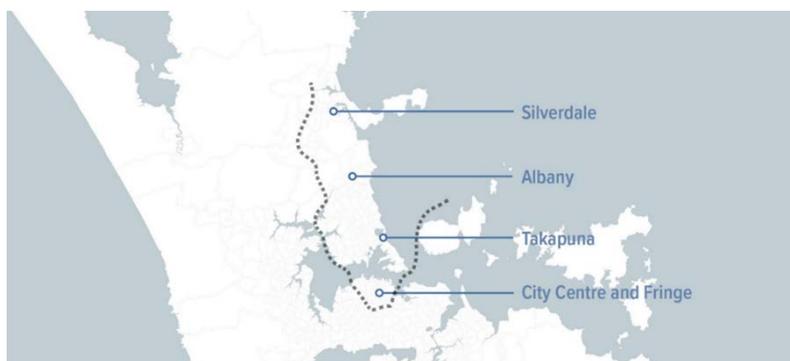


1. EXECUTIVE SUMMARY

1.1. Introduction

The growth of Auckland's North Shore is placing increasing pressure on key parts of Auckland's transport system. This pressure is being particularly felt on the strategic transport corridor, made up of State Highway 1 and the Northern Busway. This is a nationally significant corridor, providing access within the North Shore, from the North Shore to the Auckland isthmus, and acting as the most direct link between Northland, Auckland and the rest of New Zealand. The corridor is already under severe pressure and faces some unique resilience challenges, which are forecast to increase further as population and employment continues to grow.

The Auckland Harbour Bridge is an iconic structure and the corridor passes through extremely sensitive and significant environmental and cultural areas, especially between Takapuna and the city centre. The Waitematā Harbour has a special status with iwi.



The study area for this Business Case includes the entire North Shore area from Silverdale to the city centre and fringe.

A key section of this corridor is the Auckland Harbour Bridge (the 'harbour bridge'), a

nationally significant component of New Zealand's transport system. The harbour bridge is the most travelled route in New Zealand, carrying on average around 235,000 people a day, including around 30,000 public transport trips and in the order of 12,000 freight (HCV) trips¹. It has been in operation for over 60 years and will be nearing its 100th anniversary within the 30-year planning horizon of this business case.

The need for improved connectivity between the North Shore and the central isthmus has been anticipated for several decades and many studies have been undertaken into possible options. Recent work dates back to a study in 2008, which recommended a preferred route for a new road and rail crossing between the central city area and Esmonde Road on the North Shore.

Previous studies have largely focused on options analysis, rather than defining the problem to be solved or outlining a case for investment. In 2016, Auckland Transport developed a Programme Business Case for the development of rapid transit to the North Shore. This business case has built from this previous work and has undertaken updated investigations with the most recent demands and policy expectations.

Specifically, this business case responds to direction in the 2018 Auckland Transport Alignment Project (ATAP), which outlined the "urgent need" to "confirm the rapid transit corridor's future mode

¹ 171,000 vehicles per day in 2018 (around 205,000 people assuming an occupancy of 1.2 people per vehicle)

and alignment, including how it integrates with a potential future road crossing". ATAP also noted "the need to provide more certainty about the optimal timing, modal mix, configuration and operation" of any future crossing.²

This business case is a joint study between Auckland Council (AC), Auckland Transport (AT) and Waka Kotahi NZ Transport Agency (Waka Kotahi). It has analysed the current and future problems faced in the corridor, assessed a number of options for addressing these problems, and recommended a way forward to provide a comprehensive and long-lasting response. While there have been a number of previous studies into improved connections across the Waitematā Harbour, this business case is the first to establish the problems and benefits for investment and take a fully mode neutral approach in determining the preferred response. This is consistent with business case principles and includes consideration of the wider transport system

1.2. Summary of findings and next steps

The business case focuses on 'programme level' issues and conclusions – outlining the following high-level series of interventions to be progressed further:

- Further investigate the potential for land-use planning and demand management (e.g. road pricing) to optimise existing infrastructure and delay the need for major investment.
- Urgently upgrade the Northern Busway to increase its capacity, reliability and overall service quality.
- Develop an additional rapid transit connection for the North Shore (including across the Waitematā Harbour to the city centre), that integrates with the upgraded busway and the wider public transport network to provide high quality access to opportunities and travel choice.
- Improve roading connectivity in the corridor in a way that addresses resilience issues in the corridor (including the Auckland Harbour Bridge).

This work has confirmed the urgent need to enhance the existing busway, which is now being progressed through a Detailed Business Case. The scale, complexity and multiple interdependencies of the indicative rapid transit and road improvements identified means that more detailed analysis is required before their exact form, function and timing can be confirmed.

Indicative rapid transit and road options were looked at to better understand some of their key issues and guide where further detailed analysis is needed.

² Auckland Transport Alignment Project (2018), pages 25 and 32.

1.3. Current and Future Problems in the Corridor

This nationally significant corridor faces several key problems now and into the future. Addressing these problems and enabling the corridor to function effectively will have substantial local, regional and national benefits. The key issues are:

- Population and employment growth are leading to an increased demand for travel, which will increasingly exceed the existing network's capacity. As capacity is reached and exceeded across more modes of transport and across more of the day, there will be significant detrimental effects on access, travel choice and the efficient movement of goods and services.
- The very high and growing dependency on the corridor, particularly for cross-harbour travel, means that its vulnerabilities have increasingly significant impacts on Auckland and New Zealand if service levels are compromised. While the Harbour Bridge is in good condition, it is an ageing structure with growing maintenance needs and will require increasing traffic management restrictions to protect its ongoing structural integrity.



These issues are discussed further below.

Current and future growth is placing growing pressure on the corridor, including impacting on the efficient movement of goods and services

The North Shore's population is projected to grow from 337,000 to around 500,000 by the late 2040s, with most of this growth forecast to occur north of Albany. The city centre and fringe is the largest and most productive employment centre in New Zealand, with employment in this area expected to grow from 125,000 to 212,000 over the next 30 years. The North Shore is a major part of the city centre's labour pool.

The Northern Motorway has been congested at peak times for many decades now, resulting in long and unreliable travel times. Since the Northern Busway opened in 2008, commuters have had the option to avoid this congestion by using public transport – and ridership has increased dramatically from approximately 800,000 trips a year to over 6,000,000 trips annually, when traffic growth in this period has largely stayed static.

Continued public transport growth will push parts of the busway to its capacity limits, firstly in the city centre and then at key stations. This will result in slower and less reliable bus journeys, leading to severe access and travel choice issues for the corridor. Moving more people by public transport will enable access to employment (and the wider productivity and prosperity benefits that will bring) to grow in a way that realises the vision of Auckland Council's City Centre Master Plan.

Because the corridor has long been congested for general traffic at peak times, growth in vehicle demand has been accommodated through a lengthening of the traditional 'peaks', a process that is forecast to continue across much of Auckland's motorway network in the future. A lack of alternative routes across the Waitematā Harbour, combined with the important role the corridor

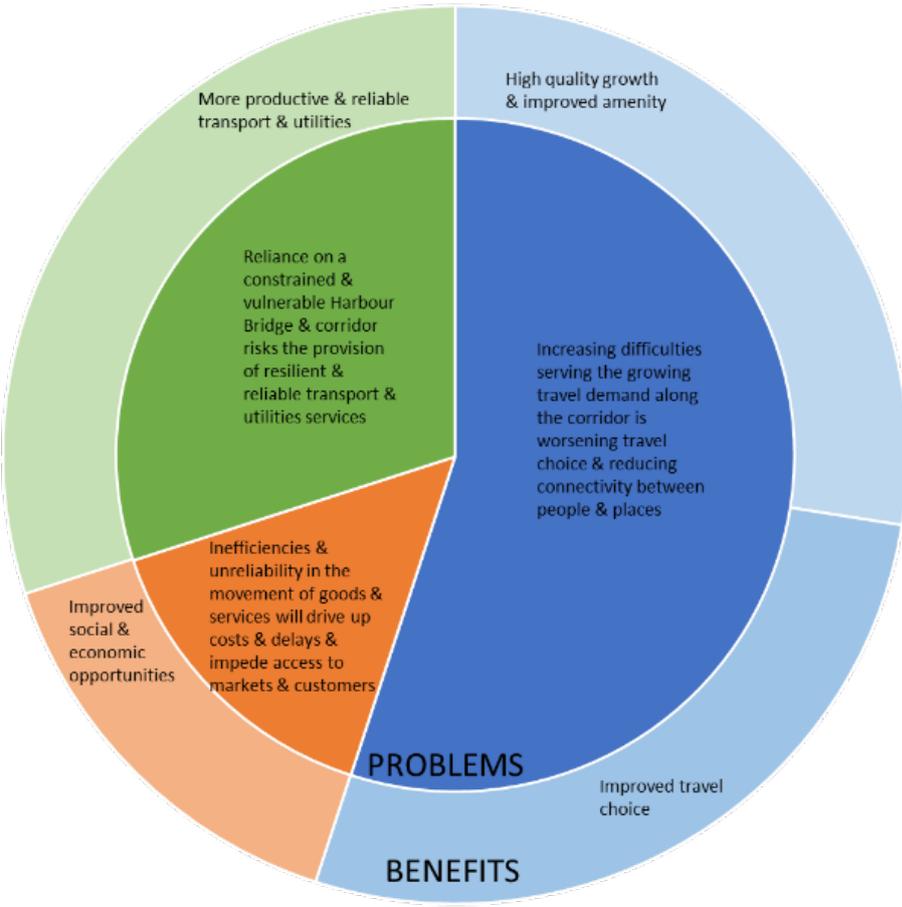
plays in Auckland's freight network, means that all day congestion in this corridor would have widespread effects on economic productivity and prosperity at a local, regional and national level if not addressed.

Access in this corridor is highly dependent on a single route with several vulnerabilities

The high level of reliance on a single corridor and bridge means that various vulnerabilities could have significant impacts on Auckland and New Zealand if service levels were compromised. These include:

- While the harbour bridge has been strengthened on several occasions in the past, further strengthening is no longer possible. This means that maintaining the structural integrity of the bridge is likely to require some restrictions on heavy vehicles in the future, such as limiting the lanes they can use, the number of heavy vehicles allowed on the bridge at any one time, or the time of day they are able to travel on the bridge.
- Increasing seawater inundation due to storm surges and sea level rise, especially between the Onewa Road and Akoranga Drive interchanges.
- The restrictive ability to manage and recover from around 2,000 traffic incidents per year.
- The harbour bridge is over 60 years old and will require increasingly significant maintenance over time to protect its structural integrity.

These issues have been summarised in the business case problem statements and investment objectives outlined below. The access and travel choice problem is considered to be the most significant, reflecting the critical role the corridor plays in Auckland's transport system (including its public transport network).



IO 1 : Enable Auckland to Achieve quality, compact growth & improved amenity

IO 2 : Provide improved travel choices and access to employment, education and social opportunities

IO 3 : Improve the productivity, resilience & reliability of Auckland's transport networks

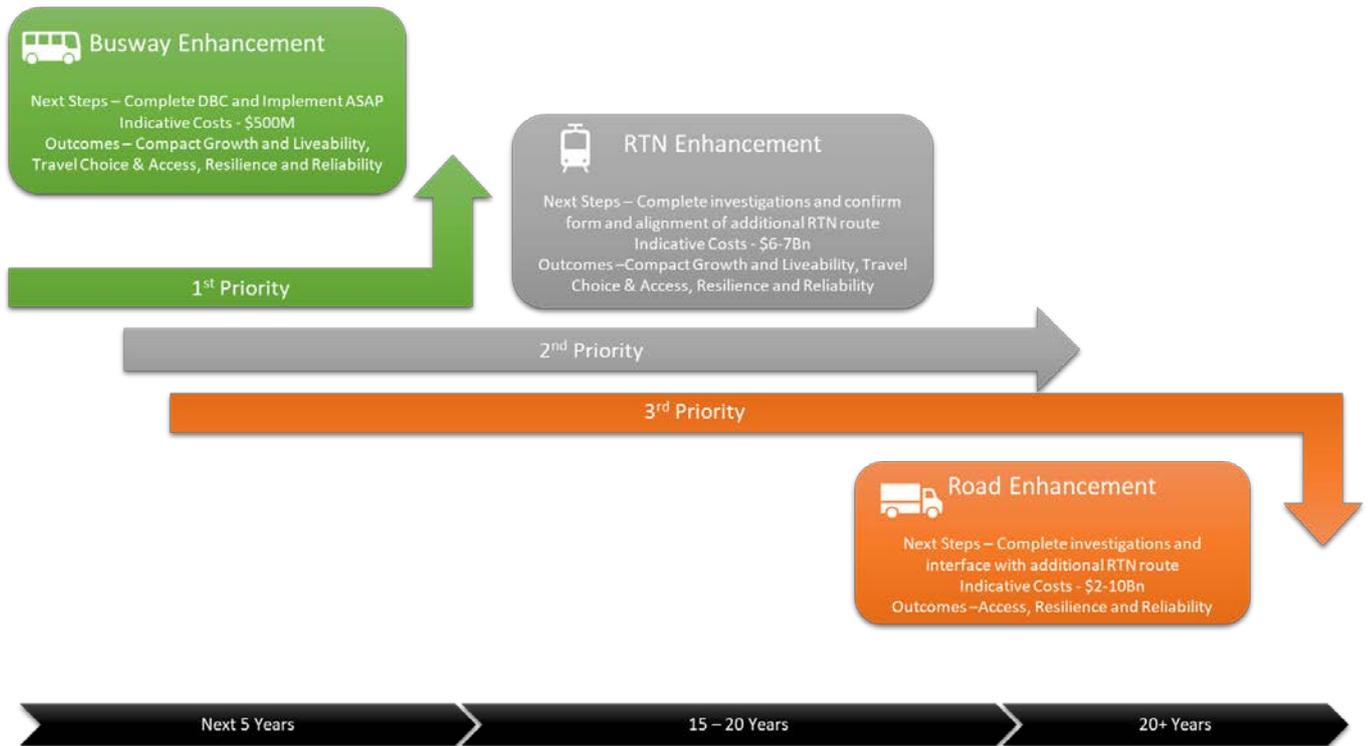
1.4. Programme level assessment and findings

Given the scale and complexity of the problems faced in the corridor, a variety of interventions over a number of decades are likely to be required. Following Waka Kotahi's 'intervention hierarchy' approach, land-use planning, demand management, network optimisation and new infrastructure initiatives were all considered as part of undertaking the programme-level analysis. A number of options were tested and considered.

The outcomes of this analysis are summarised in the table below:

Intervention Stage	Key findings
Integrated planning	<ul style="list-style-type: none"> The timing, location and scale of growth on the North Shore is a key driver of the timing of investment. There is an important link between the timing of greenfield urbanisation around Dairy Flat and the need for high-cost rapid transit and road investment. Focusing growth in and around major centres (especially Takapuna and Albany) will help reduce travel demand and support mode shift to public transport. Employment growth on the North Shore will ease pressure on the harbour crossing part of the corridor and potentially delay the need for major investments.
Demand management	<ul style="list-style-type: none"> Road pricing can help reduce congestion on the corridor, potentially delaying the need for road investment. However, it will increase public transport demand and potentially bring forward the need for rapid transit upgrades. Legislative change is required to enable road pricing. City centre plans will reduce road capacity, discourage people from driving there, and increase public transport demand.
Best use of existing network	<ul style="list-style-type: none"> Filling gaps in the Northern Busway (i.e. sections without a dedicated corridor), expanding busway stations and resolving city centre constraints can unlock spare capacity in other parts of the busway, realising the full potential of existing infrastructure. Increasing non-peak direction road capacity (rather than peak direction capacity) across the harbour will help unlock spare capacity on the existing motorway network. Protecting the ongoing functionality of the Auckland Harbour Bridge will mean this critical asset continues to provide value to Auckland and New Zealand.
New infrastructure	<ul style="list-style-type: none"> An upgraded busway will not have sufficient capacity to meet medium-long term public transport demand. An additional rapid transit connection is therefore required to ensure public transport remains an attractive travel option and to retain resilient cross-harbour access. The additional rapid transit connection should directly serve Takapuna and Smales Farm from the north and south, as well as integrate with the busway and the wider public transport network. Two rapid transit crossings of the harbour (i.e. the busway over the Harbour Bridge and an additional rapid transit crossing on a separate alignment) are required to meet forecast demand. In the longer-term, improved road connectivity is required in the Albany to city centre corridor to address projected all-day congestion, protect the motorway from increasingly frequent flooding and to preserve the long-term structural integrity of the Harbour Bridge.

These outcomes indicate a programme of significant investment in the strategic spine of the North Shore transport system as follows:



1.5. Rapid Transit and Road Options Assessment and Findings

Following these programme level findings, further analysis was undertaken to understand the outcomes and impacts of the additional rapid transit and road options. The options considered are summarised in the table below. These options included road pricing (and the resultant effects) in the analysis.

Rapid transit options	Road options
<p>A number of options (and sensitivities) were considered including:</p> <ul style="list-style-type: none"> • Conversion of busway to LRT • Additional heavy rail rapid transit routes • Additional light rail rapid transit routes • Stations at Takapuna, Smales Farm and sensitivity test of Albany 	<ul style="list-style-type: none"> • An upgrade to the existing harbour crossing to allow 10 lanes of traffic (5 in each direction) • A new 6 lane road tunnel under the harbour between the city centre and Akoranga • Widening of the Northern Motorway between Akoranga and Constellation

This business case originally sought to identify the preferred form, function and timing of a preferred new cross harbour alignment of all future improvements in the corridor. However, careful and more detailed investigation to understand the wider implications on the transport system of the additional rapid transit connection and the road improvements is required before their exact form, function and timing can be confirmed. This is because of the complexity of the issues faced in the corridor, the scale of future investment to address these issues, and the strong interdependencies of the corridor with wider policy and planning (e.g. road pricing, wider rapid transit network planning).

Further investigation of the busway enhancements is being progressed already through a Detailed Business Case. The extent to which the busway enhancement ultimately enhances public transport capacity will impact the timing and nature of subsequent investments. Therefore, this business case only undertook an initial assessment of the rapid transit and road elements of the programme, with a focus on helping to define where future effort needs to be focused.

Key findings from this initial assessment are outlined below:

Rapid Transit Key Findings

- An Additional Rapid Transit Connection would make the most significant contribution to achieving the investment objectives outlined in this business case.
- While the programme-level work is clear that two rapid transit connections between Smales Farm/Takapuna and the city centre are required to meet forecast demand, it is not yet clear what the best approach is north of Smales Farm/Takapuna. Key findings to inform future work are:
 - If the Additional Rapid Transit Connection terminates at Smales Farm/Takapuna, it is unlikely to generate sufficient ridership to be cost effective and would only carry around 15% of cross-harbour peak time public transport trips (with 85% of trips still on the busway).
 - Extending the Additional Rapid Transit Connection to Albany (or even further to Silverdale/Orewa) results in the new connection playing a much greater role in meeting demand. However, complex issues still need to be resolved in terms of how this is done. In particular:
 - Upgrading the busway between Smales Farm and Albany to a rail-based mode will be the least costly option but means potentially significant disruption to passengers during construction.
 - Providing a second rapid transit corridor (either next to the motorway at grade or away from the motorway in a tunnel) will be much more expensive but would have less disruption and may open up new rapid transit catchments.

- Finalising the mode of this new rapid transit connection (i.e. light-rail, light-metro or heavy rail) should be done through a region-wide network planning process because of significant interdependencies with other rapid transit corridors – especially on the isthmus.
- The busway cannot be upgraded to heavy rail without significant works (major tunnelling etc.) and the resultant disruption to the operation of the existing busway.
- The alignment and mode of the Additional Rapid Transit Connection will have important land-use implications, with a potentially substantial refocusing of growth around stations required to maximise benefits from the investment.

Roading Key Findings

- There is a significant difference in cost (around \$8 billion) between upgrading the Auckland Harbour Bridge corridor (for example via a parallel structure) and constructing new road tunnels under the harbour between the city centre and Akoranga.
- However, upgrading the Auckland Harbour Bridge corridor is likely to have significant environmental, cultural and social impacts. While the consentability of such works would not be fully understood until tested through normal processes, advice informing the business case has suggested it would be unlikely under current legislation.
- Neither road option analysed would eliminate congestion in the corridor at peak or interpeak times. Most interpeak trips between the North Shore and the isthmus would be 1-3 minutes faster in 2048 due to the road investments (compared to only investing in public transport improvements).
- Any road option would likely need to be accompanied by widening on upstream and downstream elements of the motorway and local network in order to achieve tangible benefits, and the costs and implications of these works need to be understood as part of any decision on additional cross-harbour roading capacity.
- The Northern Motorway needs to be raised between the Onewa Road and Esmonde Road interchanges to reduce flooding risk.
- A new crossing would ease pressure on the Auckland Harbour Bridge to a greater extent than an upgrade in the immediate vicinity of the bridge, assisting with enabling maintenance of the structure and providing a level of improved resilience (noting the corridors merge back together north of the crossing).
- Further work is required in the next phase of work to ensure longer term roading improvements effectively target the key problems in a way that supports wider transport and urban outcomes, in particular:
 - The improvements need to sufficiently ease pressure on the existing Auckland Harbour Bridge so that major maintenance activities can be undertaken to preserve its long-term structural integrity.
 - Detailed design and operational needs to ensure peak direction traffic volumes:

- between the North Shore and the city centre decrease in line with City Centre Masterplan aspirations
- travelling past the city centre does not unreasonably exacerbate congestion in other parts of the network
- The merits and complications of combined or separate road and rapid transit connections needs to be considered in more detail, including when they are needed and whether the optimal design is consistent with a combined crossing, as well as cost and environmental impact considerations.
- The size and timing of investment needs to be carefully considered, to ensure value for money.

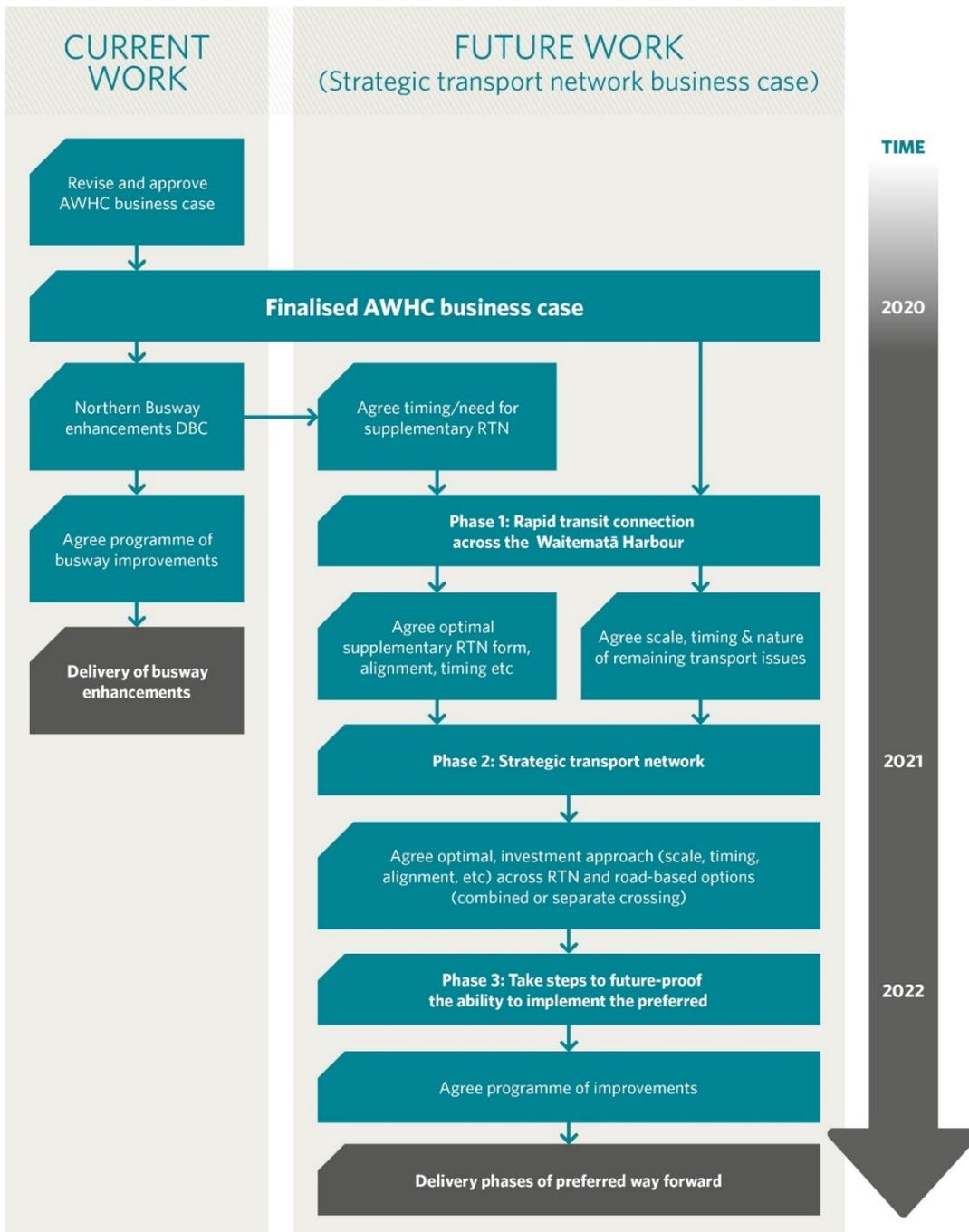
1.6. Next steps

This emerging programme has a forecast Investment Assessment Framework of **VERY HIGH** due to the scale of the significant access and public transport implications addressed which delivers the following outcomes.

Through this work, a number of areas have been highlighted where more detailed investigations are required to confirm the exact form of the future transport system. In the short term four key steps are proposed:

- **DBC for Busway improvements:** This will develop the exact form of the busway enhancements for early implementation. This work is urgent and has been commenced by Auckland Transport.
- **Strategic Transport Networks single-stage business case for:**
 - **An additional rapid transit connection across the Waitematā Harbour (Phase 1)**
This phase will confirm the exact form (including mode) and alignment of the new cross harbour rapid transit connection, including an understanding of timing such that it may be in place prior to the enhanced busway reaching capacity
 - **Strategic transport networks (road and rapid transit) (Phase 2)** This phase confirms the wider rapid transit network on the North Shore and what additional roading network across the harbour should look like, when it is required and how any new road crossing would interact with Phase 1
 - **Future proofing and route protection (Phase 3)** This phase will seek to route protect the land required from Phases 1 & 2

The above workstreams will be heavily influenced by the wider transport system and these interdependencies need to be a key part of this further investigation.



1.7. Governance

The recommended programme is large and complex, with many interactions and interdependencies. The successful delivery of the programme will require the continuation and evolution of the collaborative partnership and working arrangement between Waka Kotahi, Auckland Transport and Auckland Council that has been developed through this business case stage. It is proposed to continue the existing governance arrangements, with a vertically integrated approach proposed to drive effective project outcomes, delivery and monitoring of the programme.

