestrian Crossing	Medium-Low
Taka St Up and Down Pedestrian Crossing	Medium
Walters Road Up and Down Pedestrian Crossing	Medium

¹ Note the risk rating shown is as per the future score which has the improvements implemented after the study was undertaken representative of what is on site today.

As shown in **Table 7-1**, except for Spartan Road and Manuroa Road pedestrian Down crossing, the other level crossings have a risk rating of ‘Medium’. This is stated within the “Level Crossing Risk Assessment Guide” is ‘neither overly dangerous, nor particularly safe and has a medium risk of death or serious injury to users crossing the railway line.’ The ‘low’ rating assessed for Spartan Road is mainly attributed to the low pedestrian demand due to the surrounding industrial land use.

Although these crossings are not necessarily assessed as having a high-risk rating, they ultimately still pose a safety concern as barriers cannot prevent a vehicle and/ or a vulnerable road user from moving onto the track whether intentionally or unintentionally. Thus, the industry recognises this and as such KiwiRail adopts an elimination first approach when upgrading an existing level crossing with grade-separation assessment being the first requirement before other treatments are considered. If this cannot be achieved, it is a requirement when modifying an existing level crossing to achieve at least an LCSS of ‘Medium-Low’.

Reported crash data extracted for each of the level crossings from Waka Kotahi’s Crash Analysis System (CAS) for the last 10-year period between 2012 to 2021 are summarised in **Table 7-2**.

Table 7-2 : CAS Data Summary (2012 - 2021)

Level Crossing	CAS Summary
Spartan Road	2 recorded crashes where trucks have hit the level crossing barrier arms.
Manuroa Road	7 recorded crashes with 4 being rear ends resulting from vehicles having to stop at the level crossing and vehicles from behind rear ending. - One incident involved a vehicle overtaking and colliding with the vehicle in front waiting for barrier clearance.

³ Auckland Metro South Pedestrian Crossing LCSIA, (Stantec, October 2018)

Level Crossing	CAS Summary
Taka Street	3 recorded crashes with one vehicle colliding with the train where the driver did not stop for the flashing red lights. Another involved a truck being struck by the barrier arm as the vehicle tried to clear the crossing.
Walters Road	3 recorded crashes with 2 rear end crashes and 1 where the vehicle was struck by the barrier arm as it tried to clear the crossing.

As shown, although there have been few recorded crashes at these level crossings, the barriers that are there to protect the road users are themselves a hazard. Also, it highlights the risks that are still very much present even when safety measures are installed and does not prevent risky behaviours.

The future growth as detailed in Section 2, will see an increase in the number of pedestrian and cyclists using these level crossings. In addition, to respond to the future growth in Auckland, there is planned four tracking of the rail corridor increasing train frequency to better serve and provide for the growing population. This will consequently exacerbate the current safety risks and increase barrier downtimes which is further discussed below. Thus, it will be impractical and unsafe to have at-grade crossings once four tracking happens. Furthermore, the increase in barrier downtime resulting from the increased frequency may increase public frustration with the prolonged delay. This may lead to risky behaviours as drivers, pedestrians and cyclists seek to cross the railway line when a train is approaching. Other impacts are further discussed below.

Therefore, if no investment is made, road users will continue to be subjected to the safety risks at the level crossings. The outcome will be further death and serious injury crashes which undermines the Road to Zero strategy, GPS 2021 direction and Ministry of Transport's outcomes.

7.1.2 Problem 2: Resilience and Access

Increase in train frequency and barrier downtime will result in adverse east west connectivity and decreasing levels of service for all users including active modes.

There are several network improvements to the passenger rail service in the near term and long-term plan to support Auckland's population growth which include:

- City Rail Link (CRL) – anticipated go live in December 2024/ early 2025
- Third main line (Wiri to Quay Park) on parts of the Southern Line – completion expected in 2024
- Electrification from Papakura to Pukekohe (expected to occur in the 2nd to 3rd Decade / 2028 - 2047)
- Additional Drury Stations, and
- Four -tracking of the rail corridor between Wiri and Pukekohe .

The improvements will see a significant increase in rail capacity including that of freight trains and increased accessibility as it becomes faster and easier to reach places. However, this will lead to increased barrier downtime at the existing at-grade level crossings. **Table 7-3** shows the barrier down time changes between 2015 and 2031 which accounts for CRL and the increased in train frequency. This indicates:

- The level crossings within the project will see an increase barrier downtime of at least 100% in the AM peak and over 140% in the PM peak between 2015 and 2031.

- By 2031, as train frequency increases to 24 trains per hour (tph), the barrier down time is forecasted to increase by at least 50% or 30 minutes in both peak periods with Spartan Road having the longest barrier down time. This is due to the placement of the adjacent signals which requires to be down longer to optimise train throughput. It is estimated to have the barrier down for 44 minutes during the AM peak hour.

Table 7-3 : Estimated barrier down time changes from 2015 – 2031 (Source: Traffic Impact Assessment of Rail Level Crossings in Auckland, Resolve Group Ltd, May 2022)

Barrier Closure time changes 2015 - 2031 (%)								
Rail Level Crossing	2015 (Actual)		2021 (Forecasted)		2031 (Forecasted)		2015-2031 % increase	
Name	% Closure AM Peak	% Closure PM Peak	% Closure AM Peak	% Closure PM Peak	% Closure AM Peak	% Closure PM Peak	AM Peak Growth	PM Peak Growth
Church Street East	14.6%	13.0%	16.8%	14.2%	33.5%	28.3%	129%	118%
Porters Avenue	16.2%	15.1%	27.8%	25.9%	46.3%	43.2%	186%	186%
George Street	12.5%	12.6%	27.2%	32.3%	45.4%	53.8%	264%	328%
Morningside Drive	17.3%	14.5%	26.0%	24.8%	43.3%	41.4%	150%	186%
Asquith Avenue	18.4%	13.8%	27.7%	21.6%	46.1%	36.1%	150%	161%
Rossgrove Terrace	20.2%	14.9%	30.3%	23.3%	50.4%	38.8%	150%	161%
Woodward Road	17.3%	16.0%	27.6%	26.2%	46.1%	43.6%	167%	173%
St Jude Street	14.9%	15.3%	26.1%	26.1%	43.6%	43.6%	191%	186%
Chalmers Street	13.9%	13.9%	22.3%	23.8%	37.2%	39.7%	167%	185%
St Georges Road	11.9%	12.0%	20.4%	20.5%	34.1%	34.2%	186%	186%
Portage Road	8.8%	9.8%	16.2%	15.4%	26.9%	25.6%	208%	161%
Fruitvale Road	13.0%	16.6%	24.1%	26.0%	40.1%	43.3%	208%	161%
Glenview Road	12.1%	19.4%	26.4%	30.3%	44.1%	50.5%	264%	161%
Sherrybrooke Place	13.9%	18.8%	25.8%	29.5%	42.9%	49.1%	208%	161%
Bruce McLaren Road	16.1%	17.7%	27.7%	26.6%	46.1%	44.3%	186%	150%
Mt Lebanon Lane	15.8%	24.5%	31.7%	38.4%	52.8%	63.9%	233%	161%
Metcalfe Road	13.5%	14.4%	23.2%	22.5%	38.6%	37.4%	186%	161%
Christian Road, Swanson	6.9%	6.1%	11.9%	12.2%	19.8%	20.3%	186%	233%
Crown Road	20.3%	16.3%	19.8%	20.3%	23.8%	24.4%	17%	50%
Sutton Road	20.3%	16.3%	19.8%	20.3%	23.8%	24.4%	17%	50%
Opaheke Road	20.3%	16.3%	19.8%	20.3%	23.8%	24.4%	17%	50%
Boundary Road	20.3%	16.3%	19.8%	20.3%	23.8%	24.4%	17%	50%
Walters Road	21.1%	18.6%	33.8%	33.0%	50.7%	49.5%	140%	167%
Taka Street	26.7%	22.0%	37.1%	39.2%	55.7%	58.8%	109%	167%
Manuroa Road	25.2%	21.2%	40.3%	35.1%	60.4%	52.6%	140%	148%
Spartan Road	30.6%	27.4%	49.0%	46.9%	73.5%	70.4%	140%	157%
ORorke Road	10.7%	9.1%	9.2%	9.1%	9.2%	9.1%	-14%	0%

Table 7-4 shows the results of the modelling undertaken and further supports the above:

- At Walters Road, of those that are delayed, vehicles can experience a maximum delay of up to four minutes during the peak periods. This suggests some vehicles are waiting for the barrier to go up multiple times before they make it across and queues build up impacting the surrounding network.
- Similar delays may be experienced at Manuroa Road and Taka Street during the peak periods.
- Vehicles at Spartan Road is expected to have maximum delays of close to three minutes during the PM peak period.

Table 7-4 : Level Crossings Delays

Rail Crossing	Average Delay per Delayed Vehicle (minutes)			Maximum Delay per Vehicle (minutes)		
	AM	IP	PM	AM	IP	PM
Eastbound						
Spartan Road	1.0	0.7	1.0	2.7	1.8	2.8
Manuroa Road	1.0	0.8	1.0	3.9	2.0	3.9
Taka Street	1.0	0.7	1.0	3.9	1.4	3.9
Walters Road	1.0	0.7	1.0	3.7	1.4	3.6
Westbound						
Spartan Road	1.0	0.8	1.0	3.0	1.4	2.7
Manuroa Road	1.2	0.7	1.3	3.9	1.5	4.0
Taka Street	1.1	0.7	1.1	4.0	1.4	3.9
Walters Road	1.1	0.7	1.4	3.9	1.4	4.0

The consequence is a decrease in the level of service experienced by all users as delay increases at these locations. Pedestrians and cyclists will have to wait longer to cross leading to frustration. This could encourage risk-taking behaviour causing serious incidents. It also reduces walking and cycling connectivity as delays becomes a much greater proportion of their overall trip discouraging active mode use. In addition, neighbourhood surrounding the level crossing will have a negative impact as it exacerbates the community severance caused by the rail corridor dividing communities.

Likewise for vehicles, the decrease in east-west connectivity caused by the additional delays will have a much greater effect on the overall network. Overflow or the ability to clear queued vehicles before the barrier arm lowers will be increasingly more critical with the increase in frequency. The longer the barrier down time, the longer the queues and the longer it takes to dissipate the traffic impacting adjacent intersections and further. The “*Traffic Impact Assessment of Rail Level Crossings in Auckland*”, *Resolve Group Ltd (May 2022)* study has indicated that by 2031, the total daily delay for all vehicles at:

- Walters Road is anticipated to have the highest delay in excess of 5 days of waiting time.

- Manuroa Road is estimated to have 93 hours of delay, Spartan Road of 60 hours and Taka Street of 35 hours.
- All four-level crossings have the potential for 'overflow' thus, impact adjacent intersections and the wider network.

Note that with the excessive delays predicated, vehicles are likely to re-route, or other forms of transport may be chosen which is not considered as part of the assessment. However, it provides a good indication of the expected network impacts.

In addition, the extensive delays anticipated cause variability in travel time creating inefficient bus services that are unreliable which discourages their use. Also, access to goods and services, employment and other amenities will be compromised. Further, the impact on the arterial network will in turn impact the signification productive areas for the city such as the Takaanini Industrial area which is situated adjacent to the Spartan Road level crossing and within close proximity of the other level crossings. The same study has ranked all level crossings across the network based on a number of factors including traffic operations and safety. **Table 7-5** shows the 'red priority' level crossings which have been identified as having high time delays, high safety deficiency and/or being prone to overflow.

Table 7-5 : Level crossing ranking based on weighted performance outcomes in 2031 (Source: Traffic Impact Assessment of Rail Level Crossings in Auckland, Resolve Group Ltd, May 2022)

Level Crossing	2021	CRL Open	2028	2031
Walters Road	1	1	1	1
Manuroa Road	2	2	2	2
Spartan Road	2	3	2	3
Taka Street	2	3	7	4
Woodward Road	5	5	4	4
Morningside Drive	5	5	4	6
Bruce McLaren Road	5	5	4	6
Portage Road	5	5	7	10
Opaheke Road	5	14	13	15
Glenview Road	10	5	7	8
Metcalfe Road	10	5	7	8

The above indicates:

- All four level crossings are amongst the top ranked level crossings across all years and are the top four in 2031.
- Walters Road and Manuroa Road remain as first and second across all years.

In addition, the significant delays expected at Spartan Road will have damaging effects on the freight and heavy vehicles going in and out of the industrial area by road. The variability in travel time due to the level crossing will limit freight efficiency which is key to productivity and economic prosperity.

If investment does not occur:

- Access to economic and social opportunities will be compromised by prolonged delays and congestion
- Increased user frustration and decrease in customer satisfaction
- Decrease in the attractiveness of active modes and its uptake will be hindered, and
- Increases in emission as traffic moves at a slower pace

7.1.3 Problem 3: Rail System Capacity

The existing level crossings limits the potential north south rail capacity restricting access to economic and social opportunities and rail freight efficiency.

At present, north-south passenger rail capacity is constrained in part by the presence of numerous at grade level crossings across Auckland, including those within scope of this DBC. The Railways Act 2005 states that 'A rail participant must ensure, so far as is reasonably practicable, that none of the rail activities for which it is responsible causes, or is likely to cause, the death of, or serious injury to, individuals. As such, without a plan in place for the removal/replacement of the level crossings, the rail regulator (Waka Kotahi) would not be able to undertake testing and commissioning of new trains or implement restrictions similar to that on the current Western line.

The rail and road network are interdependent, one cannot change without impacting the other. As discussed in Problem 2, there are consequences with the extended barrier downtime inflicted by the CRL day 1 timetable for vehicles and active mode users at these locations. However, the benefits of these improvements cannot be fully realised with the existing level crossings as per the regulatory direction. This in turn will continue to restrict access to economic and social opportunities via rail, having a flow on effect to mode share for public transport.

The rail capacity is influenced by the signalling systems and the ability to get people on and off trains quickly. The presence of level crossings presents vulnerability in the system as there is increased risk of faults and incidents. Hardware faults such as gates malfunctioning, or barrier arms being hit can lead to incidents causing unexpected delays and cancelled train services. **Table 7-6** shows the number of incidents reported at the different level crossings by year. Incidents include broken barrier arms, failed lights and warning bells not working.

Table 7-6 : Level crossings reported incidents⁴

	2017	2018	2019	2020	2021	2022*	Total
Manuroa Rd	20	25	9	8	10	7	79
Spartan Rd	11	5	1	5	6	5	33
Taka St	6	4	1	2	1	1	15
Walters Rd	10	10	7	3	8	5	43
Total	47	44	18	18	25	18	170

* - up until June 2022 data

As indicated, 170 incidents have been reported since 2017 for the four level crossings with Manuroa Road and Walters Road having the greatest number of incidents. The delays caused by these incidents result in lost productivity and are a cost to the road users. This is estimated to cost \$0.42M

⁴ Data provided by Kiwi Rail on 6th July 2022.

in 2028 and increase to \$0.93M in 2048+ if the level crossings remain.⁵ In addition, when this happens, train speeds must reduce at these locations until a full safety inspection is carried out causing further delay to services reducing capacity. Thus, time may be lost due to unplanned stops and speed restrictions limits capacity when an incident occurs. Further, level crossings limit the placement of signals in ideal locations which prevents the optimisation of headways between trains, reducing the potential train capacity.

Another way to increase rail capacity is to run trains closer together which will require more barrier downtime and less time for traffic to dissipate at the level crossings. As detailed in Problem 2, significant delays can be anticipated which will cause user frustration. Hence, excessive crossing closure times to improve rail will be at the intolerable expense of other road users which will not be accepted by the community.

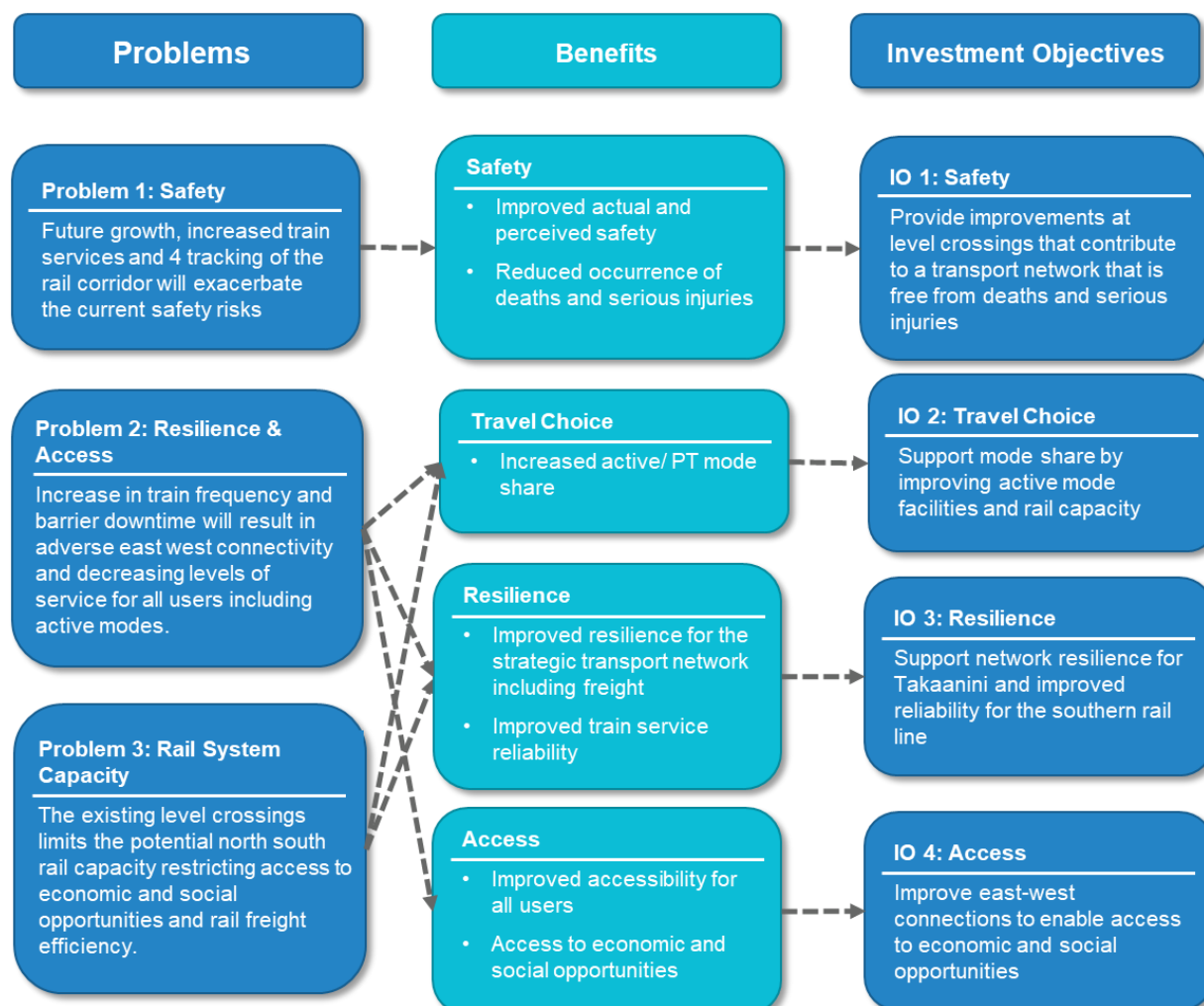
Thus, if left as is, the potential north south rail capacity is limited, restricting rail freight efficiency and accessibility to economic and social opportunities for rail users. This leads to reduced productivity impacting economic growth.

⁵ Refer to Appendix G: Transport Outcomes Report and Appendix K: Economics Report for details.

7.2 Investment Logic Map

Following on from the development of the problem statements, the benefits and key investment objectives were developed and agreed upon with the relevant stakeholders. The Investment Logic Map (ILM) is shown in **Figure 7-4**.

Figure 7-4 : Takaanini Level Crossings ILM



As shown, the DBC problems could be mapped to four investment objectives to address the problems identified. The key benefits from addressing these problems are:

- A transport network that is free from deaths and serious injuries.
- Promote and encourage the uptake of low carbon transport modes.
- Improved economic prosperity in increased accessibility and network resilience including freight.

7.3 Benefits, investment objectives and measures

The following key performance indicators (KPIs) were developed for each of the investment objectives. These are outlined in **Table 7-7** below along with baseline and target measures.

Table 7-7: Benefits, objectives and measures

Benefits	Investment Objective	Measures	Baseline	Target
Significant safety improvements for all users leading to safer communities.	Provide improvements at level crossings that contribute to a transport network that is free from deaths and serious injuries	KPI 1.1: Number of level crossing related crashes/ incidents	KPI 1.1: 15 recorded crashes between 2012 to 2020	KPI 1.1: No crashes/ incidents relating to level crossings Reduced DSIs due to less VKT
Promote and encourage the uptake of low carbon transport modes.	Support mode share by improving active mode facilities and rail capacity.	KPI 2.1: CO ₂ emissions – Tonnes of CO ₂ equivalents emitted	KPI 2.1: 386,500 CO ₂ emissions in 2048+ Do minimum closure scenario	KPI 2.1: Reduce emissions of greenhouse gases, other than biogenic methane, to net zero by 2050 and beyond
		KPI 2.2: Reduction in vehicle kilometres travelled (VKT) in the network	KPI 2.2: 11,438,400 daily VKT in 2048+ Do minimum closure scenario	KPI 2.2: Reduction in daily VKT of 134,900
		KPI 2.3: Mode shift from single occupancy private vehicles	KPI 2.3: 2,900 active mode trips (local trips) and 1,600 PT trips (going north) in Do minimum closure scenario	KPI 2.3: 15% mode share of active modes and 30% PT mode share
		KPI 2.4: People throughput of pedestrians and cyclists	KPI 2.4: 1,700 daily pedestrian trips and 550 daily cyclist trips across the five east-west connections in Do nothing scenario.	KPI 2.4: Increase of 110 pedestrian and 110 cyclist trips daily

Benefits	Investment Objective	Measures	Baseline	Target
Improved productivity from a more reliable and efficient transport network especially for those in Takaanini.	Support network resilience for Takaanini and improved reliability for the southern rail line.	KPI 3.1: Number of faults/ incidents related to level crossings	KPI 3.1: 170 recorded fault incidents between 2017 and 2022	KPI 3.1: No faults/ incidents relating to level crossings
		KPI 3.2: Travel time variability	KPI 3.2: Travel time spread in the Do minimum Closure is 28 minutes (between Wiri and Takaanini)	KPI 3.2: Reduce travel time spread by 9 minutes (between Wiri and Takaanini)
Improved access to key destinations enabling greater economic and social opportunities.	Improve east-west connections to enable access to economic and social opportunities	KPI 4.1: Proportion of employment accessible within 15,30,45 mins accessible by public transport	KPI 4.1: 333,600 jobs are accessible within 45 mins of public transport from the study area	KPI 4.1: Increase of 2,800 jobs accessible within 45 mins of public transport from the study area
		KPI 4.2: Proportion of employment accessible within 15,30,45 mins accessible by active modes	KPI 4.2: 23,000 jobs are accessible within 15 mins from west Takaanini by active modes 75,000 jobs are accessible within 30 mins from west Takaanini by active modes 134,000 jobs are accessible within 45 mins from west Takaanini by active modes	KPI 4.2: Increase of 11,000 jobs accessible within 15 mins of cycling from west Takaanini Increase of 14,100 jobs accessible within 30 mins of walking from west Takaanini Increase of 14,700 jobs accessible within 45 mins of walking from west Takaanini
		KPI 4.3: Proportion of employment accessible within 15,30,45 mins accessible by car	KPI 4.3: 51,930 jobs are accessible within 15 mins from east Takaanini by car 201,900 jobs are accessible within 30 mins from east Takaanini by car 343,600 jobs are accessible within 45 mins from east Takaanini by car	KPI 4.3: Increase of 200 jobs accessible within 15 mins from east Takaanini by car Increase of 8,400 jobs accessible within 30 mins from east Takaanini by car Increase of 7,600 jobs accessible within 45 mins from east Takaanini by car

8 Partner and stakeholder engagement

This section summarises engagement undertaken with Partners, key stakeholders, and the community by Te Tupu Ngātahi for this DBC.

The team utilised a wide variety of methods to engage at an appropriate level for each stakeholder group. For the purposes of guiding levels of engagement appropriately, stakeholders were defined by the following stakeholder groups:

- Key political and government
- Partners
- Council
- Community and campaign groups
- Land, property, business owners
- Education
- General public

The information gathered through engagement has been used to inform route refinement and subsequent option refinement. A more detailed engagement summary may be found in **Appendix E: Engagement Summary**

8.1 Engagement history

The engagement undertaken to support the DBC continues from the previous work undertaken during the PBC and IBC phases. This is shown in **Figure 8-1** below.

Figure 8-1 : South Engagement process



8.2 Owner Engagement Summary

Te Tupu Ngātahi has ongoing engagement with Waka Kotahi and Auckland Transport throughout the development of this DBC. Led by Owner Interface Managers, the project team has regularly collaborated with subject matter experts from the organisation to ensure technical and strategic alignment of the DBC. Forums have included:

- Regular technical sessions and workshops to discuss corridor and intersection form and function, design standards, and emerging options.
- Specific sessions to discuss design assumptions, key principles or specific design issues.

8.3 Partner Engagement Summary

The Project Team has worked closely with our partners Manawhenua and Auckland Council.

8.3.1 Manawhenua

Te Tupu Ngātahi recognises the responsibilities and commitments of engagement with Manawhenua as a Treaty Partner. We maintain a Manawhenua forum (for operational and kaitiaki level interaction) and enable linkages with the wider governance level relationships of Waka Kotahi and AT via the Tāmaki Transport Table and Auckland Council Kaitiaki Governance Table. The focus of this group is Programme-wide delivery, particularly seeking consistency across projects.

Between late 2021 and 2022, Te Tupu Ngātahi attended a number of Manawhenua hui and site visits. These provided insights on aspirations and issues for Manawhenua. The discussions included:

- Overview and updates on the Takaanini Level Crossings project
- Opportunities to provide input on the Options Assessment process and design
- Importance of ecological and environmental areas

What we heard from Manawhenua included:

- The level crossings area has a history of poor safety, and a reputation for serious injury and death. They acknowledge that something must be done with the existing level crossings.
- There were concerns with stormwater diversion and treatment. Wetlands in the project area are significant to Manawhenua.
- Manawhenua had issues with peat in the area due to cultural aspects that need to be adhered to and noted visual amenity was a key concern.

Feedback obtained from Manawhenua was incorporated in the development of options and to confirm the emerging preferred options. Engagement with Manawhenua will continue as the project progresses.

Detailed Manawhenua engagement summary may be found in **Appendix E: Engagement Summary**.

8.3.2 Auckland Council

There has been ongoing engagement between Te Tupu Ngātahi and Auckland Council which supports the Programme's desired outcome of integrated land use and transport planning. In particular, there has been discussion with Auckland Council regarding the future plans for the Takaanini Industrial zone and also the Takaanini future urban zone to understand the potential for rezoning and timing of development.

8.3.3 KiwiRail

Te Tupu Ngātahi has engaged regularly with KiwiRail throughout the development of this DBC. This included meetings to share and discuss information including:

- Understanding the plan for 4-tracking through the area
- Design assumptions being made by Te Tupu Ngātahi
- Feedback on the Rev A design of the recommended option

8.4 Elected Members

A presentation was made to the Papakura Local Board on an update of the level crossings on the 15 June. A briefing pack was sent to the Papakura Local Board including a memo on the project, community flyer and landowner letter template. A presentation was also held for the Papakura Local Board on 15 June 2022 and in November 2022. Written updates on the project was provided to Franklin and Manurewa Local Boards in December 2022. A meeting was held with Dr Anae Neru Levasa, MP for Takanini and was invited to the Business Breakfast held on the 27th November and 12th December 2022.

The Papakura Local Board gave their support for the proposed changes in the level crossings project. Their written formal feedback requested works be sequenced to minimise the impact on the wider road network. The sequence they advised is Manuia Road, Taka Street, Walters Road, followed by the closures at Spartan and Manuroa Road. Their feedback noted congestion in the morning and early afternoon between Manurewa and Papakura. It also requested others undertake assessments into transport management and audit fencing and barriers, to ensure safety around the crossings. The Local Board requested that extensive information campaigns in multiple languages take place, to engage the community about track safety and the risks of crossing at a rail line.

8.5 Key Stakeholders

Key stakeholders, such as government agencies and interest groups were engaged with throughout the engagement period, as well as prior of ongoing programme wide engagement. A summary of the engagement with key stakeholders are provided in Table 8-1.

Table 8-1 : Key Stakeholders engagement summary

Who we engaged	Feedback
Hynds Pipe Systems	Submitted written feedback during the initial consultation period voicing concerns towards the proposed closures of Spartan Road and Manuroa Road level crossings. Against the proposed new crossing at Manuia Road on the basis that the surrounding area would not support the kind of traffic using it.
Ia Ara Aotearoa Transporting New Zealand	Against the closure of Spartan Road and Manuroa Road closures and would like to see grade separation. Supportive in providing for active modes.
NZ Heavy Haulage Association	Against to the Manuroa Road closure but support Taka Street grade separation in principle as long as design accommodates for tall, wide and/or heavy loads.
Tegel Foods	Against the closures at Spartan Road and Manuroa Road. Concerned with redirected freight traffic would impact safety in residential and school streets and negatively impact the freight industry.
Kāinga Ora Homes and Communities	Against the closure of the Manuroa Road level crossing. Concerned that a pedestrian-only bridge will impact their customer's ability to access the eastern side of Takaanini where there are amenities.
Takaanini Business Association	A letter was received that expressed the association's concern with the project and its scope. The association would prefer to see future grade separation be part of a new masterplan for Takaanini. The letter requests that the proposals are suspended, reviewed and replaced with a new scope of work within an updated masterplan.

More details may be found in **Appendix E: Engagement Summary**

8.6 Public Engagement

The engagement period to support the DBC was undertaken between 12 August and 26 September 2022. The online engagement tool 'The Hive' featuring an online survey and an interactive map with the option to 'drop a' a pin and add a comment was used.

Following on from the initial feedback received, the community were invited to provide further feedback between 5th November and 20 December to ensure the community had a chance to share their thoughts. In addition to this, two community open days were also held on 5th and 8th November.

Freight industry members reached out near the end of engagement to express that they felt they had not been notified properly. Ensuring they were given a chance to provide their feedback, a session was held by Auckland Transport for their freight industry group on 3 October 2022.

Te Tupu Ngātahi received a total of 70 pieces of feedback via the online engagement tool. 26 (37%) came from survey responses, and 44 (63%) came from drops on the interactive project map. 11 email submissions were also received.

8.6.1 Landowner engagement summary

380 letters were sent out in August 2022 to potentially affected landowners. Individual meetings either online or face to face were offered to provide them further opportunity to discuss the project.

The team heard from 23 potentially affected landowners over the engagement period. Several comments and questions were made around land requirements, project timeframes until construction, and queries over what the grade separated crossings would look like.

Two face – to face meetings were held at the time of writing. A common concern was that there was not enough information. We took this as an opportunity to continue our engagement with business breakfasts with local business owners, two community open days in November and through re-opening the online engagement platform. Engagement with landowners will continue as the project progresses through the DBC phase, and into the NoR phase in 2023 including more face to face meetings.

8.6.2 Community Engagement Summary

Feedback from the community was important for developing knowledge used in decision making processes. Over the engagement period, a range of methods were used to engage with the community, including:

- **Advertising** – interactive poster, newspaper advertorial and information posted on Papakura Local Boards social media channels.
- **Video** - a visual of the project created for use on the Te Tupu Ngātahi YouTube page, as well as the project's interactive online engagement platform.
- **'The Hive'** – online engagement tool.

Summary of key theme themes and responses are provided in Table 8-2 below.

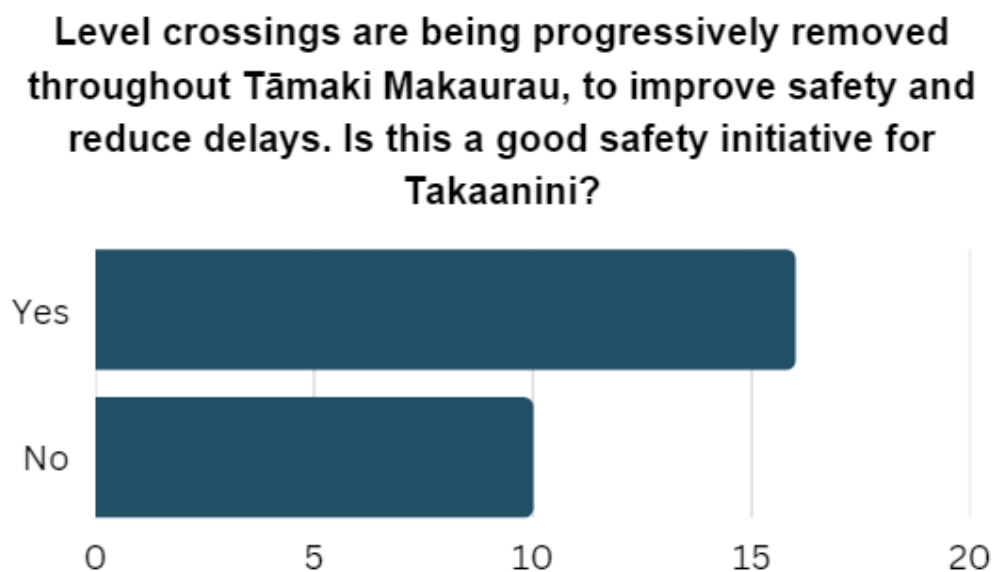
Table 8-2: Summary of key themes and responses

Key theme	Comments	What we will do
Requests for more information	- People felt that the engagement collateral did not have enough information - Some pieces of feedback asked whether there were 3D models or concept designs we could show for the bridges. This was a common question across both rounds of consultation. - People also commonly asked where the bridges would start and stop, what height they would be, and what route they would follow.	- We presented more information about our options for each of the proposed level crossing removals at our community open days on 5 November and 8 November 2022 - We have engaged local businesses at a Business Breakfast on Thursday 27 October and Monday 12 December - We cannot provide more design detail at present. This is information that is developed during the detailed design phase of the project, which is at present 10-20 years away - We will continue to update potentially affected landowners, key stakeholders and the community as the project progresses.
Utilising underground space at Walters Road	- Pieces of feedback questioned why the option of an underpass at Walters Road was not the preferred option - Some people also stated they wanted to see the current rail tracks move underground or become a 'subway' style network.	We have investigated the option of an underpass at Walters Road. It is not our preferred option due to geotechnical issues with peat, in addition to cost. The area is also a floodplain, which would create high risk.
Potential closures of the Spartan Road and Manuroa Road level crossings	- We heard from industrial freight stakeholders that this is an important route for them and their ability to conduct business - People felt that closing Spartan Road would redirect heavy vehicle traffic into residential streets and create congestion - Some feedback did not think Oakleigh Avenue has the capacity to support increased traffic movements should both crossings potentially close - People also told us that the current Manuroa Road crossing is widely used by thousands of vehicles a day, and that closing it would not be a good outcome for the community.	- We have proposed to close both the Spartan Road and Manuroa Road crossing and provide an alternative crossing at Manuia Road. - We cannot grade separate at Spartan Road due to the proximity of the Takanini interchange. There is not enough space for a bridge at this location and constructing a bridge at Spartan Road would have significant impact on the built environment. The current crossing also has a poor safety record. - We have proposed to close Manuroa Road to ensure an even distribution of grade separated crossings with vehicle access. Keeping the ability to cross at Manuroa Road would mean the potential Manuia Road bridge would not have all of the possible benefits for users in the future.
Grade separation at Takaanini Train Station	A small number of the feedback placed requested that grade separation also be extended to the Takaanini Train Station. People feel the current level crossing to get to the platform is unsafe, and that increased train services will heighten the chance of an accident.	Grade separation of the level crossings at Takaanini Train Station is not within the scope of this project. We will pass on feedback around people's concerns with this crossing to Auckland Transport.

Key theme	Comments	What we will do
Active modes	- Some pieces of feedback from the community doubted an uptake on active modes, based on anecdotal evidence that it is currently unsafe and that the current community does not walk or cycle. - Other pieces of feedback voiced concern for the proposed road closures impacting people's ability to walk around the community. Some people felt this would disrupt their ease of walking to locations of interest. - A small number of mobility scooter users, trolley, pram users and the like were concerned that bridges would disrupt accessibility around the community.	- We are proposing to provide active modes facilities at all the proposed crossings in the project. This will provide the community with more transport choice, as well as facilities that are safe and user friendly. - We will designate space that will allow for flexibility in design. This leaves enough room for design features that will provide accessibility to each of the proposed bridges, such as staircases, ramps, and lifts. We are giving flexibility in design so that these facilities can be determined during detailed design in 10 to 20 years' time. This will ensure these facilities serve the community that will be using the new bridges.
Amenities	- Concern was expressed across all feedback about the impact the potential grade separated crossings would have on the community - Feedback covered topics including visual amenity, land use, as well as noise and vibration during construction.	We have carried out technical investigations as part of the DBC process. These will help the project team understand these impacts in greater detail.
Approach to community engagement	- We heard from some people in the first round of consultation that the approach to engagement was not enough - Some people questioned why there was not a community open day during the August-September consultation period - We heard from concerned freight stakeholders that they were not informed or directly consulted on for the project during the first round of engagement	- Following the first round of consultation, we accepted this as an opportunity to improve our approach to engagement with the community - We held two community open day November 2022 to present more information to the community, and to give people an opportunity for face-to-face discussions with the project team - We also held a briefing session with AT's freight industry group in response to freight stakeholder concern that they felt unengaged - We will continue to engage with our partners, key stakeholders, potentially affected stakeholders, and the wider community.

Respondents were also asked whether they thought the progressive removal of level crossings across Auckland was a good safety initiative. 61% of survey respondents thought that removing level crossings is a good safety initiative for Auckland, whereas 39% did not think level crossing removals are good safety initiative (see **Figure 8-2**). Note, this is based on a very limited number of responses.

Figure 8-2: Support towards region-wide level crossing removals as a safety initiative



8.7 Next Steps

The constrained built-up environment of the project has resulted in complexities and impacts that are not generally experienced within greenfield sites. The project team has heard the responses and feedback to date and will continue the dialogue with landowners, the community and key stakeholders beyond the consultation period. Feedback and analysis will be shared with the community and landowners in early 2023. Affected landowner engagement is also scheduled to occur in early 2023 as property impacts become better defined.

9 Strategic Case Summary

In summary, the Strategic Case provides background context and rationale for investing in changes at the four level crossings:

- Spartan Road;
- Manuroa Road;
- Taka Street; and
- Walters Road.

Specifically, the strategic case:

- Provides relevant strategic context, alignment with strategic direction and summarises work previously undertaken
- Details the short-term problems, outcomes, and alignment with longer term investment objectives
- Summarises evidence that shows support of the problems, and
- Sets out benefits, investment outcomes, measures, baselines, and targets.

Through the above, the Strategic Case confirms the need to invest to support the growth in the south and also to:

- Improve safety outcomes at the level crossings to provide for safer communities
- Improve productivity from a more reliable and efficient transport network that will enable greater access to economic and social opportunities, and
- Promote and encourage the uptake of low carbon transport modes.



Economic Case

10 Economic Case

This section describes the development of the recommended option and includes:

- Establishment of the Do Minimum
- Scope of Options Extent
- Option development process
- Assessment undertaken for the recommended option
- Overall outcomes of the recommended option

10.1 Do Minimum Option

The project considered three potential 'Do Minimum':

- **Level crossings remain ('Do nothing')** – rail improvements including increased track capacity and train frequency leading to increased delays and safety risks at the level crossings;
- **Level crossings removed and roads are cul-de-sac ('Do minimum')** – rail improvements proceed, however the safety risks and delays are so significant that the level crossings must be removed;
- **Constrained rail upgrades**– rail improvements proceed but cannot be fully realised i.e. constrained speed and headway resulting in decreased capacity due to the impacts of the level crossings. Although this scenario is valid, it involves benefits for elements (e.g. rail upgrades) outside the scope of the level crossings DBC. Thus, **not considered** for economic appraisal.

A '**Staged Do Minimum**' was also considered whereby the 'Do nothing' scenario occurs until 2038, the gradually transitioning to the Do minimum closure scenario, and then continuing with the full DO minimum closure scenario from 2048 onwards. Hence, three 'Do minimum' options are considered as part of this DBC, 'Do nothing', 'Do minimum' and 'Staged Do minimum'.

Other assumptions as part of the 'Do minimum' options include:

- Four tracking between Papakura to Pukekohe in 2048 and 2048+; whereas two tracking in 2028 and 2038 ;.
- Three new stations at Maketuu, Ngaakooroa and Paeraataa (Drury Central, Drury West and Paerata) in 2028,2038,2048 and 2048+;
- The upgrade for Bremner, Jesmond, Waihoehoe and SH22 for the years 2028, 2038,2048 and 2048+ as defined in the Drury Local Business Case;
- The North South Opaheke arterial is considered only in 2048+ and taken out from earlier years
- Pukekohe Expressway and full-length Mill Road upgrade is assumed in 2048 and 2048+
- FTN upgrades proposed as part of the South FTN DBC.

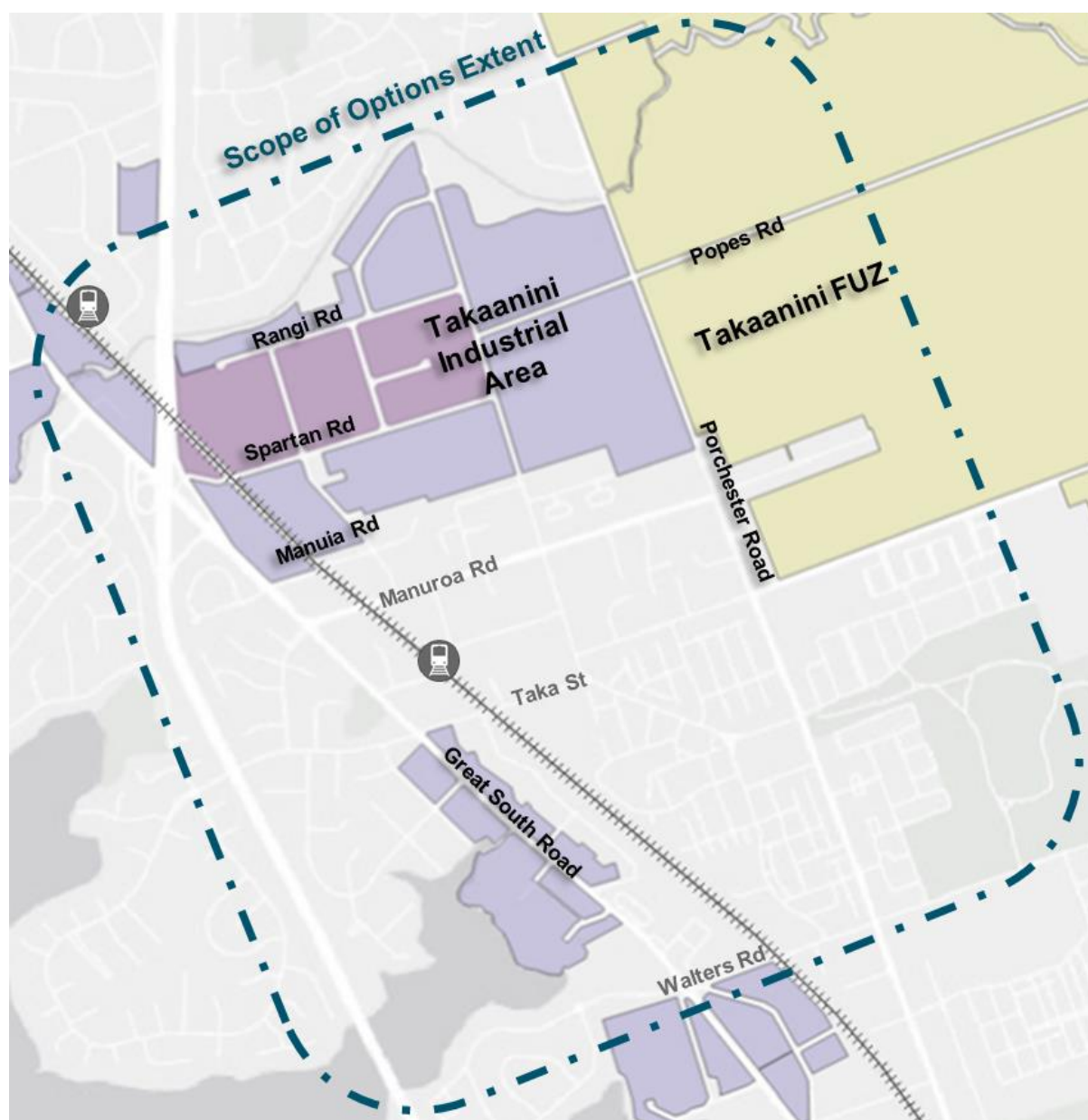
More information on the development of the Do Minimum is included **Appendix K: Economics Assessment**.

10.2 Scope of Options Extent

The scope of options included in this Economic Case are:

- Revisiting the IBC preferred option ; and
- Alternative east-west connections over the rail corridor between the northern extent of the Takaanini Industrial area and Walters Road (see **Figure 10-1**).

Figure 10-1 : Scope of Options Extent

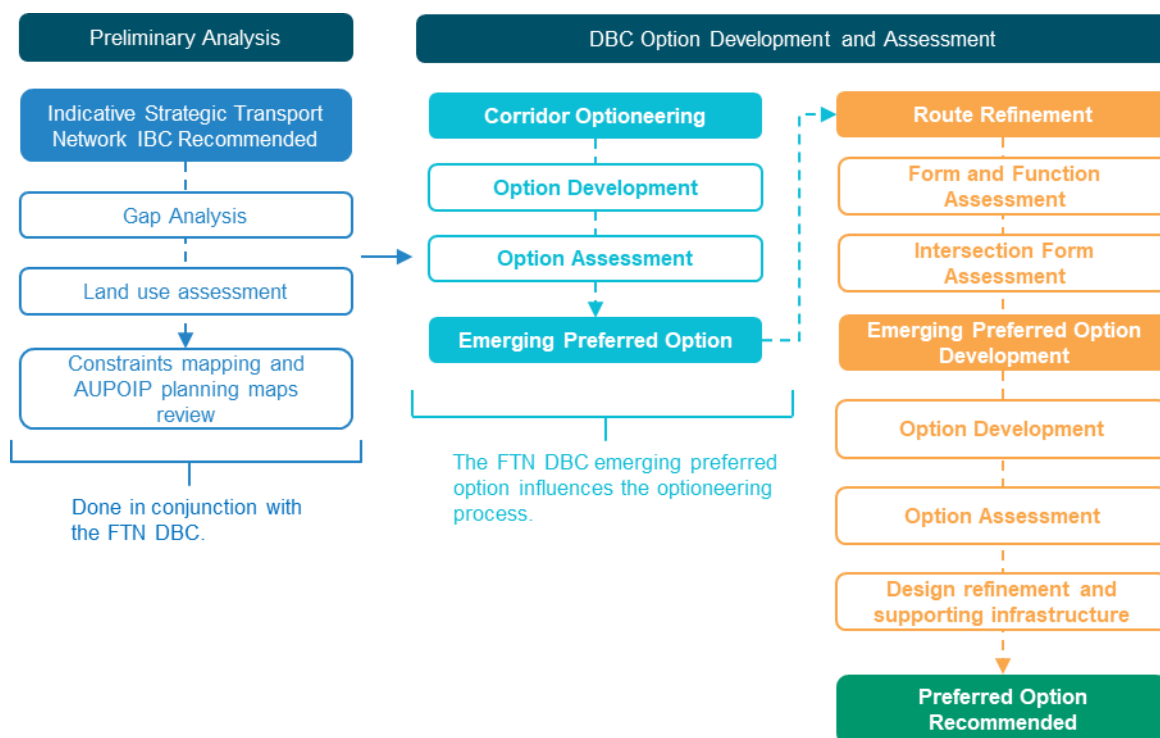


10.3 Option development and assessment methodology overview

The high-level optioneering process is summarised in **Figure 10-2**. The process adopted was informed by the previous stage of assessment (i.e., the PBC informed the options for the IBC and the IBC informed the options for the DBC). The result of the optioneering process was to confirm an emerging preferred option to be developed into the recommended option for route protection.

The option assessment methodology is summarised in the following sections.

Figure 10-2 : Option Development and Assessment Methodology



10.4 Preliminary analysis

The preliminary analysis was undertaken for the Takaanini DBCs as a whole given there are interdependencies between the FTN and level crossings. The key steps in the preliminary analysis are summarised in **Table 10-1**.

Table 10-1 : Preliminary Analysis Stages

Step	Description
Gap analysis	Prior to commencing the DBC option development and assessment, a gap analysis of the South ISTN, specifically the components that relate to the Takaanini DBC Package was undertaken. The review checked to see whether anything had changed since the IBC including policy direction and statutory documents (for example, Plan Changes and / or National Policy Statements). This identified any gaps or issues that required further consideration during the DBC phase. This also informed whether the IBC recommended option should be subject to further optioneering given the changes that have taken place, or whether the assessment during the IBC phase was proportional to the scale of potential effects.

Step	Description
Land use assessment	The future land use was assessed to understand the transport requirements to best service the intended land use as well as identification of opportunities to enhance land use and transport integration. This was used as an input into the general constraint mapping process and later aided in the optioneering process.
Constraint mapping	Constraint mapping was undertaken to understand the potential constraints and included the following areas: • Property • Ecology • Urban design • Cultural • Landscape and visual • Archaeology/ built heritage • Stormwater and flooding • Planning/ land use/ social cohesion Constraints were mapped in GIS and their significance recorded.

10.4.1 Gap Analysis

The key changes and recommendations identified through the gap analysis in relation to the level crossings included:

- **Optioneering carried out to date.** It was recommended to revisit the PBC/ IBC recommended option including the potential to look at level crossings independently of one another and consider property access impacts in greater detail.
- **Changes in legislation and direction with respect to climate change.** In response to this, the gap analysis recommended further consideration of the viability of the Rangi Road bridge given the embodied carbon and potential construction complexity. In addition, it is expected to induce more traffic by improving access and thus, increase in transport emissions post construction. A gap analysis of the impact of including/ excluding Rangi Road in the network was undertaken and is detailed below.
- Subject to the findings of the Rangi Road gap analysis, consideration of the following issues was also recommended:
 - The implication of closing Spartan Road and Manuroa Road if Rangi Road is no longer in the network i.e., the severance of the road access to the industrial zoned land.
 - Re-consideration of the strategic importance of Popes Road in the network if Rangi Road is not progressed, especially given the Mahia Road and Roscommon Road FTN corridor will be undertaken separately by AT.

10.4.1.1 Rangi Road Gap Analysis

During the South Indicative Business Case (IBC), Rangi Road was recommended as a multi-modal corridor with regional significance in the future network. This corridor was the preferred Frequent Transit Network (FTN) route and a key industrial connection in the Takaanini network. Rangi Road viaduct and Popes Road arterial were also seen as one link/ arterial project, which provided a key east-west connection to the North South Mill Road strategic arterial.

A high-level assessment against key transport outcomes was undertaken to assess the need for Rangī Road in the future transport network. It established that Rangī Road was a key connection to the industrial area and an alternative will be required if Rangī Road was not in the network.

As part of the assessment, a test was also undertaken to understand the impact of reducing the number of east-west connections from three (the number of crossings proposed under the IBC recommended) to two in the network south of Papakura Stream and north of Walters Road. This resulted in increased queuing and traffic pressures on other parts of the network. Thus, it was established that at least three east-west connections should be provided in the Takaanini network to achieve optimal east-west connectivity and access.

The assessment concluded that:

- A **direct industrial connection is needed** to provide for access and transport resilience in the Takaanini network.
- A **minimum of three east-west connections are needed south of Papakura Stream and north of Subway Road to serve the Takaanini area.**
- **Further optioneering can be undertaken to identify alternatives to Rangī Road viaduct** which can achieve transport outcomes whilst reducing adverse effects on the surrounding built environment.
- Future **corridor optioneering should take a network approach to determine different combinations of replacement or closure at the level crossings** in order to fully understand the optimal level of infrastructure that would support adjacent land uses and access to the PT network.

More details may be found in **Appendix C: Options assessment Report**.

10.5 DBC Option Development and Assessment

The preliminary analysis identified whether the IBC option assessment had sufficiently considered all alternatives. Further consideration was then given to the nature and significance of identified constraints, gaps and the land use context at the option development and option assessment stage.

Two phases of optioneering and assessment were undertaken which are further detailed below:

- **Network optioneering** – this refers to the location of the corridors in which the level crossings are situated. Optioneering is undertaken to determine whether these will be grade separated or closed to vehicular traffic. This was undertaken as a network approach and new corridors were also considered as part of the optioneering process.
- **Route refinement** – Once corridor option has been confirmed. Optioneering is then the refinement of alignment variation to avoid identified constraints. Alignment refers to how an option connects between two points on the corridor. There may be several different alignments in a single corridor.

The option assessment during both the corridor optioneering and route refinement stages included either a full MCA assessment with Subject Matter Expert (SME) input and/or a project team option assessment.

10.5.1 Form and Function

The Corridor Form and Function (CFAF) process was used for the purpose of defining a desired cross-section for the identified east-west cross sections. The CFAF has been designed by Te Tupu

Ngātahi to provide a consistent methodology to define the desired corridor form and function requirement and ensure all modes are considered. It is based on the AT Roads and Streets Framework (RASf) guidance which considers both 'place' and 'movement' significance. As part of this process SMEs were consulted for endorsement allowing for high engagement and design efficiency.

An initial high-level assessment was undertaken based on the IBC recommended network to inform the option development and assessment. This assessment indicated a two-lane corridor of 24m width active mode facilities.

Noting that any change in the recommended option will alter the traffic flows on the different corridors, the assessment was undertaken again following identification of the recommended option to confirm the cross sections. This is further detailed in Section 10.5.3.1.

Details of the RSAF and CFAF assessment may be found in **Appendix G: Transport Outcomes Report**.

10.5.2 Network Optioneering

Figure 10-3 summarises the Takaanini DBC network optioneering process with the FTN optioneering undertaken first prior to the level crossings. This is because the primary role of the FTNs is to connect and support rail and with several of the level crossings situated close to rail stations, whether the FTNs will utilise these will dictate the outcome for the level crossings. The main outcome from the FTN corridor assessment indicated Alfriston Road will be the main east-west connection for the FTN.

Figure 10-4 shows the assessment extents for the level crossings.

Figure 10-3: DBC Corridor Option Development and Assessment

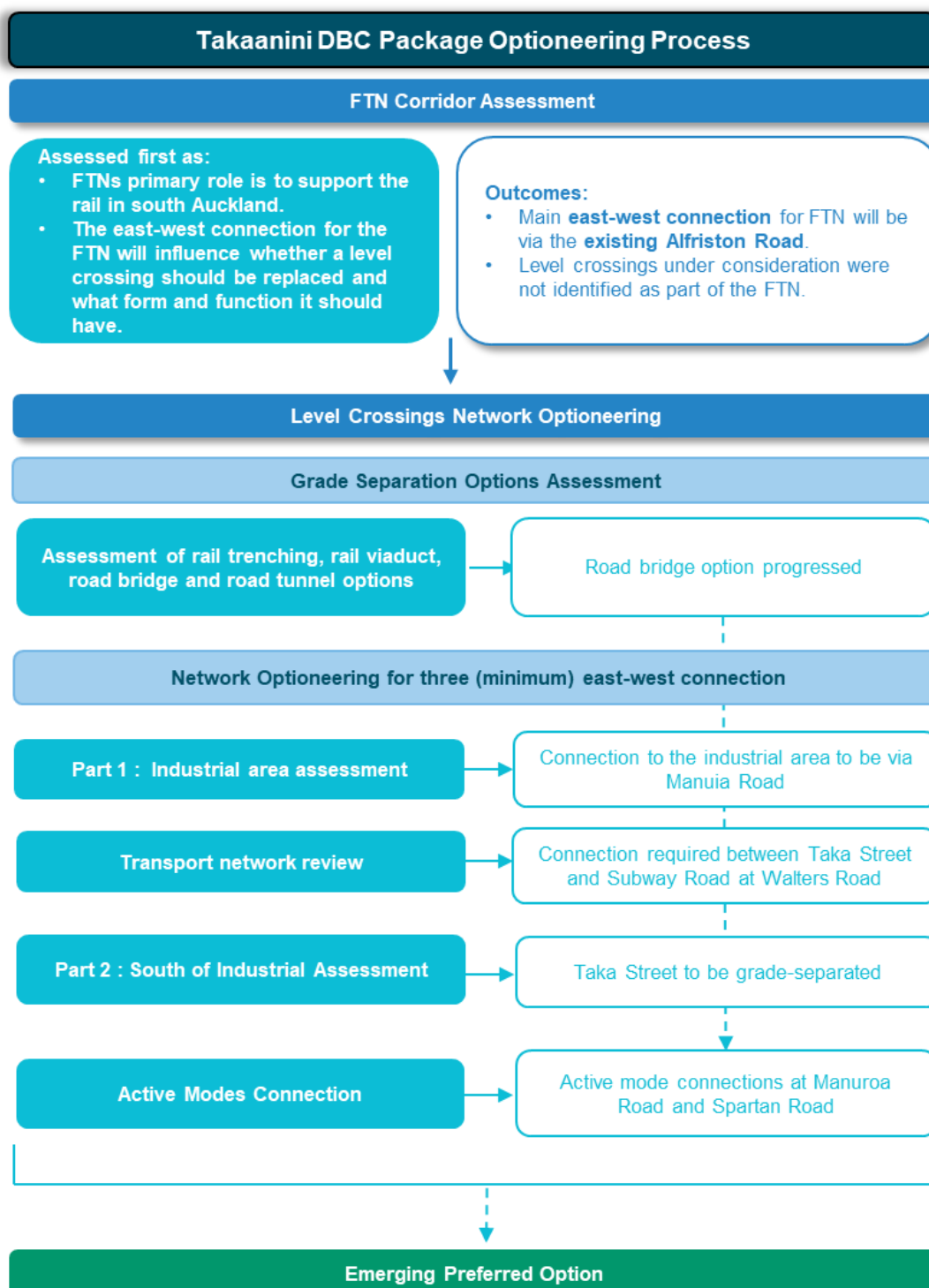
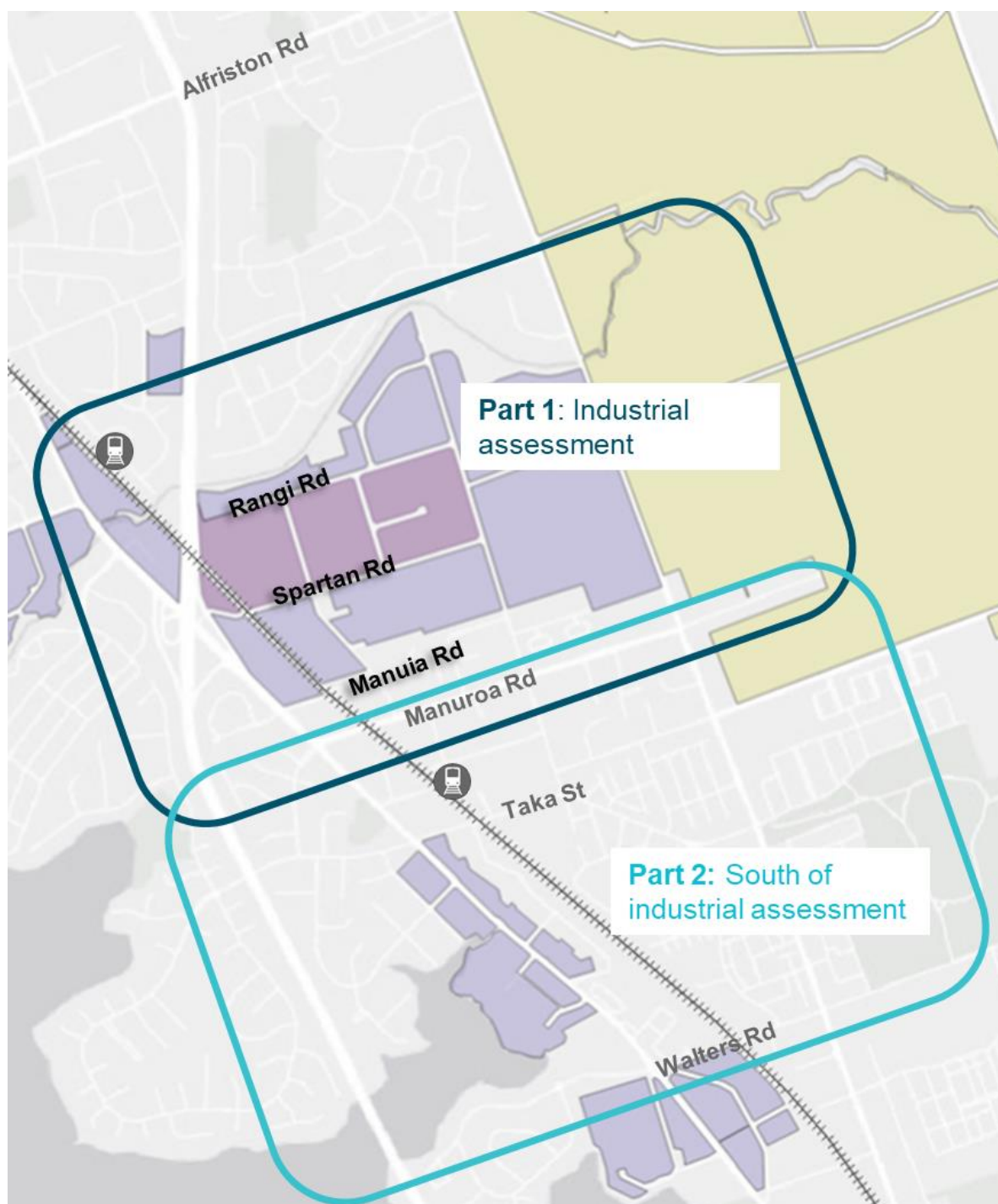


Figure 10-4 : Assessment Extents



The outcomes noted above from the preliminary assessment formed the underlying assumptions and inputs into the optioneering process with the IBC recommended option forming the basis for the options to be assessed and/or considered.

Thus, network optioneering centred around identifying **at least an additional three east-west** connections within the project extent. At least one of these connections needs to **provide access to and from the Takaanini Industrial area** as identified through the preliminary analysis (refer to Section 10.4).

- The corridor optioneering process was undertaken in two parts:

- **Part One: Industrial area assessment** – focussed on identifying the east-west connection for the Takaanini industrial area.
- **Part Two: South of industrial area assessment** – identified the remaining east-west connections required to serve the area south of the industrial area.

The corridor optioneering process was undertaken as a network approach to provide a more holistic understanding of the cumulative effects of the different combinations of replacement or closure at the level crossings. 'Scenario' options of the different combinations representative of the potential final network were developed for assessment with the IBC recommended option as the starting point. This approach formed the basis of the option development and assessment undertaken.

The assessment of options in both parts was undertaken by technical specialists scoring against the MCA Framework. This considered an 11-point scoring system ranging from -5 to +5 with +5 being 'very high positive impact' and -5 being 'very high adverse impact'⁶. Table 10-2 shows the MCA scoring scale.

Table 10-2 : MCA scoring scale

Effects criteria	Scoring
Very high adverse impact	-5
High adverse impact	-4
Moderate adverse impact	-3
Low adverse impact	-2
Very low adverse impact	-1
Neutral impact	0
Very low positive impact	1
Low positive impact	2
Moderate positive impact	3
High positive impact	4
Very high positive impact	5
-	Not scored

Summaries of the assessments are discussed below with full details of the MCA and MCA Framework in **Appendix C: Options Assessment Details**

10.5.2.1 Grade separation options assessment

An initial assessment of the possible grade separation options was undertaken. This was important to establish upfront as it forms part of the corridor assumptions to be assessed.

High level design of the different grade separation options was undertaken and key things to note:

- Given the design requirements, it is assumed that the rail would either need to be raised/lowered across all level crossings given the distance between them or raised/lowered at Walters Road only. However, an alternative solution would be needed for the other remaining crossings.

⁶ The 11-point system is adopted and agreed to be used by all Te Tupu Ngātahi Business Cases.

- Due to the proximity of SH1 rail underpass, it is not possible to have a rail viaduct clear Spartan Road level crossing, thus closure required. Similarly, for a rail trench due to the proximity of the Papakura Stream Spartan Road will need to be closed.
- For both the road bridge and underpass, consideration needs to be given to existing property accesses and interfaces with existing intersections.

Noting the above, the Early Assessment Sifting Tool (EAST) was used to assess the different grade separation forms. The outcome is summarised in **Table 10-3** and indicates:

- The rail trenching/ viaduct were discarded due to construction challenges and risks, and the options being highly disruptive to rail operations. A road underpass (under the rail line) is anticipated to have similar challenges with respect to construction given the peat soil conditions in the area. In addition, there is an element of the need for the level crossings removal or grade separation as soon as possible preferably before City Rail Link (CRL) day one in 2025 due to the excessive barrier downtime anticipated. Thus, implementation timing precludes these options to be feasible within the timeframe. Also, the anticipated affordability and value for money is low.
- Road bridge (road above rail) option is the only option progressed for grade separation.

Table 10-3: EAST assessment outcome

No	Grade Separation Form	Progress/ Discard	Comment
1	Rail Trench (rail under road)	Discard	Although it is perhaps the best outcome in terms of visual effects, it is discarded due to it having the greatest construction complexity and cost given the peat soil conditions. The same challenges are anticipated even if Walters Road is considered in isolation.
2	Rail Viaduct (rail over road)	Discard	Discarded due to construction complexity and risks, implementation timing/duration and low affordability. Significant visual effects and land requirements. The same challenges are anticipated even if Walters Road is considered in isolation.
3	Road bridge (road over rail)	Progress	Achieves the investment objectives and is anticipated to have the least construction complexity and impacts.
4	Road underpass (road under rail)	Discard	Discarded due to construction complexity and risks, implementation timing/duration and low affordability and value for money.

More information may be found in **Appendix C: Options Assessment Report**.

10.5.2.2 Part One: Industrial area assessment

Initial Assessment

Part One of the assessment focussed on providing access to and from the Takaanini industrial area. It considered the area bound by Manuroa Road (southernmost east-west access to the industrial area) and the northern extent of the industrial area (**Figure 10-4**).

With the IBC recommended option forming the basis of the scenarios and only one east-west connection is required to serve the industrial area, both Taka Street and Walters Road remain unchanged from the IBC recommendation for all scenarios. Thus, the assessment focussed on Rangi

Road, Spartan Road and Manuroa Road as the access to the Takaanini industrial area. Conducting the assessment this way helped to isolate the key decision around the industrial area connection.

Three scenarios were assessed and are shown in **Table 10-4**.

Table 10-4 : Part One industrial assessment scenarios

East-West Crossings	Scenarios		
	Scenario 1: IBC Recommended	Scenario 2: No Rangi, No Manuroa	Scenario 3: No Rangi, No Spartan
Alfriston Road (Existing)	Open	Open	Open
Rangi Road	Open	N/A	N/A
Spartan Road	Closed	Open	Closed
Manuroa Road	Closed	Closed	Open
Taka Street	Open	Open	Open
Walters Road	Open	Open	Open

Open – new or existing crossing / bridge for vehicular traffic with active mode facilities.

Closed – existing level crossing removed and existing corridor to be cul-de-sac.

The assessment criteria and scores for each scenario are summarised in **Table 10-5**. **Appendix C** provides details of the full assessment.

Key outcomes from the assessment:

- **Scenario 1** with the Rangi Road viaduct performs well against the investment objectives, transport system integration and user safety criteria. However, it scores moderate to highly adverse for landscape/ visual, urban design, stormwater, and construction. It is also anticipated to have the highest capital and embodied carbon cost of all scenarios.
- **Scenario 2** with Spartan Road does not perform as well as the other scenarios against investment objective two in providing travel choice due to the surrounding land use. It also scored highly adverse for human health and wellbeing due to the diversion anticipated for heavy vehicles impacting residents due to the restriction on right turn from Spartan Road to Great South Road. In addition, this option is not preferred due to operational impacts given its proximity to the Takaanini interchange and would require a complimentary solution such as having Manuroa Road open and/or change the design of Spartan Road to allow a full-movement intersection with Great South Road. Further, a novel structure i.e. such as a spiral bridge as not to interfere with the Takaanini interchange else reconstruction of the SH1 off-ramp will be required to provide a linear bridge. Thus, this presents construction challenges and complexities.
- **Scenario 3** with Manuroa Road performs better overall but is anticipated to have highly adverse impact on human health and wellbeing like Scenario 2. In addition, more industrial traffic will be diverted to use this largely residential corridor, which is expected to be negatively received by the community and stakeholders. Hence, like Scenario 2, this scenario is not preferred in isolation and would require a complementary solution.

Table 10-5 : Summary of Part 1 MCA Assessment

Criteria	Scoring		
	Scenario 1: IBC Recommended	Scenario 2: No Rangī, No Manuroa	Scenario 3: No Rangī, No Spartan
Investment Objective 1: Safety			
Investment Objective 2: Travel Choice			
Investment Objective 3: Resilience			
Investment Objective 4: Access			
Land Use Futures			
Urban Design			
Land Requirement			
Social Cohesion / effects			
Human Health and Wellbeing			
Transport system integration			
User safety			
Ecology			
Historic Heritage			
Landscape / Visual			
Stormwater			
Natural Hazards			
Construction impacts on utilities / infrastructure			
Construction disruption			
Construction costs / risk / value capture			

It is important to remember that this assessment is focussed around providing access to the industrial area with Spartan Road currently providing this function. However, its proximity to the Takaanini interchange and associated banning of right turns out from Spartan Road onto Great South Road means northbound industrial traffic is diverted through existing residential areas. In the long-term, even if Spartan Road was grade separated, this restriction on right turning would remain. This means any solution at Spartan Road would either need a complementary solution, i.e. a second access to the industrial area that allows right turning out to Great South Road, or an acceptance that industrial traffic would use residential routes.

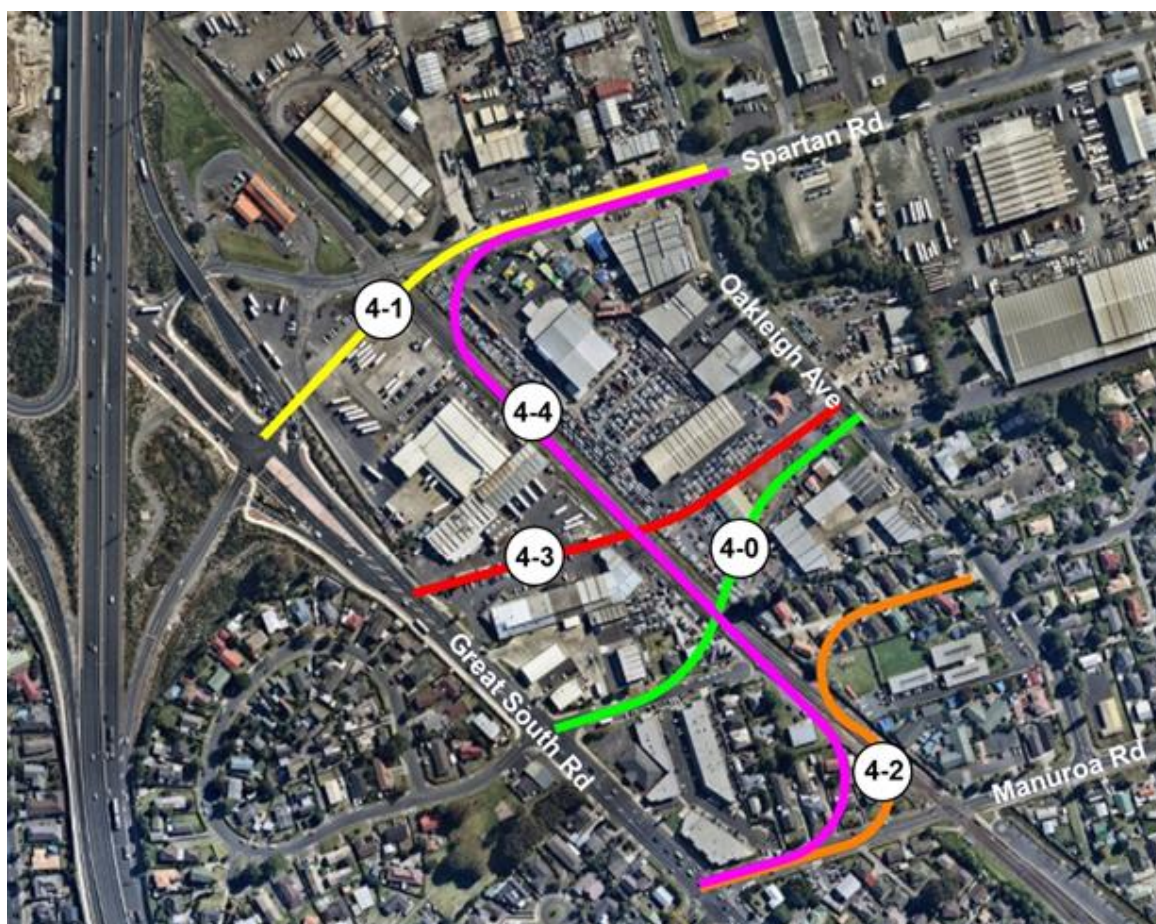
Rangī Road and Manuroa Road as possible alternatives have highly adverse effects that should be avoided as demonstrated through the MCA. **Thus, with no clear preferred option, it was**

considered alternative option/s should be explored before complimentary options to the above scenarios are considered.

Alternative Options

Possible viable alternative options bound between the Papakura Stream and Manuroa Road were explored and are shown in **Figure 10-5**.

Figure 10-5 : Industrial Access Alternative Options



The assessment of the options focused on finding an alternative that would provide the outcomes sought with lesser effects than those identified within the previous scenarios. Thus, the assumptions for the previous scenarios remain i.e Taka Street and Walters Road will be grade separated with the options in **Figure 10-5** forming new scenarios. These were assessed in a similar fashion using the MCA framework.

The assessment criteria and scores are summarised in Table 10-6. Key outcomes from the assessment:

- **Scenario 4-0**, connection using Manuia Road performs the best against the investment objectives. It also performs the best for the transport criteria, transport system integration and user safety. Also, the scenario is anticipated to have only low to very low adverse impacts.
- **Scenario 4-3**, connection from Hitchcock Road to Great South Road performs similarly well against the investment objectives as Scenario 4-0 though scoring slightly less for Investment Objective 3. This is due to Scenario 4-3 being within a closer proximity to the interchange, thus

increasing the likelihood of vehicles queuing back to the interchange and consequently impacting the state highway. It is anticipated to have only low to very low adverse impacts.

- **Scenarios 4-1, 4-2 and 4-4** scores highly adverse in at least one criteria. Scenario 4-1 is anticipated to have high construction disruptions due to the connection to the state highway off-ramp. Scenario 4 -2 restricts and impacts the potential for future rail expansion due to it running parallel to the railway line, thus scores poorly for construction impacts on utilities/infrastructure. This is also applicable for Scenario 4-4 which in addition scores highly adverse for stormwater due to the extensive new pavement required generating large water quality effects.

Table 10-6 : Summary of Part 1 Alternative Options MCA Assessment

Criteria	Scoring				
	4-0	4-1	4-2	4-3	4-4
Investment Objective 1: Safety					
Investment Objective 2: Travel Choice					
Investment Objective 3: Resilience					
Investment Objective 4: Access					
Land Use Futures					
Urban Design					
Land Requirement					
Social Cohesion / effects					
Human Health and Wellbeing					
Transport system integration					
User safety					
Ecology					
Historic Heritage					
Landscape / Visual					
Stormwater					
Natural Hazards					
Construction impacts on utilities / infrastructure					
Construction disruption					
Construction costs / risk / value capture					

The assessment identified **Scenario 4-0** and **Scenario 4-3** will deliver the outcomes sought in providing for industrial traffic without diversion through the residential area. Both also do not have any anticipated highly adverse effects like the other scenarios or the previous scenarios. However, **Scenario 4-0**, connection to Manuia Road being further away from the Takaanini interchange will provide greater network resilience and have greater traffic benefits. **Thus, Scenario 4-0 is the preferred scenario.**

Summary of Part One Assessment

The initial Part One assessment identified that grade separating at the existing east-west crossing locations as a primary access to the industrial access had undesirable effects that should be avoided. Hence, alternative locations were explored and the preferred option was a new connection via Manuia Road.

Table 10-7 shows the MCA outcomes for the initial scenarios assessed and for the preferred alternative option, Manuia Road (henceforth, referred to as Scenario 4 for simplicity).

Key outcomes from the assessment:

- Scenario 4 performs equally as well as Scenario 1 against the investment objectives and only slightly less in Transport criteria.
- Scenario 4 had no criteria scoring in the moderate to high adverse effects unlike Scenarios 1 to 3. This has mainly been attributed to the smaller structure required than say Scenario 1 and being able to provide for a full movement intersection with Great South Road which removes the industrial traffic away from the residential areas.
- Any adverse impacts for Scenario 4, such as landscape/visual have the opportunity to be improved through mitigations which can be explored in the route refinement stage.

The assessment of all four scenarios were presented to Manawhenua and they had concerns around the visual effects of the new bridges and the treatment of Manuroa Road is of interest. However, they have also indicated a level of comfort with the Manuia Road crossing (Scenario 4) as long as there are ways to make incremental improvements as the design develops.

Based on the assessment and feedback, **the emerging preferred is Scenario 4, Manuia Road.**

Table 10-7 : Part One Assessment Summary

Criteria	Scoring			
	Scenario 1: IBC Recommended	Scenario 2: No Rangi, No Manuroa	Scenario 3: No Rangi, No Spartan	Scenario 4: Manuia Road
Investment Objective 1: Safety				
Investment Objective 2: Travel Choice				
Investment Objective 3: Resilience				
Investment Objective 4: Access				
Land Use Futures				
Urban Design				
Land Requirement				
Social Cohesion / effects				

Human Health and Wellbeing				
Transport system integration				
User safety				
Ecology				
Historic Heritage				
Landscape / Visual				
Stormwater				
Natural Hazards				
Construction impacts on utilities / infrastructure				
Construction disruption				
Construction costs / risk / value capture				

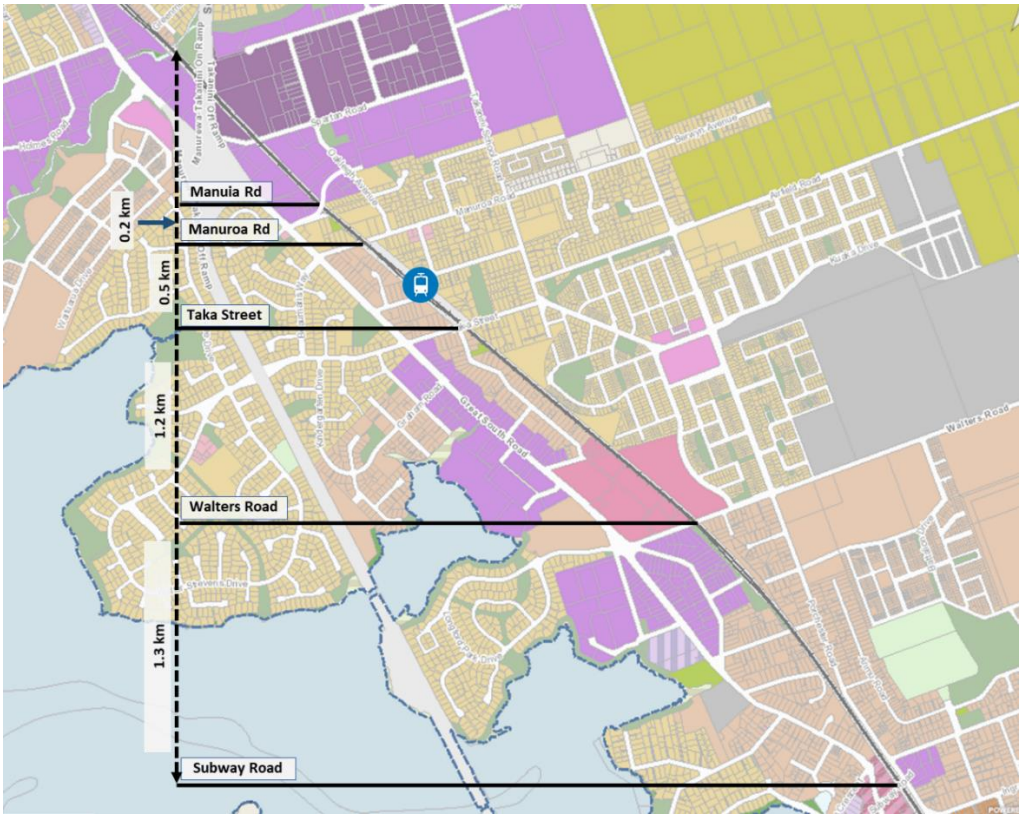
10.5.2.3 Transport Network Review

The Part One assessment identified Manuia Road as the preferred connection for the industrial area which differs from the IBC recommended network, i.e. Rangī Road viaduct has been replaced by Manuia Road as the preferred connection to the industrial area. Hence, to understand the effect of this, especially in relation to the transport network south of the industrial area, a transport network review was completed. This revisited the remainder of the IBC recommended option to understand whether closing Manuroa Road and keeping both Walters Road and Taka Street were still relevant in providing for the required east-west connectivity.

- The distance between Walters Road and the adjacent east-west crossing across the NIMT is 1.3km to the south at Subway Road and 1.2km to the north at Taka Street. Removing Walters Road from the network will result in a significant gap in the east-west connectivity (refer to **Figure 10-6**).
- Tironui Road pedestrian level crossing located approximately 300m south of Walters Road will be removed as part of AT's pedestrian level crossing programme. Walters Road is planned to be the alternative route for active mode users.

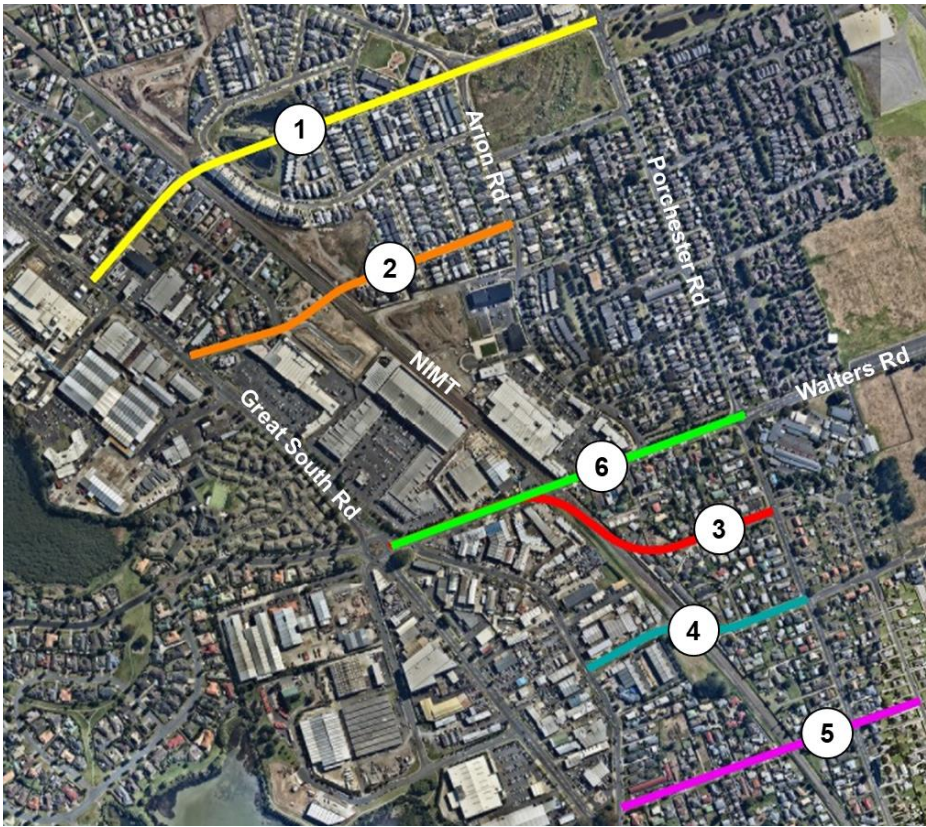
Thus, it was established that an east-west crossing between Taka Street and Subway Road is required for optimum east-west accessibility for the community. Though if the connection is too close to Taka Street or Subway Road then there will still be a significant gap. Hence, a connection will be required between Taukari Road/Beach Street and Waterview Road for optimum connectivity.

Figure 10-6 : East-west crossings on the network



Possible viable options bound between Taukari Road/ Beach Street and Waterview Road were explored as shown on **Figure 10-7**.

Figure 10-7 : Options between Taka Street and Subway Road



These options were then assessed against the MCA framework and the outcome of the assessment is shown in **Table 10-8**.

Key outcomes from the assessment:

- **All options** perform well against the investment objectives as grade separation will improve safety, provide travel choice benefits through dedicated walking and cycling facilities and increased network resilience. **Option 3 and 6** performs best against the access investment objective as all other options reduces the connectivity to the Town Centre on Walters Road severing neighbourhood connectivity.
- **All options** are anticipated to have high adverse impact for construction costs/risk / value capture due to the potential construction complexity. However, it is anticipated the effect may be mitigated through further design refinements.
- Similarly, **all options** are anticipated to have high adverse impact for natural hazards due to the peat ground conditions and anticipated settlement. However, this is also anticipated to be able to be mitigated.
- **Option 1** is anticipated to have very high adverse impact on stormwater as it will pass through two newly constructed wetlands that are designed to manage the runoff from nearby residential dwellings. This is the only option anticipated to have such significant impact and is discarded on this basis.
- **Option 2, 4 and 5** are not preferred as options are anticipated to have high adverse effect on human health and wellbeing due to additional traffic being diverted through residential areas. This can be avoided with Options 3 and 6.
- **Options 3 and 6** are anticipated to have similar benefits and effects due to both providing access to the Town Centre on Walters Road and minimises diversion through residential areas. However, Option 6 will better integrate with the transport system being an existing road and thus less human health and wellbeing effects and stormwater impact due to less new pavement required. It is also preferred from an urban design perspective as it is better aligned with the surrounding land use and potentially provides a stronger and legible east-west link.

Thus, on balance, Option 6, using the existing Walters Road alignment was the preferred option.

Table 10-8 : Summary of Options MCA Assessment

Criteria	Scoring					
	1	2	3	4	5	6
Investment Objective 1: Safety						
Investment Objective 2: Travel Choice						
Investment Objective 3: Resilience						
Investment Objective 4: Access						
Land Use Futures						
Urban Design						

Criteria	Scoring					
	1	2	3	4	5	6
Land Requirement						
Social Cohesion / effects						
Human Health and Wellbeing						
Transport system integration						
User safety						
Ecology						
Historic Heritage						
Landscape / Visual						
Stormwater						
Natural Hazards						
Construction impacts on utilities / infrastructure						
Construction disruption						
Construction costs / risk / value capture						

10.5.2.4 Part Two: Area south of the industrial area

The Part One assessment and the transport review assessment has identified Manuia Road and Walters Road as two of the three east-west connections required. Manuia Road will serve the Takaanini Industrial area and Walters Road forms the southernmost crossing (within the scope of this project). Hence, a crossing in between the two that services the area south of the industrial area forms the basis of the Part Two assessment.

Taking the same approach as the Part One assessment, Scenario options were developed for the combination of replacement and/or closure of Manuroa Road and Taka Street (Table 10-9). The assumptions noted for the Part One assessment are applicable for this assessment.

Table 10-9 : Scenarios for Part Two assessment

East-West Crossings	Scenarios		
	Scenario 5: Manuroa Road Only	Scenario 6: Taka Street Only	Scenario 7: both Manuroa and Taka
Alfriston Road (Existing)	Open	Open	Open
Rangi Road	N/A	N/A	N/A
Spartan Road	Closed	Closed	Closed
Manuia Road	Open	Open	Open

East-West Crossings	Scenarios		
	Scenario 5: Manuroa Road Only	Scenario 6: Taka Street Only	Scenario 7: both Manuroa and Taka
Manuroa Road	Open	Closed	Open
Taka Street	Closed	Open	Open
Walters Road	Open	Open	Open

The assessment criteria and scores for each scenario are summarised in **Table 10-10**. The MCA assessment findings summary is shown in **Table 10-10**.

Key outcomes from the assessment:

- **Scenario 7** scores the best in the Transport criteria and well in the investment objectives. However, it is also anticipated to have the greatest adverse effect given two bridge structures will be required. This includes enabled and embodied carbon as with more road capacity provided, the more traffic is induced.
- **Scenario 5** is the least preferred from an investment objective perspective especially around resilience due to its proximity to the Manuia Road intersection. This could impact intersection operations with the potential of impacting the Takaanini interchange.
- **Scenario 6** scores more favourably than Scenario 5 against the investment objectives and is the preferred scenario for Land Use Futures and Social Cohesion criteria. This is anticipated to have less land requirements and the least adverse effects of all three scenarios.

The scenarios were presented to Manawhenua for feedback, and it is noted that none of the options were preferred. However, Ngā Manawhenua acknowledged that Scenario 6 would be the most sensible to be further explored.

Thus, **Scenario 6 of having Taka Street open forms the emerging preferred option.**

Table 10-10 : Summary of Assessment for Part Two assessment

Criteria	Scoring		
	Scenario 5: Manuroa Road Only	Scenario 6: Taka Street Only	Scenario 7: both Manuroa and Taka
Investment Objective 1: Safety			
Investment Objective 2: Travel Choice			
Investment Objective 3: Resilience			
Investment Objective 4: Access			
Land Use Futures			
Urban Design			
Land Requirement			

Criteria	Scoring		
	Scenario 5: Manuroa Road Only	Scenario 6: Taka Street Only	Scenario 7: both Manuroa and Taka
Social Cohesion / effects			
Human Health and Wellbeing			
Transport system integration			
User safety			
Ecology			
Historic Heritage			
Landscape / Visual			
Stormwater			
Natural Hazards			
Construction impacts on utilities / infrastructure			
Construction disruption			
Construction costs / risk / value capture			

10.5.2.5 Active Mode Connections

The emerging preferred option from the assessments is Scenario 6. With this, Spartan Road and Manuroa Road will be fully closed with no connection for any mode. It was considered that there may be merit in exploring whether active mode connections should be provided at these locations given the investment objective includes both travel choice and accessibility.

A transport assessment was undertaken which explored several factors to understand the need for the connections. This included an understanding of the spacing between the east-west active mode connections with both Spartan Road and Manuroa Road included and excluded as per that shown in **Figure 10-8**.

The assessment concluded that there is a strong case for **providing east-west active modes connection at both Spartan Road and Manuroa Road** for the following reasons.

At Spartan Road given:

- It is expected that walking and cycling demand will increase on Spartan Road, contingent on the development of the industrial zone surrounding Spartan Road. The active modes connection will provide access to jobs in the future, given the expected increase in jobs in the Takaanini industrial area.
- The policy context regarding climate change provides clear support for the provision of active modes where possible. This east-west connection will accommodate the anticipated uptake of active modes and/or encourage people to shift to active modes.
- Route distances are impacted for those travelling north from the industrial area when Spartan Road is closed in the network. Diverted routes are approximately 600m longer for those travelling north. There are no other active mode connections north of Spartan Road in the industrial area, and south of the Papakura Stream. Hence, the Papakura Stream acts as a barrier for active modes users travelling to and from the north. This emphasises the importance of the need for an east-west connection at Spartan Road to access places such as Te Mahia Station.
- Providing a connection at Spartan Road will increase active mode permeability across the southern rail line in the Takaanini network. This connection is also in between Te Mahia and Takaanini train station, hence, has the opportunity to increase commuter trips to rail.
- An active mode bridge replacement is needed to mitigate the effects of the approximately 600m diversion required for active mode users resulting from the level crossing closure at this location.

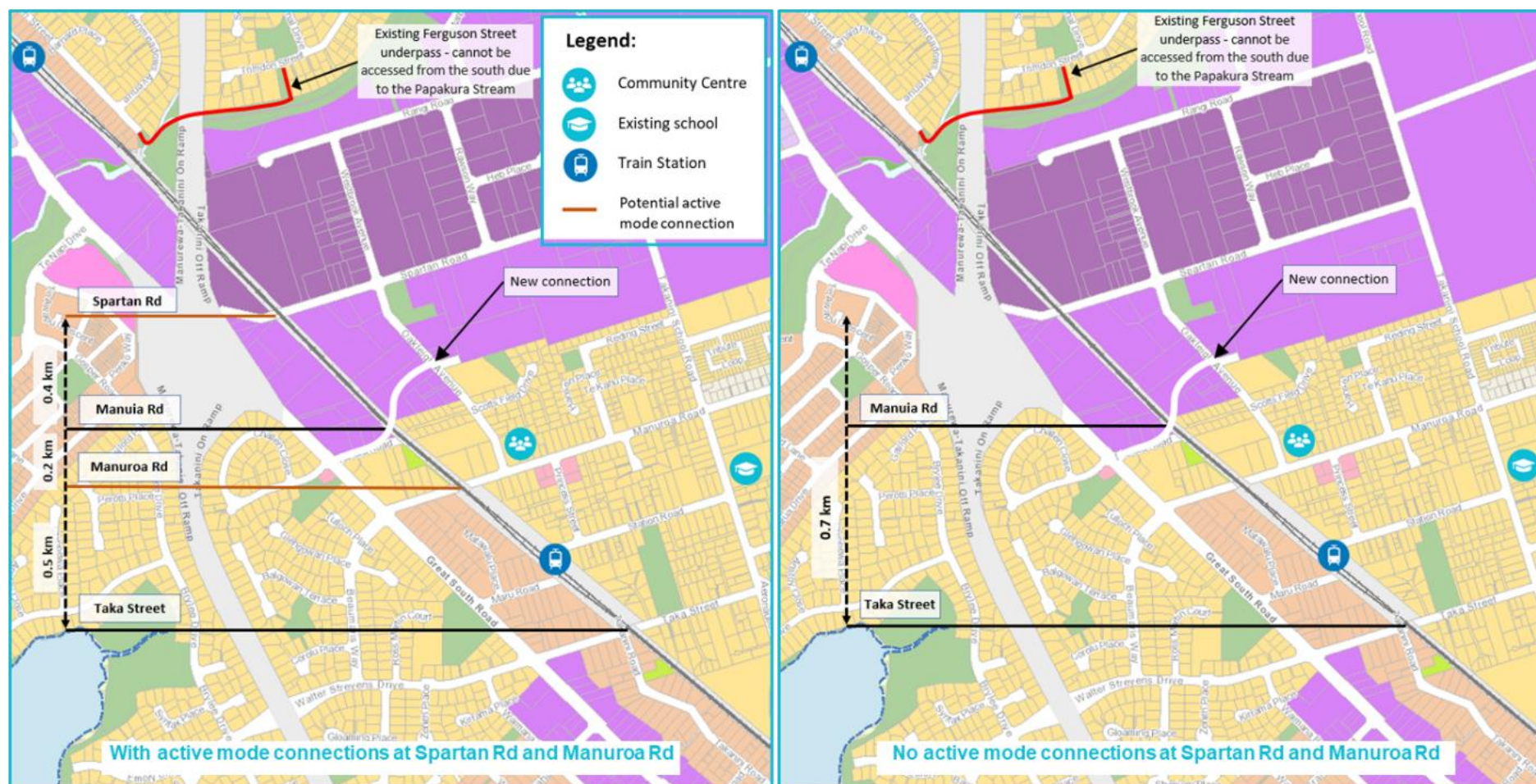
At Manuroa Road given:

- This connection will increase active mode permeability across the southern rail line in the Takaanini network. Manuroa Road is also in proximity to local and key destinations in the vicinity such as:
 1. Takaanini School
 2. Takaanini Train Station
 3. Neighbourhood centre: post shop, dairy, local supermarket, laundromats etc
 4. Community centre/ church
- The policy context regarding climate change, provides clear indication for the provision of active modes where possible. This east-west connection will accommodate the anticipated uptake of active modes and/or encourage people to shift to active modes.

- In the likely instance where there is no east-west through connection via Takaanini Station, there is expected to be longer diversion routes for pedestrians and cyclists travelling north and south from Manuroa Road if there is no east-west connection provided here. These diversion routes are 300m to 500m longer.
- Current pedestrian and cyclist data show that people are using the existing Manuroa Road east-west connection to cross over the rail line. It is expected that walking and cycling demand will increase in the future, especially given evolving land use decisions on intensification around stations with the NPS:UD and MDRS. Hence this east-west connection plays a critical role for access in the future network.
- An active mode bridge replacement is needed at this location to mitigate the effects of the 300m to 500m diversion for active mode users resulting from the level crossing closures at this location.

More details on the assessment may be found in **Appendix C: Options Assessment Report**.

Figure 10-8 : East-west active mode connections with both Spartan Road and Manuroa Road included and excluded



10.5.2.6 Emerging preferred network

The emerging preferred network which was confirmed with owners and stakeholders is shown in **Figure 10-9**. The main difference between this and the IBC recommended option is Rangī Road is no longer part of the network. Manuia Road will instead provide access to the Takaanini Industrial area.

Figure 10-9 : Emerging Preferred network



10.5.3 Route Refinement

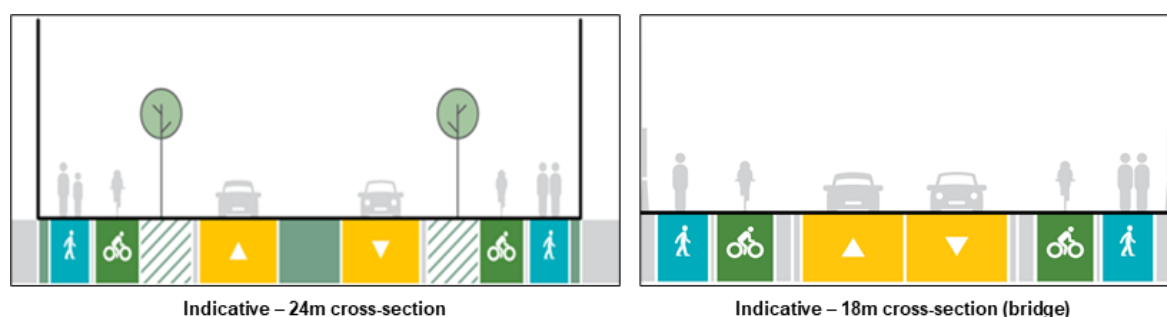
The following sections details the route refinement process undertaken for the emerging preferred option. Route refinement considers the refinement of alignment variations to avoid identified constraints where possible. As part of the route refinement process, corridor and intersection assessments were undertaken which are detailed below.

10.5.3.1 Corridor Assessment

The Corridor Form and Function (CFAF) process was used for the purpose of defining a desired cross-section for the identified east-west cross sections. As part of this process SMEs were consulted for endorsement allowing for high engagement and design efficiency.

The assessment has indicated a two-lane corridor with the following proposed future cross-sections for all corridors as shown in **Figure 10-10**.

Figure 10-10 : Indicative Cross-Sections



Details of the RSAF and CFAF assessment may be found in **Appendix G: Transport Outcomes Report**.

10.5.3.2 Intersection Assessment

In parallel to the CFAF, a process was undertaken to identify the likely future intersection form and function of intersections for the emerging preferred. The purpose of this process was to identify the indicative intersection controls and subsequent footprint implications. It is noted that the final decision on the form and control of the intersections could be modified when further land use certainties are known at time of implementation.

Table 10-11 shows the intersections analysed as part of this DBC. Note that as Great South Road is part of the FTN route within the FTN DBC, intersections such as Great South Road and Manuroa Road will be captured there instead as the works required will be mostly related to the FTN.

Further details of the assessment may be found in **Appendix G: Transport Outcomes Report**.

Table 10-11 : Takaanini Level Crossings Indicative Intersection Forms

Intersection	Recommendation	Comment
Manuia Road (new connection)		
Great South Road/ Manuia Road	Signalised intersection	Connected Communities is proposing to signalise this intersection.
Manuia Road/ Oakleigh Avenue/ Hitchcock Road	Single lane roundabout	New intersection with Hitchcock Road
Walters Road		
Walters Road/ Arion Road	Retain existing signalised intersection	Adjacent commercial and residential land use
Walters Road/ Great South Road	Will remain as a roundabout and will be assessed as part of the FTN DBC given bus priority measures are required.	
Tironui Road/ Walters Road	Left in left out	Located approximately 40m from the Walters Road roundabout. Provides access to the industrial/ commercial area.
Taka Street		
Taka Street/ Great South Road	Will remain as a signalised intersection and will be assessed as part of the FTN DBC given bus priority measures are required.	
Taka Street/ Kauri Heart Ave	Retain existing single lane roundabout	This is a recently upgraded intersection and physical works for the level crossings will end prior to the intersection.
Manuroa Road		
Manuroa Road/ Great South Road	Will remain as a signalised intersection and will be assessed as part of the FTN DBC given bus priority measures are required.	
Manuroa Road/ Oakleigh Ave	Retain priority intersection	The cul-de-sac works of Manuroa Road will mean less traffic will use this intersection, as such no works are proposed at this intersection.
Spartan Road		
Spartan Road/ Great South Road	Will remain as a signalised intersection and will be assessed as part of the FTN DBC given this will be more impacted by FTN works.	
Spartan Road/ Westbrook Ave	Retain priority intersection	The cul-de-sac works will mean less traffic will use this intersection, as such no works are proposed at this intersection.

10.5.4 Emerging Preferred Option Development

The corridor and intersection form and function specifies the requirements for the emerging options to be further designed. The design considered included the consideration of:

- Vertical alignment
- Horizontal alignment
- Property access – in particular driveway access for existing corridors

Full details of the design process, assumptions and decisions are detailed in **Appendix H: Design Report**.

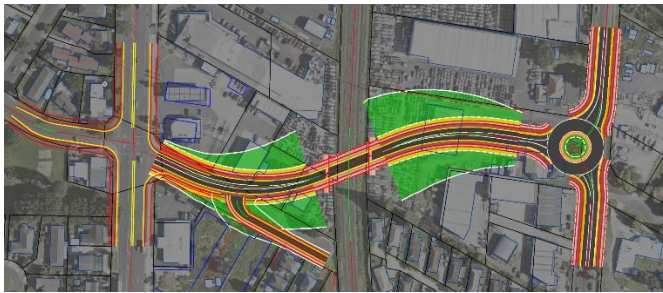
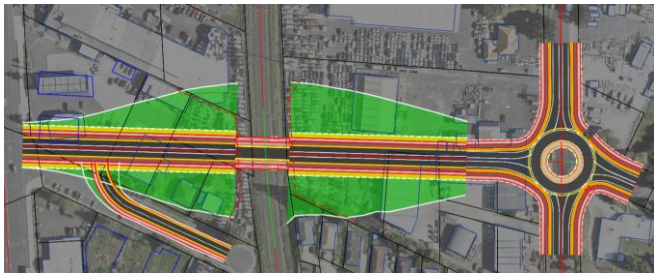
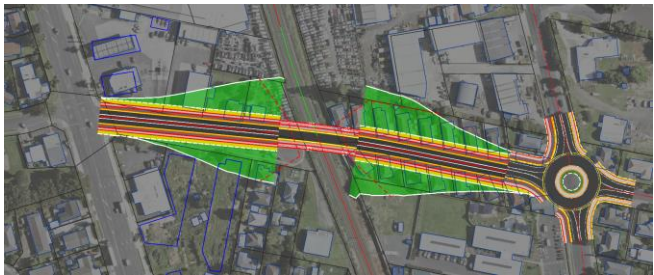
Options for each corridor were explored and assessed by the Project Team, and specialists where required. The same MCA framework was adopted for assessment with details provided in the following sections.

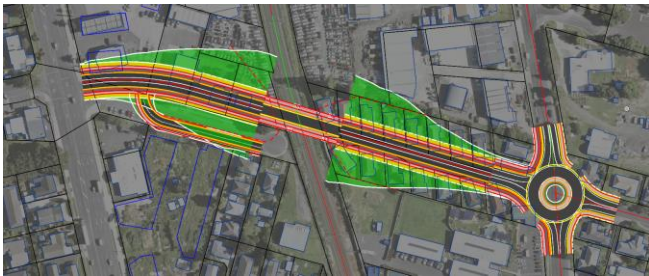
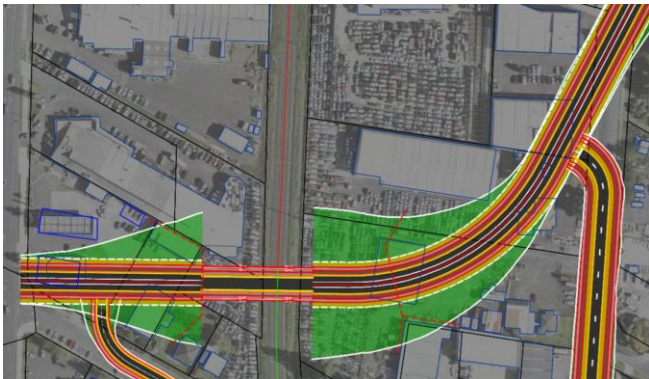
10.5.4.1 Manuia Road

With Manuia Road being a new connection between Great South Road and Oakleigh Avenue, a number of different alignments were explored that had differing impacts. All options assume the same cross-section and intersection forms as per the form and function assessments.

The options are summarised in **Table 10-12**.

Table 10-12 : Manuia Road Route Refinement Options

Option	Design	Description
1		Maximise use of existing Manuia Road and intersection form with GSR. High skew structure crossing of NIMT. Bridge length of approximately 35m.
2		Realigns intersection with GSR to safer form. Tie in with existing intersection with Hitchcock Road (to be changed to roundabout). Access provided to existing properties on southern side of Manuia Road. Bridge length of approximately 30m.
3		Maximise use of existing Manuia Road and intersection form with GSR. Tie in with Portrush Lane and existing intersection with Scotts Field Dr (to be changed to roundabout). Removes access to all existing properties on Manuia Road. High skew structure crossing of NIMT. Bridge length of approximately 35m.

Option	Design	Description
4		High skew structure crossing of NIMT. Realigns intersection with GSR to safer form. Tie in with Portrush Lane and existing intersection with Scotts Field Dr (to be changed to roundabout). Access provided to existing properties on southern side of Manuia Road. Bridge length of approximately 35m.
5		Transport oriented alignment prioritising industrial movement to/from NE. Realigns intersection with GSR to safer form. Access provided to existing properties on southern side of Manuia Road. Bridge length of approximately 30m.

These were assessed using the MCA framework and the findings are shown in **Table 10-13**.

The key outcomes from the assessment are:

- All options scores favourably against the investment objectives as they are expected to provide similar outcome and there are no real differentiating factors.
- **Option 2** is anticipated to provide the greatest benefit. It scores the best for urban design and user safety due to it being the most direct and legible option. It will also provide a clear delineation between industrial and residential land use. The option scores will have low adverse impact for construction costs/risk/value capture as opposed to moderate adverse impact for all other options.
- **Options 3 and 4** are anticipated to have the greatest land requirements with no real additional benefits when compared with the other options.
- **Option 5** is expected to have the worst urban design outcomes due to its lack of legibility, severance of industrial land and large residual parcels. It is also anticipated to have the greatest ecological effect as it could impact the ecological features adjacent to Oakleigh Ave and Hitchcock Road.

Thus, Option 2 is identified as the preferred option/alignment for Manuia Road as it is anticipated to provide the greatest benefits the least impacts.

Table 10-13: Summary of Manuia Road route refinement MCA assessment

Criteria	Scoring				
	1	2	3	4	5
Investment Objective 1: Safety					
Investment Objective 2: Travel Choice					
Investment Objective 3: Resilience					
Investment Objective 4: Access					
Land Use Futures					
Urban Design					
Land Requirement					
Social Cohesion / effects					
Human Health and Wellbeing					
Transport system integration					
User safety					
Ecology					
Historic Heritage					
Landscape / Visual					
Stormwater					
Natural Hazards					
Construction impacts on utilities / infrastructure					
Construction disruption					
Construction costs / risk / value capture					

10.5.4.2 Taka Street and Walters Road

Identifications of constraints were undertaken prior to exploring potential alignment variations for the grade separation of Taka Street and Walters Road.

This identified for Walters Road:

- **Eastern side of the rail line** – The southern side is predominantly residential whereas the northern side has a large shopping complex. This shopping complex should be avoided where possible to minimise the associated property risks and impact on community amenity. The existing intersections of Arion Road and Braeburn Place need to be carefully considered to ensure adequate access is maintained.
- **Western side of the rail line** – both sides of Walters Road are commercial land uses including a childcare centre, Carters, and car service centres. Thus, there is no strong argument to avoid a specific commercial business over another but noting that adequate access will need to be provided if impacted.

For Taka Street:

- **Eastern side of the rail line** – Predominantly residential with a number of long driveways that services a group of properties. There is the Takanini Reserve on the northern side adjacent to Cathy Lane. Access to properties needs to be considered.
- **Western side of the rail line** – Mixed residential and commercial properties including a care centre and childcare centre on opposite sides. Access to properties needs to be considered. Takaanini Road needs to be carefully considered to ensure adequate access is maintained.

Following on from the constraints analysis, alignment variations to gain enough clearance for the bridge to cross the rail line were considered between the following locations:

- Walters Road – Great South Road and Porchester Road
- Taka Street – Great South Road and Takaanini School Road

The project team considered that there was no strong evidence to develop ‘off-line’ variations i.e. shifting the existing road alignment north or south as:

- An ‘on-line’ option using the existing road alignment could avoid/ mitigate some of the constraints identified.
- Deviation from the existing road alignment would be more disruptive especially from a property perspective.
- Deviation from the existing road alignment would be more complex to construct as it would require a non-linear alignment to tie back into the existing straight road.

Thus, ‘on-line’ options were developed for Taka Street and Walters Road as shown in **Figure 10-2** and **Figure 10-12**.

Figure 10-11 : Taka Street 'online' option



Figure 10-12: Walters Road 'online' option



10.5.4.3 Manuroa Road and Spartan Road

The closure of the level crossings at Manuroa Road and Spartan Road will require cul-de-sacs on either side of the rail line. In addition, active mode bridge connections are proposed at both locations.

The cul-de-sacs are designed as per the AT TDM standards and design of the active mode connections allow the flexibility of either a bridge or underpass to be implemented at a future date at Spartan Road, and a bridge with stairs or lifts at Manuroa Road. An underpass would not be suitable at Manuroa Road due to it being in a flood plain and in poor ground conditions (peat soils). The location and flexibility requirements in the design of these crossings have been discussed and agreed with AT.

The location for the cul-de-sac and active mode connection at Spartan Road considered where there may be less property impacts such as avoiding buildings where possible. For Manuroa Road, consideration was given to integrating with the Takaanini Train Station which sits on the southern side.

Figure 10-13 and **Figure 10-14** below shows the designations at Spartan Road and Manuroa Road, respectively. It is worth noting that there is flexibility in the designation shown and in the future design phase of the project, the area shown may be minimised through value engineering.

Figure 10-13 : Spartan Road designation for cul-de-sac and active mode connection

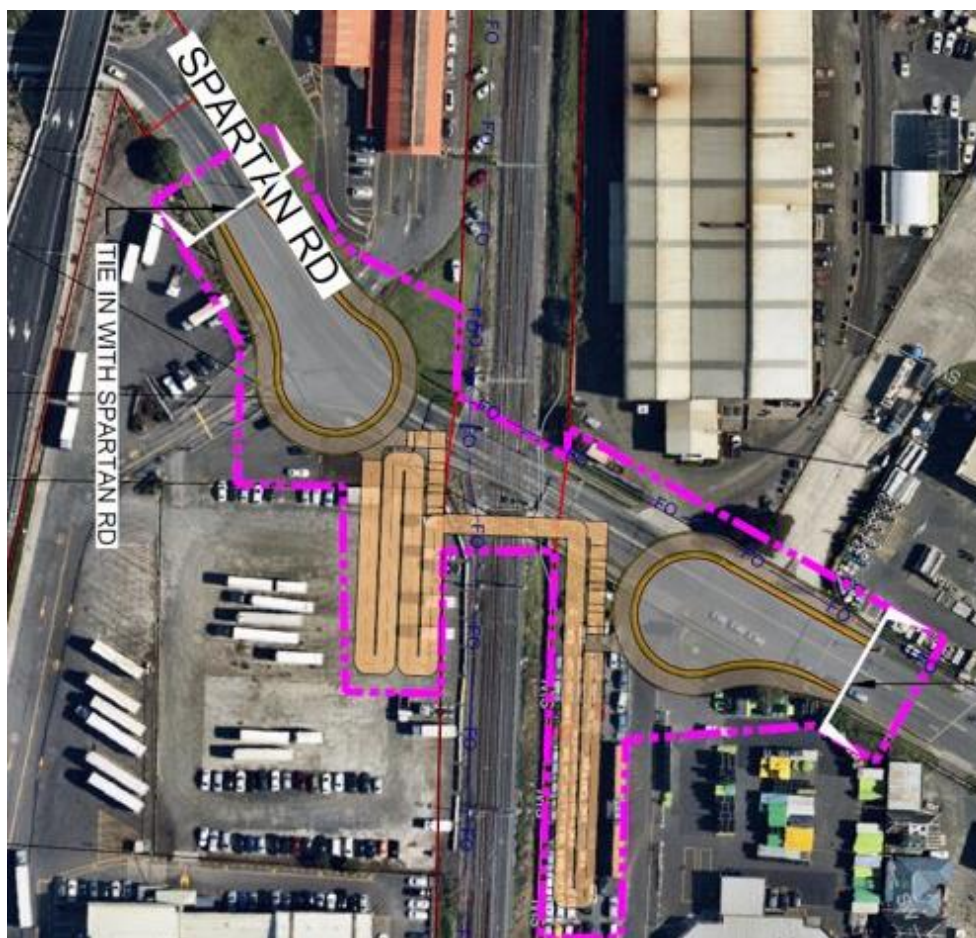
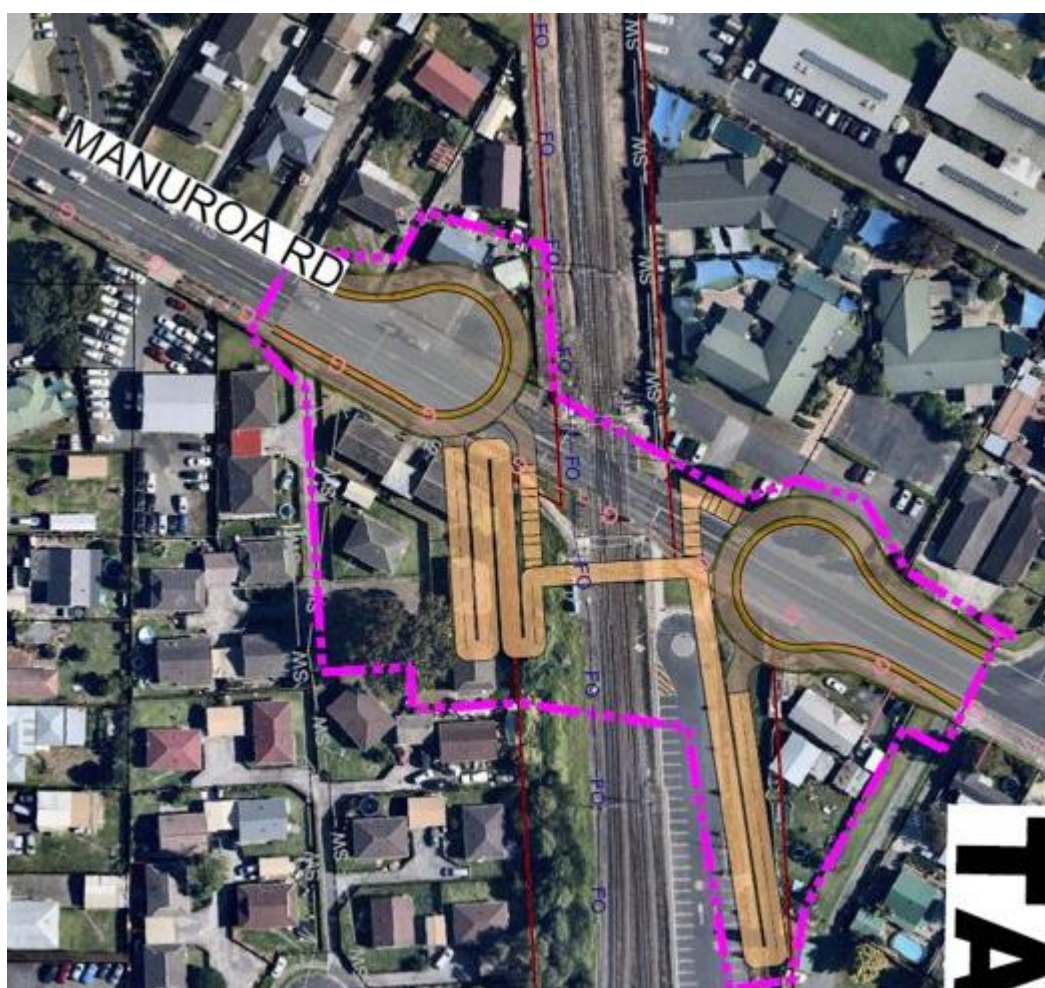


Figure 10-14: Manuroa Road designation for cul-de-sac and active mode connection



10.5.5 Further options assessment

Following feedback received from the community, owners and project partners, a more detailed assessment was undertaken for a road underpass. The assessment focussed on Walters Road as an initial sieve to understand whether there is merit in pursuing this further for other corridors.

Figure 10-15 and **Figure 10-16** shows indicative designs of a bridge and underpass at Walters Road, respectively.

Figure 10-15 : Walters Road bridge



Figure 10-16: Walters Road underpass



The MCA framework was used for assessment and the scoring is summarised in **Table 10-14**. The key outcomes from the assessment:

- Both options perform similarly against the **investment objectives** with the assumption that groundwater management and flood pumping will be in place for the underpass. However, there is a likelihood that the system may malfunction and as such the bridge is preferred from a network resilience perspective. Albeit this may be rare thus does not change the scoring for investment objective 3
- **Urban Design** – The bridge option was preferred under this criterion on the basis that an underpass would be a poorer outcome for active modes in terms of CPTED and perceived threat/personal risk concerns associated with undergrounding. Note that a bridge was scored

neutrally given the adverse interface impacts of a bridge structure at a localised scale are balanced out by the positive effect of east-west connectivity and overcoming severance at a macro scale.

- **Landscape and Visual** – The underpass option was preferred under this criterion on the basis that it would have significantly reduced visual impacts in the context of the commercial, industrial, and residential surroundings compared with a bridge.
- **Stormwater** – The bridge option was preferred under this criterion on the basis that an underpass would require groundwater management (seepage pumping) and flood pumping in all events exceeding the capacity of existing stormwater infrastructure. Additional investigation also notes the greater risk associated with an underpass as any dewatering is likely to result in risk of consolidation settlement of the surrounding area and buildings due to the soft soils such as peat. To address this risk, the designation will likely be greater.
- **Natural Hazards** – The bridge option was preferred under this criterion on the basis that the high groundwater table and deep soft peat ground conditions present significant construction challenge and risk for an underpass. The ground is susceptible to settlement if loaded or if the groundwater is lowered, which in turn may impact on existing structures and services surrounding the site. Moreover, the walls required by an underpass option will create a permanent barrier for groundwater seepage flow.
- **Construction impacts on utilities/infrastructure** – The bridge option was preferred under this criterion on the basis that an underpass would necessitate relocation of an existing stormwater pipe, local utilities, and a fibre cable not otherwise required by a bridge.
- **Construction disruption** – The bridge option was preferred under this criterion on the basis that an underpass would take longer to construct on the basis that staged construction would be needed to maintain rail operations, and that ground settlement associated with an underpass could necessitate releveling of rail lines. The releveling of the rail lines has the potential to impact the rail operations during construction.
- **Construction costs/risk** – The bridge option was preferred under this criterion on the basis that high groundwater table and deep soft peat ground conditions present significant construction challenge and risk for an underpass. An underpass would require cut-off walls along both sides of the excavation to prevent groundwater drawdown/ground settlement, and that the walls would necessitate staged construction to maintain rail operations (and potentially releveling of rail lines in the event of ground settlement). Moreover, the completed structure would be below the groundwater table and therefore buoyant, thus requiring anchoring in place.

Table 10-14 : Walters Road options MCA Summary

Criteria	Scoring	
	Bridge	Underpass
Investment Objective 1: Safety		
Investment Objective 2: Travel Choice		
Investment Objective 3: Resilience		
Investment Objective 4: Access		
Land Use Futures		

Criteria	Scoring	
	Bridge	Underpass
Urban Design		
Land Requirement		
Social Cohesion / effects		
Human Health and Wellbeing		
Transport system integration		
User safety		
Ecology		
Historic Heritage		
Landscape / Visual		
Stormwater		
Natural Hazards		
Construction impacts on utilities / infrastructure		
Construction disruption		
Construction costs / risk / value capture		

Further to the assessment, indicative cost estimates were undertaken. Depending on the construction methodology, it is anticipated that an underpass could be up to 4 times more expensive than a bridge. This is a very high-level estimate based on an indicative design. Geotechnical investigations will need to be undertaken to provide more certainty around ground conditions which will be able to better inform the complexity, extent of works required and a more accurate cost estimate. Notwithstanding, the underpass option is still anticipated to have greater risks, costs, and effects.

Given the Takaanini area has similar ground conditions (peat soil), it is anticipated the same effects and risks is applicable at Taka Street also. Thus, there is little merit in pursuing the underpass option further and confirms a bridge is the recommended grade separation option.



Recommended Option

11 Recommended Option

The recommended option is as per that shown in **Figure 10-9** above and is summarised below:

- The project is no longer recommending a new grade separated crossing/viaduct at **Rangi Road**, as initially recommended in the IBC.
- A new grade separated bridge connection is proposed between **Manuia Road** and Oakleigh Avenue/ Hitchcock Road. The connection will provide direct access to the Takaanini industrial area.
- Existing at grade level crossings at **Spartan Road** and **Manuroa Road** will be fully closed to vehicular traffic but will be replaced by grade-separated active mode bridges.
- Existing at grade level crossings at **Taka Street** and **Walters Road** will also be closed but will be replaced by grade separated bridges which will accommodate all modes.
- Separated walking and cycling facilities will be provided in the bridge footprint at the location where a grade separated crossing is recommended i.e., Manuia Road, Taka Street and Walters Road.

The recommended option will:

- Contribute towards a transport network that is free from deaths and serious injuries through the removal of level crossings which are inherently unsafe.
- Promote and encourage the uptake of low carbon transport modes by enabling increased rail capacity and reliability for trains and buses and through providing for a safe, dedicated active mode facilities over the rail line.
- Improved economic prosperity in increased accessibility and network resilience including freight.

Appraisal Summary Table (AST) for the recommended option is included and can be found in **Appendix K: Economic Assessment**.

11.1 Key performance indicator outcomes

The following key outcomes shown in Figure 11-1 can be achieved by investing in the recommended network. Additional details may be found in **Appendix G: Transport Outcomes Report**.

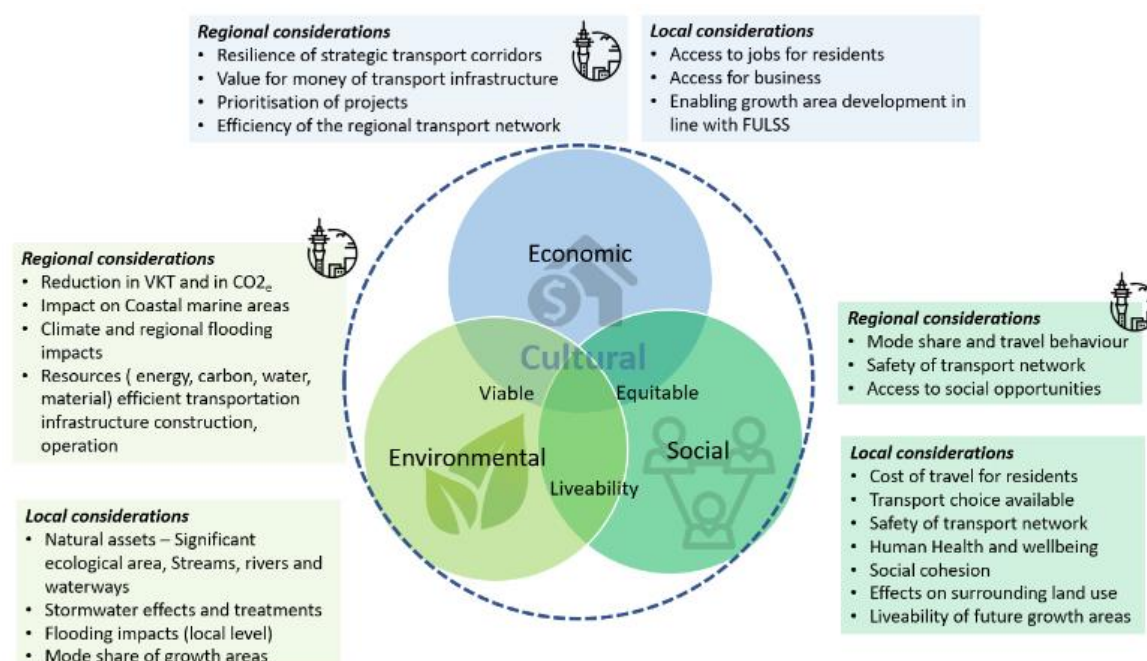
Figure 11-1: Outcomes for the Takaanini Level Crossings recommended network

Overall investment outcomes for the Takaanini Level Crossings recommended transport network (2048+)					
Outcomes achieved		Alignment			
Safety	Provide improvements at level crossings that contribute to a transport network that is free from deaths and serious injuries	 Removes 4 level crossings in Takaanini 94 DSIs estimated to be saved over 40 years	 3 new and improved multi-modal east-west connections with safe and separated cycle facilities	 2 new safe active mode connections	
Resilience	Support network resilience for Takaanini and improved reliability for the southern rail line.	 Reduction in level crossing fault incidents. Reduction on impact on rail passenger travel time.	  Improvement in travel time reliability. Reduction in travel time spread to 19 minutes.		
Climate Change	Provide a transport network that reduces reliance on cars and supports mode shift.	 7,090 tonnes reduction of CO ₂ per year. 182,800 tonnes reduction of CO ₂ over 40 years.	  134,900 less vehicle kilometres travelled daily		
Contribution to outcomes					
Travel Choice	Support mode share by improving active mode facilities and rail capacity.	 38% Public transport mode share for trips from Takaanini to north of Manurewa (AM peak)	 Supports rail projects to enable increased train frequency in the future	 26% walk and 1 % cycle for Takaanini local trips (AM peak) 2,600 daily active mode trips across the east-west connections	
Access	Improve east-west connections to enable access to economic and social opportunities.	 336,400 jobs accessible within 45 minutes by PT	 14,700 additional jobs accessible within 45 minutes from west Takaanini by walking	 420,800 jobs accessible within 45 minutes by car	

11.2 Sustainability outcomes

The development of the recommended network has been based around the three sustainability principles introduced in Section 6.3 and are shown in Figure 11-2.

Figure 11-2 : Sustainability principles



11.2.1 Climate change assessment

The Te Tupu Ngatahi intervention framework as detailed in Section 6.4 was applied during the options assessment of this DBC. The project was considered against all three elements of the Eliminate-Reduce-Optimise framework which has influenced the recommended option. A summary of the resulting applicable investigations for the level crossings and the DBC response is shown in Table 11-1:

Table 11-1 : Climate change assessment summary

Element	Y/N	DBC Response
Consider Elimination?	N	- It is considered the network would not function effectively leading to increased enabled carbon and the opportunity for transformational mode shift towards low carbon modes would be lost if the project does not happen. - Thus, the project is critical in supporting overall mode shift and climate change response.
Consider Reduction?	Y	- The main reduction opportunity is in realising carbon opportunities associated with the number and location of the east-west crossings: - Four east-west crossing provided (including Alfriston Road) for optimal connectivity. Additional connections will induce more traffic and enabled carbon.

Element	Y/N	DBC Response
		- Dedicated active mode facilities are provided across all east-west connections even where level crossings will be removed i.e. at Manuroa Road. This will positively contribute to mode share. - Location was chosen to reduce construction and embodied carbon, hence Manuia Road replaced Rangi Road as the preferred industrial east-west connection.
Consider Optimisation?	Y	- The main optimisation opportunities include further design details in the next phases to consider the design of greenspace, native planting and active mode facilities that are attractive and easy to use. - Implementation of the Spartan Road active modes bridge to be when and if the industrial growth is realised. This could have a positive impact on construction and embodied emissions.

More details of the climate change assessment may be found in **Appendix B: Climate Change Assessment**.

11.2.2 Environment Outcomes

The environment outcomes for the recommended option are summarised in Table 11-2.

Table 11-2 : Environment outcomes for the recommended option

Environment	Details
Emissions	- There is a 6,160 tonnes yearly reduction of CO₂ emissions in the 2048+ recommended network compared to the Do minimum closure scenario in 2048+. - There is a 2,660 tonnes yearly reduction of CO₂ emissions in the 2048+ recommended network compared to the Do Nothing scenario in 2048+. - There is 102,000 less vehicle kilometres travelled daily in the recommended network compared to the Do minimum closure scenario. There is 50,500 less vehicle kilometres travelled daily in the recommended network compared to the Do nothing scenario. - Reduction in vehicle kilometres travelled is due to improved east-west connectivity provided in Takaanini for traffic that would otherwise be diverted to longer routes.
Wetlands	Natural wetlands and high amenity wetlands have been avoided where possible in the development and assessment of options.
Habitats	Where possible, impacts on local streams i.e. the Papakura stream and Significant Ecological Areas have been avoided.
Recycling materials	- Large structures i.e., rail trenching/viaduct presents a burden on resource use. These have been considered as part of the optioneering process. - Future implementation stages will need to consider reducing less material waste on site and selecting materials with fewer emissions over their cycle. In addition, consider using alternative fuel sources in machinery, equipment, to and travel from site.

11.2.3 Social Outcomes

The social outcomes as per that set out within the non-monetised benefit cost manual for the recommended option are summarised in **Table 11-3**.

Table 11-3 : Social outcomes for the recommended option

Social	Details
Inclusive Access – Impact on user experience of the transport system - Impact on Mode choice	- Increases the percentage of cycling network that is of a high quality through providing for active mode facilities at all east-west connections including where roads are being cul-de-sac. This increases active mode permeability across the southern rail line and provides active mode accessibility to key destinations such as schools, community centres, local shops and public transport stations i.e. the RTN and FTN on Great South Road and Porchester Road. - There is expected to be a daily throughput of 1,800 pedestrian trips and 700 cyclist trips across the five east-west connections in the recommended network.
	- Enables and maximise the rail upgrade benefits i.e. rail capacity and frequency hence providing better choices and experience for residents for short and longer trips. 239,900 jobs accessible within 45 mins by PT 14,700 jobs accessible within 45 mins by active modes.
Healthy and Safe People	- Four level crossings in the Takaanini area will be removed. Incidents at level crossings typically result in high severity crashes (i.e. deaths and serious injuries). Increased growth and people movement in the Takaanini network, would result in increased likelihood of incidents. Hence, the removal of the level crossings will improve future safety outcomes. Around 4 DSIs estimated to be saved per year in 2048+. - Increasing the attractiveness of low carbon transport modes ultimately contributes to the health and wellbeing of people.

11.2.4 Economic Outcomes

The economic outcomes for the recommended option are summarised in **Table 11-4**.

Table 11-4 : Economic outcomes for the recommended option

Economic	Details
Resilience	- Supports network resilience for Takaanini and improved reliability for the southern rail line - Reduces the number of incidents and lost productivity. This improves rail efficiency in the system in the recommended network. - Improvement in travel time reliability for all modes by travel time spread, reducing from 28 minutes to 12 minutes.
Transport Choice	- Enables and maximises rail upgrade benefits providing better transport choice. The project contributes to the wider mode-shift strategy in the South by enabling projects such as CRL and four-tracking. 23% to 27% of local trips within Takaanini in the 2048+ peak period are taken by active modes (3,200 active mode trips).

Economic	Details
	36% to 40% of trips originating in Takaanini, travelling north of Manurewa in the 2048+ peak period are taken by PT (1,900 PT trips).
Access to jobs	239,900 jobs accessible within 45 mins by PT 14,700 jobs accessible within 45 mins by active modes 424,900 jobs accessible within 45 mins by car
Integration with other projects	Opportunity to integrate active mode connection at Manuroa Road with the Takaanini Station as part of future Masterplan study.
Connectivity	Provide direct east-west connections for residents and businesses into the wider transport network.

11.3 Staging assessment

There is uncertainty in the final timing and staging of the project. Ultimately, the Rail PBC and Auckland Network Level Crossings SSBC will determine when and how the recommended option will be delivered. The following sections discuss external uncertainties for the assumed staging and possible alternative staging scenarios.

11.3.1 External uncertainties

There are external uncertainties that may have an impact on the recommended option, staging and timing.

One aspect to consider is how the recommended option might be impacted should the 'Do Minimum' network (which includes four tracking between Papakura to Pukekohe) either not be delivered or have a delay in delivery. These are key projects that form the overall transport network which is why they have been assumed in the Do Minimum. It is not anticipated any of the assumed infrastructure will have an impact on the recommended option.

Even if four tracking does not occur, there is still a need for the project as the level crossings inherently pose a safety risk and impact the transport network including rail capacity and efficiency. Thus, the issues are worth noting but do not change the need for investment or the proposed recommendation.

Another aspect to consider is the potential change in the surrounding land use. As noted previously, there are no privately initiated plan changes anticipated at present but Plan Change 78 is live which will not change the underlying land use.. If the Takaanini Industrial Zone is rezoned to say residential, the recommended option would not preclude an additional connection to be built if required.

11.3.2 Assumed staging

For the purpose of this DBC, the below staging (Figure 11-3) has been assumed as per discussions with Auckland Transport. The proposed staging considers the following:

- **Priority for closure** of at-grade connection
- **Network capacity** and maintaining vehicular connections
- **Online/ offline option** – does staging have an impact on the footprint/ designation?

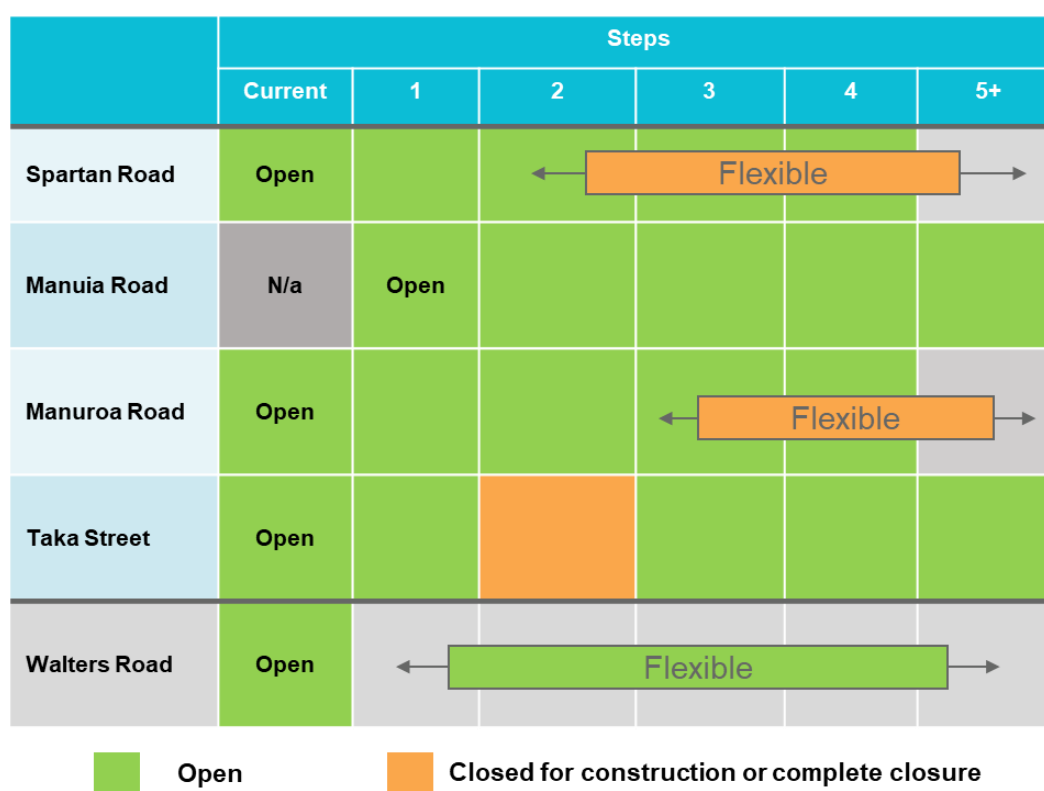
- **Constructability** – construction period, consenting pathway, complexity
- **Placemaking/ regeneration** – community impact, station master planning

It aims to provide a functional network with maximum network connectivity and minimising of road closures as much as possible.

The steps shown in **Figure 11-3** are:

1. Construct Manuia Road bridge and open connection. This will provide the opportunity to close Spartan Road when required.
2. In parallel, Walters Road could be built offline or have a temporary road adjacent to maintain connectivity. Given its distance from the other level crossings in Takaanini and ability to maintain connectivity during construction, there is flexibility when this occurs. However, it is worth noting that the current level crossing prioritisation work undertaken indicates this as top priority for removal/ replacement.
3. Close Taka Street for construction and reopen Taka Street bridge.
4. Close Spartan Road and Manuroa Road and construct active mode bridge. Note that there is flexibility in when to close Spartan Road and Manuroa Road once Manuia Road and Taka Street are built, respectively.

Figure 11-3 : Proposed Staging

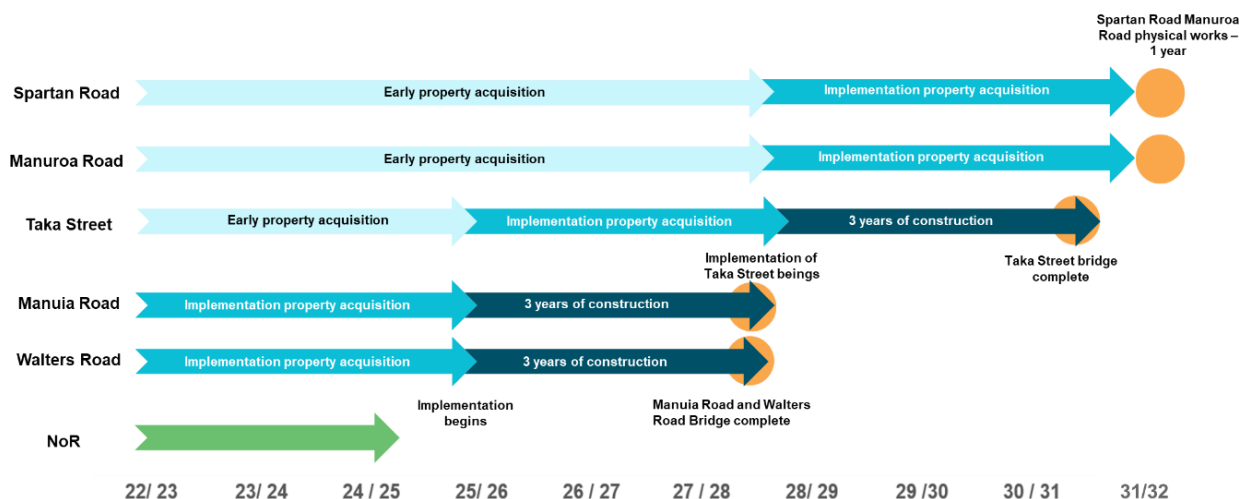


The timing of when each stage occurs will influence and be influenced by elements such as cashflow and funding availability. With the urgency of the removal of the level crossings, preferably before CRL day one, this DBC considers an implementation start date in the FY 25/26. This would require the project to proceed to consenting in parallel with route protection, and have the project referred via an accelerated option, for example via Covid Fast-Track legislation. Thus, lodgement in May 2023 and a potential start date in 2025. The likelihood of this eventuating is low. However, this provides an indication of what can be achieved in 10 years if planning processes are combined and an

acceleration method is considered. This scenario responds to the need for the removal/ replacement of the level crossings for CRL Day one operations which is expected to be late 2024/2025.

Figure 11-4 shows the indicative timing for the project from lodgement through to implementation completion based on the staging set out above.

Figure 11-4 : Indicative timing based on earliest implementation start date of FY 25/26



This is the assumed staging and timing for the Economic Analysis undertaken as part of this business case (referred to as Scenario 1). Noting that the later the implementation date, the greater the benefits to be realised, especially congestion related benefits. Thus, this provides a conservative approach to benefits estimation.

11.3.3 Alternative staging and timing

Given the uncertainty in timing of staging, alternatives were also considered for the purpose of indicating potential cashflow and funding needs. Three alternative scenarios have been considered:

- **Scenario 1b – Alternative staging to proposed:** This is essentially the same as the assumed staging i.e. to respond to CRL Day 1 operations except Walters Road is built first before Manuia Road bridge. This has the effect of smoothing out cashflow but extends the overall implementation period. Note: Manuia Road and Walters Road projects have similar costs and could be swapped in order of implementation with a similar cash flow profile.
- **Scenario 2- Implementation starting in FY 28/29:** This scenario demonstrates a more realistic implementation start date to allow the completion of all planning and design phases in a sequential way. It provides an indication of the earliest realistic possible completion date. It is likely that the implementation start date could be later or earlier as there are several factors that influences this i.e., appeals could extend this. Staging remains the same as in Scenario 1.
- **Scenario 2b – Scenario 2 with a different staging:** This considers the limited funding under the 2021-2031 RLTP and presents what could be funded under this RLTP. This assumes:
 - Walters Road is implemented within this RLTP.
 - Implementation property and construction cost for all other corridors is pushed out to the next RLTP.
 - Implementation will be in stages with Walters Road then Manuia Road then Taka Street then the closure of Spartan Road and Manuroa Road and their active mode connections.

These scenarios are shown in **Figure 11-5**, **Figure 11-6** and **Figure 11-7**.

Figure 11-5 : Alternative Scenario 1b - Walters Road and Manuia Road staged

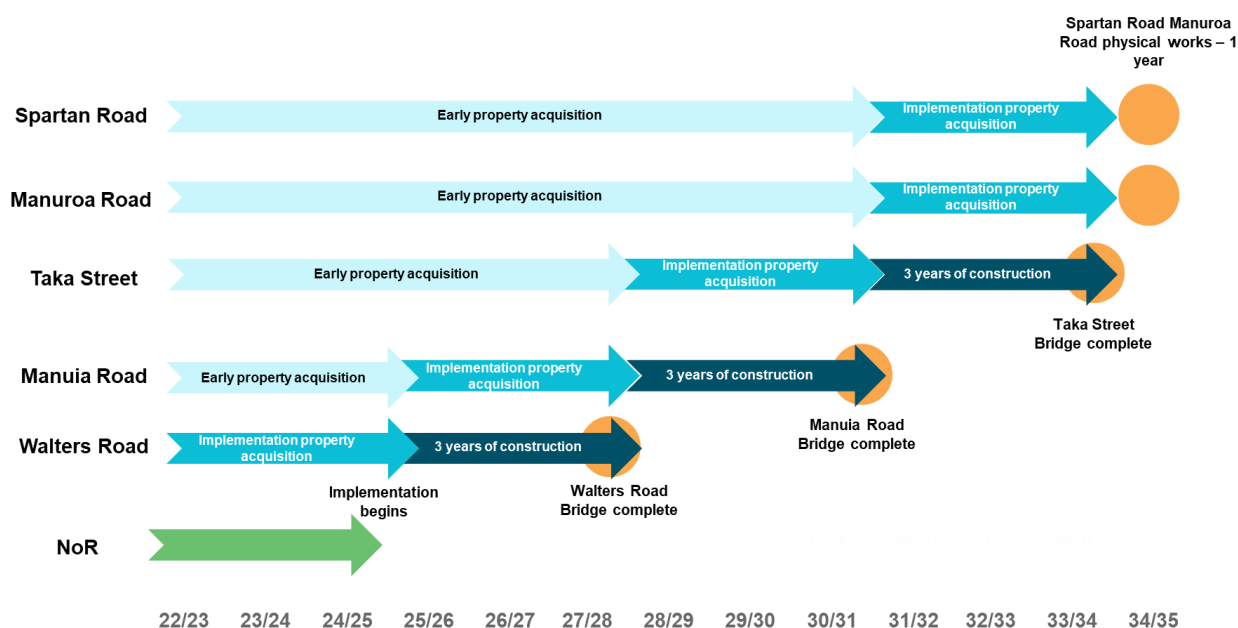


Figure 11-6 : Alternative Scenario 2 - Implementation in FY 28/29

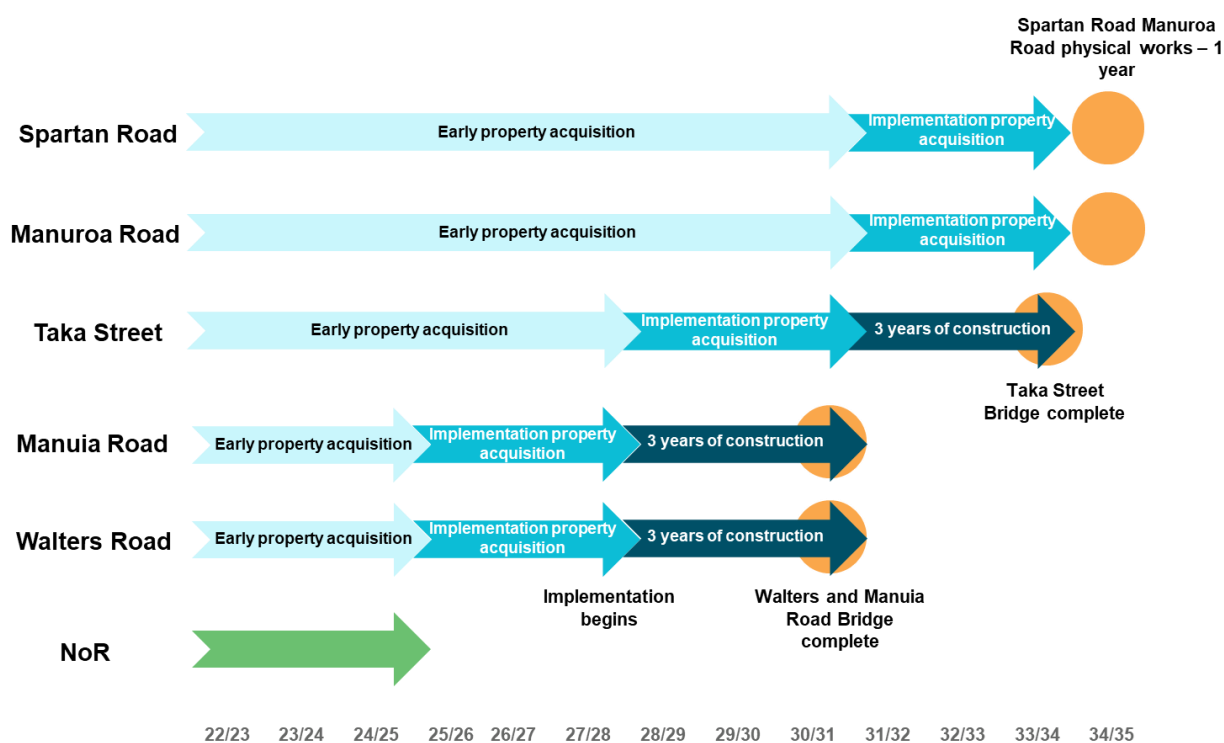


Figure 11-7 : Alternative Scenario 2b - Alternative staging to Scenario 2

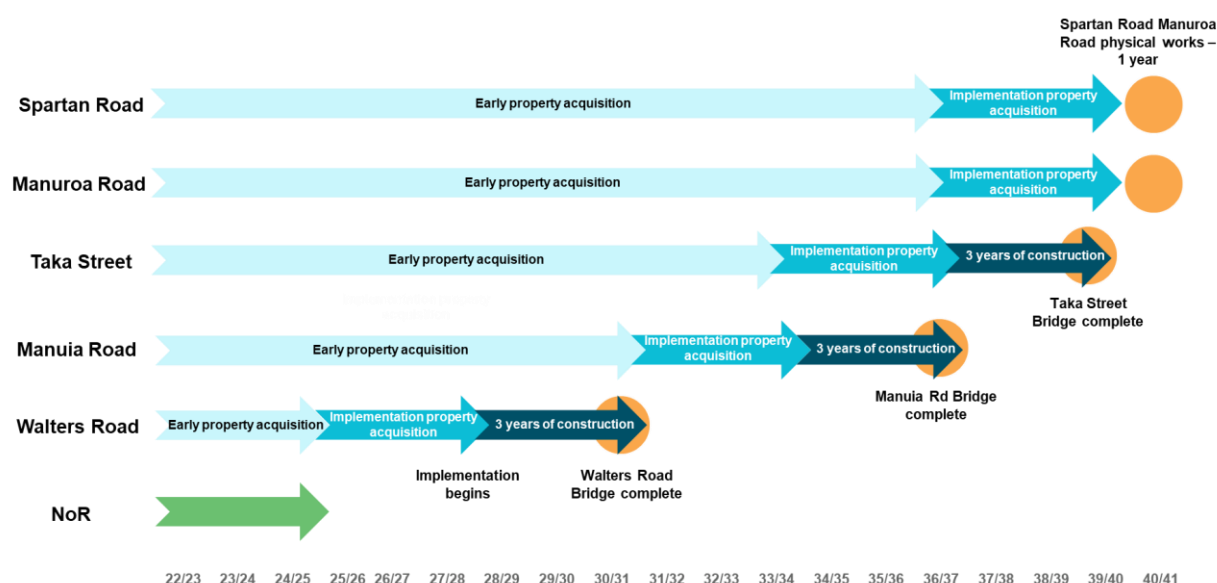


Table 11-5 below provides a summary of the pros and cons of each assumed scenario.

Table 11-5 : Pros and Cons of Different Staging Scenarios

Scenario	Pros	Cons
Scenario 1 – Earliest implementation FY25/26	- Allows the benefits of CRL to be realised as quickly as possible. - Delivery anticipated by 2030/31.	- Current funding is unable to fund this. - Will need to undertake resource consent with current NoR and consider an accelerated pathway i.e. Covid Fast-Track legislation.
Scenario 1b – Alternative staging to Scenario 1	- Smooths out cashflow compared with Scenario 1. - Delivery anticipated by 2033/34.	- Current funding is unable to fund this. - Will need to undertake resource consent with current NoR and consider an accelerated pathway i.e. Covid Fast-Track legislation.
Scenario 2 – Implementation starting in FY 28/29	- Completion of planning and design phases in a sequential way – more realistic implementation start date. - Delivery anticipated by 2033/34	Current funding is unable to fund this.
Scenario 2b – Alternative staging to Scenario 2	- Funding availability within this RLTP. - Smooths out the cashflow to the next RLTP.	- Delivery completion is not complete until 2040/41. - CRL benefits are not fully realised until much later.

12 Economic Analysis

This section summarises the economic analysis which has been prepared for the recommended option. This purpose of this DBC is for route protection, rather than imminent implementation. Thus, the appraisal has been targeted at this decision (to progress to route protection), rather than a detailed assessment that could be expected for an implementation decision.

This economic evaluation has been undertaken in accordance with the Waka Kotahi NZ Transport Agency Monetised Costs and Benefits Manual (MBCM).

Appendix K: Economics Assessment sets out the full methodology, assumptions, scenario testing, incremental analysis, and sensitivity analysis undertaken.

12.1 Key assumptions

The key assumptions assumed for the economic analysis are shown in **Table 12-1**.

Table 12-1 : Key economic assumptions

Assumption Type	Assumption
Base date	1 July 2021
Time zero	1 July 2024, 7-year construction period (covering the phased construction of the bridges, with the bridges being progressively opened during this period)
Analysis period	40-year analysis period and sensitivity tested for 60 years
Travel time benefits	Assessment of base and congested (CRV) travel time benefits from SATURN models.
Vehicle operating costs	Assessment of base running vehicle operating costs (VOC) from SATURN models.
Discount rates	Discount rate 4% applied to all annual benefits and costs, but sensitivity tested for 3% and 6%.
Transport reliability benefits	Assumed as 8% of the base travel time benefit, as a standard approach for the Do Minimum Closure case. Adopted 20% of the base travel time benefit for the Do Nothing case.
Public transport reliability	Public transport reliability benefits are estimated as 70% of public transport user benefits in the commuter peaks and 70% in other periods.
Emissions	CO ₂ benefits are calculated from VEPM 6.3 emission rates.
Walking and cycling benefits	Estimated based on trip demand and travel cost matrices from SAMM, using the same method as used for public transport benefits in MSM, and using the same approach as South DBCs.
WEBs	As a sensitivity test, WEBs calculated for the Do Minimum Closure 2048+ scenario, in accordance with the MBCM, then applied using an adopted percentage uplift to the conventional benefits. The analysis is done for three principal types of WEBs - agglomeration, imperfect competition impact, and labour market impact.

12.2 Cost

This section summarises the project construction and property costs prepared for the economic analysis. Indications of operational and maintenance costs have also been given. The estimates and appraisal have been developed with available information for the purpose of informing a decision on whether to invest in route protection.

Detailed information is included in **Appendix J: Cost Report**.

12.2.1 Capital Cost

Cost estimates (expected cost P50) and property costs broken down by corridor are outlined in **Table 12-2**. Refer to **Appendix J: Cost Report** for more details.

Table 12-2 : Capital Cost for the recommended option

Corridor	Works	P50 Cost (\$M) (includes property)	
Spartan Road	Closure and active modes bridge	42.65	
Manuia Road	Grade separated crossing – bridge	118.94	
Manuroa Road	Closure and active modes bridge	48.46	
Taka Street	Grade separated crossing - bridge	102.85	
Walters Road	Grade separated crossing - bridge	122.65	
Total		435.55	

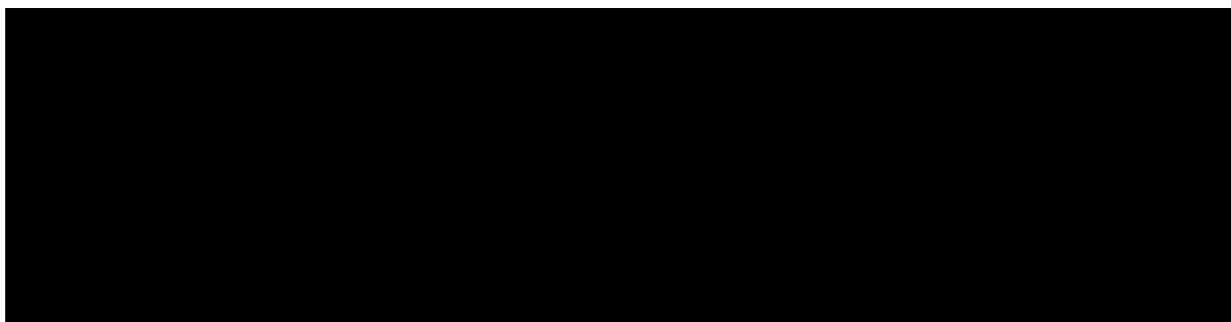
The P50 estimated cost includes the following costs:

- Property.
- Project development.
- Pre-implementation.
- Physical works and implementation.

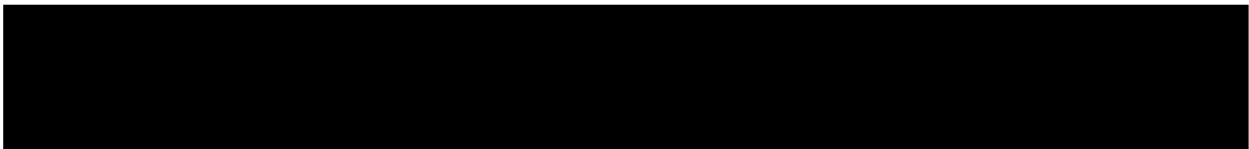
12.2.2 Operation and maintenance costs

Operating and maintenance costs associated with the project are shown in **Table 12-3**. The following descriptions illustrate how these were assessed.

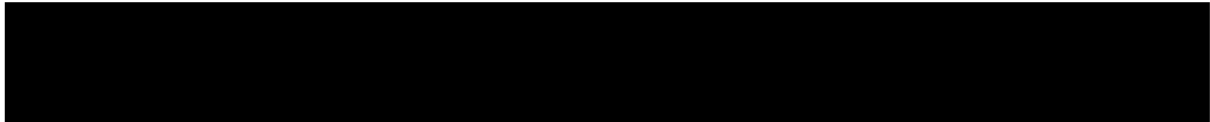
General Maintenance



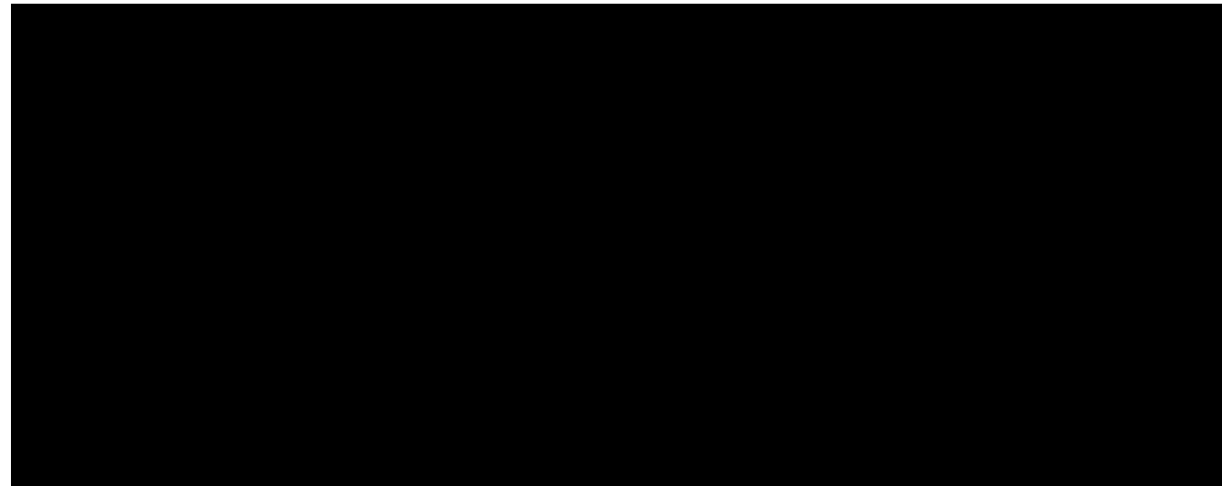
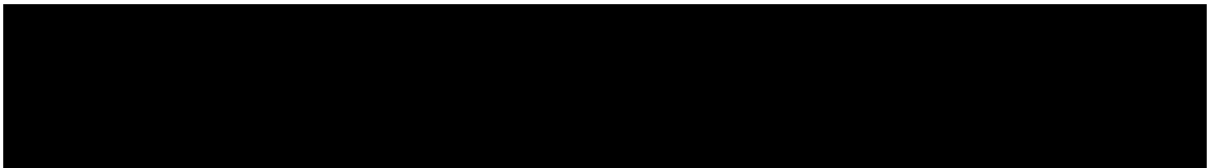
Road Resurfacing



Bridge Maintenance



Rail Crossing Signals Operation and Maintenance



12.2.3 Project costs for economic assessment

The present value (PV) project costs used in the economic assessment is shown in **Table 12-4**.

Table 12-4: NPV project costs

No.	Item	PV capital Cost (\$M)	PV Maintenance Cost (\$M)	PV PT Operating Cost (\$M)	PV total net costs (\$M)
1	Recommended network – Do Nothing	382.6	0.6	0	383
2	Recommended network – Staged Do Minimum	382.6	2.2	2	387
3	Recommended network – Do Minimum Closure	382.6	3.6	3	389

12.3 Benefits

The key economic benefits generated from the project are summarised in **Table 12-5**. Refer to **Section 10.1** for the description of the different scenarios.

Table 12-5: Summary of core benefits for TLC DBC

Item	NPV Benefits (\$M)		
	Recommended network – Do Nothing	Recommended network – Staged Do Minimum	Recommended network – Do Minimum Closure
Traffic - Travel Time Benefits	210	579	1,061
Traffic - Congestion Benefits	27	84	170
Traffic - Trip Reliability	42	57	85
Traffic - Vehicle Operating Costs	71	153	242
Active Modes	-5	37	76
Crash savings	16	36	51
PT - Travel Time Benefits	0	1	4
PT - Reliability	0	1	3
PT - Health benefits	0	-9	-17
PT - Resilience	57	30	6
CO2	7	15	28
PV total net benefits excluding WEBs	423	984	1709
WEBs Benefits (5%)	21	49	85
PV Benefits Including WEBs	445	1,034	1,794

- The recommended network will aid in resolving the problems and meet the investment objectives by:
 - Providing seamless east-west connectivity reducing significant delays and congestion in the Takaanini area through the removal of the level crossings. This in turn improves resilience and access for all road users including active modes. As expected, these traffic benefits make up the bulk of the benefits with there being a plausible amount of active mode benefits due to the improved connectivity.
 - Removing the safety risk associated with level crossings. These benefits are small in context of the traffic benefits (approximately 3% - 4%) but is essential in achieving a network that is free from death and serious injuries.
 - The project does not directly improve access to rail stations or improve bus service operations with respect to the Do-Nothing scenario. However, the removal of the delays at the crossings would improve bus travel time and reliability on the wider network as

overall network delays are reduced. In addition, the removal of crossings will enable greater train frequency and capacity, improving freight efficiency and access to social and economic opportunities. These have only been partially assessed quantitatively and so the benefits presented would be conservative.

12.4 Benefits cost ratio (BCR)

The Base Estimate BCRs with and without Wider Economic Benefits (WEBs) are shown in **Table 12-6**. Overall, the expected BCR ranges between 1.1 and 4.6 depending on the do minimum scenario.

Table 12-6: Summary of core BCRs

No	Item	PV total benefits (\$M PV)	PV total net costs (\$M PV)	BCR excluding WEBs	WEBs (\$M PV)	BCR including WEBs
1	Recommended Network – Do Nothing	423	383	1.1	21	1.2
2	Recommended Network – Staged Do Minimum	984	387	2.5	49	2.7
3	Recommended Network – Do Minimum Closure	1,709	389	4.4	85	4.6

- The results are sensitive to the definition of the do minimum, as demonstrated by the different BCRs with respect to the Do Nothing, Do Minimum Closure, and Staged Do Minimum scenarios.
- With the high frequency rail service operating in future supporting the development future south at Drury, the barriers are expected to be down for the majority time of the day if existing patterns of operations as set out in the Do Nothing remain. Hence this project is crucial for maintaining safe and reliable network operation essential to the development of the Takaanini area and areas further south.
- It is expected that the existing at grade rail crossings will be converted to cul-de-sacs in order to operate high frequency trains in later years. Hence the project comparison with the Staged Do Minimum scenario is the most likely representative of the project which yields a BCR of 2.5 without WEBs.

12.4.1 Summary of BCR Ranges

The BCR range estimation is split into analysis framework and parameter sensitivity tests. The Analysis framework includes Discount rate and Analysis period and Parameter sensitivity includes WEBs, active mode benefits, traffic benefits variability and cost variability. Full details are included in **Appendix K: Economics Assessment**.

Table 12-7: BCR range summary

Type of Sensitivity Test	Recommended Network – Do Nothing	Recommended Network – Staged Do Minimum	Recommended Network – Do Minimum Closure
Analysis Framework	0.78 – 1.9	1.7 – 4.6	3.3 – 6.5
Parameter Sensitivity	0.87 – 1.3	2.0 – 3.1	3.4 – 5.4

The sensitivity tests show:

- The BCR with respect to the Do Nothing is 1.1 without WEBs and slightly increases to 1.2 if WEBs are included.
- The BCR with respect to the Do Minimum Closure is 4.4 without WEBs and increases to 4.6 if WEBs are included.
- The BCR with respect to the Staged Do Minimum is 2.5 without WEBs and increases to 2.7 if WEBs are included. The Staged Do Minimum case is assumed as the likely scenario as the high frequency rail services in the future is expected to push for a need for crossing closures.
- Sensitivity testing of many of the assumptions or parameters used in the analysis indicated that there are few circumstances where the BCR falls below 1. The BCRs are relatively insensitive to changes in these assumptions and parameters, and the results can therefore be considered robust. The results of these sensitivity tests are summarised in **Table 12-7**.
- Larger variations would result from changes to the analysis framework (evaluation periods and discount rates away from the standard values) used in the assessment.
- In relation to the sensitivity analysis, the BCR ranged from 0.78 to 1.9 with respect to the Do Nothing, 1.7 to 4.6 with respect to the Staged Do Minimum, and 3.3 to 6.5 with respect to the Do Minimum Closure, with the analysis framework tests affecting the lower and upper bounds of these ranges.
- With respect to either the Do Minimum Closure or the Staged Do Minimum, all sensitivity tests give a BCR greater than 1. The BCR with respect to the Do Nothing falls below 1 for five sensitivity tests: the 6% discount rate with a 40 and 60year analysis period, 25% less traffic benefits, P95 costs, and the decelerated growth scenario.
- The benefits with respect to the Do Nothing may be understated because of the effects of unreliability and increased travel times, especially for PT users, with increased barrierdown time.

12.5 Investment prioritisation method

The Waka Kotahi Investment Prioritisation Method for the 2021 – 24 National Land Transport Programme (NLTP) has been used to understand the potential investment prioritisation for the Takaanini Level crossings. The assessment is shown in **Table 12-8**.

Table 12-8 : Investment prioritisation assessment

Factor	Rating
GPS Alignment	Medium Gives effect to the GPS With the recommended option: • Removing the safety risk at level crossings, contributing to a network free of death and serious injuries. It is estimated to save up to 94 DSIs over 40 years • Enabling the full benefits of the rail upgrades such as CRL to be realised. This contributes towards 38% of public transport mode share for trips from Takaanini to Manurewa and 336,400 job accessible within 45 minutes by public transport • Supporting climate change outcomes with an estimated reduction of 7,090 tonnes of CO₂ per year and 134,900 kilometres travelled daily. • Improves network resilience with improvement of up to 19 minutes in travel time reliability and reduces the impacts on passenger rail service as fault incidents associated with level crossings are removed. • Improves public transport and freight efficiency as overall network delays are reduced.
Efficiency	BCR 1.1 – 4.4 (L – M)
Scheduling	High Non-delivery of the recommended option has a significant impact on realising the benefits of CRL impacting travel choice, mode shift and climate change outcomes. Other interdependency includes: • Four tracking of the rail line may not occur if the level crossings are still in the network • South Frequent Transit network (separate DBC) – the FTN especially Great South Road may be impacted by the delays caused by the level crossings thus reducing the effectiveness and benefits of the proposed FTN. • Growth in the south will be stifled as the infrastructure is not there to support
Priority order	5-7
Explain any variances from the existing NLTP priority order The current NLTP has assessed the overall Auckland Level Crossings Programme strategic fit being 'Medium', effectiveness 'High' and BCR being 'Low'. This is consistent with the above assessment except the BCR could be 'M' although noting that this assessment is focused on the Takaanini Level Crossings only and not for the whole network.	



Financial Case

13 Financial Case

The section outlines the Financial Case for both route protection and implementation of the level crossings. The Financial Case is based on several variables given the typically long term and uncertain nature of route protection. The uncertainties include:

- Outcomes of the Rail PBC and Level Crossings SSBC which are currently under development and may impact the staging and/ or timing.
- Change in quantum of property acquisition required, which may occur as a result of designation changes post-DBC, although the risk is considered low for these projects.
- Cost of property is higher or lower than assumed.

This uncertainty should be considered by funders when allocating property funding. The following analysis is based on the staging assumed in the Economic Case which is based on constructability and transport planning principles in minimising disruptions. Alternative staging is also considered given the interdependency on the Rail PBC and Level Crossings SSBC which will ultimately drive when and how the project will be implemented. Given the uncertainties, the effect of the alternative staging has been shown as a sensitivity during the discussion on property costs to assist owners in understanding how early property acquisition may be required. It is also noted that the graphs assume the “likely” escalation of 10% for property and 2% for construction costs unless otherwise stated.

13.1 Whole of life costs

The financial implications for Waka Kotahi and Auckland Transport can be summarised into the following categories:

- **Cost of route protection** (Post lodgement costs, early property acquisition and property implementation costs).
- **Implementation costs** (Project development, pre-implementation, project implementation).
- **Operations and Maintenance costs** as per the assumption set out within the Economic Case.

The cashflow for the project for the different staging scenario is shown in **Figure 13-1**. Given the small cost of operations and maintenance in relation to everything else, this has been excluded from the graphs. This demonstrates:

- Under all scenarios, the initial costs are predominantly route protection and development costs.
- The cost required between FY 22/23 to FY 30/31 varies between the different scenarios with Scenario 2b pushing out much of the cost to the next decade. The cost for the first three years and between FY 22/23 to FY30/31 (up to the end of the current RLTP) is shown in **Table 13-1**:

Table 13-1 : Whole of life cost for the different scenarios (excluding contingency and operations and maintenance cost)

Scenario	First 3-year cost (\$M)	FY 22/23 to FY30/31 Cost (\$M)	Total Cost (\$M)
1	143.2	378.8	440.1

Scenario	First 3-year cost (\$M)	FY 22/23 to FY30/31 Cost (\$M)	Total Cost (\$M)
1b	82.7	317.0	487.3
2	46.1	330.9	501.2
2b	33.8	170.0	641.2

Scenario 2b presents a likely fundable scenario under the current RLTP funding availability. It should be noted however that deferral of property acquisition and construction to later decades results in overall costs being higher as a result of property market price appreciation and construction cost escalation.

Figure 13-1 : Whole of life cost cashflow (excluding contingency and operations and maintenance) - Base Estimated Cost, 'likely' property and construction escalation (\$M)



13.1.1 Cost of route protection

Route protection using an NoR is the recommended mechanism for the project. The DBC seeks to progress the recommended upgrades to the next phase, which includes post-lodgement. Two key cost elements have been identified as being related to route protection.

13.1.1.1 Professional service – Post lodgement costs

The expected post lodgement cost is detailed in **Table 13-2**. It is assumed these costs will be incurred following NoR lodgement in 2023. It is assumed 10% of costs will be in 2023 and the remaining in 2024 and 2025.

Post lodgement for the TLC will be delivered by Te Tupu Ngātahi, and funding is already allocated for this purpose.

Table 13-2: Professional service costs for post lodgement

Post Lodgement cost item	Cost (undiscounted \$M)
Target Cost Estimate (TCE)	3.4
Risk	0.2
Escalation	0.7
Management cost	3.0
Total	7.3

13.1.1.2 Expected property costs of route protection

The Te Tupu Ngātahi Programme Wide Property Strategy identifies several different potential acquisition profiles for forecasting the potential property acquisition cashflow:

- Profile A: Designate and hold until implementation (generally applies to greenfield sites).
- Profile B: Designate and moderate acquisition (generally applies to brownfield sites).
- Profile C: Early acquisition (applicable for strategic sites).

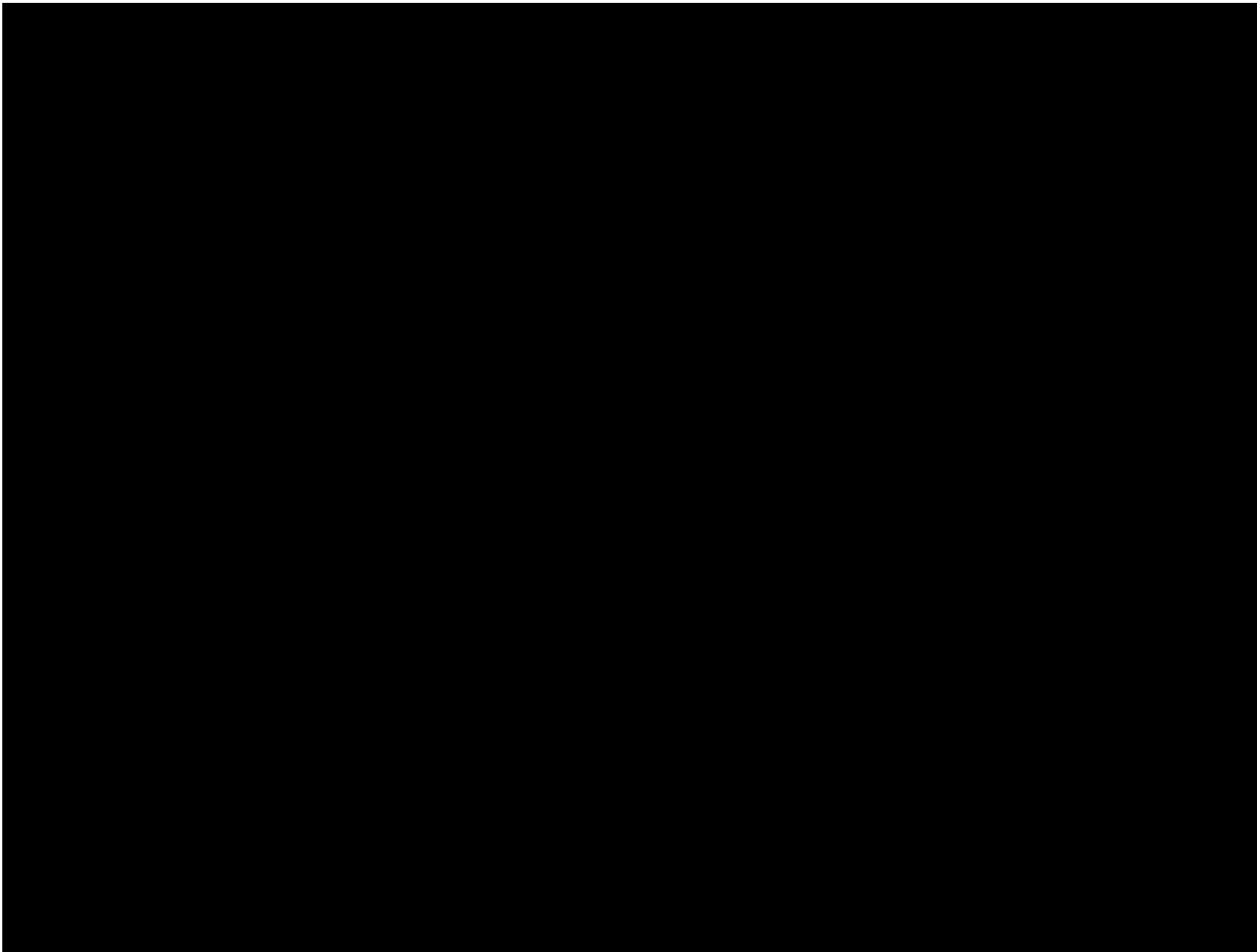
A mixture of profile A and B have been identified for the project given the following reasons (Table 13-3):

- Three of the five corridors are assessed to be Profile B given the existing urban built up environment. This combined with the recent NPS-UD and MDRS means there will be development pressures.
- Spartan Road and Manuia Road have been assessed as Profile A given the industrial nature of the site.

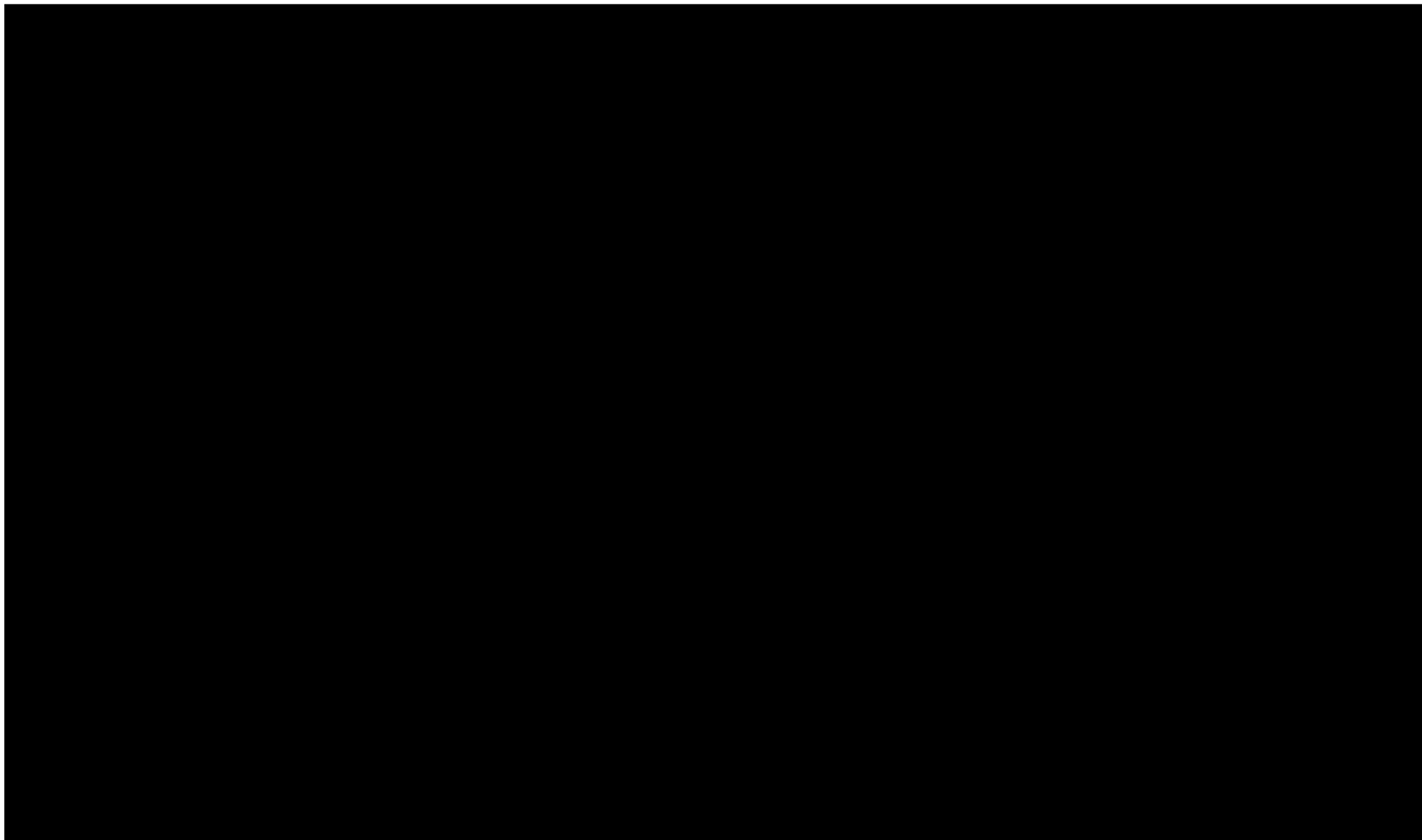
Although no sites have been identified to be Profile C due to no strategic sites have been identified. There is a potential that implementation could start in as soon as in three years, thus the Profiles are somewhat irrelevant under that scenario and acquisition will need to occur quickly.

Table 13-3 : Property acquisition profiles

Corridor	Profile
Walters Road	B
Taka Street	B
Spartan Road	A
Manuroa Road	B
Manuia Road	A



It is worth remembering that the Auckland Network Level Crossings SSBC could propose something that differs to the above scenarios and as such these provide an indication only. In addition, funding availability may impact when implementation may occur and as such impact when acquisition occurs.



Given the nature of property prices there is a high degree of uncertainty of property cost in the future. Three levels of property escalation (compounding year-on-year) have been considered with the Te Tupu Ngātahi for sensitivity purposes:

- Low – 5% escalation.
- Likely – 10% escalation.
- High – 15% escalation.

The 'Likely', 10% escalation has been assumed for reporting purposes. The range of estimated property liability by corridor in the first decade, based on the 'Low' and 'High' scenario is summarised in **Table 13-4**.

Table 13-4 : First decade property liability sensitivity by corridor

Corridor	Early acquisition property liability (\$M)		Implementation property liability (\$M)	
	5%	15%	5%	15%
Scenario 1 – Implementation complete within the first decade				
Walters Road	-	-	47.1	56.9
Taka Street	11.5	13.8	20.0	31.5
Spartan Road	1.4	2.0	6.9	14.5
Manuroa Road	6.1	8.5	11.3	23.5
Manuia Road	-	-	55.0	66.3
Total	18.9	24.3	140.2	192.7
Scenario 1b – Walters Road and Manuia Road staged				
Walters Road	-	-	47.1	56.9
Taka Street	12.4	17.4	23.0	48.0
Spartan Road	1.5	2.5	2.6	6.3
Manuroa Road	6.5	10.9	4.1	10.3
Manuia Road	11.0	13.3	50.9	80.7
Total	31.4	44.1	127.8	202.1
Scenario 2 – Implementation date in FY 28/29				
Walters Road	18.9	22.8	32.7	51.9
Taka Street	12.4	17.4	23.0	48.0
Spartan Road	1.5	2.5	2.5	6.3
Manuroa Road	6.5	10.9	4.1	10.3
Manuia Road	11.0	13.3	50.9	80.7

Corridor	Early acquisition property liability (\$M)		Implementation property liability (\$M)	
	5%	15%	5%	15%
Total	50.3	66.9	113.4	197.2
Scenario 2b – Walters Road and Manuia Road staged Implementation FY28/29				
Walters Road	18.9	22.7	32.7	51.9
Taka Street	11.4	20.2	-	-
Spartan Road	1.0	1.8	-	-
Manuroa Road	4.5	7.9	-	-
Manuia Road	12.8	21.4	21.6	53.8
Total	48.6	74.0	54.4	105.6

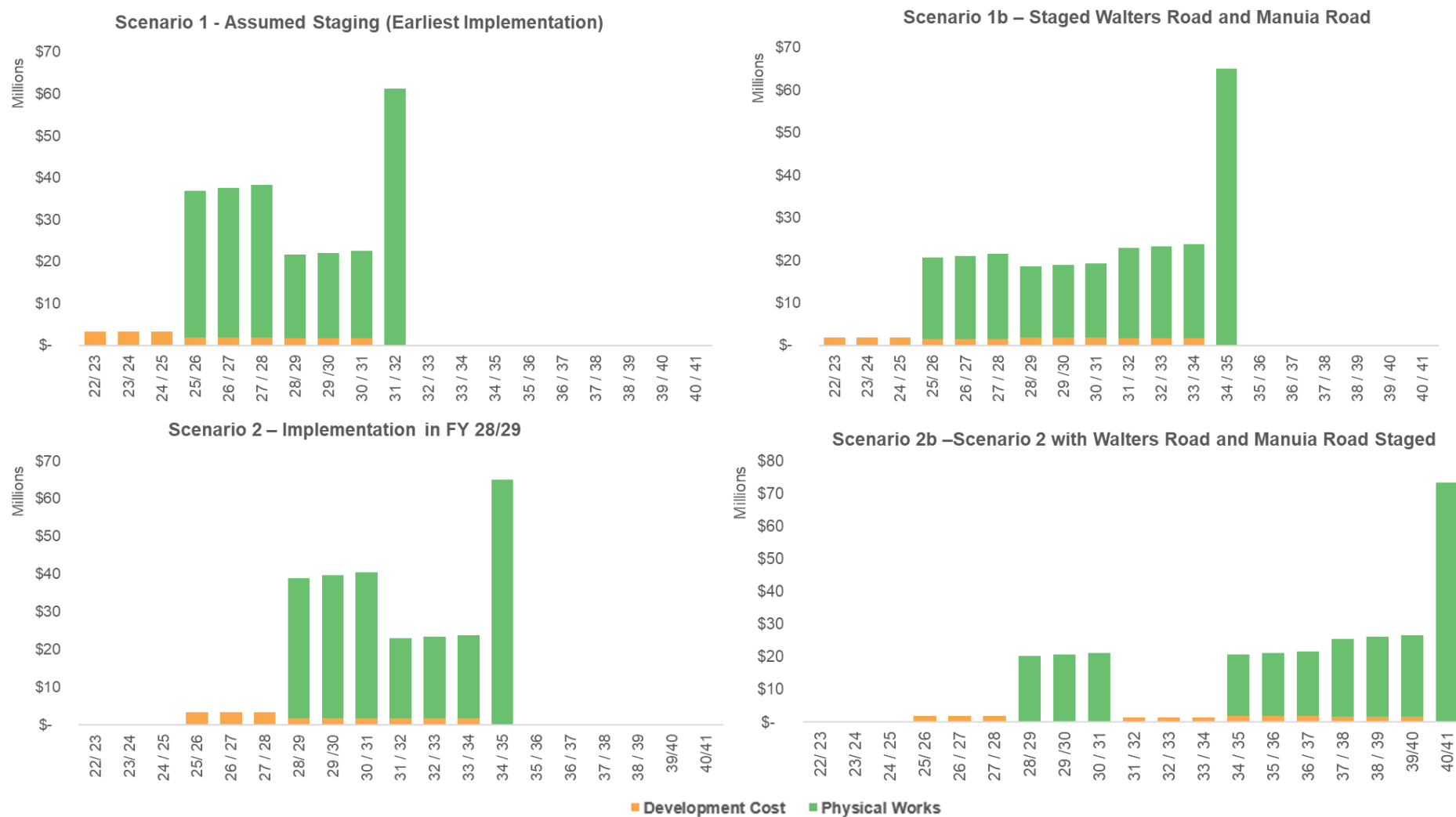
13.1.1.3 Implementation costs

The implementation costs include:

- Project development – including consultancy fees and Waka Kotahi and AT management costs
- Pre-implementation costs – including consenting, design fees, site investigations, consultation and iwi consultation.
- Project implementation costs – construction cost as well as other non-construction costs associated with supporting the construction. An allowance of 7% of physical works costs has been allowed for non-construction costs associated with completion of the implementation phase. This is made up of 5% for consultancy fees to allow for a traditional measure and value contract, plus an additional 1% for Waka Kotahi/ AT managed costs, and 1% for construction monitoring fees.
- A 'likely' construction escalation scenario of 2% has been adopted.

Figure 13-3 shows the project cashflow for the implementation costs for the different scenarios.

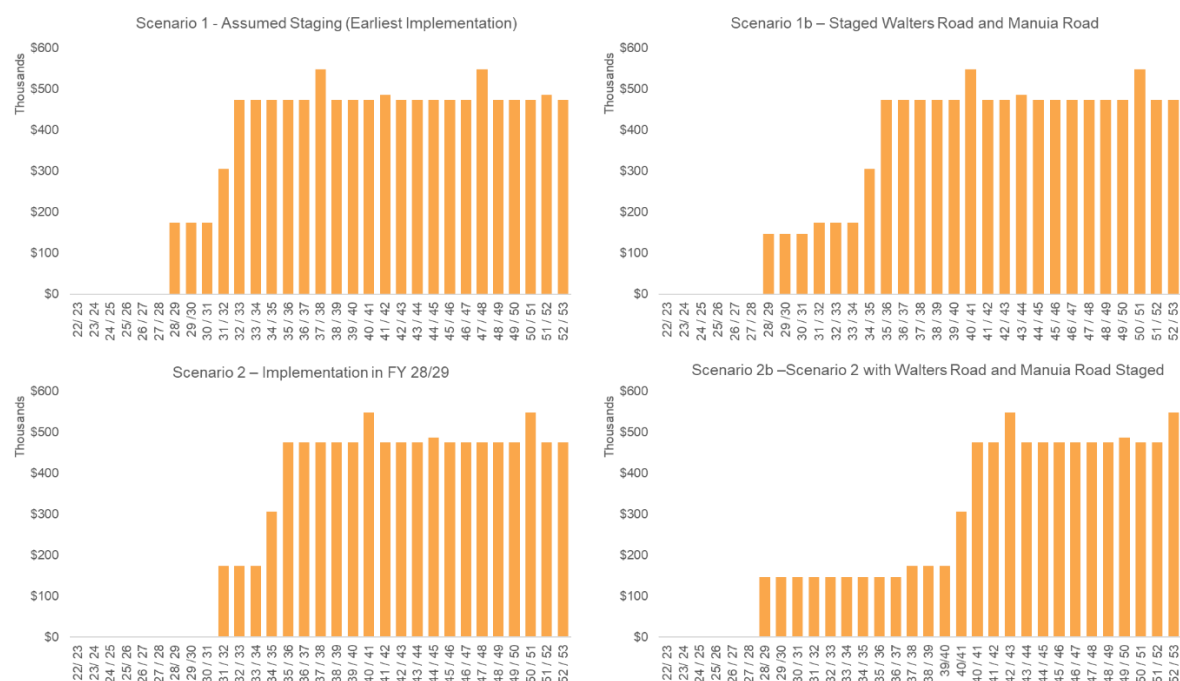
Figure 13-3 : Implementation Cost (Base Estimates, Likely construction escalation)



13.1.2 Operational costs

The operational costs were described in the Economic Case and these have been applied as an annual or one off cost as appropriate. The spend profile for these costs for the different scenarios is shown in **Figure 13-4** and as expected weighted at the end of the assessment period once infrastructure is constructed.

Figure 13-4 : Operating and maintenance cashflow



13.2 Funding

13.2.1 Funding sources

13.2.1.1 Pre-lodgement

The Regional Land Transport Plan (RLTP) 2021- 2031 includes two funding streams directly related to the DBC and NoR phases of the Programme:

- Supporting Growth Route Protection Programme - \$44M, and
- Supporting Growth – Investigation for Growth Projects - \$28M.

The Te Tupu Ngātahi programme itself is funded from the above allocations, so there is programme wide funding for NoR professional services going forward including pre lodgement and NoR documentation preparation. Preparation of this documentation does not in itself trigger the early property acquisition risk, this arises once the NoR is formally lodged.

13.2.1.2 Post-lodgement and early property liability

The Regional Land Transport Plan (RLTP) 2021- 2031 also includes a funding stream directly related to the post-lodgement phase of the Programme, and for any early property liability:

- Greenfield Transport Infrastructure Supporting Growth Post Lodgement and Property - \$65M.

13.2.1.3 Future phases

Potential funding sources are detailed in **Table 13-5**.

Table 13-5: Potential funding sources

Funding Source	Commentary
National Land Transport Fund (NLTF)	For the 2021 – 2024 NLTP, \$409 million for City Rail Link activities inclusive of level crossing upgrades. Under ATAP 2021-2031, \$220 million has been allocated for 'CRL Day One – Level Crossing Removal'. An additional \$100 million is allocated under 'Level Crossing Grade Separation' for removal of priority level crossings across the network. Thus, a total of \$320 million for level crossing removal for the Auckland network. It is understood some pedestrian level crossings work have commenced and uses a part of this budget thus, the total budget available is less than \$320 million. In addition, the Takaanini level crossings are currently the top priority for level crossing removal in Auckland, based on the work to date. However, this may be subject to change given the Auckland Level Crossings SSBC currently underway which will determine the final priority.
Approved organisations local share	Auckland Transport is the most relevant organisation to contribute funds towards the level crossings with the ownership resting with Auckland Transport.
Government grants	Given the nature of additional government funds vary throughout time, it is possible that separate government funding may become available. However, the DBC cannot assume any additional type of funding, but it is worth noting for owners to look for these opportunities when and if available.
Other supplementary funding sources Refers to contribution that are additional to the NLTF, local share funding or Crown loans.	Given the location and type of project, no cost saving opportunities have been identified i.e., developer contributions.

13.2.2 Funding Share

It is anticipated that the funding for the P50 costs will be from the NLTF which consists of the Waka Kotahi share plus the Auckland Transport FAR share.

13.2.3 2021-2031 RLTP affordability

The below provides the projected required spend within the 2021-2031 RLTP for the different staging and timing scenarios. As noted above, the potential funding available is \$320million for level crossing removals noting that some of this will already be allocated. As such, the funding available is expected to be less than this.

Table 13-6: Expected cost of project to FY 30/31

Item	Forecast Cost (undiscounted \$M)	Potential Funding
Professional services	7.3	Covered by RLTP Supporting Growth Programme funding.

Item	Forecast Cost (undiscounted \$M)	Potential Funding
Scenario 1	348 Low escalation 374 Likely escalation 406 High escalation	A shortfall is expected under this scenario. This could be \$86M and more depending on funding availability.
Scenario 1b	278 Low escalation 313 Likely escalation 355 High escalation	The shortfall under this scenario is expected to be less, however given the limited funding. This scenario eventuating is considered low.
Scenario 2	286 Low escalation 326 Likely escalation 377 High escalation	Similar to Scenario 1, a shortfall is still to be expected.
Scenario 2b	147 Low escalation 166 Likely escalation 180 High escalation	This scenario is expected to be the most likely scenario given the required spend is well within the \$320M. However, this will still be dependent on total funding availability.

It is stressed again here that the above is based on an assumed timing staging that may well change with the Auckland Level Crossings SSBC. Hence, the above is for information and consideration only.

13.3 Financial Case Summary

Table 13-7 summarises the expected costs up to FY 30/31 and current funding allocation for the assumed staging.

Table 13-7: FY30/31 Financial Case Summary (Base estimate, no contingency, likely property escalation)

Element	Base estimate 2023-2031 (\$M)	Potential funding (\$M)	Funding Required (\$M)
Professional services for NoR	7.3	7.3 (funding already available)	0
Early property acquisition	21 - 56	\$320M under ATAP 2021-2031. However, part of this is already allocated.	Depending on the proposed timing and staging, additional funding of \$54M and more may be required.
Property implementation	41 - 164		
Implementation	68 - 189		
Operations and maintenance	0- 0.5	0	0-0.5

Current information suggests that the Takaanini level crossings are at the top of the priority list to be removed/ upgraded, however this will be confirmed through the Auckland Network Level Crossings SSBC. The RLTP funding currently allows for \$320M for the removal of level crossings on the

Auckland network. Even if the entirety of this is for the Takaanini level crossings, there will still be a short fall of up to \$54M if Scenario 1 and 2 eventuates.

With the limited funding, Scenario 2b suggests the construction of Walters Road this RLTP and all other works for the other level crossings occur in the next RLTP period. Some activities may be bought forward i.e. development costs if funding is available. This is only a suggested scenario, and other works may be bought forward instead of Walters Road if required.

As highlighted by the table, funding is currently available for route protection and no additional funding is required for this next phase of work.



Commercial Case

14 Commercial Case

This section sets out the proposed approach to development of each project in relation to the recommended option described in the economic and financial cases. The following sections describe:

- Consenting/ route protection strategy for each project.
- Property acquisition strategy for each project.
- Procurement strategy for the package.

14.1 Route protection approach

The Route Protection strategy has been developed to support the DBC and make recommendations on packaging and the preferred planning mechanism to secure route protection for the project. A separate consenting strategy will be prepared as part of the NoR process which will confirm consenting pathways, required technical assessment and NoR staging.⁷ Full details can be found in **Appendix L: Route Protection Strategy**.

Route protection is warranted and necessary for the proposed level crossing closures, grade separated crossings and supporting works associated with the Takaanini Level Crossings. Due to the existing urban environment and the intensification enabled through PC78 there is a significant risk that further development will compromise the Takaanini Level Crossings corridors. The need for route protection is urgent.

Designating is recommended as the most appropriate method to protect the route for the TLC. This is because the truncated timing of PC78 and the fragmented small landholdings surrounding the corridors make alternative planning or third party mechanisms inappropriate.

It is recommended at this stage that there will be one NoR package covering the recommended option. However, it is also recommended that this approach is revisited upon receipt of community and stakeholder feedback.

14.2 Property Overview

14.2.1 Wider Te Tupu Ngātahi Context

The full property overview for the DBC is included in **Appendix I: Property Overview**. It is important to note that whilst this property overview has been developed for this DBC, this DBC is for route protection purposes only and therefore the property implications are different to those of a project where implementation is imminent. A more detailed analysis of the property issues is anticipated to be covered under the Auckland Network Level Crossings SSBC. This DBC also forms part of the wider Te Tupu Ngātahi programme of works that has developed a Programme Wide Property Overview that outlines the principles for property acquisition for the entire programme. These will guide the development of the property approach with the key points being:

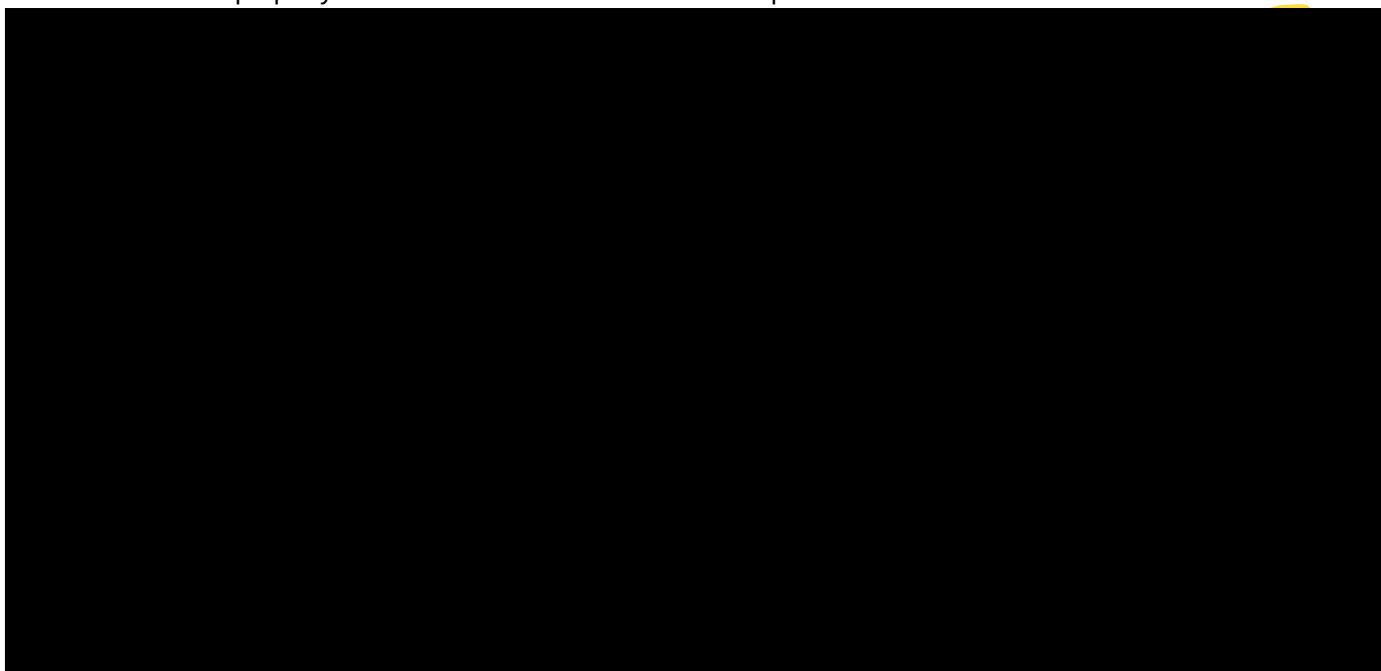
- The programme is about long-term affordability and property will be generally acquired closer to implementation.
- There will be potential early property acquisition costs as soon as the NoR is lodged.

⁷ This will likely be a standard two stage RMA process but consenting pathways will be confirmed as part of the consenting strategy.

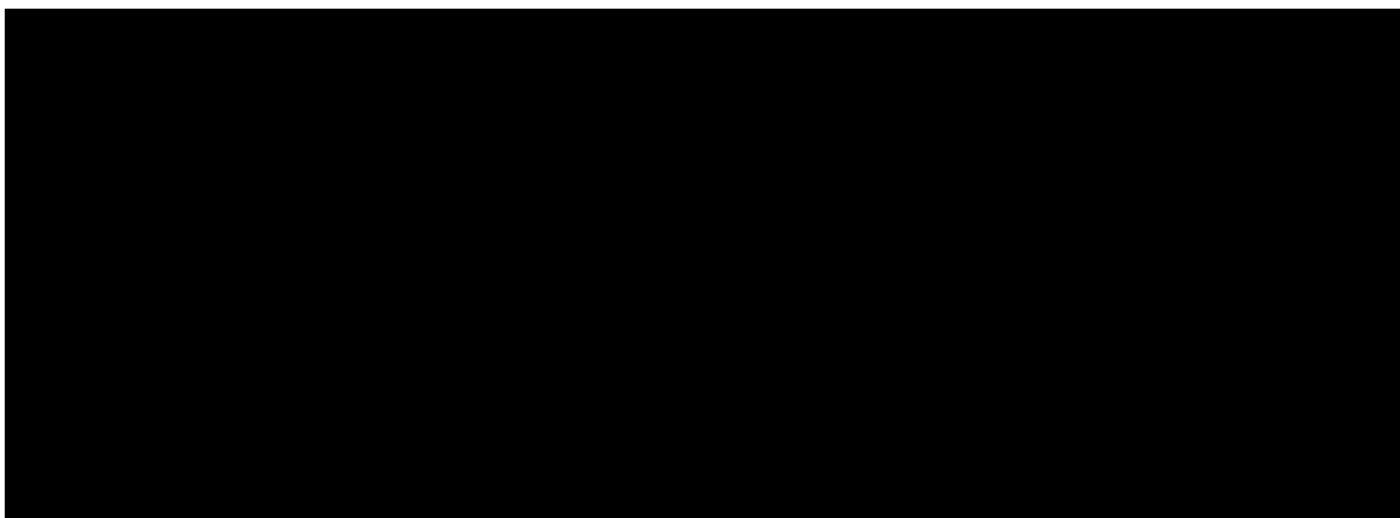
- The requiring authority will take the lead on property negotiations for that specific project, utilising the current processes of that organisation (Auckland Transport).
- Advance Purchase Guideline processes will apply.
- Where there is opportunity for strategically important properties to be acquired, these should be taken.
- A programme wide property resource will look at opportunities for resultant value capture from residual land as part of the land use integration opportunities of the programme.

Early property acquisition costs are a critical issue, and the Property Overview outlines the analysis and approach to providing as much certainty as possible to what this cost should be into the future. This Preliminary Property Overview is a living document developed for the route protection business case phase and will need to be updated in the later phases. The acquisition programme is dependent on detailed design and final land requirement plans being completed.

A total of 363 property interests have been identified for acquisition as outlined in Table 14-1.



14.2.2 Compensation



14.2.3 Key property risks and opportunities

There are a number of risks and opportunities from a property perspective shown in **Table 14-3**.

Table 14-3 : Key property risks and opportunities.

Risks	Opportunities
• Change in property prices given uncertainty of timing – With the recent NPS-UD and MDRS and the uncertainty of the macro-economic climate, it is hard to predict with certainty the level of appreciation that may occur. • Cashflow for early property acquisition given long term protection – Given the above timing issues, and what level of s185 claims there could be, confirming a value for early property acquisition is equally uncertain.	• Live zones and Plan Changes – Given the project is within a constrained urban area and with the recent NPS-UD and MDRS, the main risk is for new development occurring too close to the existing road making the project potentially more complex/ expensive to deliver in future. If route protection is not achieved imminently the opportunity may be lost to efficiently and effectively deliver the transport system and outcomes sought. • Market appreciation – Enabling intensification (NPS-UD and MDRS) is usually linked to appreciation as the development potential is increase. Thus, the earlier property is acquired, the cheaper it is likely to be. It is acknowledged that this creates affordability and funding prioritisation challenges, but there could be a financial opportunity to save costs if cashflow can be found.

14.2.4 Managing property risks

There is considerable uncertainty around the property costs given the acquisition required (and the wider Te Tupu Ngātahi programme) and therefore to best manage this uncertainty and minimise the early property acquisition expenditure as much as possible until projects are implemented the following is proposed:

- **Joint governance from owners** - It is recommended that a joint owner approach to property be taken at a governance level to ensure the appropriate prioritisation of funding.
- **Appropriate resourcing** - This is a large programme of works over an extended period of time and appropriately resourcing will ensure best for programme outcomes are achieved.
- **Application of Betterment** - Strengthening the case early for this aspect of the valuation process and ensuring a consistent and common approach across all projects is critical to potential successful use of this tool.

Waka Kotahi and Auckland Transport have comprehensive processes and teams dedicated to the ongoing management of properties once purchased. It is assumed that these existing processes will be used to manage the properties. With only 10% of the properties being full purchases the ongoing management is considered achievable. Potential ongoing management issues that will need consideration going forward are:

- **Commercial** - Where properties have multiple business tenancies or business operations that need relocating, the property cost estimates assume the freehold/unit title interests will be acquired early to mitigate business relocation costs and manage leases expiring. This is particularly relevant to this project where 40% of the properties are business zoned.
- **Redevelopment** - Where large parcels of contiguous land is being acquired there could be opportunities to redevelop and sell residual land. This is detailed more in the next steps.

14.2.5 Wider Te Tupu Ngātahi property management

It is also important to outline that the Supporting Growth Programme Wide Property Strategy sets out a number of initiatives to effectively manage the significant acquisition programme of the route protection approach. These are currently being considered and this Property Strategy is consistent with the aspirations of these wider approaches if successful. It is important to note that these wider Programme Wide proposals are not yet agreed for implementation by the partners.

At the heart of these initiatives is a Strategic Property Fund.

There are some critical components to operate the fund successfully and these are summarised below.

- **The pre allocation of funding for strategic property purchases.** The current process does enable this to occur – however it requires AT Board approval and delegated approvals. This process would benefit from streamlining with delegated authorities in place with the respective organisations and a ring-fenced fund identified within the NLTP. This fund would be utilised for properties that are endorsed as ‘Early Acquisitions’. This fund may also be used to respond to developer integrations opportunities that occur in an ad hoc manner and can occur out of sequence in response to private led plan changes. This would enable a more nimble and efficient mechanism consistent with more commercial operations.
- **Dedicated Resources.** A dedicated Waka Kotahi and Auckland Transport resource to work through commercial deals and evaluate strategic purchase opportunities. This team will work with the OIM team on the identification, acquisition and enhancement of properties purchased through the fund. Without dedicated resource, the property approach required for a programme of this scale will potentially suffer and opportunities for considerable efficiencies (and enhanced outcomes) will be lost.
- **Governance:** The fund would need to be managed and administered by members of both organisations to ensure transparency of process. This group would oversee the expenditure of the

fund and make recommendations to the acquiring entities approvals processes. The governance group would be responsible for agreeing, setting and delivering against the objectives of the fund as well as confirming the priority areas for investment.

- **Commercial Focus:** The fund will need to be managed with commercial acumen that could also identify commercial opportunities that may arise from an advanced property purchase strategy, such as aggregation of properties and alignment with/proximity to partner land holdings. While this may require changing current approaches, and potential policy and mandate, this presents the opportunity to substantially reduce the total cost of the property for this programme. To fully realise the opportunities there may be a need to work with partners such as Kainga Ora.
- **Policy and Procedure Changes:** The fund would benefit from some changes including allowing residual land purchased by AT to be sold and reinvested in the Strategic Land fund, without returning to Auckland Council. Another key change could be the application of Funding Assistance Rate (FAR) for advance property purchases

14.2.6 Property next steps

This DBC is focussed on route protection, thus there is uncertainty in exact timing of the property acquisition needs of the project until implementation is confirmed. This results in risk and uncertainty associated with the scale and timing of early property acquisition. It is anticipated that with the Auckland Network Level Crossings SSBC, the timing will be better confirmed.

To manage this risk and uncertainty appropriately and proactively, it is recommended that the following occurs:

- The Auckland Network Level Crossings SSBC reconfirms the property cost and requirements as design confidence is further developed. The SSBC should also re-evaluate the requirements if there are any changes especially with the timing and staging which may influence the cost for early acquisition.
- Value engineering is undertaken to minimise land requirements.
- Any changes in design to avoid the need for minor land requirements.
- Detailed property valuations are undertaken closer to implementation.
- Active management (including resourcing) of property programme with a view to reduce costs as much as possible, whilst also looking for opportunities to maximise value and cost savings when opportunities and funding allows.
- Willing buyer willing seller - Where there are properties that hold strategic benefit to the project and there is an opportunity for early purchase, consideration will be given to securing these properties earlier in the acquisition programme. It is considered that early acquisitions could reduce the overall property costs.

14.3 Procurement Plan

The scope of works for Te Tupu Ngātahi is to undertake the works necessary to support and obtain the designations for the recommended network (i.e., route protection) and does not currently include obtaining resource consents for individual projects.

The timing and delivery model for the remainder of works needed to support resource consent applications should therefore be considered in the pre-implementation phase of work. Once a project has been through the pre-implementation phase it will be ready for implementation. This will include

detailed design, consenting and physical works. The delivery model will need to consider factors, including:

- Scale.
- Complexity.
- Programme.

Given that this implementation phase is many years away for most Te Tupu Ngātahi projects, a detailed procurement strategy should be developed for each project at an appropriate time in advance and closer to the implementation of each project.

Some initial consideration during the implementation phase include:

- **Scale and complexity** – the bridges at Walters Road, Taka Street and Manuia Road are significant pieces of infrastructure with high risks due to factors such as scale, complexity and ground conditions. There are also additional interfaces with the rail line and design risk will vary depending on the value engineering solutions adopted.
- **Timing and urgency** – With the opening of CRL, increased delays are anticipated at the level crossings that is likely to cause extensive congestion, thus there is some urgency in having the existing level crossings removed.
- **Defined scope** – Given the scale of these projects it is possible that these could be tendered as a Design and Construct or another collaborative form of contract.
- **Supplier market conditions** – There are several suppliers available for the type and scale of work in Auckland. Additional skill sets may be required to deal with the peat ground conditions.
- **Client involvement, control and capability** - Client control will depend on the delivery mechanism eventually chosen.
- **Tangible demonstration of value for money** – value for money will form part of the decision for delivery.

It is anticipated that the Auckland Network Level Crossings SSBC will consider several of the above and will determine the procurement approach.

14.4 Required Services

Following the route protection level NoR approach described above, the remaining elements required to prepare this project for implementation include:

- Detailed design.
- Regional consents.
- Resource consents and management.
- Surveillance and quality assurance (MSQA).

Key matters to be considered include:

- **Scale and complexity** - Consents are likely to be complex. Specialist capability will be needed to design and deliver the project.
- **Funding** – There is no confirmed funding explicitly for this project. However, there is allocated funding for level crossings removal across the network. The SSBC work currently underway will determine whether this project will form part of this funding.
- **Timing and urgency** – The removal/ upgrade of the level crossings is somewhat linked to the opening of CRL given the anticipated prolonged barrier downtime.

- **Defined scope** – Consent conditions to be secured before award of physical works contract.
- **Supplier market conditions** - The Auckland market can service this range of contracts and service requirements.
- **Client involvement, control and capability** – Client's desire to retain control.
- **Non-cost success factors** – Strong desire for the client to achieve best practice environmental and stakeholder outcomes. Committed to addressing carbon reduction and maximising the opportunities to mitigate or where necessary adapt designs to best respond.
- **Tangible demonstration of value for money** – Competitive tender for services recommended.

These considerations are likely to be considered in more detail within the Auckland Network Level Crossings SSBC.

Overall procurement risk is low given there are skills, capability and client expertise to deliver the project.



Management Case

15 Management Case

The following sections describe the arrangements that will be implemented for the successful delivery of the project. It describes the delivery arrangement for each phase of the route protection and tests the project planning, governance structure, risk management, stakeholder management, benefits realisation and assurance.

It is noted that this DBC sits within the wider context of the Te Tupu Ngātahi programme, as such this management case draws on the overarching management case developed as part of the wider programme.

There are two distinct phases for delivery:

- Route protection – preparation of NoR documentation for lodgement.
- Post route protection management – post lodgement activities.

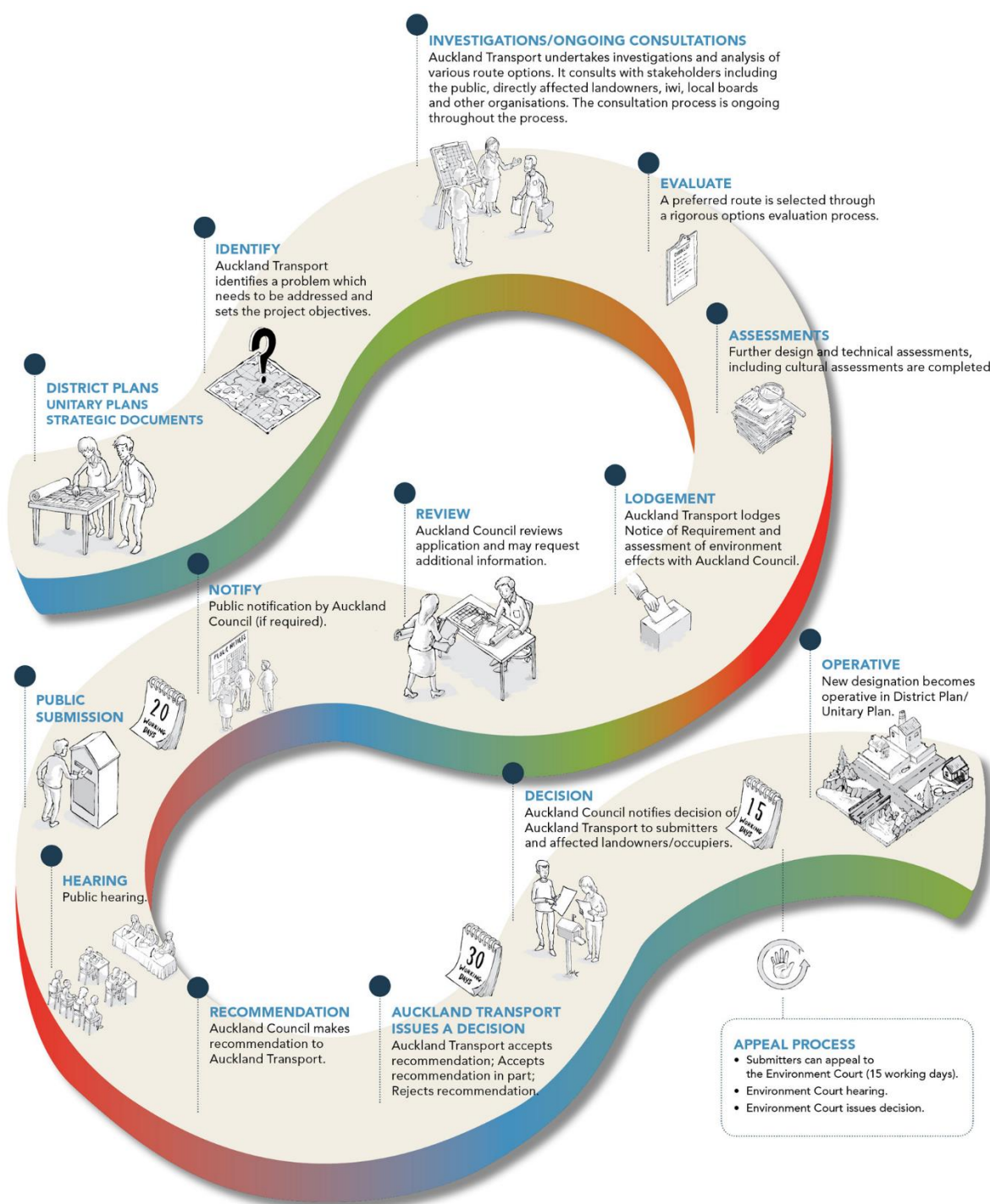
These are discussed separately in **Sections 15.1 and 15.2** below. Each section discusses the specific governance, key activities, roles and responsibilities, risks and stakeholder engagement requirements applicable for that stage. This is following by some additional overall programme management considerations.

15.1 Route protection management

It is noted there are multiple methods to achieve route protection and this section is based on obtaining a transport designation. This section covers the preparation and lodgement of NoR documentation and any post lodgement activities to confirm the operative designation.

15.1.1 Route protection process

The route protection process is shown in **Figure 15-1**.

Figure 15-1 : Route protection / NoR process ⁸

15.1.2 How is the route protection phase being governed?

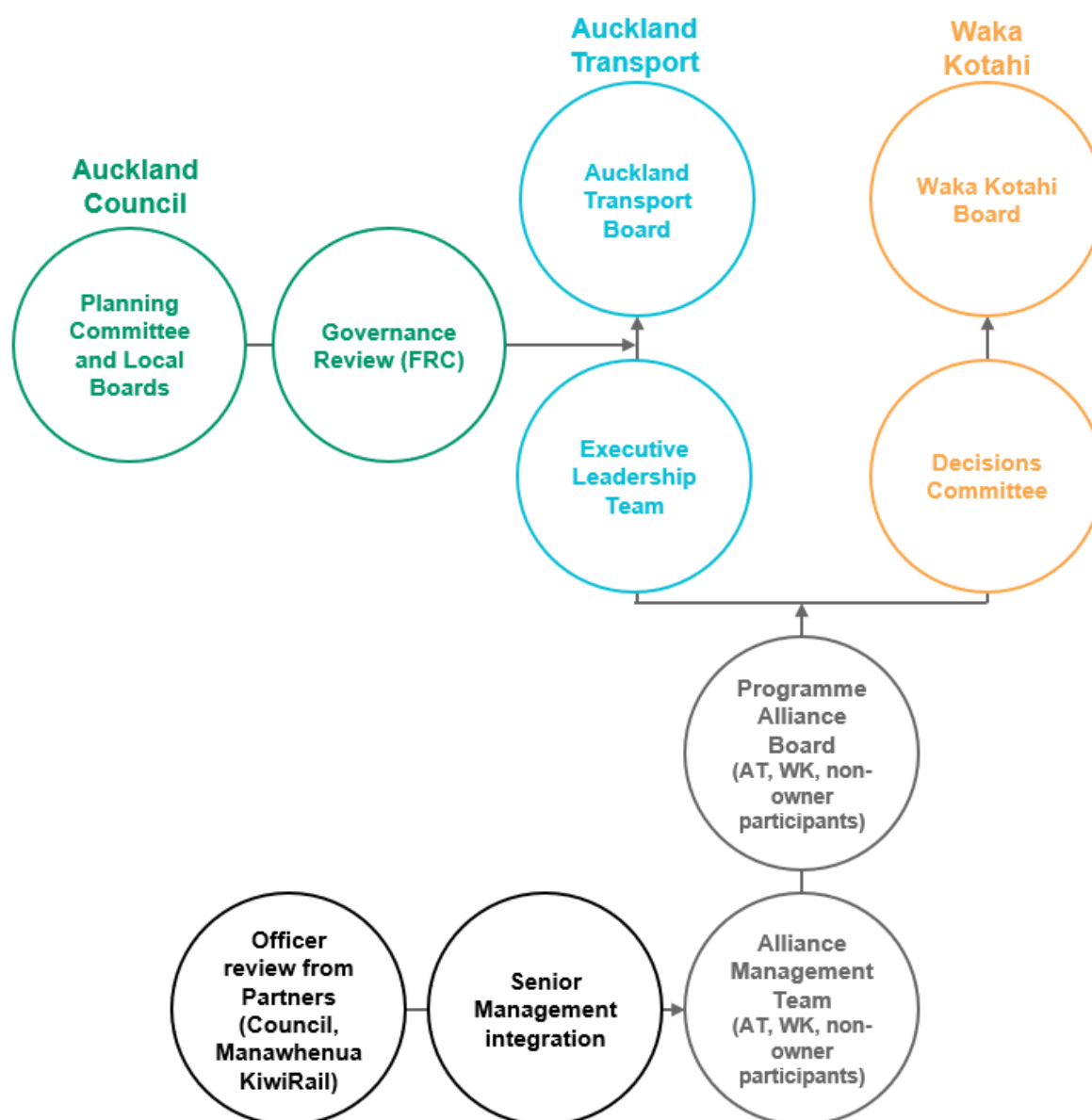
Waka Kotahi and AT identified a collaborative Alliance model as the appropriate delivery mechanism to efficiently deliver this route protection. It is intended that the Alliance would also need to work

⁸ <https://at.govt.nz/about-us/manuals-guidelines/notice-of-requirement-guide/#documents>

collaboratively with owner and partner organisations in respect of wider land use, transport system planning and specific programme governance.

Governance in the context of the Alliance is defined as the process by which the Alliance is directed, controlled and held to account. The Governance Management Plan has been developed and guides the implementation of a shared understanding of why, how and who is responsible for the effective governance of the Alliance. This structure is summarised below in **Figure 15-2**.

Figure 15-2: Te Tupu Ngātahi governance structure



The Alliance Board is ultimately responsible for approving Alliance deliverables for release. The Alliance Board does not replace the approval processes for AT or the Waka Kotahi.

The outcomes sought from the Te Tupu Ngātahi alliance over the next five years are:

- Business cases that confirm the recommended transport network and enable investors to make decisions on whether first decade projects will proceed to the implementation phase or alternatively to route protect corridors for longer term projects.
- The preferred transport network for each growth area is route protected within five years.

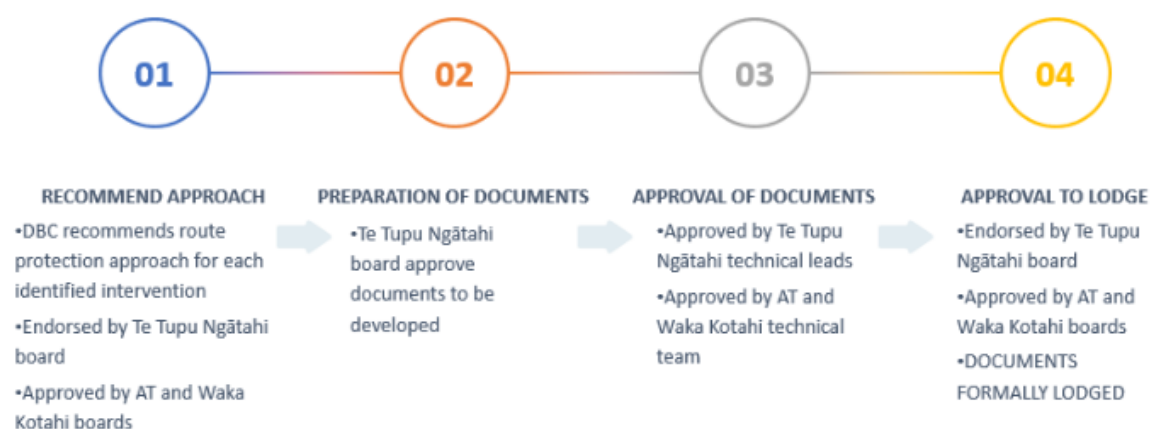
- Efficiency of process – by protecting the recommended networks in each of the four growth areas together, efficiencies are sought through the business case and NoR processes.

While projects without a physical footprint are not within the scope of Te Tupu Ngātahi, these projects (including TDM and maximising land use opportunities) are critical in meeting programme objectives and wider policy directives and are recommended to progress in parallel with the route protection task.

15.1.3 Who decides and approves the route protection approach?

The decision to formally lodge for route protection will ultimately be made by both AT and Waka Kotahi boards. There are however several steps preceding this ultimate decision as outlined in **Figure 15-3**. The process also allows for multiple review and staged approvals of the documents as they are prepared.

Figure 15-3 : Route Protection approval process



15.1.4 How are different project prioritised over others?

The benefits of route protection varies subject to a range of matters, including:

- **Urgency** – development pressure including the lodgement of private plan changes, council structure planning, or the timing of related projects to the intervention.
- **Financial benefits obtained from protection**– route protection can reduce property and construction costs associated with a project. Benefits achieved are significant if protection is obtained prior to development but erodes over time for projects in the longer term.
- **Place shaping**– certain projects have an increased influence on the surrounding urban environment. Protection of these project corridors is likely to enable land use and shape the urban form within an area.
- **Potential for value capture** – Some projects have significant value capture opportunities which are enabled through corridor protection and increased certainty for land use and development opportunities.
- **Contribution to programme outcomes**– The extent to which a project contributes to the overall programme benefits including mode share, accessibility, resilience etc.

The Takaanini Level Crossings has been prioritised by Te Tupu Ngātahi to progress through to route protection due to the urgency and the size and scale of the project. The Te Tupu Ngātahi management team regularly review the overall programme prioritisation (at least every six months) and any changes are recommended to the Alliance board for endorsement. Approval to commence the pre-lodgement work for the Takaanini Level Crossings was received in 2021 and work has started in 2022.

15.1.5 Property

The Te Tupu Ngātahi Programme Wide Property Strategy identifies an approach for the securing of strategic properties. Whilst the vast majority (60% - 80%) of property purchase is typically anticipated in the three years prior to implementation of a project, this acquisition could occur prior to route protection being enacted, or during the route protection process. The Te Tupu Ngātahi Programme Wide Property Strategy identifies several different potential acquisition profiles for forecasting the potential property acquisition cashflow.

Typically, the purchase and ongoing management of these property purchases will be undertaken by the purchasing entities business as usual (BAU) property teams. Both AT and the Waka Kotahi have well proven and tested property management processes and dedicated teams in place to manage these property purchases and then the ongoing management of these properties.

15.1.6 NoR Lodgement

The management of the NoR process is shown in **Table 15-1** below.

Table 15-1 : Management of the NoR process

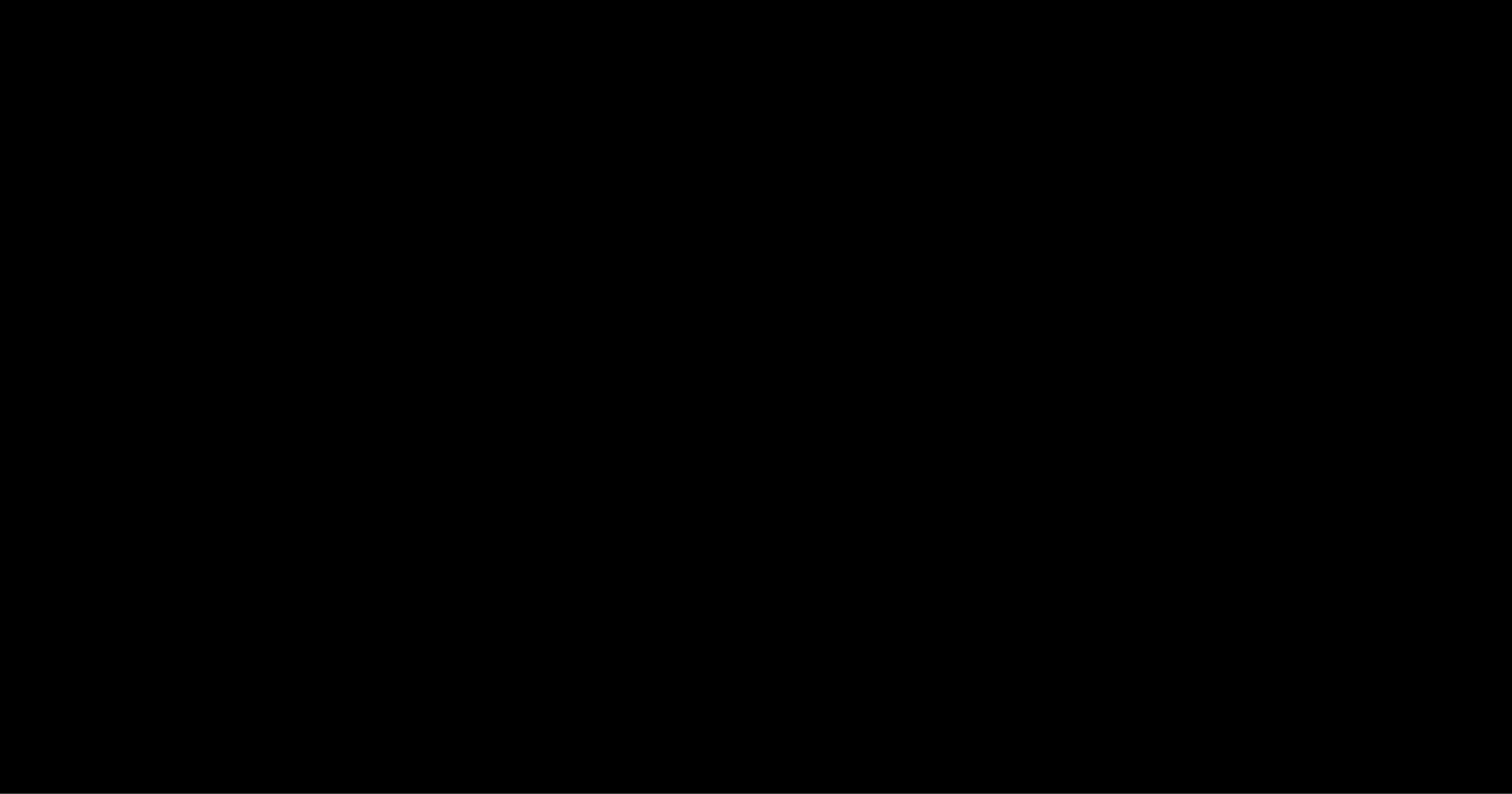
Stage	Management
Lodgement	- The decision to formally lodge documents will be made after AT and Waka Kotahi board approval of the business case. This includes the Alliance getting owner endorsement from technical leads within each owner as per the earlier described Quality Assurance process and any 'pre board' committees as required. - To ensure that the documents prepared are appropriate to the receiving authority (Council) regular (fortnightly) meetings have been established with the regulatory arm of Council to agree levels of detail and standard consent conditions prior to lodgement.
Hearing	- Once the decision is made to lodge, and documents are formally lodged; SGA will manage the interface with the receiving authority (Council) and the hearing processes on behalf of the specific requiring authority (AT or Waka Kotahi). - Leading into and during the hearings there is a need for fast decision making in respect to a number of key aspects, including conditions, submitter negotiations and requests from the hearings panel/court. - Both AT and Waka Kotahi have considerable experience in managing these dynamic situations and the SGA team will work closely with the requiring authority (AT or Waka Kotahi) to ensure that the required delegations and decision-making approval processes are in place prior to lodgement.

Stage	Management
Property agreements	Where the identified route protection mechanism does not include a designation process, such as a developer agreement, the following steps will be undertaken: • Te Tupu Ngātahi working closely with AT and/or Waka Kotahi property teams will provide technical advice to negotiations. • AT and/or Waka Kotahi will develop developer agreements. • AT and/or Waka Kotahi property teams will remain the 'custodian' of the agreement and ensure any conditions are undertaken and the agreement is monitored and actioned as required.

15.1.7 Risk and opportunity management

The Te Tupu Ngātahi programme is a large programme comprised of multiple projects and a range of policy and land use uncertainties which transpire into risks and opportunities. These must be managed to enable successful delivery.

A Risk and Opportunity Management Plan has been developed and endorsed by the Te Tupu Ngātahi governance team. The risk management process is consistent with AS/NZS ISO 31000:2009 and is consistent with typical risk management processes undertaken by AT and Waka Kotahi.

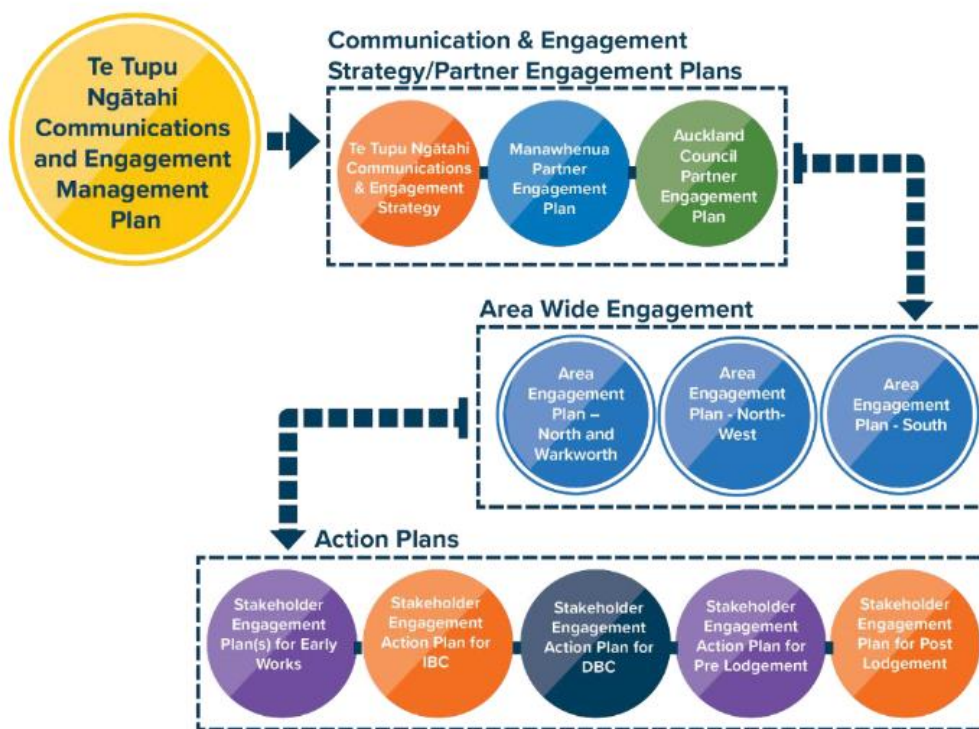


15.1.8 Engagement

Te Tupu Ngātahi has an extensive and ongoing engagement and consultation programme. The purpose of this plan is not solely to ‘consult’ with partners and stakeholders, but also to collaborate and empower others, particularly partner organisations who have their own roles and responsibilities in delivery of an integrated urban transport system and sustainable land use pattern (e.g., particularly the Council).

A Communications and Engagement Management Plan has been prepared which outlines operational policies and procedures for managing the communications, stakeholder and community engagement workstream within Te Tupu Ngātahi. The Management Plan has informed the Communications and Engagement Strategy and a variety of plans to inform engagement with partners, key stakeholders and the community/public. The relationship of these documents is shown in Figure 15-4.

Figure 15-4 : Te Tupu Ngātahi communications and engagement



The focus of the engagement at a programme wide level during the preparation of the NoRs is detailed in Table 15-3.

Table 15-3: Engagement during preparation of NoR

Theme	Programme Wide response	DBC specific response
Manawhenua	Regular hui to communicate progress and discuss specific project activities.	Regular hui and site visits with the project team.
Public engagement	Continue to build understanding of wider Te Tupu Ngātahi progress and the process of route protection as set out in the Programme Wide Comms and Engagement Strategy	Development of engagement plan for NoR preparation phase.

Theme	Programme Wide response	DBC specific response
	• Continue one-on-one engagement with landowners / developers (e.g., meetings) regarding potential effects and opportunities for shared alignment in outcomes (e.g. through developer agreements) – particularly in areas where land is live zoned or is about to be. • Inform stakeholders about the processes for route protection (e.g., via e-updates, meetings and website information) and provide an opportunity for participation (i.e. submission on the NoR or similar as appropriate).	• Individual landowner meetings have taken place where requested. • Further community engagement will take place including landowner and stakeholder engagement.
Council engagement	• Critical ongoing discussion with the Council around land use and transport integration. This will include a range of interactions from detailed structure plans to wider discussions around achieving sustainable urban mobility in the un-zoned future urban areas. This will take place through specific Auckland Council/SGA forums, workshop environments and individual meetings.	• Participation in Council land use forums.
Stakeholders	• Provide information (and seek feedback) on staging and timing for the preferred network, including specific opportunities for sequencing of urban development (e.g., meetings with utility providers regarding integration of utilities within the future transport corridor). • Ongoing workshops and communications with Programme-wide stakeholders and stakeholder groups e.g., Development/Freight/Road Users Group, Active Modes/Public Transport Advocacy Group and Environmental/Social Impact Group	• Ongoing attendance at existing stakeholder forums.
Environment	• Further understand specific issues/ environmental/ urban development effects and opportunities in the preferred network to identify potential design responses and environmental management / mitigation (for route protection documentation)	• Will be considered as part of the preparation of AEE documentation.
Property	• Identify opportunities for AT and Waka Kotahi to undertake early property acquisition (e.g. willing buyer/willing seller arrangements. Note leading this process is outside the specific scope of work for Te Tupu Ngātahi.	• Information to be passed on by project team to appropriate owner organisation.
Decision makers	• Enable Te Tupu Ngātahi to inform decision makers on the risks and opportunities of potential route protection mechanisms for the preferred network.	• Regular update of risks and opportunities registers. • Project team to work with Owner Interface Managers to allow briefing into owner organisations.

15.2 Post route protection management

15.2.1 Key Tasks

There are several key tasks after the designation becomes operative. These include:

- **Delivery of the Auckland Network Level Crossings SSBC** – which will delve into more detail regarding timing, staging and design of the level crossings amongst other things.
- **Scoping, procurement and delivery of project to implementation** – Once the project has funding, the next stage in the implementation of the project will include four stages:
 1. Consenting – Secure the required resource and required consents
 2. Design – Design development to allow construction to occur
 3. Implementation – The procurement and construction of the project
 4. Operations and Maintenance – The ongoing management of asset delivered

There are different options in delivering the above stages. For example, consenting, design and implementation could all be procured separately. It is anticipated that the SSBC will determine how this will be undertaken.

- **Purchasing and management of property acquisitions** - Typically, the vast majority of property purchase for a project is anticipated in the three years prior to implementation of a particular project. The Programme Wide Property Strategy also outlines the need for a dedicated Supporting Growth Strategic Property Fund for advanced property purchase and a dedicated team to drive this fund. It is envisaged the SSBC will provide more details around this.

15.2.2 Governance

The Te Tupu Ngātahi scope finishes with route protection. Therefore, this next phase will be managed and governed directly by the project owners of Auckland Transport. These post designation activities are generally considered Business as Usual for the owners and it is expected that the owners would identify the relevant teams within the organisation to progress the tasks.

15.2.3 Risk and opportunity management

In terms of the key risks envisaged at this time for this stage of the project, these are considered to be:

- Consistency of messaging to stakeholder and property owners
- Availability of funding for implementation (and property funding)
- Appropriate width of designation obtained

These risks (and others that may arise) will need to be proactively managed to ensure the successful implementation of the project moving forward.

15.3 Overall Project Management

15.3.1 Benefit realisation and ongoing management

Ongoing tracking and measurement are an important aspect to make sure the outcomes sought are delivered. As this project fits into the wider Auckland Network Level Crossings, it is considered the outcomes of this project should be tracked in conjunction with the wider network.

It is thought that the ongoing management of the project will be considered as part of the SSBC.

16 Conclusion and Next Steps

This DBC sets out the rationale for investing in route protection for the Takaanini Level Crossings. Based on the information provided throughout this document, the following approvals are sought:

1. Approval of the recommended option for the level crossings.

- Approval and endorsement is sought for the recommended option for the level crossings which includes:
 - A new grade separated bridge connection is proposed between **Manuia Road** and Oakleigh Avenue/ Hitchcock Road. The connection will provide direct access to the Takaanini industrial area.
 - Existing at grade level crossings at **Spartan Road** and **Manuroa Road** will be fully closed to vehicular traffic but will be replaced by grade-separated active mode bridges.
 - Existing at grade level crossings at **Taka Street** and **Walters Road** will also be closed but will be replaced by grade separated bridges which will accommodate all modes.
 - Separated walking and cycling facilities will be provided in the bridge footprint at the location where a grade separated crossing is recommended i.e., Manuia Road, Taka Street and Walters Road.

2. Approval of lodgement and route protection preparation.

Approval for lodgement and route protection for the Takaanini Level Crossings which is currently recommended as one NoR package. This is to be revisited following further community and stakeholder feedback.

It is noted that the preparation of NoR documentation is underway and documentation would be subject to standard review processes by Waka Kotahi and AT. A condition could be offered that AT/Waka Kotahi would go back to their boards once NoR documentation is complete if there are any substantial changes to be notified.

3. Approval for funding release for post lodgement activities.

Funding is available and will be unlocked with the above approvals.

4. Acknowledgement of the potential early property acquisition and associated risk arising from route protection of the recommended option.

It is acknowledged that this business case is focussed on route protection and that there are funding implications associated with early property acquisition of this route protection. This business case does not seek to resolve issues surrounding the funding required for the delivery of the recommended option.

The very nature of route protection enables the provision of planned infrastructure rather than 'responsive' infrastructure which typically results in infrastructure being retrospectively added into available land that is built-up. This planned approach therefore provides the owners with significant opportunity to front foot and respond to key issues. In addition, with CRL and four tracking occurring, it is important to be as ready as possible for when funding is available for implementation to ensure the benefits of these key projects are fully realised. This will drive the step change for the desired transport outcomes (mode shift, land use integration and accessibility enhancements).

Financially, a small investment now is forecast to save many millions of dollars in property and implementation costs that makes financial sense. Route protection requires some upfront expenditure

but is cheaper than acquiring land later due to escalated property prices and underlying growth in land values, rezoning and development.

Implementation will be considerably less difficult (and costly) due to a designation being in place prior to the growth.

There is also the challenge of funding the implementation of the options identified given the constrained NLTF. Whilst not the focus of this DBC, the DBC recognizes there may be limited funding currently. However, the business case also recognizes that the Auckland Network Level Crossings will consider and may address a number of these risks. How and if early property acquisition occurs may differ from that set out from the rest of the Te Tupu Ngātahi programme.

16.1 Next Steps

The following key next steps for Te Tupu Ngātahi in terms of route protection are:

1. Preparation of documentation for NoR.
2. Approval to lodge the NoR.
3. Lodgement of NoR.
4. Post lodgement activities.

A number of key activities have also been identified that need to be undertaken to either reduce residual risks, better manage uncertainty or unlock additional potential and opportunities for the project. These are as shown in **Table 16-1**.

Table 16-1 : Next Steps

Corridor	Next Step	Action	Owners
All	Property – Management of property acquisition	- Develop overall plan for property purchase - Consideration of strategic advance purchases.	Auckland Transport
All	Changes to the Resource Management Act – Impacts on the Route protection strategy	- The NoR team will continue tracking these policy changes and will need to adapt the strategy if required. - Not expected to influence the 'why' for route protection but might impact the 'how'.	Te Tupu Ngātahi NoR Team
All	Value engineering – Impacts on property and cost	Further design refinements as more information becomes available. Provides more certainty in cost and property impacts.	Auckland Transport
Manuroa Road	Integration with Takaanini Station Masterplan	Integration of the active mode connection with the Takaanini Station as part of the future Masterplan study.	Auckland Transport