Supporting Growth

North West Indicative Business Case for Route Protection

Version 1.2
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TE TUPU NGĀTAHI Supporting Growth

NZ TRANSPORT AGENCY WAKA KOTAHI

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1.2	18 July 2019	Final

Disclaimer

The option assessment undertaken and the Indicative Strategic Transport Network plans shown were identified through Indicative Business Cases endorsed by the Auckland Transport and NZ Transport Agency boards in early 2019. Proposed corridors shown are yet to be prioritised for funding and delivery over the next 30 years. They will require further technical investigations and engagement to confirm the detail of locations for proposed upgrades or proposed new route alignments, and any associated land requirements. This additional assessment will include development of detailed design and costings to inform further economic analysis for funding purposes. Any land requirement may also require statutory approvals, which would be subject to the processes of the Resource Management Act 1991 and Land Transport Management Act 2003. The Indicative Strategic Transport Network also includes a suite of travel demand management initiatives and supporting public transport services.

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Appendix C Transport Report

s9(2)(i) and s9(2)(g)(i)

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s9(2)(i) and s9(2)(g)(i)

Appendix N Draft Network Naming Conventions

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Acronyms

Acronym	Description
AC	Auckland Council
AT	Auckland Transport
ATAP	AT Alignment Project
AUP: OP	Auckland Unitary Plan: Operative in Part
BCR	Benefit Cost Ratio
CAPEX	Capital Expenditure
CCO	Council Controlled Organisation
DBC	Detailed Business Case
FTN	Frequent Transport Network
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
GPS 2018	Government Policy Statement on Land Transport 2018-2021
HOV	High Occupancy Vehicle
IBC	Indicative Business Case
KPI	Key Performance Indicator
MCA	Multi Criteria Assessment
NAL	North Auckland Line
NOR	Notice of Requirement
OIM	Owner Interface Manager
OPEX	Operating Expenditure
PBC	Programme Business Case
PT	Public Transport
RPTP	Regional Public Transport Plan
RTN	Rapid Transit Network
RUB	Rural Urban Boundary
SEA	Significant Ecological Area
SOI	Statement of Intent
PBC	Supporting Growth Programme Business Case
SH	State highway
Te Tupu Ngātahi	Te Tupu Ngātahi (the Supporting Growth Alliance)
TFUG	Transport for Future Urban Growth
The Transport Agency	New Zealand Transport Agency
Vpd	Vehicles per day

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Executive Summary

Purpose

The purpose of the Supporting Growth Programme is to identify and protect the recommended transport networks to support Auckland's planned greenfield growth over the next 30 years.

This Indicative Business Case (IBC) identifies key elements of the transport network in the North West Auckland growth area. It recognises that the implementation of this network is a key contributor towards improved sustainable urban mobility in Auckland. As such the transport system will need to be appropriately staged to anticipate and support growth, improve accessibility, provide high quality and sustainable mobility which facilitates mode shift – particularly towards greater use of public transport, walking, and cycling.

The IBC:

- Confirms the strategic context and policy alignment of the proposed investment
- Confirms the case for route protection and the need to invest
- Identifies an integrated transport network that enables growth in the North West.

The objective of the IBC is to seek endorsement of the recommended transport network for future route protection to take forward to a Detailed Business Case (DBC).

Business case history

In 2016, Auckland Transport (AT), the New Zealand Transport Agency (the Transport Agency), and Auckland Council (the Council) worked in partnership to develop a Programme Business Case (PBC). The PBC was a response to the pace, scale, and staging of growth identified in the Auckland Unitary Plan: Operative in Part (AUP: OP) and the Future Urban Land Supply Strategy (FULSS).

The PBC identified a preferred transport network for early route protection in the North West. The intent of the route protection approach was to save money and minimise social disruption in the long term.

This IBC further tests and develops the recommendations of the PBC to identify a robust indicative recommended transport network for route protection.

Several policies have changed since the PBC was released in 2016. This includes refreshed or new versions of the Government Policy on Land Transport 2018-21 (GPS), the Auckland Plan 2050, the FULSS, and the Auckland Transport Alignment Project (ATAP). The policies in these strategic documents set a direction for increased focus on an equitable, mode-neutral transport system which places weight on public transport, walking and cycling, improving safety and realising environmental, health and growth outcomes. This is a shift in direction from the previous GPS, which placed more emphasis on efficient travel by motorised modes.

Protecting the corridors

The key objective of the programme is to establish 'route protection' for the physical elements of the recommended option. Route protection identifies and appropriately protects the land corridors necessary to enable the future construction, operation and maintenance of the recommended network. Route protection is important as it provides property owners, businesses and the community with increased certainty regarding future infrastructure, so they can make informed decisions. The

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s9(2)(i) and s9(2)(g)(i) The route protection process itself will take place over the next four years. Those elements not requiring route protection are also identified in this IBC.

The entity carrying out this work

Te Tupu Ngātahi (the Supporting Growth Alliance) is a collaboration between AT and the Transport Agency to carry out the planning phase of the Supporting Growth Programme (formerly known as the Transport for Future Urban Growth Programme).

Te Tupu Ngātahi completed the detailed investigations necessary to recommend a transport network for the North West as outlined in this IBC. Once the transport network is confirmed, it will carry out the route protection process, as identified above, to protect the land for these networks.

Te Tupu Ngātahi comprises AT and the Transport Agency as the owner participants, consultants AECOM and Beca, and legal providers Bell Gully and Buddle Findlay.

Partners

AT, the Transport Agency, the Council and KiwiRail are investors and partners to the programme and extensive engagement has been undertaken with all of them through the development of this business case.

Manawhenua are recognised as Treaty Partners by AT and the Transport Agency and Te Tupu Ngātahi recognises these responsibilities in engagement with Manawhenua. AT and the Transport Agency's partnership with Manawhenua provides the project with a framework for working with Māori. Throughout the development of this business case, Manawhenua has been involved as partners in decision making and their views have been considered when identifying priorities for investment options.

Key stakeholders

Throughout the development of this business case, engagement has been undertaken with a range of stakeholders and interest groups including significant landholders and developers, the Ministry of Education, and the community, including young people. Feedback was received in a variety of ways (meetings, workshops, hui and feedback forms) and input into the decision-making process for the recommended network.

Auckland: a story of growth

Auckland is home to approximately 1.66 million people. The Auckland Plan 2050 - Development Strategy signals that Auckland could grow by another 720,000 people to reach 2.4 million over the next 30 years. This will generate demand for 313,000 more homes and require land for 263,000 more jobs. This business case supports the urban vision of the Auckland Plan 2050 to support high population growth through provision of quality urban form, improved access for inclusion and opportunities for improved health and wellbeing.

In July 2017, the FULSS was updated in line with AUP: OP zoning, with 15,000 hectares of land allocated for future urbanisation. This gives clarity as to when land identified in the AUP: OP will be

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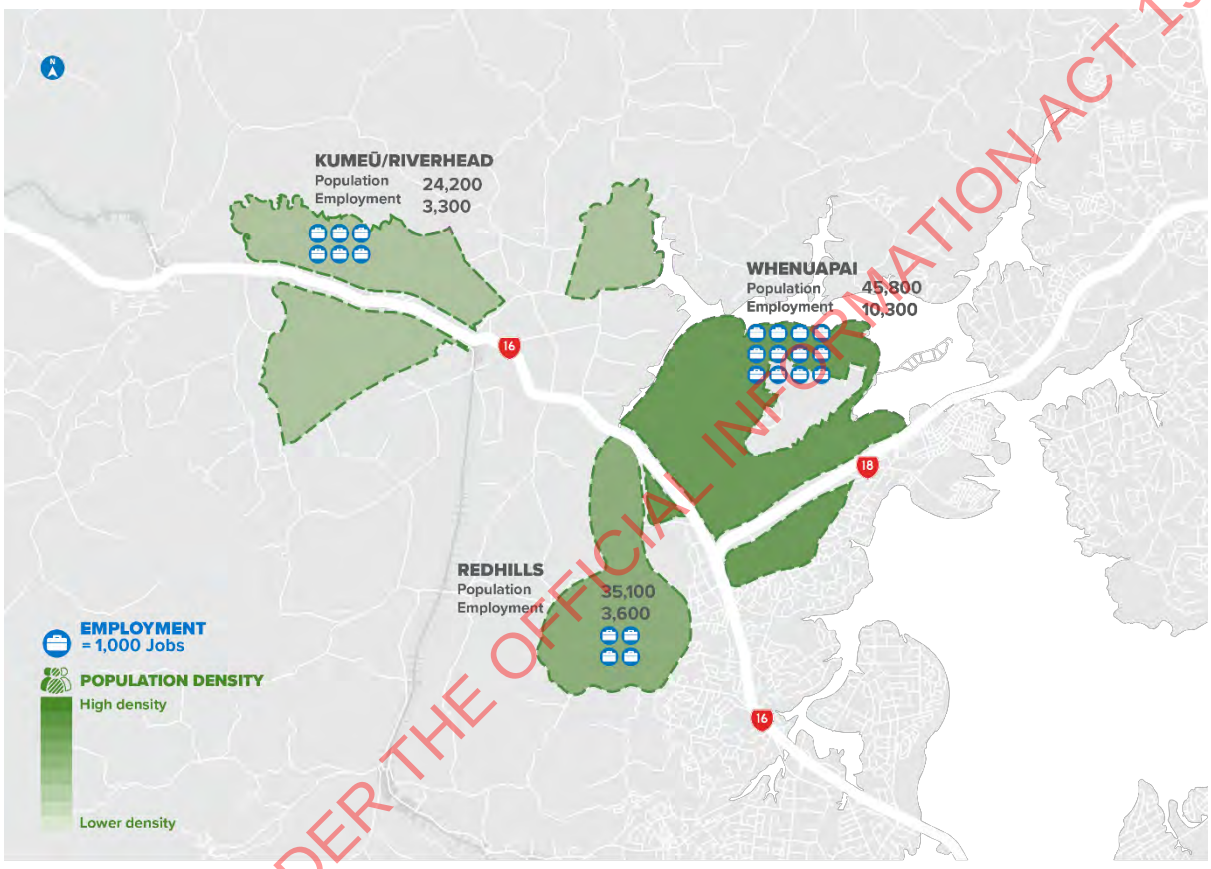
'development ready'. It provides for sequenced and accelerated greenfield growth in ten areas of Auckland, one of which is the North West.

Planning for future urban growth in the North West

The Council has identified approximately 3,300 hectares (ha.) of land for future urban development in North West Auckland. The location and scale of growth is shown in **Figure A**.

Figure A: Forecast growth in employment and population in North West (2046)



This land is anticipated to accommodate an extra 43,700 homes. There are currently approximately 3,200 dwellings in these growth areas. This equates to a total of approximately 46,900 dwellings, housing a future population of 114,100.

17,100 additional jobs are anticipated within the North West growth area by 2046. In total there are expected to be approximately 22,100 jobs in the North West by 2046.

With respect to the release of land, Redhills and some areas of Kumeū-Huapai are already live zoned and available for development. Proposed Plan Change 5 seeks to re-zone the southern part of Whenuapai in 2019. The remainder of the future urban area is planned for release in 2028-2032.

Transport problems

The problems, benefits and investment objectives for this project are summarised in **Table A**. They have been derived from the PBC problems and investment objectives then refined and developed

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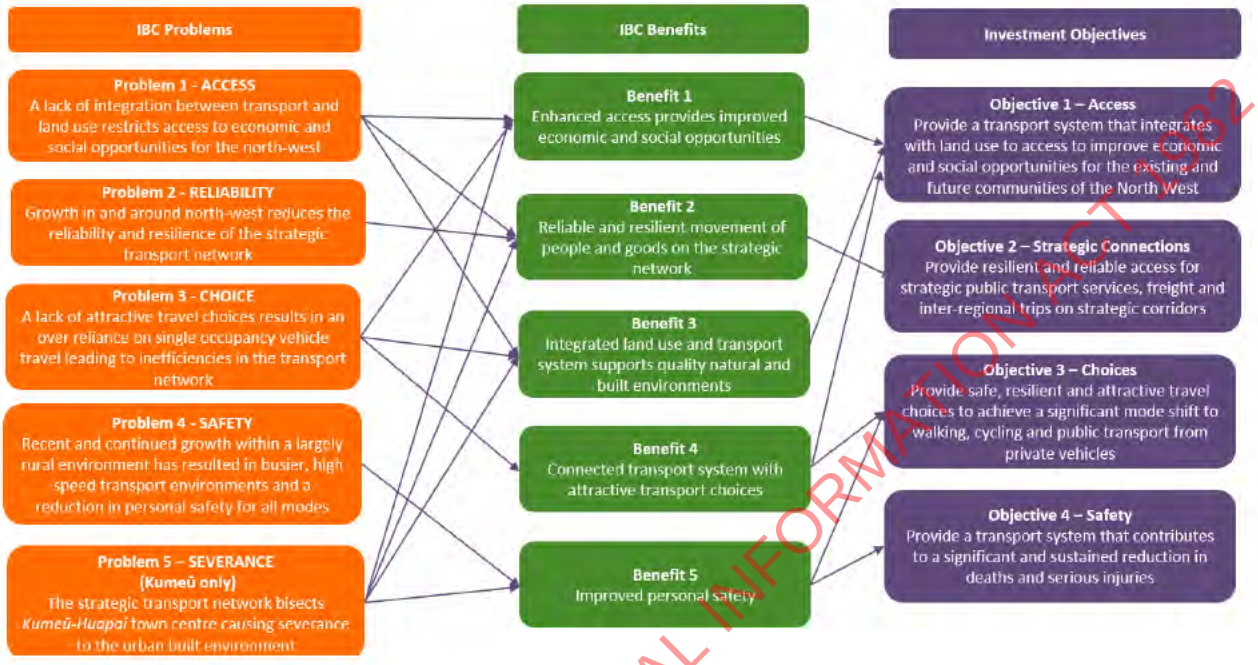
further through the workshop process. Key Performance Indicators (KPIs) and targets have also been set. These will be used to measure the success of the investment proposal in the future.

Table A: Problems, benefits and investment objectives



Influencing travel demand

The guiding principle of this business case is Sustainable Urban Mobility which seeks to develop an urban transport system that fosters a balanced development of all relevant transport modes and encourages a shift to more sustainable modes. Therefore, the business case does not provide for unconstrained demand but rather seeks opportunities to influence and reduce demand before infrastructure options are considered. A four-step approach to influencing travel behaviour was therefore developed, as shown in **Figure B** below. This included consideration of an integrated set of policy-base, soft and technical infrastructure measures to achieve the desired goal.

The application of these demand management principles in the North West is forecast to result in a shift of 22% from private vehicle travel to alternative modes if the recommended network is provided, as summarised in **Table B**. The recommended network also comfortably exceeds the PBC targets of 29% mode share by public transport for trips external to the North West and 16% mode share for active modes for trips internal to the North West. The recommended network responds to this lower level of demand.

Table B: Estimated changes in mode share

Main means of travel to work	Existing	Expected future	% Shift
Private Vehicle – North West	87%	65%	-22%
Private Vehicle - Kumeū-Huapai and Riverhead	93%	63%	-30%
Public Transport (all trips)	1%	16%	+15%

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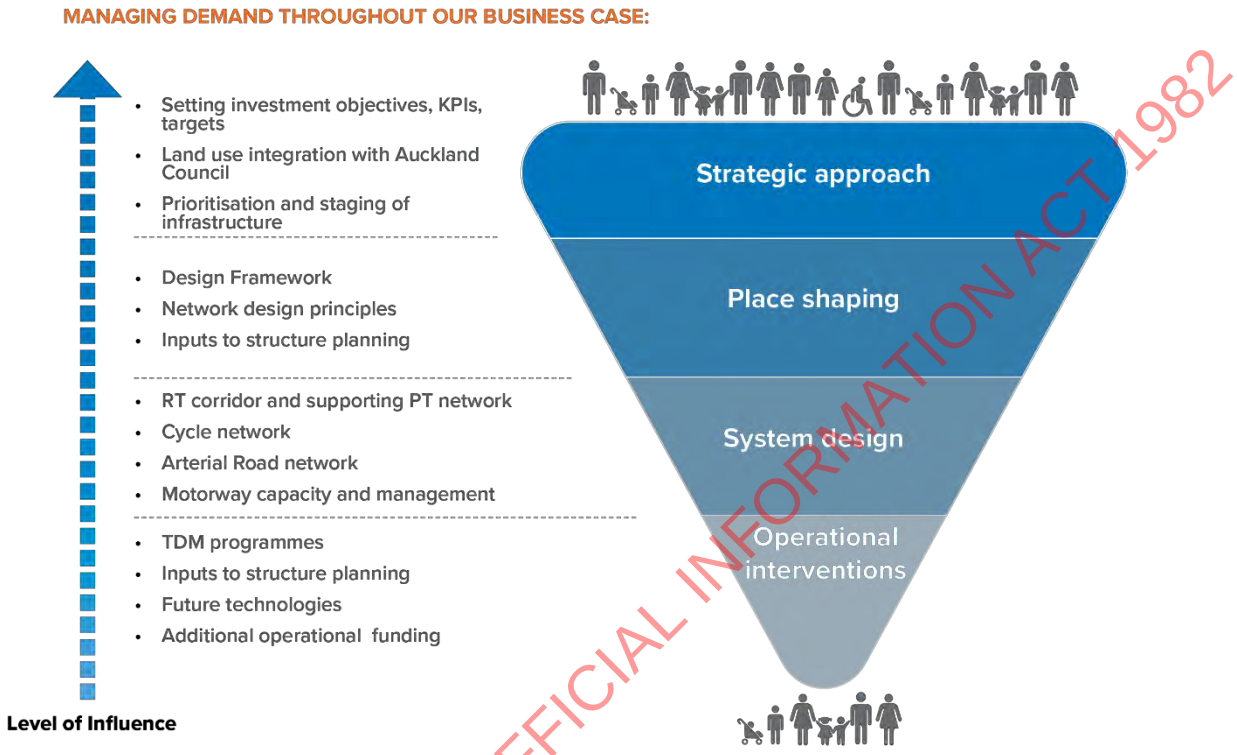
Active Modes	12%	20%	+8%

Figure B: Demand management influence through the project life cycle



Option development and assessment

Over 100 options were considered as part of the options long list. This included a range of options across all modes, including strategic and local public transport, walking and cycling, and improved and new roading infrastructure.

All infrastructure options have been assessed at the both the long and short list phases against the Te Tupu Ngātahi multi criteria analysis (MCA) framework. The framework assesses option performance against the investment objectives and four well-beings (cultural, social, environmental and economic), the purpose was to identify potential impacts and opportunities from each option:

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Recommended network

An analysis of the problem statements, evaluation of options, feedback from workshops and stakeholder / community engagement has led to the development of this recommended network.

The recommended North West transport network is shown in **Figure C** and provides:

1. Integration between landuse and transport in the North West. The network enhances place shaping opportunities and identifies the transport corridors that best connect growth areas with key destinations such as employment in the Westgate metropolitan centre and Whenuapai, local centres in Kumeū-Huapai and Whenuapai, schools and RTN stations
2. A rapid transit network to serve the North West to enable a step change in people moving capacity.
3. An alternative State highway corridor to the south of Kumeū-Huapai, to improve longer distance and sub-regional travel and access for freight.
4. An integrated system of arterial roads that have a dual function to connect sub-regions and to link land uses to the new public transport system and existing strategic road network.
5. A regional and primary active mode network that connects key destinations and links to the public transport network and interchanges.
6. Enhancement of the existing ferry system to provide alternative modes to the city centre.
7. Safety improvements on key rural corridors to reduce the effects of DSIs in the North West.
8. Complementary operational demand management measures to support alternative modes and encourage significant mode shift.

The map shown in Figure C has been prepared for communications and engagement purposes. The numbering and naming of options have therefore been simplified from the technical descriptions and option referencing system used in the remainder of this document. For clarity, Appendix N sets out these differences.

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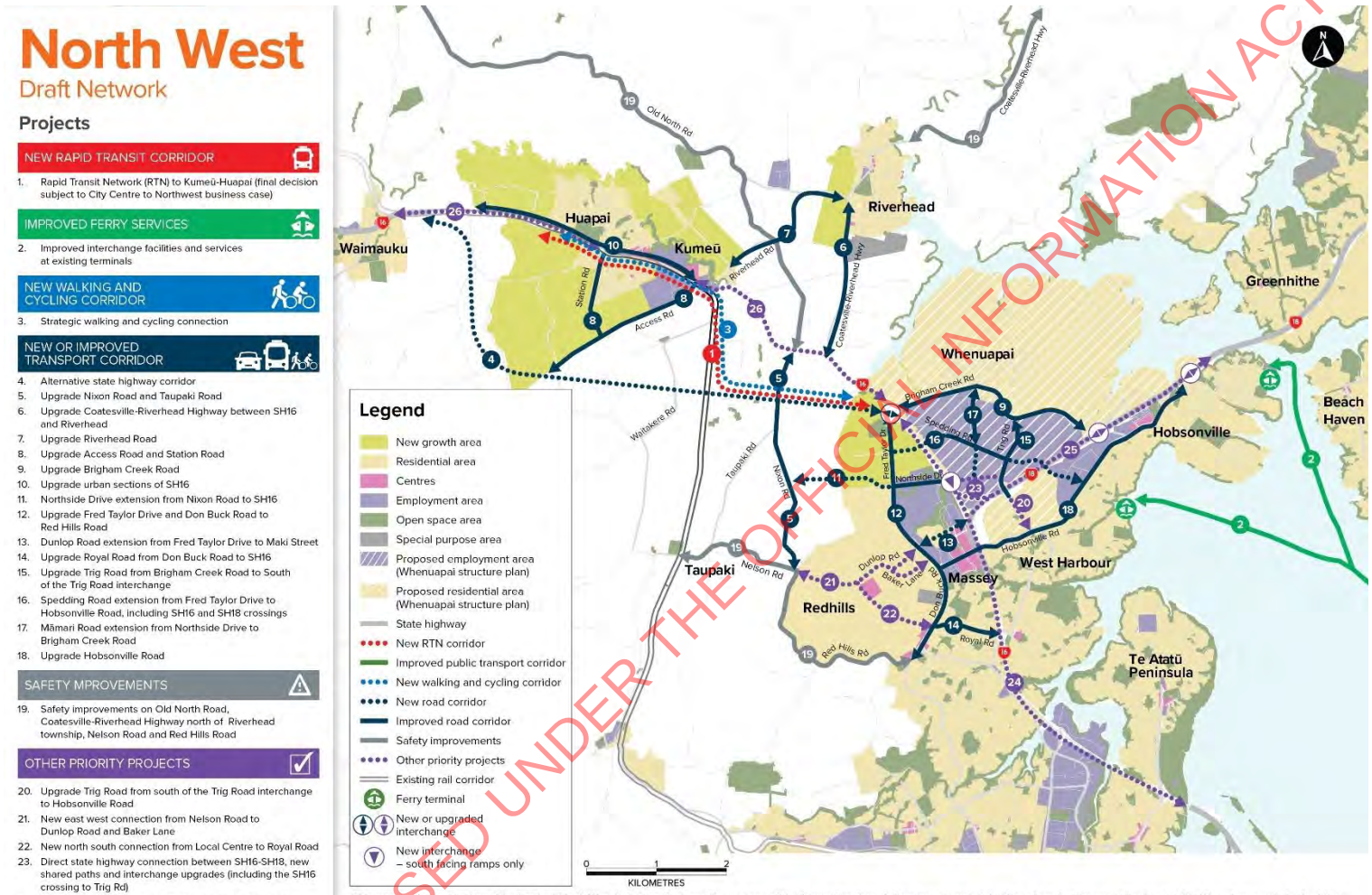
Figure C: North West recommended transport network



This map has been developed for the Draft North West Indicative Business Case as part of the Supporting Growth Programme, and at the time of production was still subject to final Board approvals by Auckland Transport and the NZ Transport Agency in early 2019. Projects shown on this map are therefore indicative only and subject to change. Projects shown on the map are yet to be prioritised for funding and delivery over the next 30 years and will require further technical investigations and consultation to confirm detailed location and land requirements. They may also require statutory approvals, which would be subject to the Resource Management Act 1991 and Land Transport Management Act 2003. The draft network also includes a suite of travel demand management initiatives and supporting public transport services.

Version 2.3: Final Issue for March IBC 2019

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Implementation and staging

The implementation of the transport system to support growth will need to be staged over the next 30 years. The staging responds to the desired FULSS timings for land release and is summarised in **Table C.** Timing may also be dependent on the provision of other supporting infrastructure such as the Northern Interceptor by Watercare.

Implementation of the recommended network is highly flexible and could be undertaken in different ways to respond to changes such as growth patterns, timing of uptake of developments and complementary urban interventions like network performance improvements ("sweating the assets") or land use zoning refinements.

Given the scale and duration of the growth proposed, the early protection of these critical transport corridors provides the required certainty for AT, the Transport Agency and stakeholders.

Table C: Recommended network staging

Staging	Plan
Stage 1A (2018-2022) Supports planned land release for Redhills, Whenuapai South, Scott Point and Huapai. Provides access for growth areas to the strategic network and actively encourages mode shift. • Redhills network and east-west connection to Westgate • Whenuapai south network • Hobsonville Road • SH16 safety improvements (delivered by Safe Roads Alliance) • Operational demand management measures.	
Stage 1B (2023-2027) Supports planned land release. Step change in people moving capacity for North West • RTN to south of Kumeū-Huapai • Fred Taylor and Don Buck Roads • Royal Road • Māmari Road and Spedding Road east extension • Operational demand management measures	

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Stage 2 (2027+) Supports 2nd decade land release for Kumeū-Huapai, Riverhead, Redhills north and Whenuapai Stage 2. • RTN to west of Huapai • Alternative state highway corridor • Redhills and Whenuapai east-west connections • Coatesville Riverhead Highway • Riverhead Road • Taupaki / Nixon Road • Operational demand management measures	

What's changed since TFUG?

The TFUG programme identified a comprehensive transport network for the North West which aimed to improve the liveability of the area with better access to jobs, environment, travel choice and economic growth.

The differences between the infrastructure proposed in TFUG (PBC) and the infrastructure proposed by this investment proposal (IBC) is summarised in **Table D** and **Table E**.

Table D: Elements added to the TFUG network

Infrastructure	Description
Location for the alternative SH16 corridor	Corridor located further south, at the edge of the Kumeū-Huapai Future Urban Zone
Redhills north-south arterial	Alignment uses existing Taupaki Road/Nixon Road instead of the new proposed TFUG alignment
Kumeū-Huapai to Riverhead connection	Safety, cycling and walking upgrade
Northside Drive extension to new north-south arterial	Further extension to TFUG alignment
Western extension to Spedding Road	Includes a SH16 crossing and extension of Spedding Road to Trig Road
Dunlop Road extension	Bus priority
Don Buck Road from Fred Taylor Drive to Triangle Road	Arterial upgrade

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Table E: Elements removed from the TFUG network

Infrastructure	Description
Alternative SH16 corridor	TFUG Corridor
Passenger rail	Reactivating rail west of Swanson
Arterial corridors	Coatesville Riverhead highway – north of Riverhead village
	Tapu Road
	East-west Redhills arterial -Nelson Road to Taupaki
	Redhills North South arterial
	Northernmost Redhills East West link
	Tōtara Road
	Connection from Hobsonville Road to West Harbour Ferry

Outcomes

Table F describes the outcomes achieved by the recommended network in relation to the measurable KPIs and investment objectives. A benefits realisation plan will be developed in the next project phase to measure success against each of these outcomes.

Table F: Recommended network outcomes

Areas	IBC Outcome
Safe, attractive walking and cycling **KPI 1A, 2B, 3A, 3B, 4A**	Comprehensive walking and cycling network, linking with the regional cycle network and supported by a secondary local cycle network enables a mode shift from 12% to 20%, exceeding the PBC target of 16%. Kumeū-Huapai predicted to experience the greatest increase in cycle mode share, given the more limited nature of existing facilities. Around 50%, 85% and 70% of households in Kumeū -Huapai and Riverhead are within 3km of employment, local activities and good quality public transport respectively. Across the whole of the North West, including Redhills and Whenuapai, access to employment and local activities further improves to around 75% to 100%. In addition, across the North West around 20% and 60% of households are within 400m of high-quality cycle facilities or 3km of the regional network respectively.
Frequent, reliable, accessible public transport **KPI 1B,2A, 2B, 3A, 3B**	Enables a substantial increase in access to social and economic opportunities, connecting communities along dedicated corridors and enables transit-oriented development – programme includes rapid transit extension to Kumeū-Huapai. This will substantially increase access for all North West Auckland growth areas. Total forecast mode shift is from 1% to 16% using public transport for all trips. The PBC included an aspirational target of a mode share of 29% of people using public transport for external trips outside the North West. Overall, the North West is expected to reduce private vehicle use, by increasing the public transport mode share for external trips to around 41%, equating to an increase of 11% or around 36% more public transport trips compared with the PBC target. The recommended network will

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Areas	IBC Outcome
	also achieve high mode shift for key destinations such as 83% of weekday AM peak trips to the city centre are expected by public transport. 40% to 50% of people in Kumeū-Huapai, Riverhead and Redhills are within 400m walk of frequent public transport services or 3km cycle of a rapid transit station, supporting mode shift for both local and strategic journeys. Whilst in Whenuapai, around 70% of people are within 400m walk of frequent or rapid public transport services.
 Resilient **KPI 1B, 2A, 3A, 3B, 4A**	Safe, attractive, convenient, high-quality alternative mode choice provided. Good quality alternative strategic corridor and grid network of arterial corridors to provide choice. This provides flexibility to respond to changes in behaviour, growth, and technology.
 Reliable **KPI 2A, 3B**	Travel time variability (between the AM peak, PM peak and interpeak) across the network is reduced for public transport and general traffic. This means access to employment, social opportunities, and core services will be more reliable than currently. The reliability of public transport will be enhanced by the extension of rapid transit services to Kumeū and Huapai, in a dedicated corridor. This improves travel time reliability for Kumeū and Huapai residents by having a dedicated public transport corridor, operating with rapid transit services on a consistent timetable. In addition, other components of the recommended network, particularly the alternative State highway corridor, reduce the variability of intra-regional and freight route journey times around Kumeū. Instead of weekday peak period journey times being two to three times off-peak journey times, the recommended network is predicted to result in weekday peak journey times being one to one and half times off-peak times. Access to the strategic network will be reliable (due to reduced travel time variability) and resilient (due to an additional access to the motorway). Reliable travel is a key enabler of local employment, as it will attract businesses and therefore jobs.
 Safe **KPI 4A**	A safe, connected network of routes accessible to people of all ages and abilities is provided. Improved safety for rural corridors with 30% reduction in daily vehicles (per km) and 43% reduction in DSIs on rural roads. Four rural roads where growth has increased personal or collective risk have been identified for physical safety improvements. Speed management will also be considered. Real and perceived safety for pedestrians and cyclists is improved with dedicated space for these users, where activation by other modes of transport provides natural surveillance.
 Development ready **KPI 1A**	The North West may be 'development ready' in the FULSS timeframes depending on regional prioritisation of greenfield growth. Enables route protection of arterial corridors. Provides appropriate capacity to meet the demands of growth. Provides flexibility to respond to changes in development timing. Provides opportunities to lead with behaviour-change initiatives.

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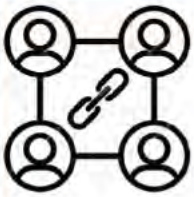
Areas	IBC Outcome
 **Cohesive community** **KPI 1A**	Existing corridors are enhanced with active mode facilities creating people-oriented streets where more people walk and cycle Public transport services hub into town centres, helping to support local businesses with high foot traffic. New corridors alleviate potential traffic demand and severance through town centres, such as Kumeū-Huapai and Whenuapai. Amenity-rich residential areas are a short, safe walk or cycle from parks, schools, shops and cafes, strengthening local communities Pressure on the environment is reduced through lower vehicle emissions Less physical space is required for car travel and can be re-purposed for people and community places.

Finance and economics

The capital and operating costs (CAPEX and OPEX, respectively) of options were developed and considered through the option selection process.

For the recommended North West package, costs are:

- Total estimated capital costs of **$2,920 - $3,660 million**
- Property and land costs of approximately **$603 million**.

Benefit Cost Ratio (BCR)

The BCR was calculated using the Net Present Value (NPV) benefits and costs as outlined in Chapter 9 of the IBC.

Table G: Benefit cost ratio – recommended network

Item	Cost ($M)
Total NPV benefits	2,640
Total NPV costs	2,610
Benefit Cost Ratio	1.0

The BCR for the recommended network of projects is over 1.0, and the present value of benefits is slightly higher than costs. It is considered that this analysis is conservative and more detailed analysis of benefits, including more detailed analysis of wider economic benefits (WEBs) may result in a higher BCR.

As individual projects progress through the DBC and pre-implementation phases, designs and costs will be developed in more detail and focus on cost-effective ways to deliver the project outcomes.

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Implementation

A preliminary property analysis and preliminary route protection strategy have been developed for the North West. The recommended network has been divided into eight potential consenting packages to be progressed at the DBC phase. The packages were determined based on a combination of urgency, timing of land use change, geographic location, complexity and functional characteristics.

Next steps

There are three key next steps for the progression of each of the elements of the recommended network, being:

- Detailed Business Case (DBC)
- Pre-Implementation
- Implementation to be staged over a 30-year period to support the timing of growth.

A DBC is required for each element identified in the recommended network, and further stakeholder and public engagement will take place as the DBCs are developed.

Te Tupu Ngātahi is tasked with completing the DBC and NOR preparation for the following elements of the IBC programme:

- Arterial roads
- Strategic State highway connections
- Strategic cycle links
- Strategic rapid transport network connections.

All other elements of the IBC recommended network will also require completion of a DBC. This will need to be procured separately by the appropriate owner (AT or the Transport Agency).

For the North West, these elements are:

- Key collector road upgrades for walking and cycling
- Interim bus services
- Demand management operational measures.

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PART A – STRATEGIC CASE

1. Introduction

The purpose of the Supporting Growth Programme (the programme) is to identify the recommended transport networks for route protection to support Auckland's planned greenfield growth over the next 30 years. This Indicative Business Case (IBC) identifies key elements of the transport network in the future urban area of North West Auckland (**Figure 1**). It recognises that the implementation of this network will need to be appropriately staged to anticipate and support growth and facilitate mode shift – particularly towards greater use of public transport, walking, and cycling to enable attractive and viable mode choice, and to contribute to active and healthy people, a cleaner environment and a more connected and liveable community in the North West of Auckland.

This IBC has been developed collaboratively with Auckland Council (Council) to realise opportunities to integrate land use and transport systems.

This IBC specifically:

- Confirms the strategic context and policy alignment of the proposed investment
- Confirms the case for route protection and the need to invest
- Recommends an integrated transport network that enables growth in the future urban areas of North West Auckland
- Seeks endorsement of the recommended transport network for future route protection (Part B of this business case) to take forward to a Detailed Business Case (DBC).

1.1. Growth story

1.1.1. Auckland

Auckland is New Zealand's largest city, home to approximately 1.69 million people[1], whose aspirations for a prosperous, healthy and connected future for themselves and their families are at the forefront of our strategic focus on wellbeing for people and the liveability of communities. In 2017, Auckland attracted 36,800 new residents; more than the rest of the country combined. The Auckland Plan Development Strategy (2050) signals that Auckland could grow by another 720,000 people to reach 2.4 million over the next 30 years.

The Auckland Plan anticipates that this growth will generate demand for an additional 313,000 dwellings and require land for approximately 263,000 additional employment opportunities[2]. In response to this demand, the Auckland Unitary Plan (AUP) identified 11,000 hectares (ha) of predominantly rural land for future urbanisation. This land is equivalent to an area 1.5 times the size

[1] Statistics New Zealand, June 2018

[2] Auckland Council (2018) *Auckland Plan 2050 Development Strategy* https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/development-strategy/future-auckland/Pages/what-auckland-look-like-future.aspx

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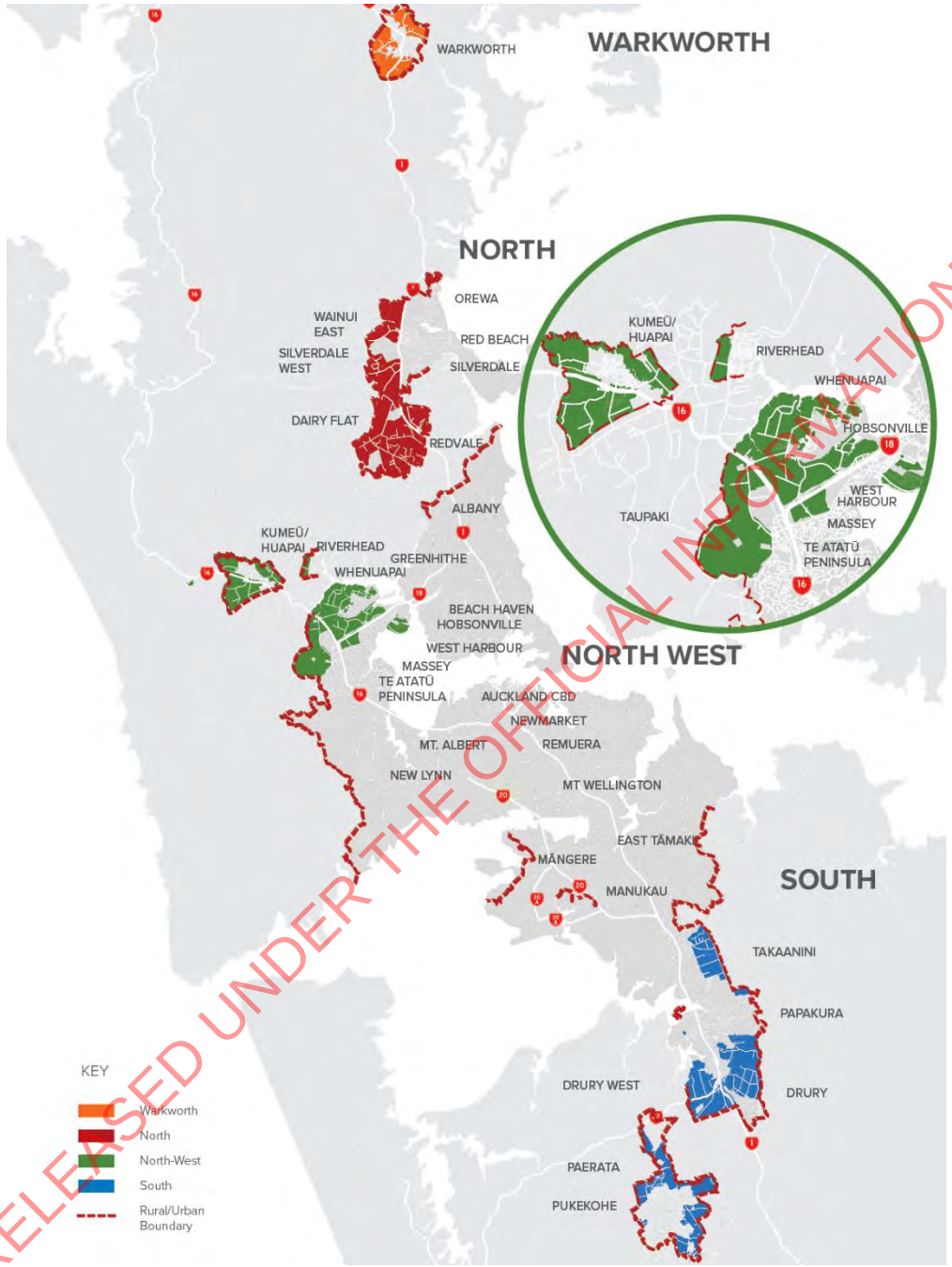
of urban Hamilton[3]. In July 2017, the Future Urban Land Supply Strategy (FULSS) was updated in line with the Auckland Unitary Plan: Operative in Part (AUP: OP) zoning, with an increase to 15,000 hectares of land allocated for future urbanisation.

Figure 1: Auckland's future urban growth areas



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[3] New Zealand Transport Agency, AT, Auckland Council (2015) *Supporting Growth Strategic Business Case*

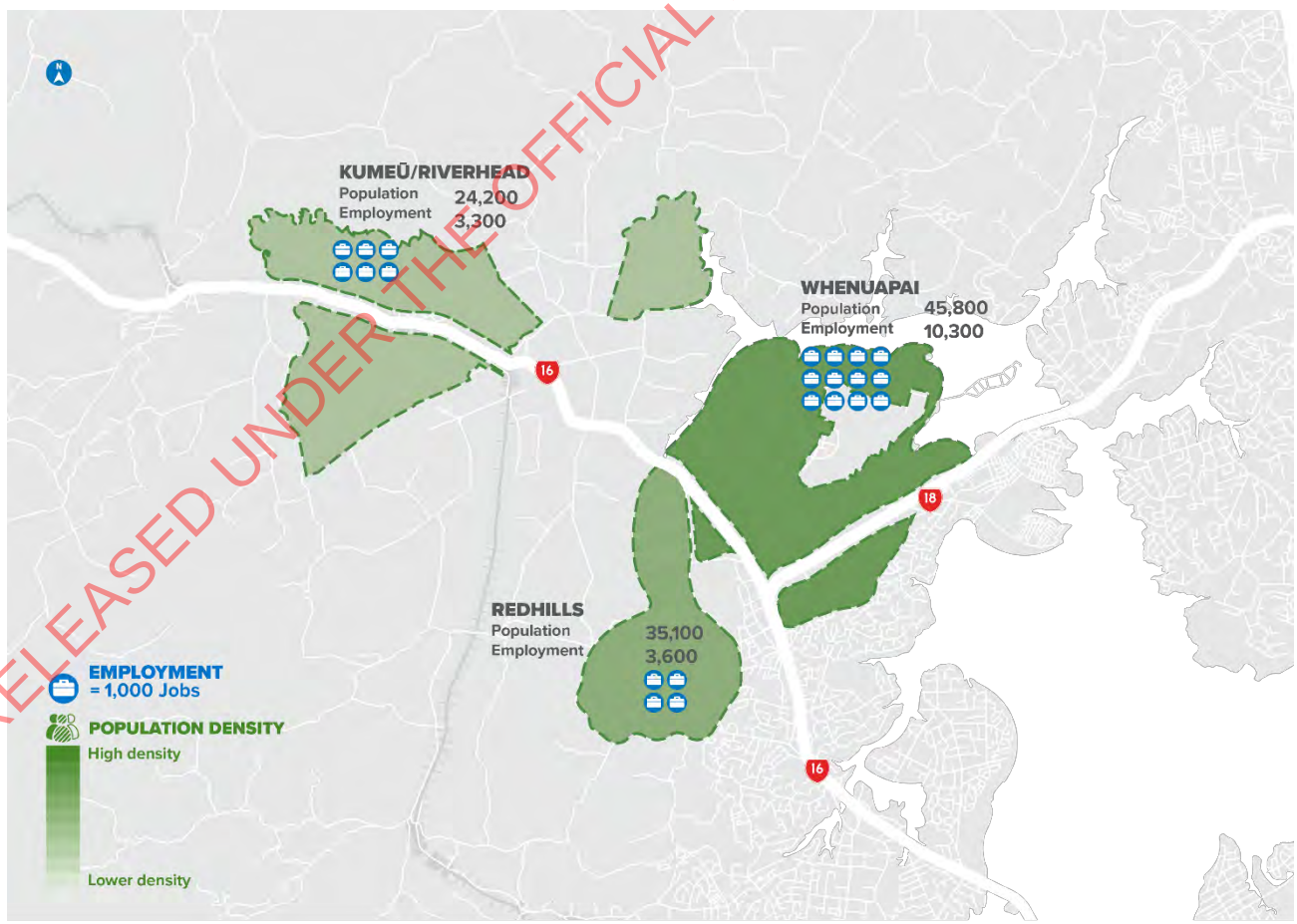
1.1.2. North West Auckland

The Council has identified 2,970 hectares of land for future urban development in the North West, including approximately 1,980 hectares within Whenuapai/Redhills, and a further 990 hectares within Kumeū-Huapai/Riverhead. Of this land, 650 hectares within Whenuapai/Redhills is currently either live zoned or a Special Housing Area (SHA). The 2,330 hectares of land not already live zoned or part of a SHA has been identified as a Future Urban Zone (FUZ) which is defined as the area within the Rural Urban Boundary (RUB).

The forecasts in the regional transport model (MSM) identify that land within the RUB in Kumeū-Huapai, Whenuapai and Redhills is currently anticipated to accommodate approximately 97,000 new residents and 13,000 new employment opportunities by 2046. Employment opportunities will be concentrated within new or expanding local centres, and within a significant new business zoned area in Whenuapai, as well as approximately 11,200 new jobs in Westgate forecast in the regional transport model. This ratio of households to jobs is low in comparison with other growth areas. **Figure 2** shows the location and scale of these anticipated population and employment opportunities.

These figures exclude 250 hectares of land identified in the FULSS within Scott Point, Helensville, Waimauku and Swanson that will enable a further 3,600 households.

Figure 2: Forecast growth between 2016 and 2046 for employment and population in North West



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1.2. Responding to growth

1.2.1. Future Urban Land Supply Strategy 2017

To provide clarity about when the land identified in the AUP:OP will be 'development ready', the Council developed the FULSS [4] to provide for sequenced and accelerated greenfield growth in the following areas of Auckland:

- North West: Whenuapai-Redhills, Westgate, Kumeū, and Huapai (this IBC)
- North: Orewa-Silverdale, Dairy Flat, and Warkworth
- South: Takaanini, Drury west, Karaka, Drury, Paerata, Hingaia, and Pukekohe.

Of relevance to this business case is the timing of growth and how this relates to the provision of infrastructure. The FULSS provides for a staged release of land as follows (shown in **Figure 3**):

- Live zoned and SHAS: 938 hectares within Whenuapai (1,150 households), Redhills (10,650 households) and Kumeū-Huapai (1,400 households)
- 2018-2022: Whenuapai stage 1 (401 hectares, 6,000 households)
- 2023-2027: No North West land release
- 2028-2032: Whenuapai stage 2 (745 hectares, 11,600 households), Redhills north (191 hectares, 1,400 households) and Kumeū-Huapai/Riverhead (992 hectares, 6,600 households).

This indicates that there is a high degree of urgency to deliver infrastructure to support growth in the North West.

To accommodate this staging, the FULSS sequencing identifies the following key infrastructure investments:

- The completion of the Northern Interceptor (by 2025) to provide bulk wastewater capacity to the area; until this time, only live zoned land and stage 1 of Whenuapai may be developed
- Safety and capacity improvements to State highway 16 (SH16), as well as the Northern Interceptor, to be completed before land can be released within Kumeū-Huapai/Riverhead.

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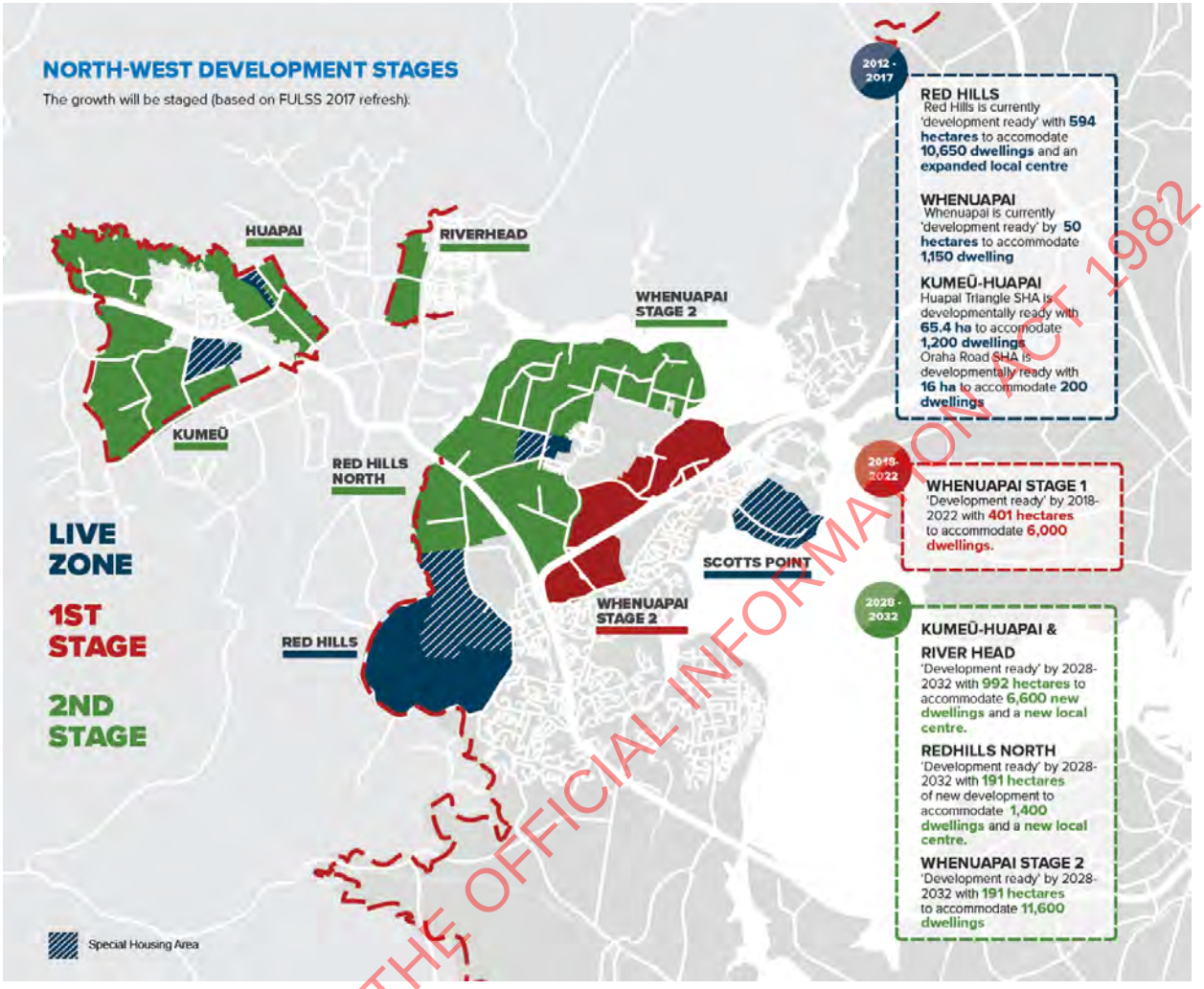
[4] FULSS 2017 land release details have been used in this IBC. This version is a refresh of FULSS 2015.

Figure 3: North West FULSS staged land release



1.2.2. Planning context

Through the North West the future urban areas are in various stages of land use planning.

Structure planning has been completed for the FUZ area in Whenuapai and was adopted by the Council in late 2016. This Structure Plan is shown in **Figure 4**. The indicative land uses identified in the Structure Plan will be progressively confirmed as 'live zones' through both private and Council initiated plan changes. The first of these plan changes which seeks to 'live zone' the southern part of Whenuapai is currently underway. The indicative zoning map for the plan change is shown in **Figure 5**.

The Redhills area, while not structure planned, was 'live zoned' during the AUP: OP process and a precinct plan included in the AUP: OP. This has resulted in a zoning change from rural to a range of urban zones including Terraced Housing and Apartment Building, Mixed Housing Urban, Mixed Housing Suburban, Single House and Local Centre. The Kumeū-Huapai/Riverhead area has not been structure planned. Land release for the Kumeū-Huapai/Riverhead area is identified in the FULSS to occur between 2028 and 2032. Council's current view is that structure planning must occur prior to the release of land. This is indicatively programmed for Kumeū-Huapai/Riverhead in 2025.

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This IBC has been developed in collaboration with Council to align the recommended transport system with their aspirations for future growth. Graphics in this IBC have been presented with the AUP:OP zoning as the base map land use with an overlay showing the proposed zoning changes as part of the Whenuapai Structure Plan. The proposed zoning as part of Whenuapai Plan Change 5 has been used as inputs for option development and assessment.

Figure 4: Whenuapai Structure Plan (Source: Auckland Council, 2016)

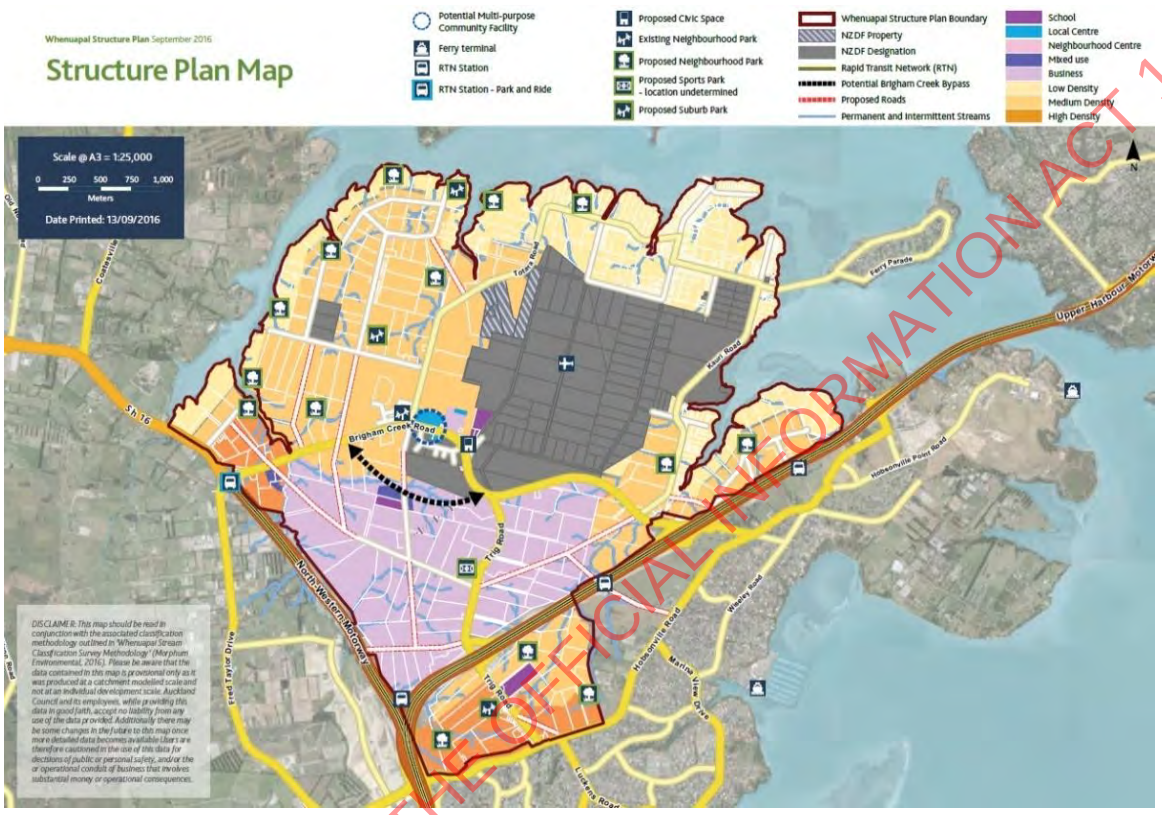

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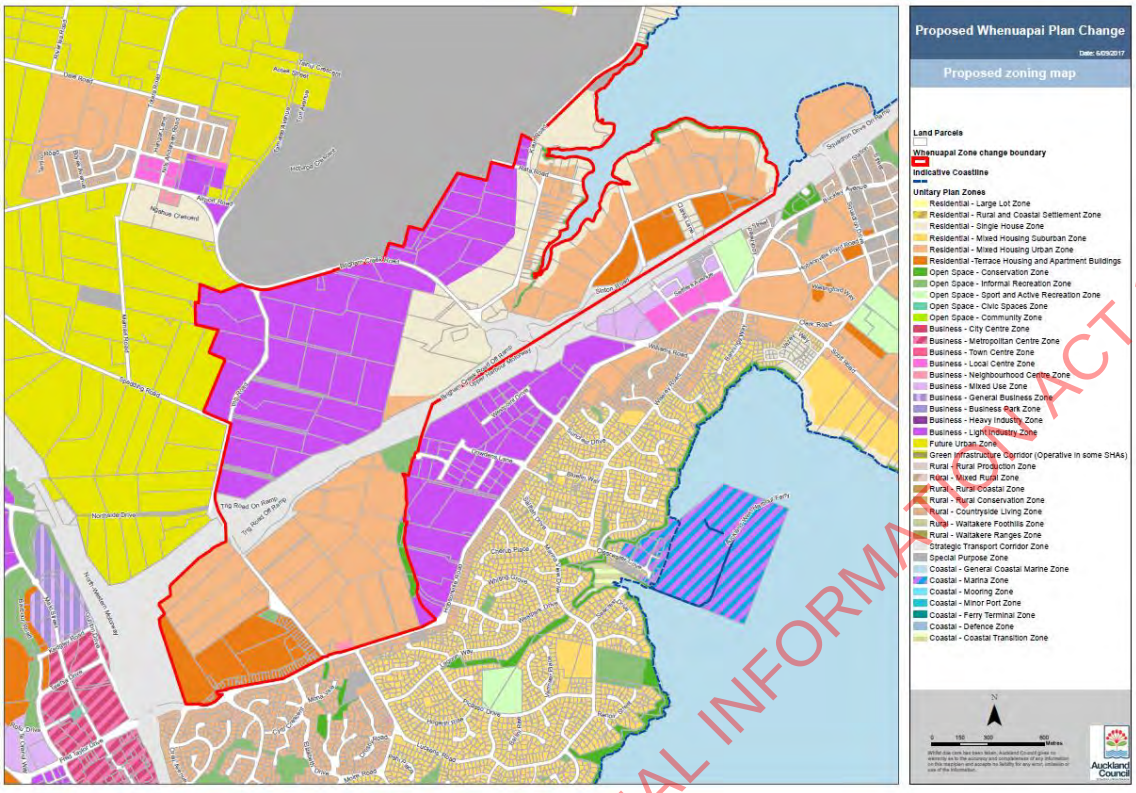
Figure 5: Proposed Plan Change 5 - Proposed Zoning Map (as notified 21 September 2017)



1.3. Business case approach

In 2016, Auckland Transport (AT), the New Zealand Transport Agency (the Transport Agency), and Auckland Council worked in partnership to develop a Programme Business Case (PBC) that responded to the pace, scale, and staging of growth identified in the AUP: OP and FULSS. The intention of this business case-led response was to identify transport networks for early route protection to provide certainty, appropriate land use / transport integration and minimise social disruption in the long term.

Figure 6 sets out the IBC process, including what has changed since the PBC, the purpose of this report, the process followed, and the key outcomes and decisions sought.

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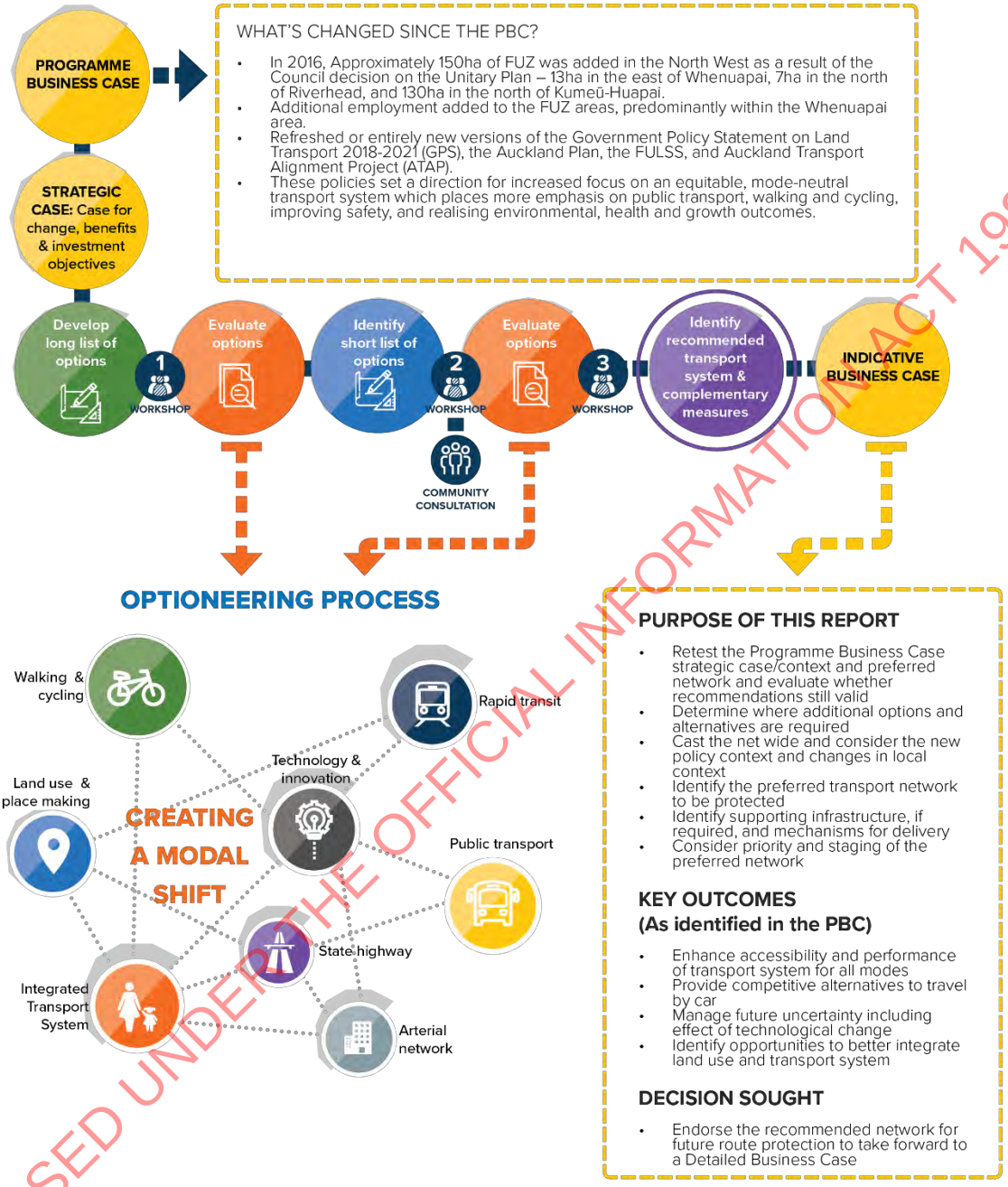
Figure 6: IBC process and timing



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1.3.1. TFUG Programme Business Case

The Transport for Future Urban Growth (TFUG) recommended programme (including demand, supply, and productivity interventions) was identified in 2016, with some of the associated costs incorporated by the Auckland Transport Alignment Project (ATAP) in their investigation and prioritisation process for the next three decades.

Specifically, the recommended programme was developed to address the following problems

- The inability to respond in a timely way to the pace and scale of greenfield development will restrict access to jobs, education and core services in and around the growth areas

- The inability of the regional transport system to cope with the growing demand of greenfield expansion will reduce travel choice and the efficient movement of people and goods.

For North West Auckland, the TFUG programme recommended the following transport improvements as shown in **Figure 7**.

Table 1 summarises the key roles of the infrastructure items and their effect on the TFUG PBC objectives.

Figure 7: North West PBC Recommendations

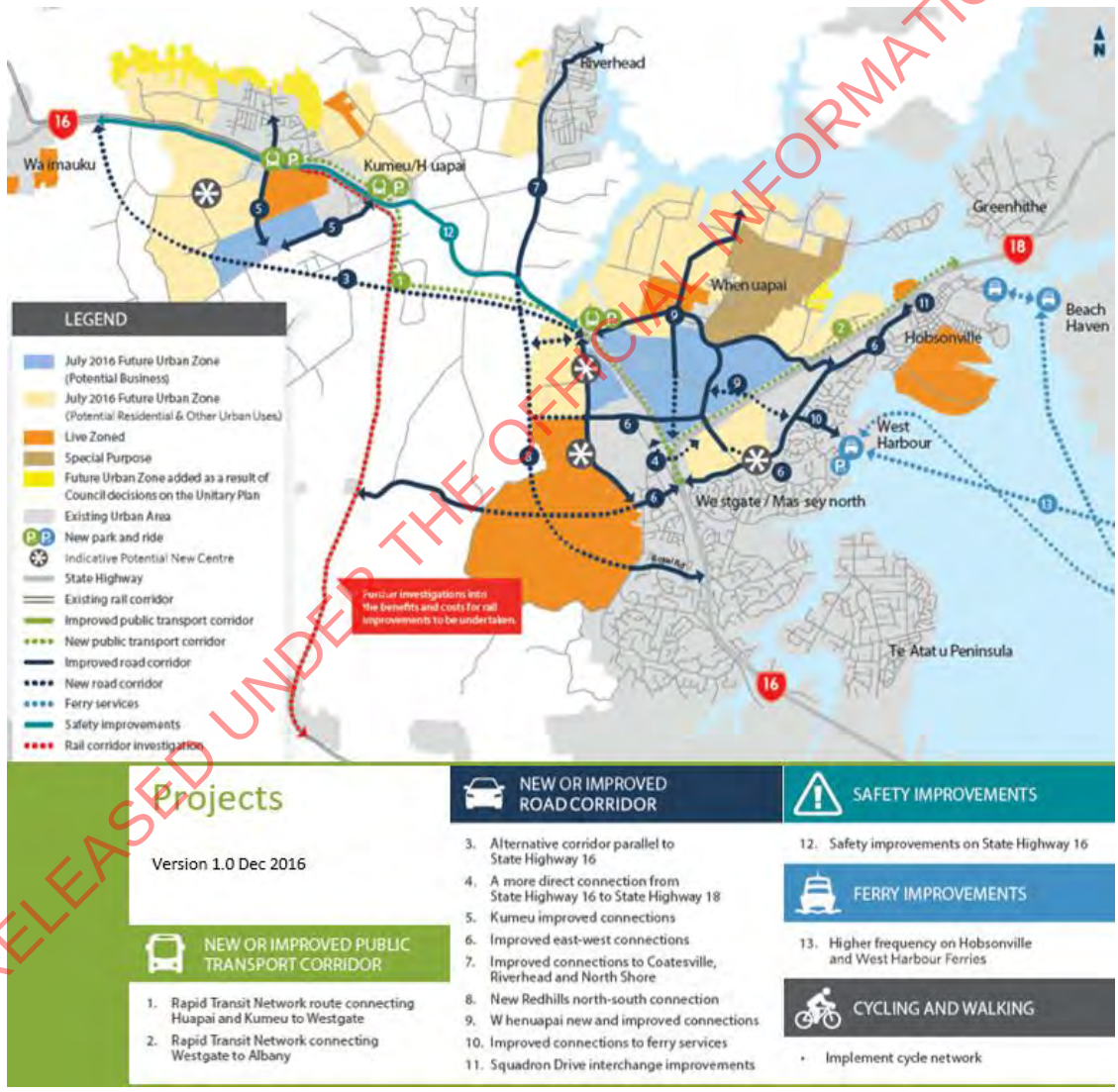

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Table 1: Effect on PBC objectives

Infrastructure	Role	Effect on Objectives
New or improved public transport corridors: 1. Rapid Transit Network connecting Huapai and Kumeū to Westgate 2. Rapid Transit Network connecting Westgate to Albany *(Programme assumed RTN from City Centre to Westgate)*	Mode shift and improved travel choice	Improves accessibility to Westgate metropolitan centre and Whenuapai employment and residential areas. Supports economic growth Facilitates FULSS development through supporting higher density housing and high order employment nodes
New or improved road corridors: 3. Alternative corridor parallel to SH16 4. A more direct connection from SH16 to SH18 5. Improved connections to Kumeū 6. Improved east-west connections 7. Improved connections to Coatesville, Riverhead and North Shore 8. New Redhills north-south connection 9. Whenuapai new and improved connections 10. Improved connections to ferry services 11. Squadron Drive interchange improvements	Improved accessibility to jobs and core services Improved infrastructure for bus, cycling and walking Improved environmental, community and cultural outcomes	Improved accessibility to access the RTN as well as Westgate metropolitan centre and Whenuapai residential and employment areas Travel time reliability for freight and vehicle travel through provision of alternate routes and improvements to motorway interchanges Promotes mode shift for bus, cycling and walking Reduction of vehicle trips and associated pollution Enhanced access to Ferry services.
Safety improvements: 12. Safety improvements on SH16	Safety	Improved safety on SH16, maintaining travel time reliability on the strategic network
Ferry improvements: 13. Higher frequency on Hobsonville and West Harbour Ferries	Mode shift and improved travel choice	Support inter coastal connections and mode shift. Improves accessibility between Westgate metropolitan and Whenuapai employment and the city centre. Supports mode shift
Cycling and walking improvements: 14. Implement cycle network	Mode shift	Reduced pollution. Health benefits.

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1.3.2. Te Tupu Ngātahi

Te Tupu Ngātahi (the Supporting Growth Alliance) is a collaboration between the Transport Agency and AT to carry out the planning phase of the Supporting Growth Programme (formerly known as the Transport for Future Urban Growth Programme).

Te Tupu Ngātahi is undertaking the detailed investigations needed to confirm the recommended transport networks – including preparation of this IBC for Auckland's North West area. Once confirmed, it will then carry out the route protection process to protect the land for these networks over the next five years.

Te Tupu Ngātahi comprises AT and the Transport Agency as the owner participants, consultants AECOM and Beca, and legal providers Bell Gully and Buddle Findlay.

1.3.3. Focus of this IBC

This IBC takes forward the recommendations of the PBC, further testing and developing the identified options so that they are robust. The IBC is an optioneering exercise to determine whether any refinement of options is required to accommodate the demand for movement associated with planned growth. This process includes consideration of additional options, variations of options and removal of options for further detail refer to **Figure 6.**

This IBC is focused on the identification of the recommended strategic transport network for route protection. It seeks to provide a strategic transport network that is right-sized through implementation of travel demand management initiatives which reduce demand for single occupancy vehicle travel and promote walking and cycling as the recommended modes for short distance trips.

The implementation of the transport system to support growth will need to be staged over the next 30 years. Given the scale and duration of the growth, the early protection of these critical transport corridors is considered necessary to provide the required certainty for AT, the Transport Agency, and stakeholders.

This IBC therefore not only identifies the recommended transport system for the planned growth, but also explores and identifies the most appropriate form of route protection. Importantly, this IBC also considers the implications of the proposed route protection for the investors in the recommended network. This includes the potential financial implications as well as stakeholder impacts.

The next phase of project development is the Detailed Business Case (DBC). The DBC further develops the recommended network. It will refine the footprint required for route protection based on more detailed engineering and technical specialist input and will also further develop the financial case, implementation strategy, route protection strategy and property strategy.

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2. Strategic alignment

This section addresses the following areas:

- Investment partners and key stakeholders and their engagement in this process
- Approach to community engagement
- Process for incorporating feedback into decision making
- Alignment with the wider policy context and key investor organisation policies.

Further information can be found in Appendix A: Strategic Case.

2.1. Partners

This section identifies and describes the investors and partners of the Supporting Growth Programme, and the engagement undertaken with each. Further information on their roles and responsibilities can be found in Appendix A: Strategic Case.

2.1.1. AT and NZ Transport Agency

AT and the Transport Agency are partners in the programme. Engagement with the wider organisations has been facilitated via Owner Interface Managers (OIM) within Te Tupu Ngātahi. Engagement has been through:

- Regular forums leading up to IBC milestones
- Attendance at IBC workshops
- Meetings to test the short list options
- Support at public open days, alongside representatives from other Transport Agency and AT teams, such as the SH16 / SH18 Connections, Safe Roads Alliance and Huapai Triangle teams.

2.1.2. Auckland Council

Auckland Council is a key partner in the programme. This IBC has been developed to be in accordance with the AT Engagement Framework and Statement of Intent (2017-2020) which specifies AT's obligations regarding engagement with Council, including Local Boards, and other Council Controlled Organisations (CCOs).

The partnership between AT, Council and CCOs requires a commitment to collaboration, openness and transparency, adhering to a "no surprises" policy and engaging with other CCOs to provide a coordinated approach.

Across the programme, Te Tupu Ngātahi has facilitated a regular Auckland Council Integration Forum to enable these commitments and to actively manage and identify risks and opportunities for the programme.

Engagement with Council regarding North West Auckland has been closely aligned with the current structure planning and plan change process that is currently underway for the Whenuapai growth area. This has involved joint attendance at open day sessions, the provision of supporting technical advice and the attendance of key Council specialists at IBC workshops. Close alignment with Council supports the programme's target outcome of integrating land use and transport.

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Regular presentations have been made to Local Boards and to councillors via the Structure Plan Political Reference Group.

2.1.3. Manawhenua

Manawhenua are recognised as Treaty Partners by AT and the Transport Agency and as such Te Tupu Ngātahi recognises the responsibilities and commitments in engagement with Manawhenua. AT and the Transport Agency's partnership with Manawhenua provides the project with a framework for working with Māori. These frameworks set out a vision to build a strong relationship with Māori, moving towards a second generation of partnership focusing on co-management and co-governance.

Regarding the development of the IBC, this means involving Manawhenua as partners in decision making and considering their views when identifying priorities for investment options.

Ten Manawhenua groups s9(2)(ba)(i) have been given the opportunity to be involved in the development of this IBC.

s9(2)(ba)(i)

Te Tupu Ngātahi maintains a Manawhenua Forum (for operational and kaitiaki level interaction) and enables linkages with the wider governance level relationships of AT and the Transport Agency via the Tāmaki Transport Table and Auckland Council's Kaitiaki Governance Table.

The focus of the Manawhenua Forum is programme-wide delivery, particularly seeking consistency across projects. In addition, representatives from the Manawhenua Forum have attended long list design, option evaluation and recommendation making processes (along with other technical specialists and key stakeholders).

Manawhenua attended the North West IBC workshops, two MCA scoring hui (2nd August 2018 and 19th October 2018) and a site 'walk over' (27th June 2018). s9(2)(ba)(i)

2.1.4. KiwiRail

KiwiRail is a partner of the Supporting Growth Programme and has been engaged with regarding the North West IBC in the following ways:

- Te Tupu Ngātahi attended a meeting with KiwiRail in September 2018 to discuss potential areas of change for KiwiRail and issues/opportunities with the short-listed options.
- A KiwiRail representative also attended the third North West IBC workshop.

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- Ongoing engagement with KiwiRail proposed for the whole SGA programme as part of the process of further refining options in order to achieve the outcomes of this BC.

2.2. Key stakeholders

Engagement with stakeholders has been undertaken across the wider Supporting Growth programme, through a series of stakeholder reference group presentations and one-on-one meetings. The purpose of these was to introduce the programme, and to discuss the options being considered through the public engagement process. More information on these stakeholders is contained Appendix H: Engagement Summary Report.

In the North West, engagement with key stakeholders has been undertaken with:

- Local stakeholder groups including the North West Business Association, and the Kumeū-Huapai Residents and Ratepayers Association.
- Significant land holders and developers in the North West such as s9(2)(ba)(i) and s9(2)(ba)(i) The overall purpose of these meetings was to hear about landowner / developer plans and potential issues or opportunities with the short-listed options.
- Utilities providers, including Watercare Services Limited (Watercare) and Transpower to discuss issues and opportunities with the short-listed options.
- The Ministry of Education (MoE) to discuss potential expanded and new school locations and issues / opportunities with the short-listed options. These discussions with MoE are occurring at a joint level with AT and Auckland Council.
- Fire and Emergency New Zealand (FENZ) to keep them up to date with the Programme, to hear about plans for new fire stations in the growth areas, and to discuss issues and opportunities with the short-listed options.
- The Public Transport Users Association (PTUA), to discuss options to improve public transport in the North West.
- The New Zealand Automobile Association (AA) to keep them up to date with the Programme and to hear about issues and opportunities with the short-listed options and Programme as a whole.

2.3. Community engagement

The Te Tupu Ngātahi team engaged with the community via several forums.

Feedback from partners, key stakeholders, future customers and the community has been considered alongside technical assessments in the process of making decisions regarding the recommended network (as a non-scored criterion in the multi-criteria analysis).

The key feedback themes have been summarised in Section 6.3, including comments to explain how this feedback is or is not consistent with the recommended network, and any issues for further consideration. The themes from engagement were also used alongside other data sources to compile current community insights on the existing network and suggestions for the future network (as included in Section 4.3 below). More details of the feedback received is contained in Appendix H: Engagement Summary Report.

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2.3.1. Public feedback

A public feedback period was held between 24 September 2018 and 19 October 2018. Four public open days were held at four venues (Massey Birdwood Settlers Hall, Riverhead Citizens Hall, Kumeū Community Centre, and the North-West Shopping Centre) drawing approximately 342 people across all four days. The information presented the key decisions being made at the short-list phase and key information to consider associated with each option. The Te Tupu Ngātahi team was on hand and available to speak to the information and answer specific questions. Attendees were encouraged to give their feedback on the information boards at the open days and through online / hard copy survey forms.

It is further noted that the engagement sessions held included information and attendance from supporting projects teams in the North West. This included:

- Watercare, with information on future projects in the North West including the Northern Interceptor
- Auckland Council projects including information on Whenuapai Plan Change 5 and the Kumeū town centre plans
- Auckland Transport projects including information on improvements to the Huapai Triangle, including Station Road and Access Road
- NZ Transport Agency with information on the SH16 /SH18 Connections project and the Safe Roads project for SH16 including engagement on safer speeds for the State highway, ahead of forthcoming formal speed limit change processes.

This joint agency approach was well received by both the public and the Local Boards. A key advantage to this approach was the ability to communicate both short and long-term measures to support the growth planned for the North West.

2.3.2. Future customers

Public engagement to date has largely attracted people from the current communities in growth areas and surrounding areas. It is highly likely that communities in these areas will be different in the future compared to today as land in the FUZ continues to be released for urban development and many of the future communities will be made up from today's children and young people.

The Te Tupu Ngātahi stakeholder reference group includes representatives from several community advocacy groups including Generation Zero and Greater Auckland. These groups are very focused on Auckland's long-term future.

To engage with children and young people Te Tupu Ngātahi ran four workshops with schools, Auckland Council's Youth Advisory Panel and young professionals which focused around key transport issues and future aspirations for Auckland as a successful city to live.

2.4. Policy context and organisational alignment

The policy context and organisational alignment relating to this investment proposal is illustrated in **Figure 8** and **Table 2**. The GPS 2018 aligns with the IBC and supports:

- Increasing access, transport choice and network resilience using a mode neutral approach to closely align with the investment objectives of this IBC.

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- Increasing the supply of serviced land for housing development in high growth urban areas, allowing for lead and other investments in transport infrastructure to support this growth'.
- Significantly reducing the number of deaths and serious injuries that occur on the transport network. This includes investment in the provision of appropriately designed and maintained infrastructure (e.g. cycleways) and speed management and urbanisation of rural roads is particularly important to increase access to, and uptake of, active forms of travel.
- Transport and land use planning reducing the need to travel by private vehicle (especially single occupancy), more frequent and highly patronised public transport services, extending greater priority on urban and rural routes for walking, cycling and public transport, and better management of parking.

Table 2This investment proposal is strongly aligned with existing policy, including the AT Statement of Intent and the Transport Agency's Long-Term Strategic View and Statement of Intent. More detail is provided in Appendix A: Strategic Case.

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Figure 8: Policy context and organisational alignment

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The GPS 2018 aligns with the IBC and supports:

- Increasing access, transport choice and network resilience using a mode neutral approach to closely align with the investment objectives of this IBC.
- Increasing the supply of serviced land for housing development in high growth urban areas, allowing for lead and other investments in transport infrastructure to support this growth'.
- Significantly reducing the number of deaths and serious injuries that occur on the transport network. This includes investment in the provision of appropriately designed and maintained infrastructure (e.g. cycleways) and speed management and urbanisation of rural roads is particularly important to increase access to, and uptake of, active forms of travel.
- Transport and land use planning reducing the need to travel by private vehicle (especially single occupancy), more frequent and highly patronised public transport services, extending greater priority on urban and rural routes for walking, cycling and public transport, and better management of parking.

Table 2: Organisational alignment

Organisation & policy	Relevance to North West Auckland
AT Statement of Intent	AT's Statement of Intent (SOI) covers the three-year period from July 2018 to 2021. The primary purpose of the SOI, is to publicly state AT's activities, intentions and overall objectives. To this end, AT's key priorities for the next three years include: • Improving the safety of the transport system • Delivering an efficient and effective transport network • Focusing on the customer • Ensuring value for money across AT's activities • Urban regeneration and placemaking.
Transport Agency Long Term Strategic View	The Transport Agency's Long-Term Strategic View (updated in June 2018) provides insight into the 30-year influences on the transport system; the challenges and opportunities they will create; their scale; and when, where and why they will emerge. It then provides direction on where effort is needed over the next ten years to address these challenges and opportunities. It provides useful context for each corridor being re-evaluated, including the key drivers of change - population growth, economic structure, climate change and technology advances.
Transport Agency Statement of Intent 2018-22 (Draft)	The Transport Agency's SOI responds to recent changes in its operating environment, including the release of the new GPS on Land Transport 2018/19-2027/28, and a new outcomes framework for the transport sector. The policy statement focuses on creating a safe, resilient, well-connected and multimodal transport system that enables new housing opportunities, liveable cities and sustainable economic development in regional NZ. This supports the enduring outcomes for the transport sector: • Inclusive access • Economic prosperity • Resilience and security • Environmental sustainability • Healthy and safe people. The Transport Agency's focus remains on creating great journeys that are easy, safe and connected to keep New Zealand moving. Eight position statements describe what the Transport Agency see as the significant challenges for the sector and the Transport Agency for at least the next four years: Transport Safety; Inclusive Access; Liveable Communities; Transport Technology; Resilience; Environment; and Regulatory.

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3. Local Context

3.1. Who are we?

From the earliest of times, the North West region has been an important transport corridor. These corridors have provided Manawhenua, early settlers, later immigrants, and the communities of today with the opportunity to access west coast beaches, harbour areas of Auckland, and more recently recreational activities such as vineyards and wineries.

Key portage corridors enabled Manawhenua to move by canoes between the Waitematā and Kaipara Harbours via the Kumeū Stream and Pītoitoi (Brigham Creek) or Rangitopuni (Riverhead). Additional walking tracks gave access to the Kaipara hinterland and west coast beaches. The ease of access to, and within, this region may have supported the historical role the North West has played as a meeting place between iwi. [5]. This traditional meeting place, ease of access, and resulting inter-group relationships, has resulted in a rich and varied heritage, with numerous iwi identifying with the area. This is demonstrated further in place names through the region, such as Taupaki, which means 'a peace making'.

The first European settlers arrived in the North West in the early 1840s and were likely attracted to the large reserves of timber. Other settlers that established commerce in the area included:

- Thomas Deacon who came to Riverhead in 1843, establishing the Riverhead Tavern, thought to be New Zealand's oldest riverside tavern, which continues to operate today
- John Brigham, who acquired land near Riverhead for a flour mill in 1855 and
- Rice Owen Clark, who established a brickworks at Hobsonville Peninsula in the 1860s.

The district was further settled by immigrants from the Dalmatian coast of Croatia in the 1930s and 1940s many of whom were part of traditional winegrowing families. This saw a shift in the landuse from traditional pasture and farming, to orchards and in vineyards which can be seen today.

Urbanisation has continued to spread further North West with residential development progressing in conjunction with the extension of SH16, resulting in the suburbs of Massey and West Harbour. Further population increases are now occurring in Whenuapai, Hobsonville, Kumeū-Huapai and Riverhead with the 2013 Census data providing a snapshot of the residents of the North West in **Figure 9.**

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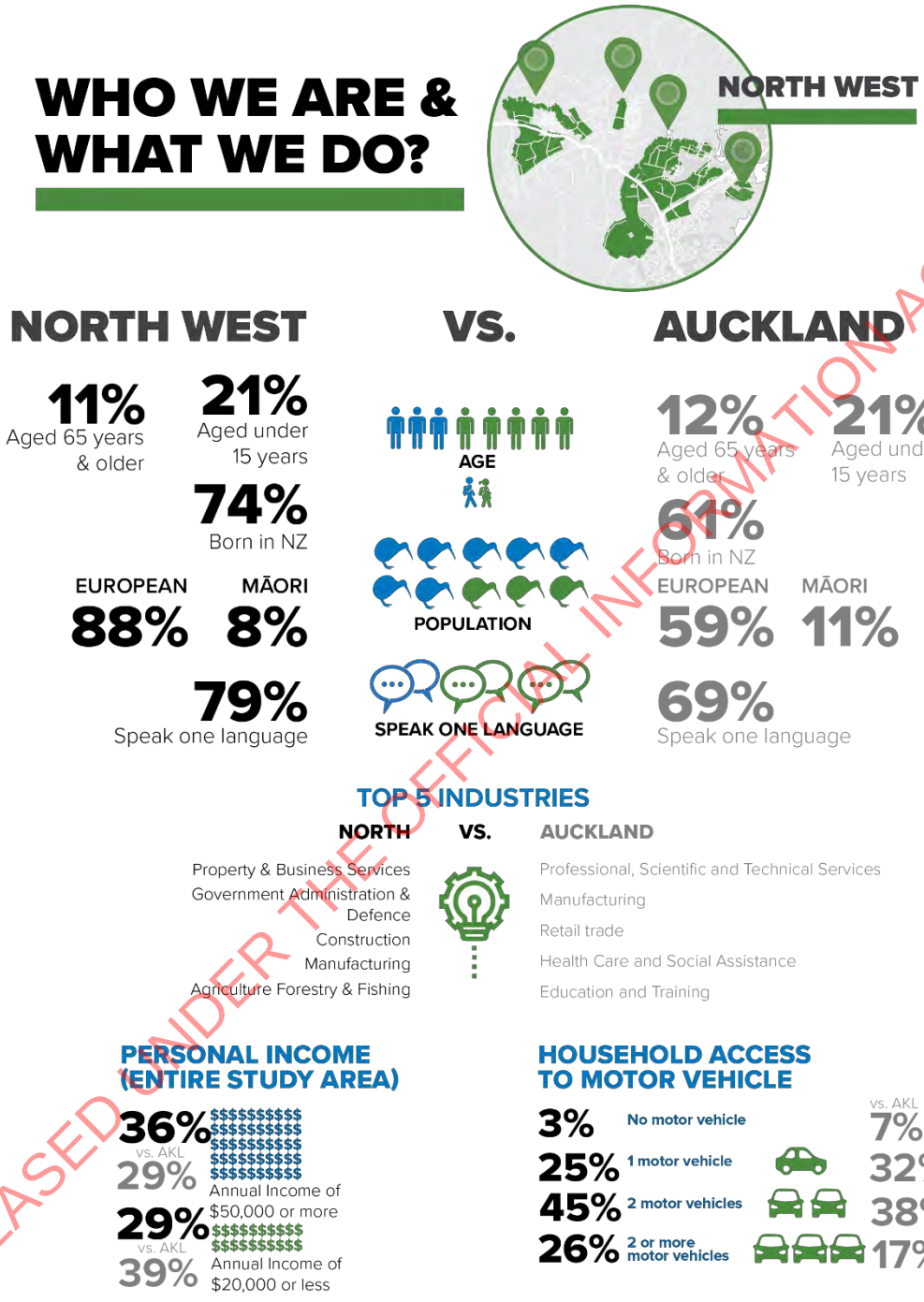
[5] Auckland Council North and North West Rural Urban Boundary Options: Cultural Heritage Overview, CFG Heritage, 2013

Figure 9 North West demographics



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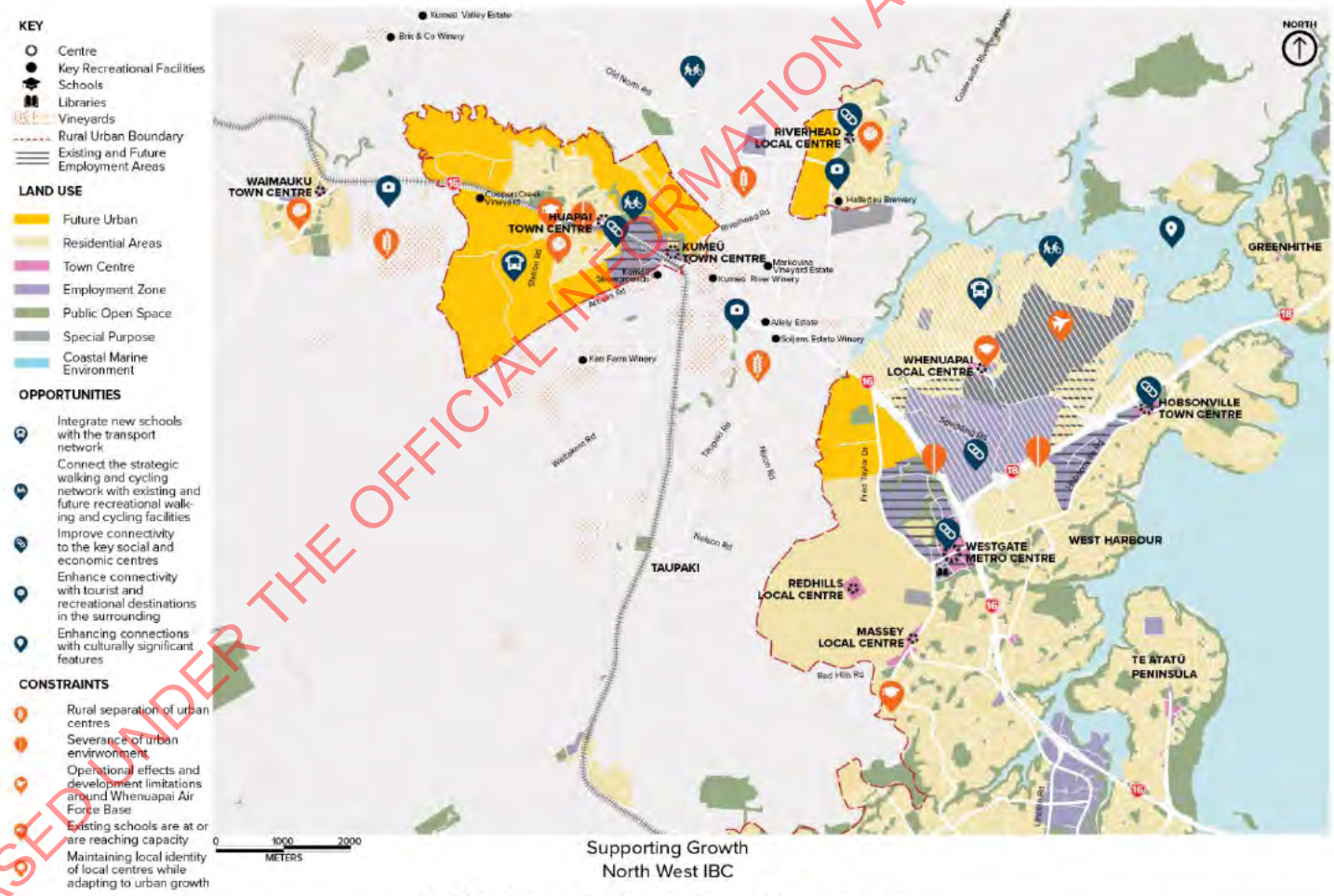
3.2. Social and Economic Opportunities and Constraints

The social and economic opportunities and constraints are shown in **Figure 10**.

Figure 10 North West Social and Economic Opportunities and Constraints



Supporting Growth
North West IBC

Social and Economic - Opportunities and Constraints map

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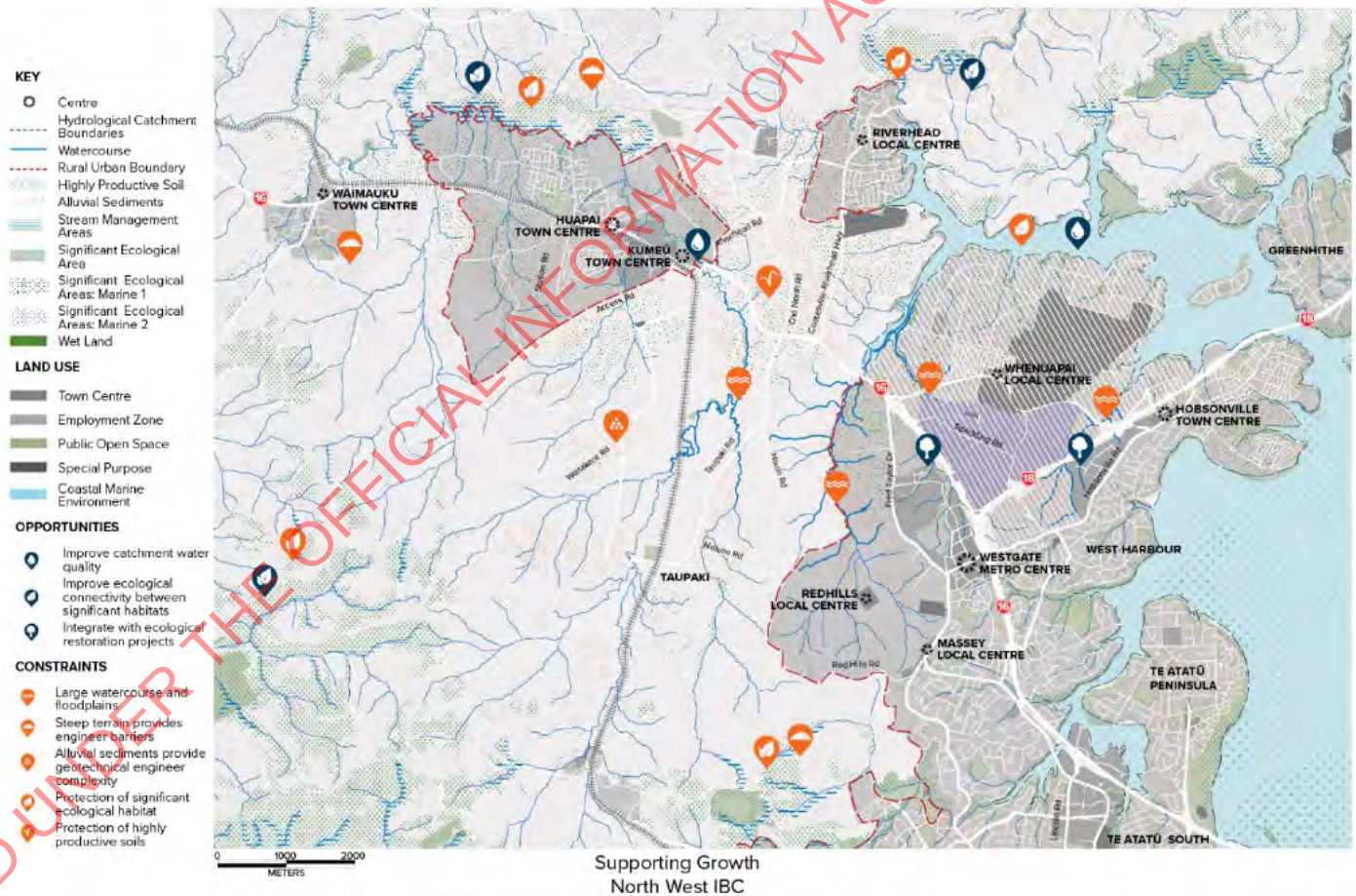
3.3. Natural Environment Opportunities and Constraints

The natural environment opportunities and constraints are shown in **Figure 11**.

Figure 11 North West Natural Environment Opportunities and Constraints



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Natural Environment - Opportunities and Constraints map

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4. Strategic assessment

This section sets out the:

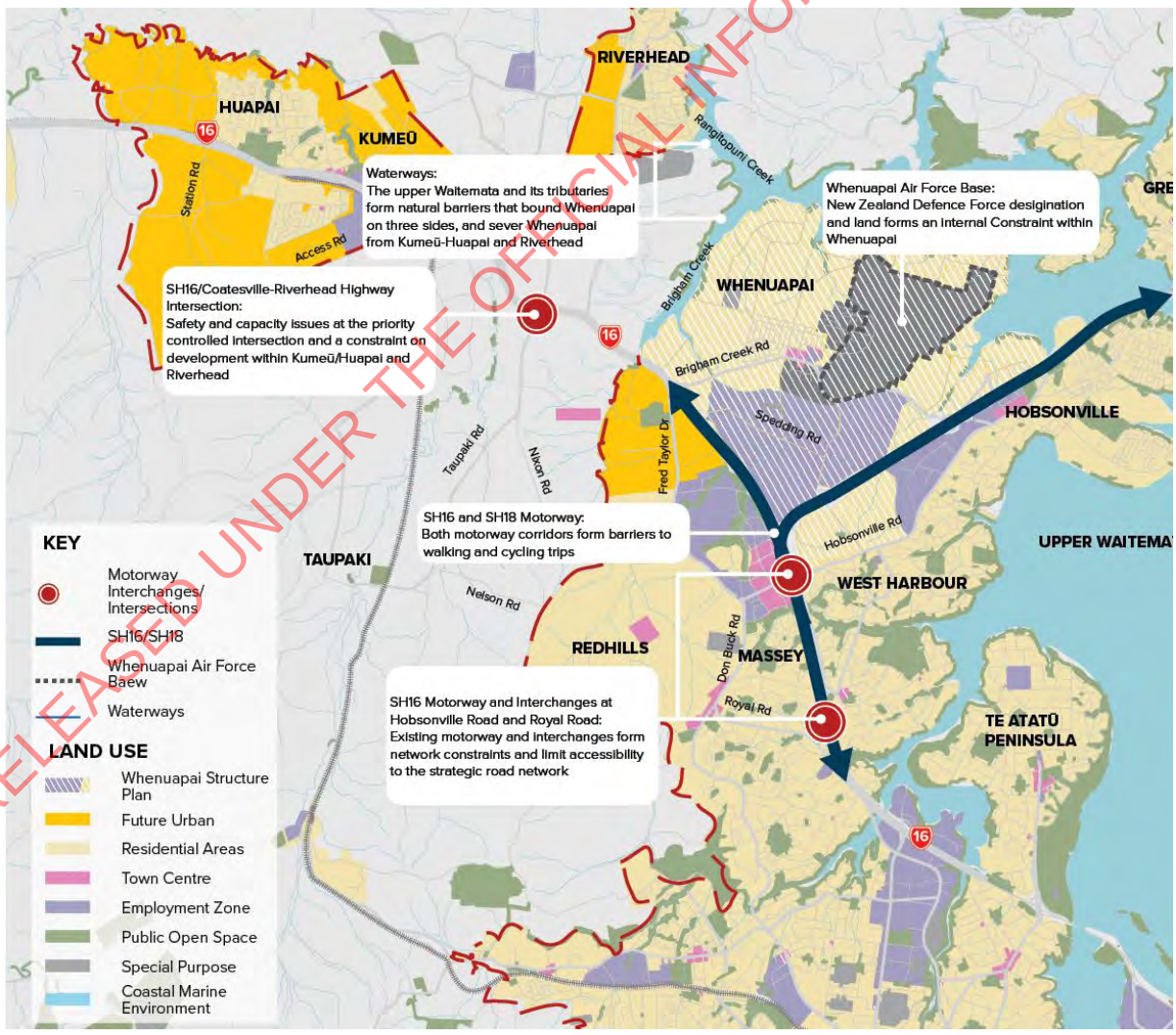
- Current transport constraints, opportunities, and travel patterns relating to North West Auckland (Section 4.1 and 4.2)
- Key insights received through consultation with current customers (Section 4.3)
- Problems, benefits, investment objectives, and KPIs which specifically relate to the North West area (Sections 4.7 - 4.13).

4.1. Transport constraints and opportunities

4.1.1. Key constraints

Figure 12 shows the key constraints on the North West transport system. These constraints relate to both the natural and built form of the North West.

Figure 12: Network constraints in the North West



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The North West is accessed via SH16 and SH18, which provide strategic connectivity to the southeast and city centre, and to the North Shore, respectively. SH16 east of Brigham Creek Road, and SH18 west of Albany Highway are both limited access motorway corridors, with four or more lanes of traffic. Both routes provide onward connectivity to SH1. Access to the SH16 motorway corridor is currently available at Brigham Creek Road, Hobsonville Road and at Royal Road (south facing ramps only). Access to SH18 is currently available at Trig Road (east facing ramps only), Brigham Creek Road and at Squadron Drive (east facing ramps only).

The intersection of SH16 and SH18 forms an important junction in the strategic road network and sits centrally within the North West area. Currently, this intersection only provides connections between SH18 and SH16 (south) and movements between Kumeū-Huapai and Riverhead and SH18 are required to use Brigham Creek Road.

North West of Brigham Creek Road, SH16 narrows to a two-lane rural highway. This road currently operates with both capacity and road safety concerns. Through Kumeū-Huapai, SH16 runs in parallel with the North Auckland Line (NAL) rail corridor and together, these corridors result in severance through the centre of both towns. SH16 is the single strategic connection to Kumeū-Huapai, and further north, and is a critical link on the network. This causes problems due to its lack of resilience and requires strategic and local trips to mix, compromising both functions,

The North West growth area is constrained by poor land use and transport integration. Communities are geographically separate, widely distributed and of low density. This presents a challenge to provide adequate catchments for walking and cycling and public transport.

The existing public transport network is limited to ferry services at West Harbour and Hobsonville, and range of bus services. Local services include the 122, 125 and 114 services and two connector services. While these services are appropriate to service the existing urban areas of the North West, they provide neither the capacity, or reliability needed to meet the identified investment objectives particularly with respect to mode shift to support the planned future land use growth in the area.

Figure 13 below shows the network implemented in mid-2017 as part of the New Network for the North West.

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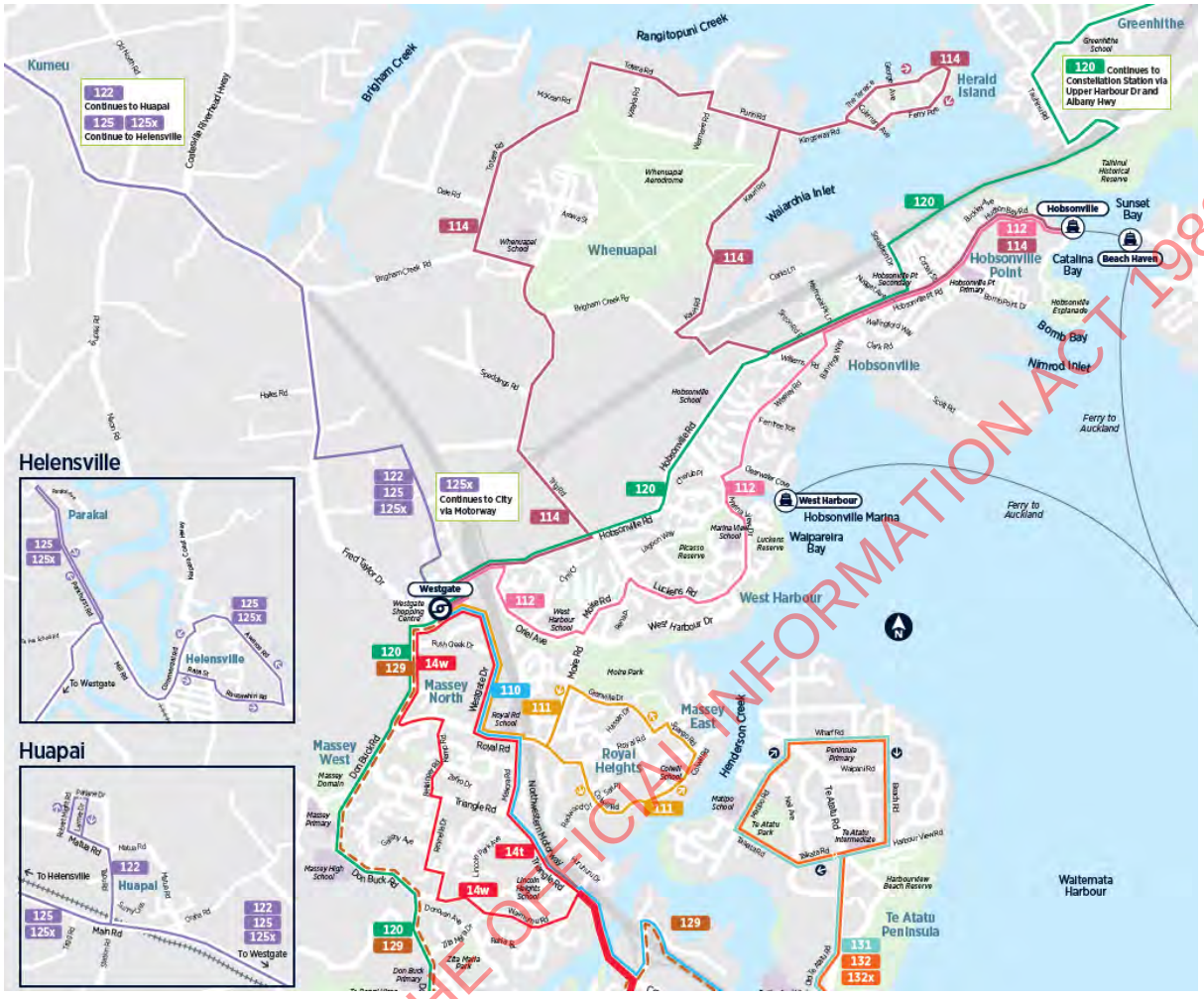
Figure 13: North West New Network as at March 2017



The existing road network is largely rural in character, with narrow carriageways, poor alignments and limited shoulder provision. Many of these roads have high existing personal and collective crash risks, which are likely to be exacerbated as a result of growth. Footpaths are provided within the existing urban areas of Kumeū-Huapai and Riverhead but not in the wider currently rural area. This does not match the proposed urbanization of these areas. There are currently few safe pedestrian crossing opportunities across either SH16 or SH18. There are limited existing cycling facilities within the North West.

There are currently limited cycling facilities provided to enable movement between current settlements and Westgate.

The current transport system is described in further detail later in this document in relation to the problem statements.

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4.1.2. Key opportunities

Table 3 summarises key opportunities for the North West.

Table 3: Key opportunities to achieve an integrated transport system

Opportunity	Description
Customer behaviour change	There is potential to conduct local customer insight gathering (research) on how to reduce barriers and maximise behaviour change incentives. This could include: • Understanding how active modes can be made safe and be perceived to be safe • Understanding trade-offs between different types of infrastructure • Pricing levels to create the right solution to influence behaviour at the best cost. Other trade-offs include proximity and shortest journey versus scenic enjoyment, actual and perceived safety on/near roads and, personal security when using less public routes. There are several options being explored in the transport demand management space to influence customer behaviour in their use of motor vehicles, such as on-demand services. Local experiments with demand management levers would help to find the optimal mix for the North West's unique local conditions.
Active modes	Implementing walking and cycling infrastructure that meets the Transport Agency's Cycle Network Design Guidance will encourage higher participation by attracting new and existing residents who are interested in active modes. Recommendations include: • Connected, continuous, convenient and comfortable cycling networks need to connect key destinations, which will greatly increase the uptake of cycling • Scenic areas are great for recreational use, but direct lines to key destinations are needed to create mode shift • On busy arterials separation is important • Where separated cycle facilities are provided, vehicle crossings should be removed to enhance safety and participation • All walking and cycling infrastructure need good lighting and passive surveillance, especially at night • Specifications of minimum widths of footpaths / cycle lanes/ shared paths and when to use which, so that all ages and abilities are enabled. These recommendations will be incorporated into the cycle network design as it is developed through the DBC phase.
Public transport	Customer insight gathering is recommended to explore current and future customers' need to commute to the city centre for work, tertiary education and other opportunities and how to provide better access to multi-modal travel options for different types of commuters. This could include measures to support increase existing mode share, • Provision of greater frequencies, • Bus priority measures to improve travel time reliability • Better network infrastructure such as interchange facilities • Better integration of modes including cycling facilities and walking facilities at key PT hubs These recommendations will be further developed into the PT network design as it is developed through the DBC phase
Changing demographics	Current population demographics will change over time. Current residents will age and newer, younger families with different needs will continue to move to the North West. Local trips will continue to be an important focus in the future. As population increases, it is important that modes other than private car are accommodated safely. There is an opportunity to balance the needs of current and changing future population groups to increase the attractiveness of active and public transport options, as follows:

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Opportunity	Description
	• Regarding the current aging population, customer insight gathering could explore the ways that footpaths and cycling lanes could support mobility scooters and wheelchairs. • Because the future population is likely to include young families, a further consideration is to provide footpaths that are wide enough to accommodate pushchairs and give a sense of protection from fast moving traffic; i.e. different routes or physical separation. • Footpaths and cycle lanes should be future-proofed to support new technologies such as e-scooters. • In summary, we will need to build footpaths and cycle lanes for a diversity of customers, keeping in mind their different needs and different speeds.

4.2. Current travel patterns

Generally, current travel patterns in North West Auckland [6] can be described as:

- Commuting to employment outside of the North West (70% of trips).
- Travel within the North West, with a proportion of existing residents living and working in this area (30% of trips).
- Travel north-south where the North West is not the destination, but rather people are passing through due to the configuration of the existing road network. This applies to both freight and tourist traffic and is particularly a feature of Kumeū-Huapai travel patterns because SH16 passes through the town centre, causing congestion and severance.
- Current commuter travel is predominantly by private car (approximately 93%), with high levels of single occupant vehicles, and minimal travel by public transport or cycling.

The consequences of these travel patterns combined with the constraints and opportunities identified previously are:

- **Isolation from employment** – although employment opportunities are provided within the North West, many residents commute further afield for employment.
- **Limited mode choice for travel within the North West -** limited investment in active modes results in high car use, even for short trips.
- **Poor safety record on rural roads** - The North West has an extensive rural road network and some of these key links currently experience high speeds, high volumes, rat running and have identified safety issues. Increasing traffic volumes will increase safety risks.
- **Conflicting town centre and freight / strategic traffic needs** – freight and strategic traffic on the existing SH16 corridor must pass through the Kumeū-Huapai town centre. This results in conflict between town centre user needs and the need to prioritise and allow for growth in freight and strategic traffic. This can cause significant delays both within the town centre and on rural side roads. Queueing traffic restricts access to properties and causes perceived safety issues. Freight and strategic traffic re-route along rural roads to avoid congestion, increasing safety risks.

[6] Based on 2013 Census data and 2018 modelled forecasts. Travel patterns assessed via the Census may have changed and continue changing following the introduction of public transport services in 2018.

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- **Poor access** – Whenuapai is currently effectively an island, separated from other North West communities by SH16 and SH18, with the harbour as a boundary to the north and east. The existing accesses to this community are congested at peak times.
- **Poor transport choice** – current high reliance on private vehicle travel continues, resulting from a poor range of alternative mode choices.
- **Highly engaged community** - over the past 10 years there has been significant community / customer dissatisfaction with the roading network. This has focused on its poor safety record and increasing congestion. The community has high expectations for short-medium term improvements.
- **Liveability outcomes** are compromised by all these challenges. This reduced quality, as experienced by the community includes limited pedestrian and cyclist access and connectivity, restricted access to core services and employment areas, safety and health related issues such as personal security and public health and reduced community identity.

4.3. Key customer insights

Prior to the commencement of the Supporting Growth Programme there had been a lot of community engagement about transport issues in the North West. This prior engagement has been recognised and integrated into the Supporting Growth Programme by analysing customer insights from past feedback on:

- TFUG PBC (2016)
- People's Panel Survey - Housing and Travel Report (2016)
- AT Market Perceptions Public Transport Adoption Framework (2018)
- AT Active Modes survey
- Local Board Plan feedback.

This information, together with feedback that was received during the Te Tupu Ngātahi public open days and feedback period has provided important customer insights into problems with the existing North West transport network and aspirations/suggestions for the future transport network.

Current customer insights on the existing network and suggestions for the future network were received during the public consultation period together with other survey and data sources (from the Transport Agency and AT). This information is summarised **Figure 14**. These customer insights have been used to inform the problem, benefits and investment objectives for this project and to develop and assess options. The issues raised will be covered in more depth as part of this IBC and future programme stages. More detailed insight gathering will also be undertaken as the programme progresses, so that the development and implementation of individual programme elements is consistent with the feedback we have been given.

Overall, the information suggests that there is significant appetite and demand from future customers for the transport network to provide travel choice and deliver safe, connected networks to enable people to live and move around the North West by walking, cycling and public transport.

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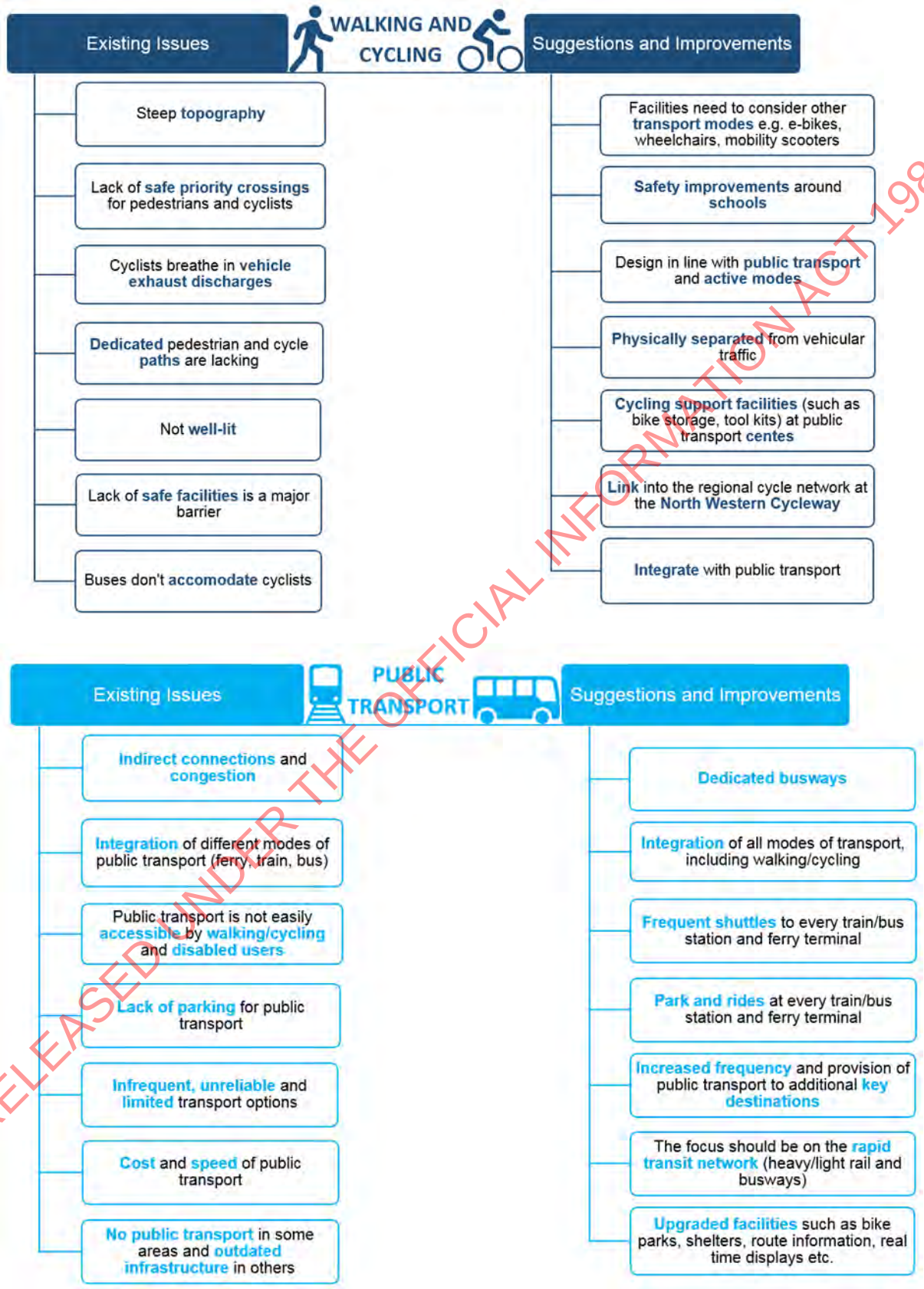
Figure 14: Customer insights in the North West



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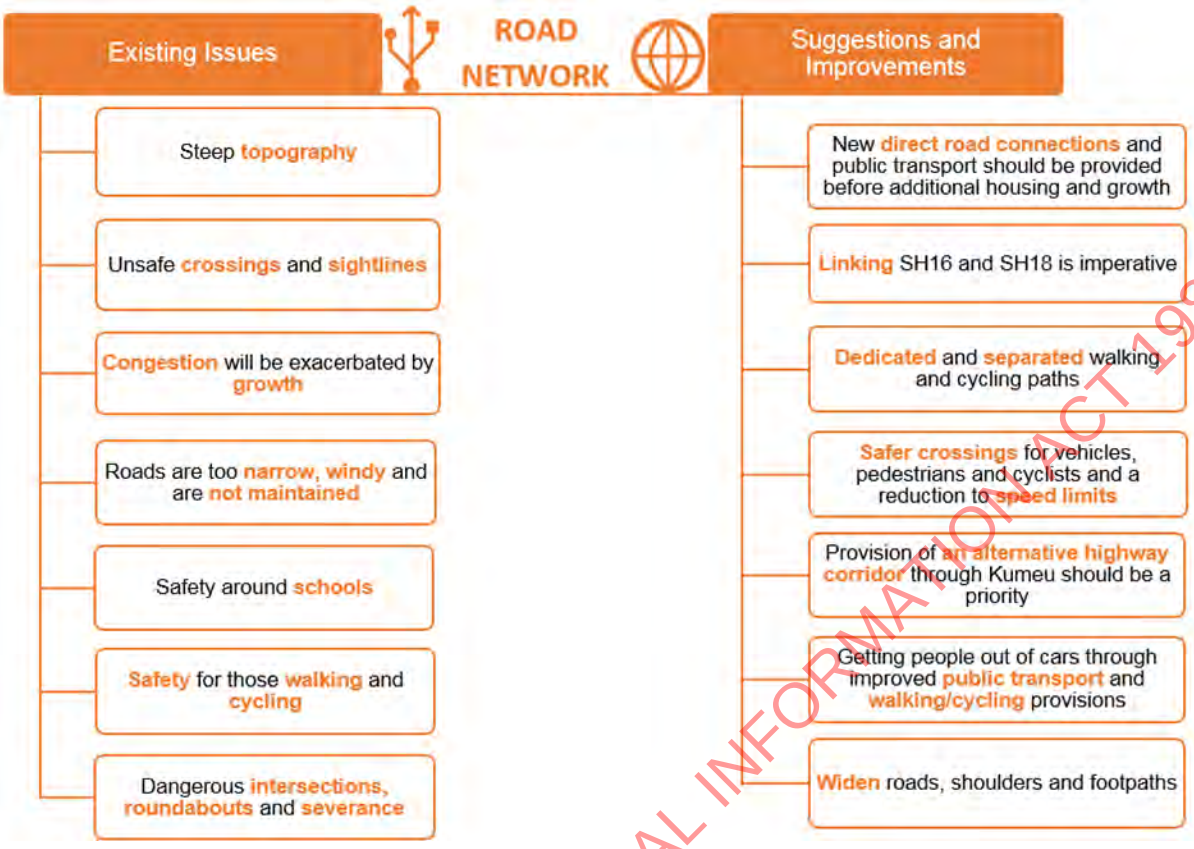

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4.4. Related projects

Several projects which impact the North West area are currently in development. These are shown in **Figure 16** and more details for each project is included in **Table 4**.

Figure 16: North West related projects

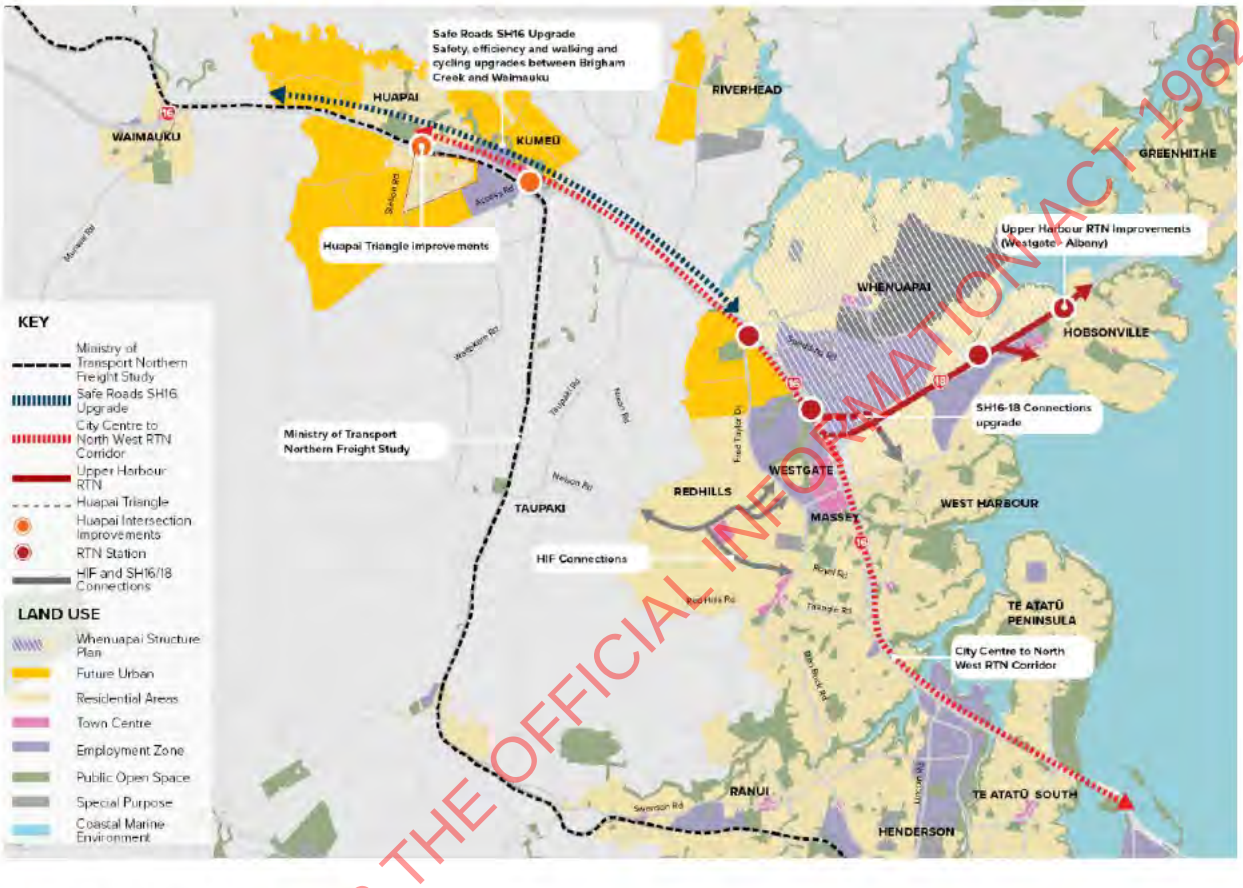

Table 4: Related North West projects

Project	Description
City Centre to North West RTN	ATAP has recommended a light rail-based solution for the RTN within the next decade and investigations for light rail are at a very early stage. A separate SSBC will commence in 2019 to identify to how best to develop this RTN to support the desired transport and development outcomes for the North West. Implementation of an RTN for the North West within the next decade is important to support planned growth in this area. Investigations were completed by AT, in coordination with the Transport Agency, on the North West RTN in 2017. This work, while still draft, has formed the basis of assumptions used in this IBC. This includes an assumption that an RTN will be provided to Brigham Creek adjacent to SH16 and adjacent to SH18 to Squadron Drive. In the assessment of RTN options, this IBC considers options for all modes including heavy rail, RTN corridors from Brigham Creek Road towards Kumeū-Huapai and local bus corridors.
SH16 / 18 connections	Package of improvements to improve connectivity between SH16 and SH18. Upgrades include:

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Project	Description
	• Direct north east connection between SH16 and SH18 and south facing ramps at Northside Drive. • Upgrade Squadron Drive and Brigham Creek Road interchanges on SH18 to support Whenuapai and Hobsonville growth areas. • Connect local roads and create strategic walking and cycling connections.
Upper Harbour RTN	ATAP has indicated that a bus-based rapid transit line will be provided along SH18. Previous investigations have identified two potential stations between Westgate and Upper Harbour bridge. Further investigations are required to determine the optimal time for delivery and will also include consideration of land use access integration and intensification.
Safe Roads SH16 upgrade	The purpose of this project is to improve safety, efficiency and walking and cycling on SH16 south of the Kumeū-Huapai town centre and north of Station Road. Improvements include: • New roundabout at the Coatesville-Riverhead Highway / SH16 intersection to support the Riverhead growth area, • Central wire median along Main Road in Kumeū-Huapai, • Shared pedestrian / cycleway along SH16, • Engagement on safer speeds, support for forthcoming speed limit change process.
Huapai Triangle improvements[7]	The Huapai Special Housing Area (SHA) comprises 1,200 dwellings including a retirement village. There are two primary connections between the SHA and SH16 at the Kumeū-Huapai town centre, via Station Road and via Access Road. This project recommends improvements to these intersections with SH16. These improvements will be considered as part of the baseline for any longer term works on these corridors.
Housing Infrastructure Funding (HIF)	Early works were identified in Redhills and Whenuapai to support the live zoning of the Redhills precinct and early stages of growth in Whenuapai. A funding application was approved as part of the HIF programme. Subject to completion of a DBC, funding may be used to support delivery of: • Redhills east-west link including PT priority along Dunlop Road and a vehicular link on Baker Lane, • Redhills north-south link from the local centre to Royal Road, • Realignment of Trig Road south of SH18. These elements have not been reassessed as part of this IBC but are assumed to form part of the recommended network s9(2)(i) and s9(2)(g)(i)
Ministry of Transport Northern Freight Study	Study to investigate Northland's future rail freight requirements. The North Auckland rail line connects Northland and Auckland and passes immediately to the south of SH16 / Main Road through Kumeū-Huapai town centre. The main issues affecting this project include: • Potential to increase freight services on the North Auckland line. Increased numbers of freight trains will increase pressure on level crossings, potentially increasing the severance effects for Kumeū-Huapai town centre. • Potential for additional tracks. This would also increase severance in Kumeū-Huapai. The findings from this study are due in 2019 and will need to be incorporated into the DBC phase of this project.

[7] https://at.govt.nz/projects-roadworks/huapai-triangle-special-housing-area/

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4.5. Scale of growth

Within the North West growth area, when fully urbanised, is expected to house 42,355 new households, in addition to 13,000 new employment opportunities. This level of household growth corresponds to approximately 97,000 new residents – greater than the existing population of Palmerston North, and approximately 11 times the current population of the North West area. **Figure 8** in Section 1.2.1 shows the FULSS (2017) planned land release.

Figure 17 shows the forecast households in the North West area between 2016 and 2046, and **Figure 18** shows forecast employment over the same period.

Figure 17: I11 forecast households in North West, 2016-2046

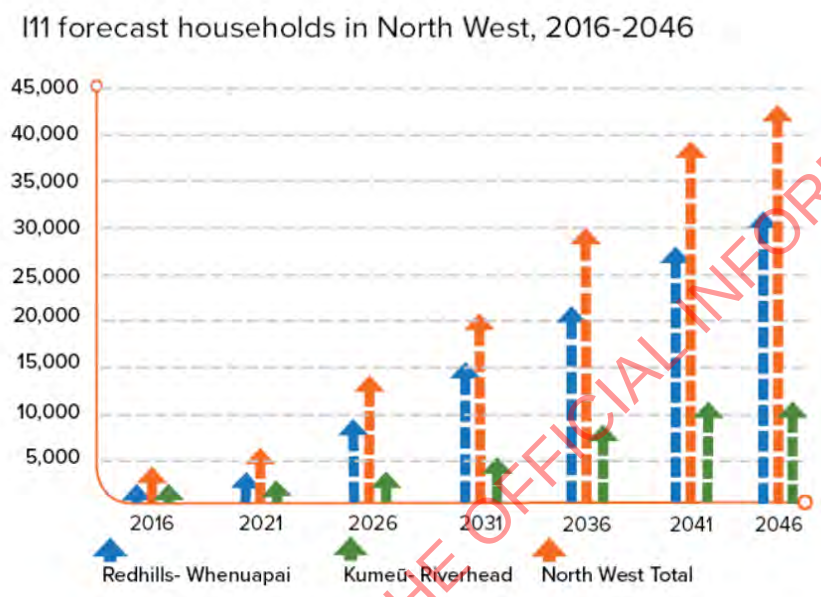

Figure 18: Forecast employment in North West, 2016-2046

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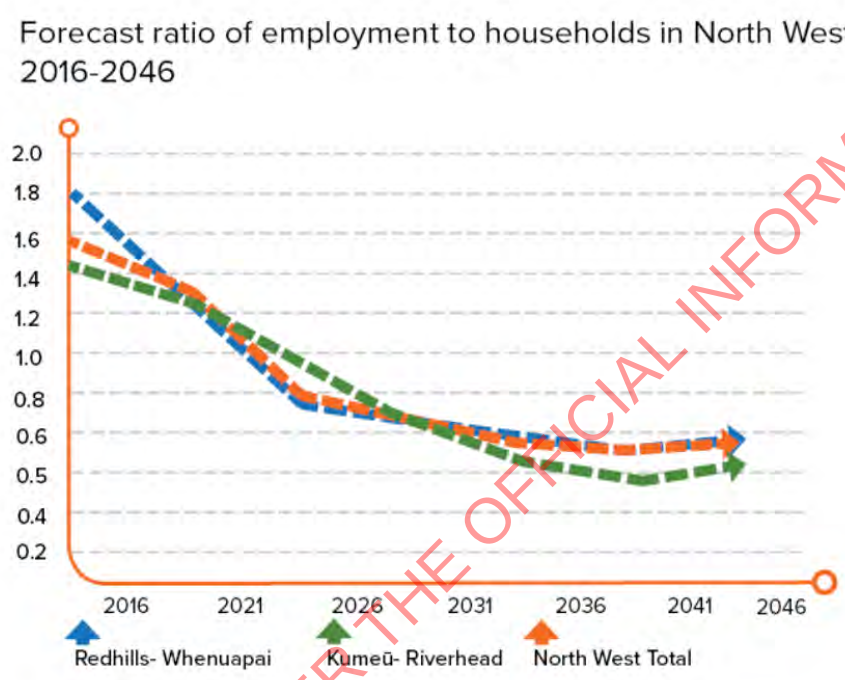
It is generally expected that an urban area will have a balance between the number of households and the number of jobs, at a 1:1 ratio, in order to provide residents with local job opportunities. **Figure 19** shows this ratio graphically for the North West area. The figure illustrates that the ratio of local employment to households is predicted to drop from around 1.6 in 2016 to approximately 0.6 in 2036. This indicates a growing deficit in local employment, as household numbers increase, resulting in an increasing need for residents to travel to employment outside of the North West.

Increasing travel demand outside of the North West increases pressure on the strategic transport system to accommodate these trips. Rapid transit plays an important strategic role, providing an attractive alternative to private vehicle travel and reducing demand on the State highway network.

Figure 19: Forecast ratio of employment to households in North West, 2016-2046



4.6. What happens if we do not invest in transport infrastructure in North West Auckland?

This section sets out what would happen in North West Auckland if the planned growth took place without corresponding investment in transport infrastructure.

The key issues are likely to be:

- Liveability outcomes are compromised.
- North West Auckland's growth potential is limited.
- Increased pressure on rural roads from high speeds and rat running by vehicles seeking to avoid significant congestion which will further exacerbate safety issues on the rural road network

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- Unmanaged growth in demand for private vehicle travel, which will result in traffic volumes on existing roads above their designed capacity – resulting in severe congestion, severance, and high stress for travellers.
- Poorly integrated land use limits opportunities to encourage public transport, walking and cycling, encouraging private car use to continue at existing levels.
- Poor correlation between local jobs and population increases demand for commuter travel outside of North West.
- Existing safety risks increase on key corridors such as SH16 and Coatesville-Riverhead Highway as traffic volumes increase with limited investment in safe solutions.
- Limited urbanisation of the currently rural road network, which will have negative outcomes for safety, urban form, and active travel.
- Limited investment in public transport to key locations reinforces high car use.
- Opportunity to provide lead infrastructure which supports mode shift, i.e. walking and cycling, is lost due to unconnected development.
- Transport and policy outcomes are not achieved, i.e. mode shift and reduced reliance on private vehicles.
- Strategic network resilience risk associated with only a single access to Kumeū-Huapai and limited access to Whenuapai. Over-reliance of these connections for both strategic and local activities compromises both functions.

Growth will directly affect the ability of the transport system to function and access to economic and social opportunities in the North West will be restricted if planned growth proceeds without corresponding investment in transport infrastructure. Conversely, without investment in transport infrastructure, the growth potential of the North West will be limited, as developers invest in less constrained locations.

As an example, there are currently 1800 households in Kumeū-Huapai and Riverhead in 2016. Assuming a trip rate of 10 trips per household per day and a car mode share of 85% then this equates to potentially 15,000 vpd on SH16. The projected growth by 2046 is to reach 12,500 households which without any additional infrastructure would be a seven-fold increase in traffic. This could theoretically result in over 100,000 trips. This is clearly over capacity for SH16 and would result in significant congestion and could promote significant increases in trips on unsuitable rural roads on parallel routes as well as peak spreading.

The issues above relate to delayed capital investment. Importantly, delaying route protection investment would also likely result in poor outcomes including increased property and construction costs and reduced certainty for landowners, existing communities and future customers.

As seen in **Figure 20**, the resulting percentage changes in land values between 2014 and 2017 are significantly aligned with the zoning changes implemented as part of the AUP OP.

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Figure 20: Percentage Change in Land Values in Redhills between 2014 and 2017[8]

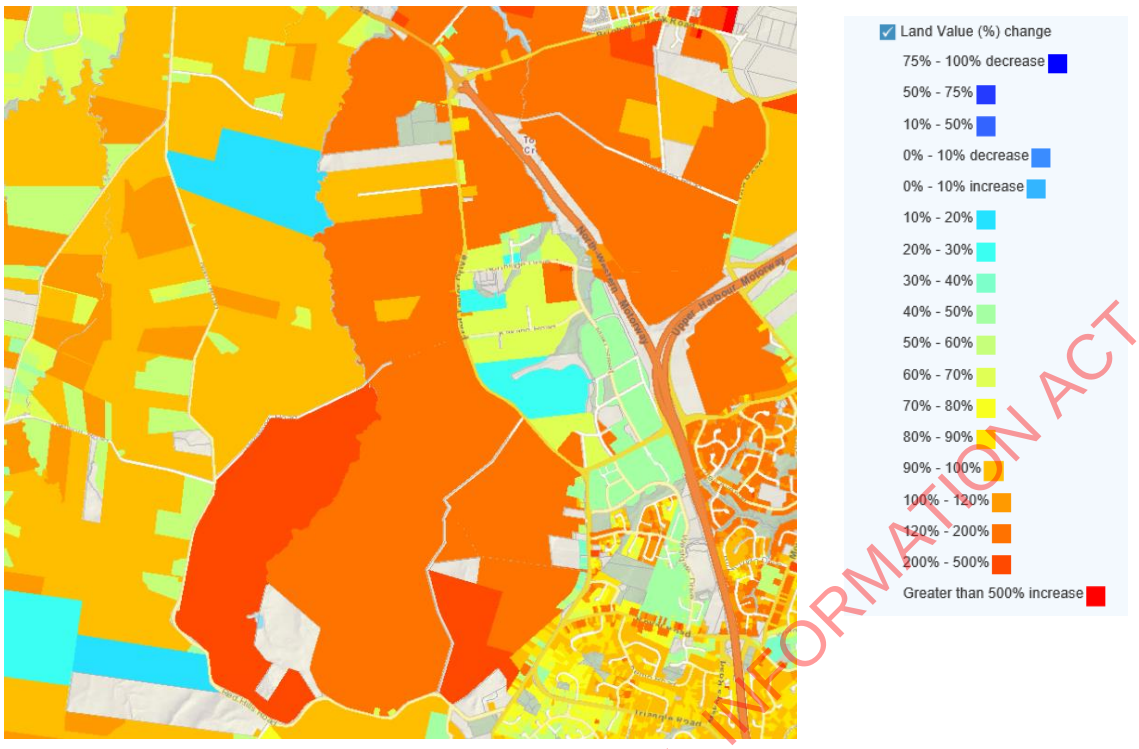

Table 5 sets out these effects in the context of achieving the GPS priorities.

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[8] Auckland Council GIS Viewer, GEOMAPS, accessed 30 November 2018

Table 5: Effect of planned growth – without corresponding transport investment – on GPS priorities

GPS priority	Impact of planned growth
Access	• Limited investment in walking and cycling facilities results in high car usage, despite the relatively small geographic distances of local trips. • Limited investment in public transport to key locations, results in high car use. • New road corridors are not connected, resulting in cul-de-sacs, as private developers only construct what is required for their site. Network resilience is significantly reduced. • Land potentially not able to be developed due to high infrastructure costs. Where ownership is fragmented, agreement and funding are very difficult. Corridors may never be constructed. • Unmanaged growth in demand for private vehicle travel, which will result in traffic volumes on existing roads above their designed capacity – resulting in severe congestion, severance, and high stress for travellers. • Reduced integrated land use and transport planning resulting in a less accessible network and reduced liveability for the North West.
Safety	• High vehicle speeds continue – rural road form does not encourage slower speeds which are safer. • Few footpaths and no separated cycle facilities mean people do not feel safe to walk or cycle, even for short trips. Limited walking and cycling to school.
Value for Money	• Lower initial capital cost to AT and Transport Agency, however this is at the cost of safety and improved access. • Greater operating costs for public transport with inefficient public transport networks • Entirely reliant on developers to provide new infrastructure, reducing growth potential and ability to deliver a system wide approach.
Environment	• Very few safe, attractive mode choices resulting in high car dependency (>90% of travel) remains unchanged. This outcome is inconsistent with targets relating to reducing carbon emissions. • Higher car dependence can also result in higher levels of runoff contaminants into waterways • Wider roads required to provide for high car demand, resulting in less available green space and poorer urban form dominated by road corridors. • Fewer walking and cycling facilities mean less uptake in active modes and fewer healthy people in the community. • Reduced opportunities for integrated land use and transport planning resulting in a lower uptake of lower emission modes such as cycling, walking and electric buses.

Figure 21 details the modelled traffic flows for the 2046 Do Minimum scenario and **Figure 22** summarises the resulting congestion from the flows. The figures show significant flows of up to 50,000 vpd south of Kumeū-Huapai on SH16 and associated congestion and queues. Key arterials such as Fred Taylor Drive, Brigham Creek Road and Hobsonville road would carry between 20,000-35,000 vpd which would result in significant congestion and cause subsequent delays to public transport reducing the attractiveness of this mode. The surrounding rural roads such as Taupaki Road, Red Hills Road and Waitākere Road would also experience increased traffic from the additional growth which will increase the safety risk as rural roads are forced to carry more traffic than they were designed to accommodate.

Overall this increased growth on the network would reduce accessibility within the North West and restrict access to social and employment opportunities. The resulting congestion would significantly

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reduce the attractiveness of the bus network which would invariably be delayed by this congestion. Without additional infrastructure the safety and attractiveness of walking and cycling would also be compromised. This would ultimately result in the North West remaining heavily dependent on the private vehicle with a very low mode shift due to limited efficient and reliable travel choices. Without attractive access, the development potential for the North West may not be realised.

Figure 21: What happens if we do nothing in the North West - 2046 traffic flows

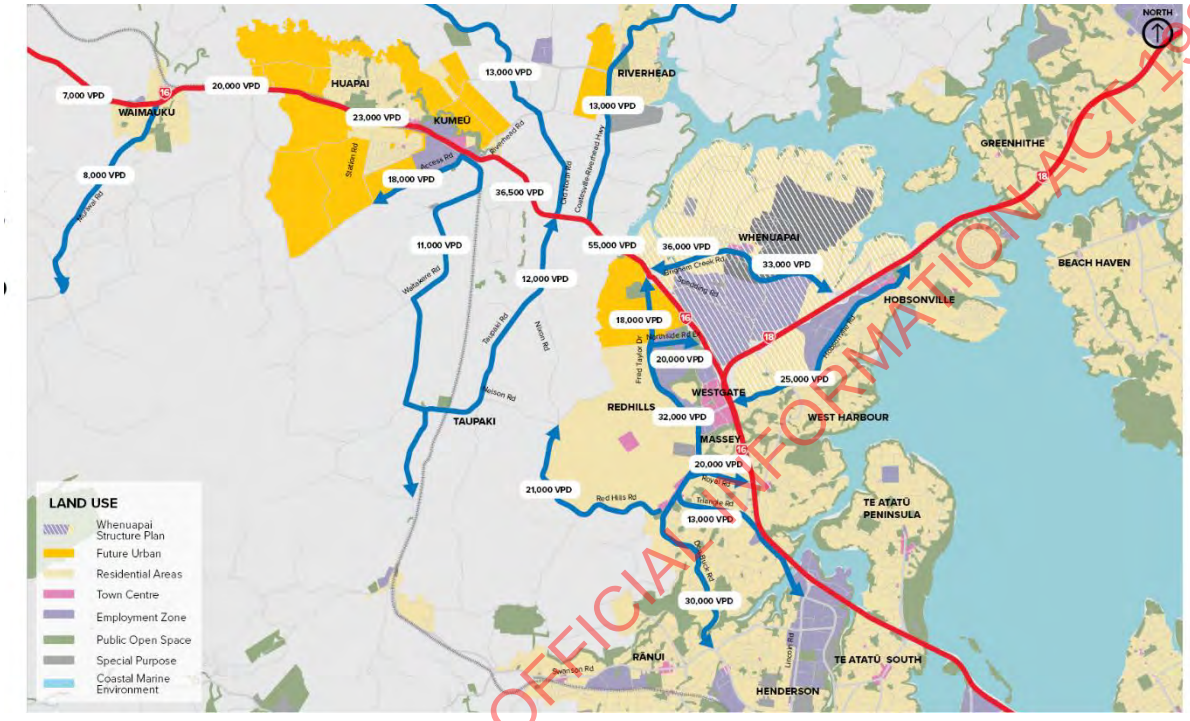
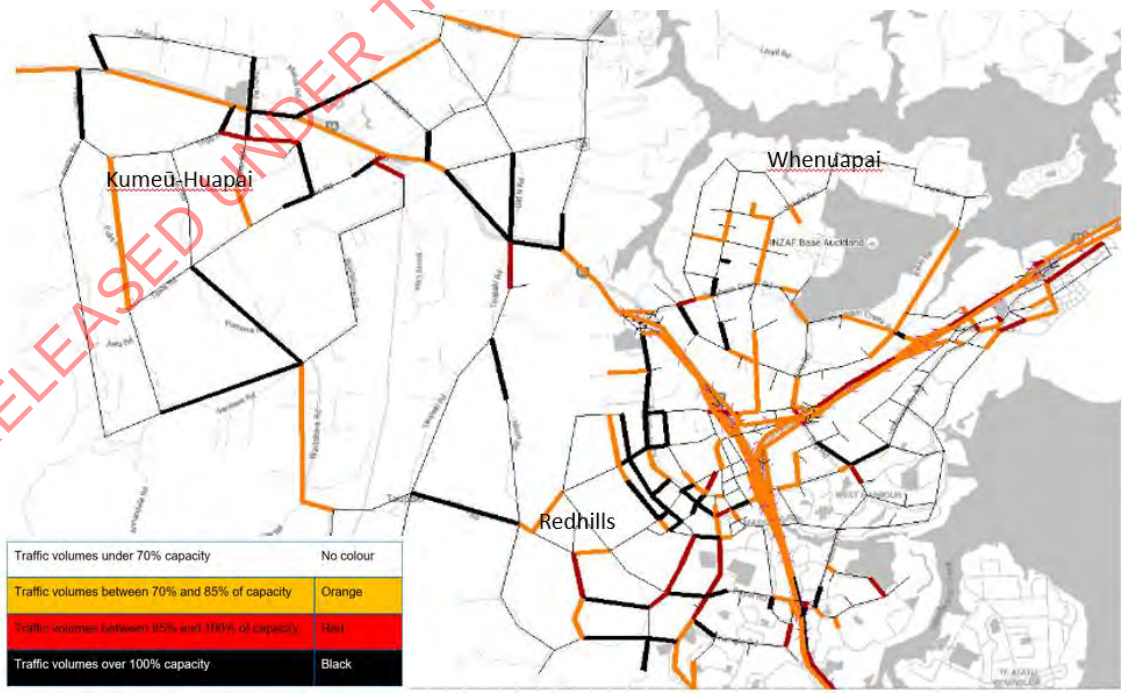


Figure 22: What happens if we do nothing in the North West - 2046 Capacity



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4.7. Defining the problem

The PBC identified the following problems for the future urban areas of Auckland:

- **Problem 1:** Inability to respond in a timely way to the pace and scale of greenfield development will restrict access to jobs, education and other core services around and in growth areas.
- **Problem 2:** Inability of the regional transport system, to cope with the growing demand of
- greenfield expansion will reduce travel choice and efficient movement of people and goods.

To identify the problems likely to affect the future transport system in the North West, the problem statements developed in the PBC were reviewed along with the GPS, AT's SOI and the Transport Agency's Long-Term Strategic View and other existing documentation. Input was obtained from several key stakeholders[9] and a workshop held on 5 July 2018 to present the evidence that had been gathered. At this workshop, the following key problems were identified:

- **The potential for the transport system to be poorly integrated with existing and future land uses** and not delivered to meet land-release timeframes – a poor outcome would include peripheral low-density urban development which is reliant on access by private car. If managed properly the transport system can provide strong leverage for promoting desirable land use outcomes.
- **Lack of existing and future system resilience and reliability** – the existing transport system, particularly SH16, has no alternative routes and all traffic heading from the city to Kumeū-Huapai, must travel on the State highway, causing significant congestion and delays at peak times. A more resilient and reliable network is required to support planned future growth.
- **Lack of travel choice** – due to the existing rural nature of the North West areas, currently there are very limited public transport services and limited footpaths. North West residents are very dependent on private vehicles and have told us that they do not feel safe to cycle because of high vehicle speed, high traffic volumes and lack of safe facilities.
- **Safety** – the existing rural road network is under pressure from current and likely future growth levels resulting in safety concerns on the existing corridors, particularly for vulnerable road users.
- **Severance –** the form and function of SH16 and the existing rail line currently impacts on the urban form of Kumeū-Huapai and has resulted in significant severance.

These identified issues were developed into IBC problem statements which are described and evidenced in the following sections. A full account of the process and evidence base can be found in Appendix A: Strategic Case.

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[9] List of stakeholders provided in Appendix H – Engagement Feedback Summary.

4.8. Problem 1: Access

A lack of integration between transport and land use restricts access to economic and social opportunities for the North West

4.8.1. Poor access to economic and social opportunities

The following maps (**Figure 23** to **Figure 26**) graphically illustrate the areas of Auckland that are currently accessible within 30-minute and 45-minutes' travel in the morning peak period, by public transport and by private car, from Kumeū-Huapai and Whenuapai, respectively. They show the existing network performance, with no interventions in place.

Both Kumeū-Huapai and Whenuapai accessibility maps illustrate that the Auckland city centre, much of west Auckland and the North Harbour business area are accessible by car within 30-minutes' travel. Within 45-minutes' travel is all the North Shore, west Auckland, central Auckland and part of south Auckland. Very generally, the 45-minute catchment includes most of Auckland's economic and social opportunities.

By contrast, the public transport accessibility maps illustrate that only employment in Kumeū-Huapai, Helensville and Westgate are accessible from Kumeū-Huapai and Whenuapai within 30- or 45-minutes' travel by bus. This illustrates a significant accessibility gap in that existing residents have little choice but to travel by private car in order to access economic and social opportunities outside of the local area.

This lack of accessibility is likely to be exacerbated in the future as the forecast ratio of employment opportunities to households reduces in the North West, increasing demand for longer distance commuter travel.

Figure 23: Existing Kumeū-Huapai public transport accessibility map

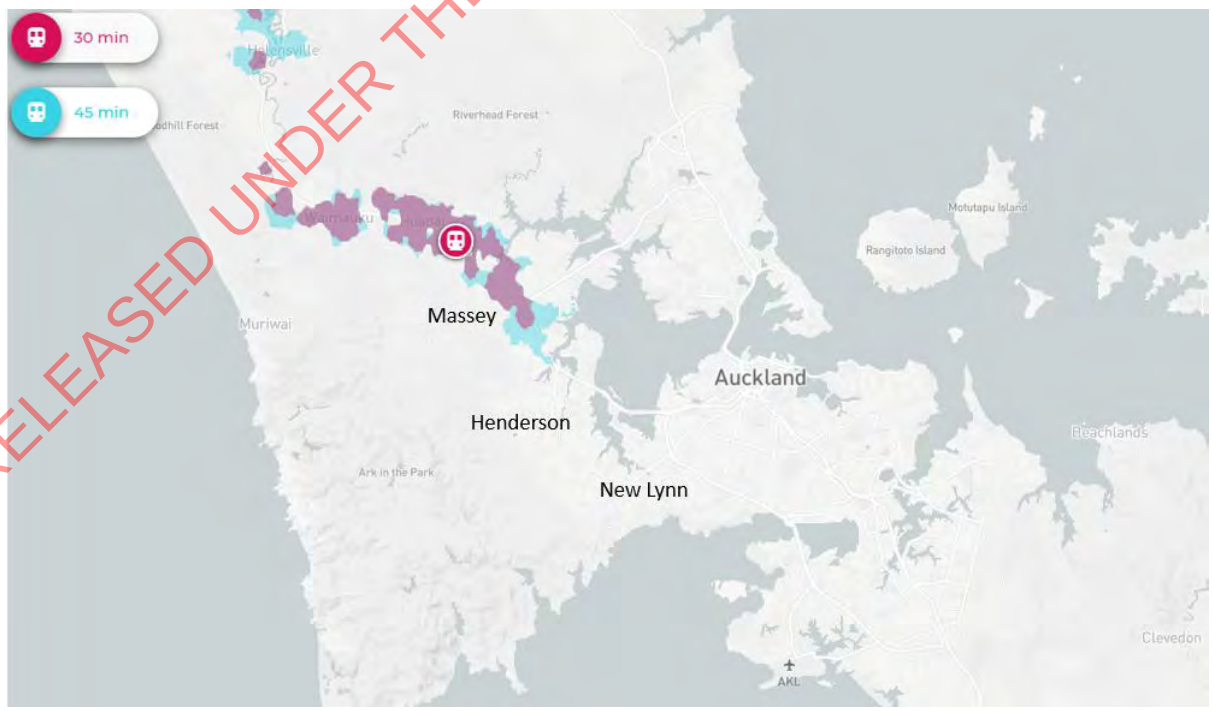

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Figure 24: Existing Kumeū-Huapai car accessibility map

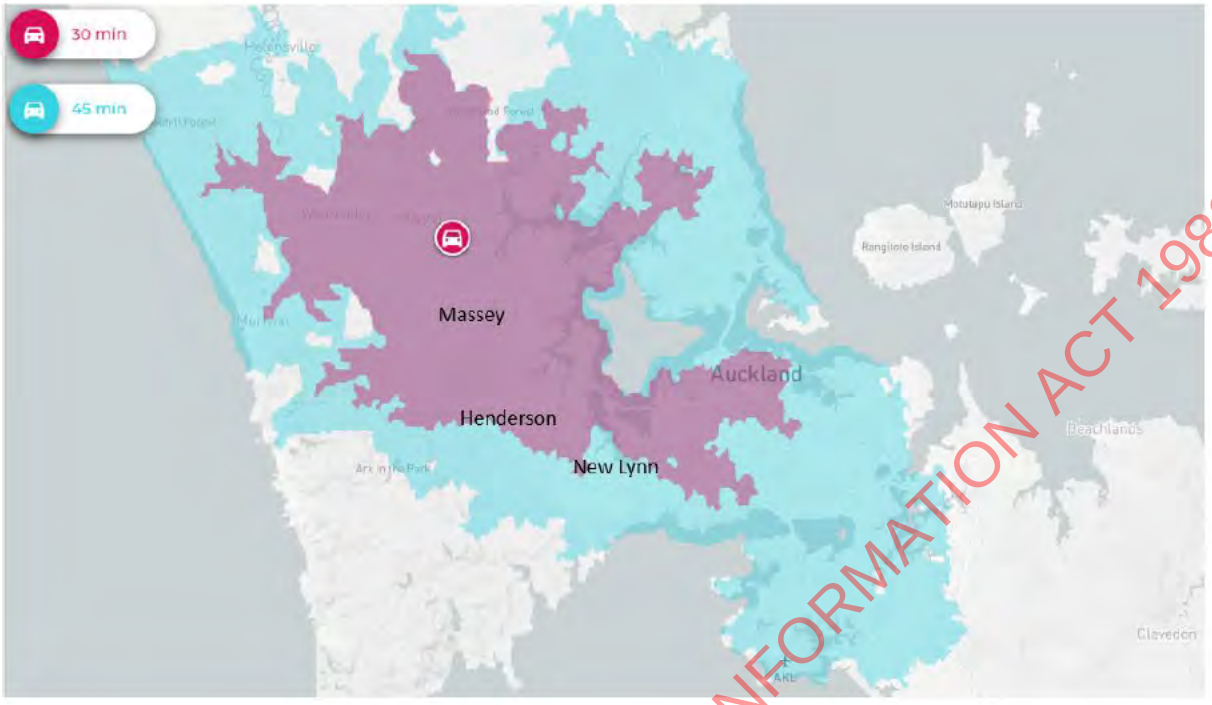

Figure 25: Existing Whenuapai public transport accessibility map

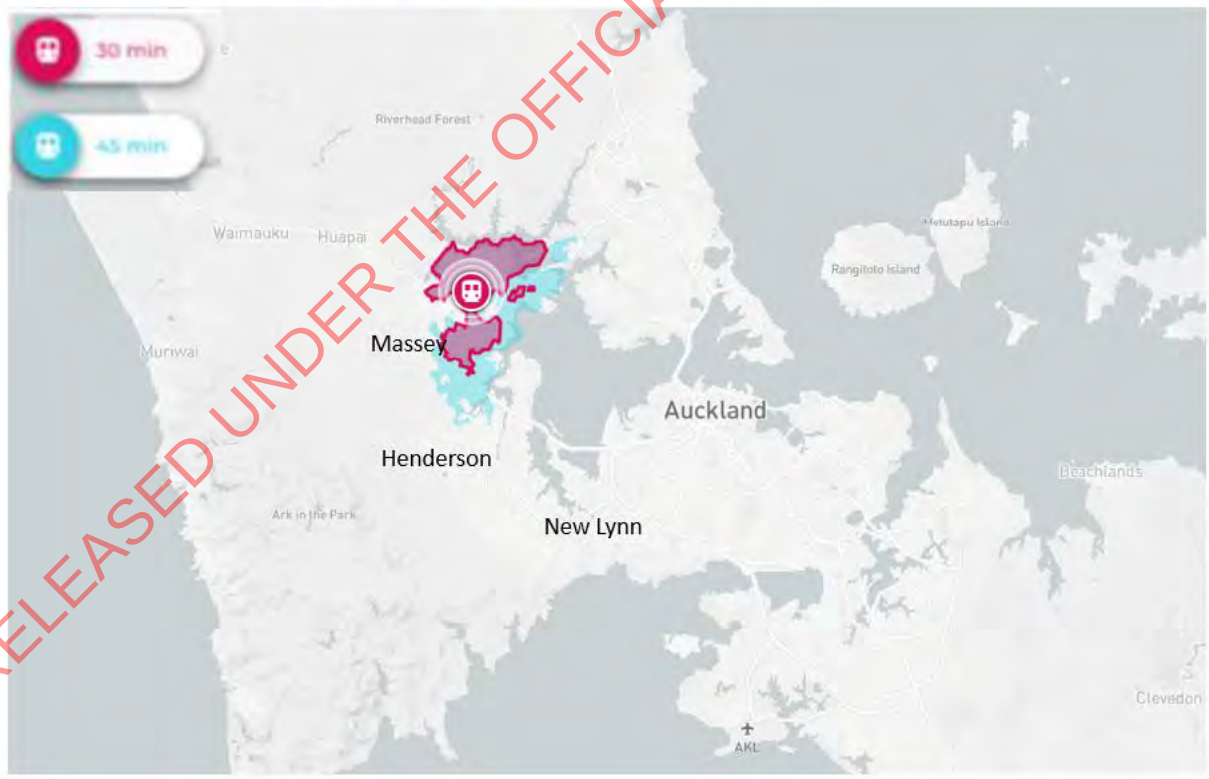

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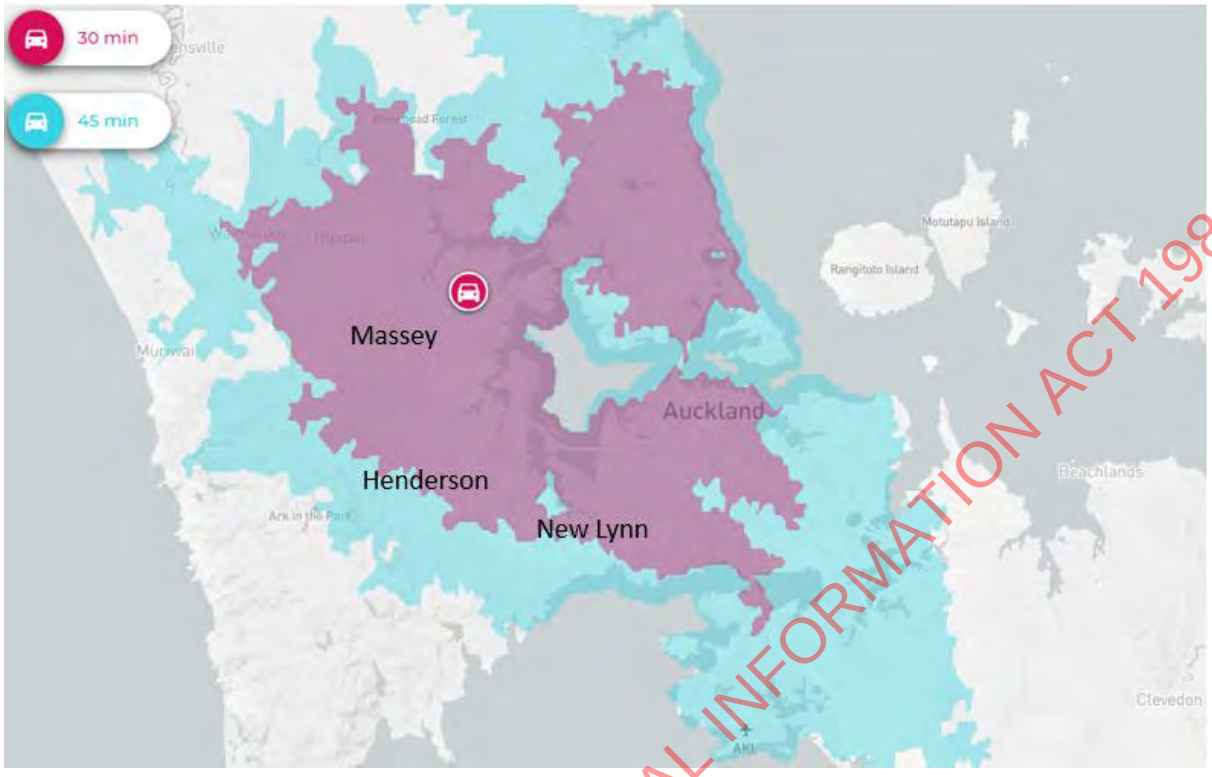
Figure 26: Existing Whenuapai car accessibility map



The existing transport network in the North West is predominantly rural, with very few footpaths or cycle facilities. Where these are provided, they often do not connect key destinations such as schools and community facilities. Existing roads are relatively narrow, with narrow shoulders and vehicles often travelling at high speeds. As a result, walking and cycling is not considered safe by many in existing communities and accessibility by walking and cycling is currently very poor.

4.8.2. Outcomes of integrated landuse and transport

The benefits of a fully sustainable urban mobility system include:

- Improved accessibility for all users.
- Balanced system that responds to diverse demands for people, businesses and industry.
- Integration of different transport modes.
- Is sustainable and balances the need for economic viability, social equity, health and environmental quality.
- Optimised efficiency and cost effectiveness.
- Better use of urban space and existing transport infrastructure and services.
- Enhanced attractiveness of the urban environment, quality of life and public health.
- Improved safety and security.
- Reduced air and noise pollution, greenhouse gas emissions and energy consumption.

The below case study in **Figure 27** shows the relationship between mode choice and landuse. Specifically, the Transit-Oriented Development (TOD) shows a lower level of private vehicle use and corresponding increase in public transport and active travel. Similar TODs could be promoted in the North West to further deliver enhanced liveability and better network outcomes.

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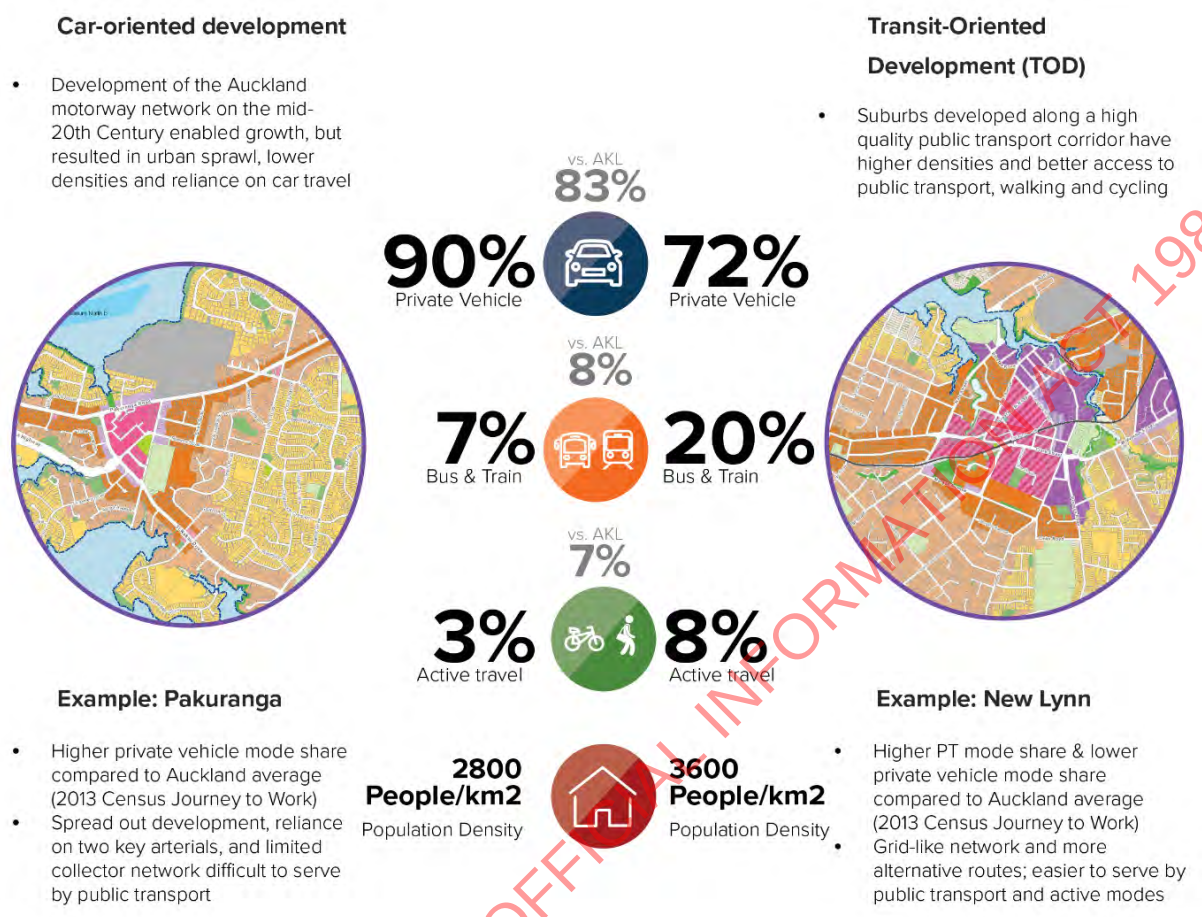
Figure 27 Outcomes of integrated landuse and transport



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4.8.3. North West land use / transport integration challenges

This section describes key integration challenges that contribute to poor existing access to economic and social opportunities in the North West. With the anticipated growth, the nature of the environment will change significantly from the current conditions and access is likely to be further reduced by these challenges:

- **SH16 and North Auckland Line (NAL) severance** – the existing SH16 and NAL corridors create a strong severance effect in Kumeū-Huapai. Few roads cross the corridors from north to south and there are even fewer opportunities for pedestrians or cyclists to cross. The planned development in Kumeū-Huapai sits both to the north and south of the corridors, while key destinations including the town centre, public transport stops and primary school are close to the corridor either directly to the north or south. Overcoming severance and improving access between newly developing residential areas and these destinations will be a key integration challenge.
- **SH16 and SH18 motorway severance** – Both the SH16 and SH18 motorway corridors provide severance between growth areas. These corridors effectively cut the Redhills-Whenuapai area into two, while also severing both areas from the existing West Harbour and Hobsonville urban areas. There are currently few existing roads across these corridors and crossing opportunities for pedestrians and cyclists are currently far too infrequent, providing a significant disincentive to walk or cycle.

- **Supporting transport choice** – current mode share in the North West demonstrates a high reliance on private vehicles. The accessibility maps presented above demonstrate that even where public transport is provided, the services do not provide adequate access to economic and social opportunities for North West residents.
- **Isolation from employment** – future employment in the North West will be in Kumeū-Huapai, Whenuapai and Westgate, but many residents of the North West will commute further afield for employment. Meeting the travel needs of these users will require integration of land use and future rapid transit facilities. Good quality walking and cycling networks are also required to connect employment and residential areas to provide alternatives to car travel.
- **Providing good access for freight and strategic traffic** – the existing SH16 corridor through the Kumeū-Huapai town centre carries high volumes of freight and strategic traffic. This results in conflict between the need to remedy the severance issues identified above, while also prioritising and allowing for growth in freight and strategic traffic. This leads to a need to identify a safe and efficient alternative corridor for freight and strategic traffic.
- **Managing impacts on the environment** - currently, transport accounts for nearly 40% of Auckland's greenhouse gas emissions due to a heavy reliance on petrol/diesel fuelled private vehicles. The Auckland Plan has a target to reduce its greenhouse gas emissions by 40% by 2040. Cars and light trucks produce far more CO^2 emissions per capita than other modes; therefore, mode shift to public transport and active modes is critical to managing the impacts of climate change. Road run-off also requires management as it is one of the biggest contaminators of Auckland's harbours and estuaries.

Without well-integrated land use and transport systems, only small incremental and ad-hoc mitigation of existing problems is achieved, which reinforces the over-reliance on private vehicle travel.

Problem 1 Summary

- The existing public transport network does not provide adequate accessibility to economic and social opportunities for residents of the North West, meaning that car travel is the only viable means of access for many residents.
- Integration of land use and the transport network will require provision of good quality, connected networks. It will also require integration of land use and the public transport network, to maximise the benefits of investment in rapid transit.

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4.9. Problem 2: Reliability and Resilience

Growth in and around the North West reduces the reliability and resilience of the strategic transport network

4.9.1. Travel demands increase in line with growth

Within the North West growth area, 38,800 new households are planned, in addition to 13,000 new employment opportunities. This level of household growth corresponds to approximately 97,000 new residents.

Existing and forecast 2046 travel demand, corresponding to this expected growth in households and jobs, has been extracted from the MSM for the North West growth area. This data considers both vehicle travel and public transport use based on the forecast population and employment numbers but does not forecast active mode use.

Figure 28 shows the significantly increased volume of vehicles and public transport users travelling eastbound across defined screen lines, over the two-hour morning peak period for 2016 and 2046.

Figure 28: Eastbound trips across North West screen lines

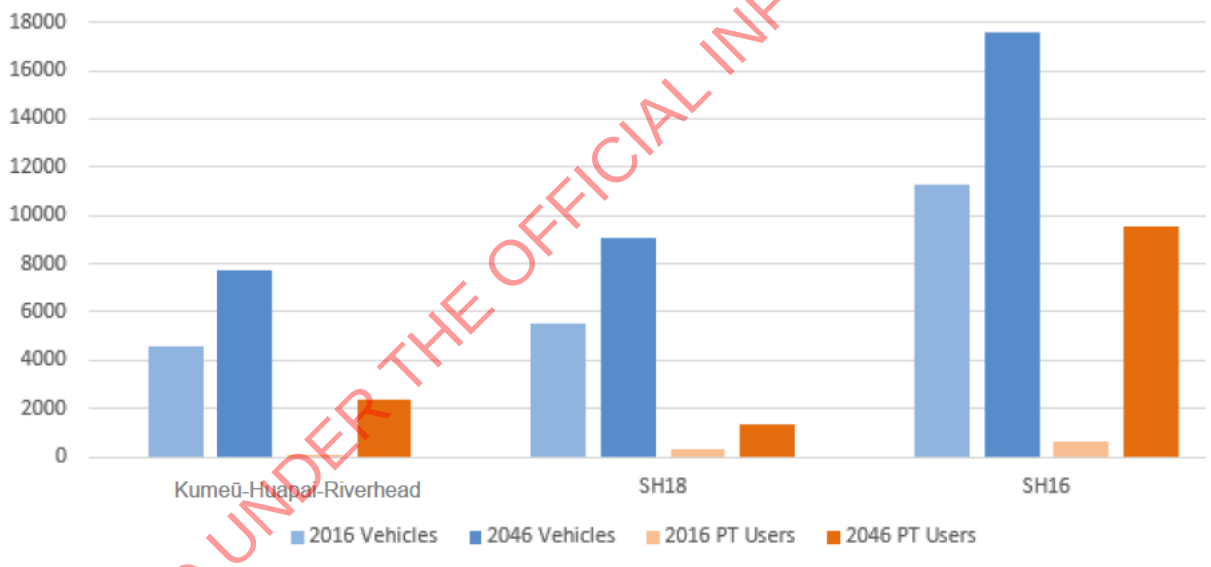

Figure 29 below summarises the forecast 2046 trip distribution[10] for the North West area (AM peak period) and shows that 37% of all trips are expected to be internal trips within the North West business case area. Of the remaining trips significant demands include:

- 23% to the city centre and central areas – most likely via SH16 corridor
- 22% to other western destinations such as Henderson and New Lynn employment nodes

Many of the trips within the North West growth area (37%) would also need to use SH16 for all or part of their journey, because of the lack of alternative routes available. This added to the 23% of trips

[10] Outbound morning peak hour vehicle trips from MSM, Scenario ATAP1.1

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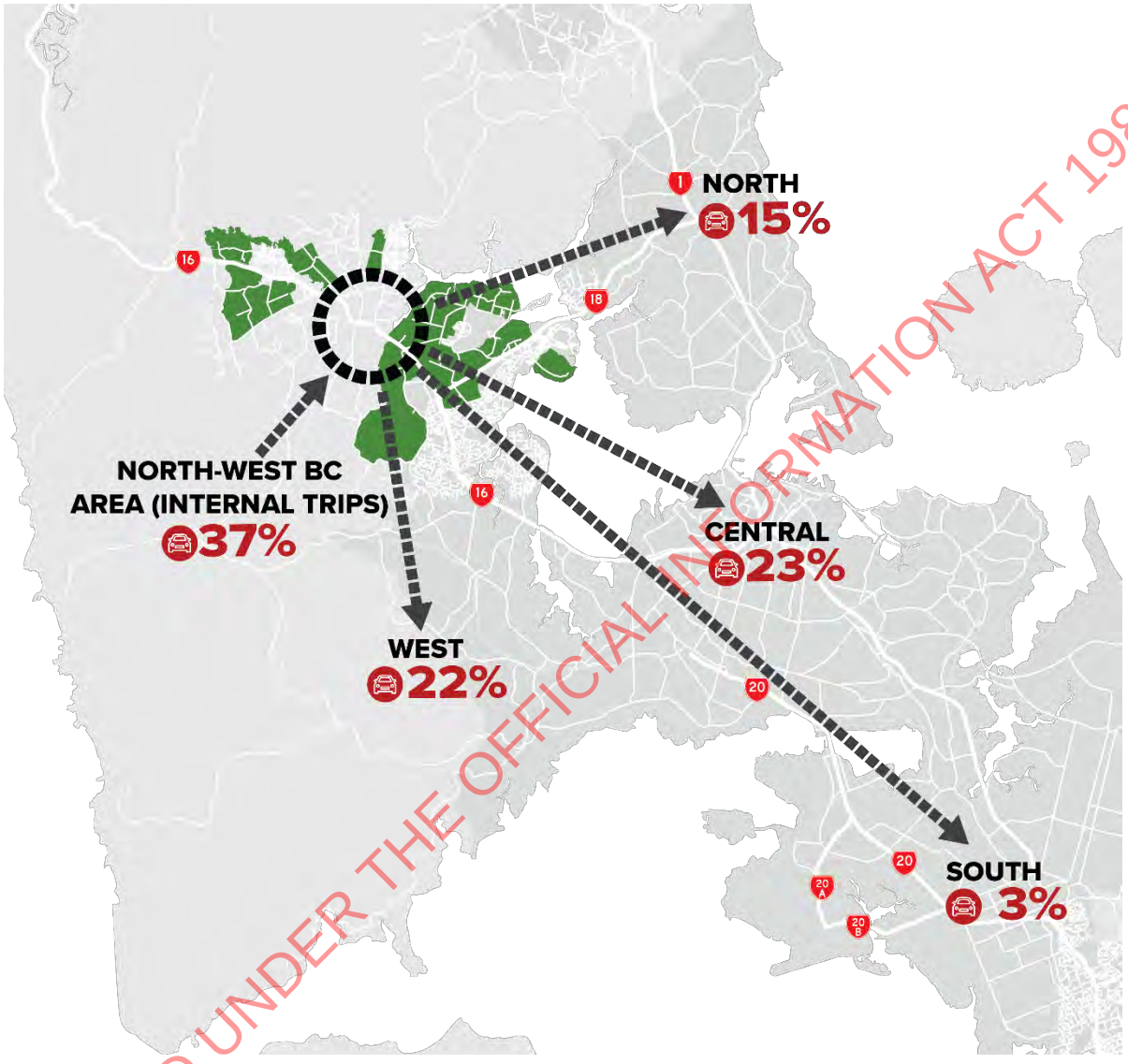
with destinations in the city centre and central areas could result in up to 60% of all North West trips being reliant on the SH16 corridor for people-movement.

Figure 29: North West outbound trip distribution, 2046 morning peak hour



* West area includes Massey, Henderson, New Lynn

4.9.2. Transport system fails to meet forecast travel demands

Vehicle trips from the MSM have been input into the North West SATURN traffic model to evaluate the performance of the transport network, with the land use changes predicted under the i11 land use scenario, but only limited future investment in transport infrastructure.

The 2046 'do minimum' scenario includes the following key projects in the North West area, which have been identified through earlier processes.

- SH16 Brigham Creek Road to Waimauku Safety Improvements, based on the Transport Agency's Safe Roads Alliance SSBC
- SH16/18 Connections, based on the Transport Agency's SSBC

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- North West Rapid Transit to Brigham Creek station, as identified in ATAP 2018
- Associated connections with improved frequent, connector and local bus services.

Figure 30 - Figure 33 show the existing (2016) and forecast (2046) network performance, for the morning and evening peak periods. Roads have been colour coded to indicate varying degrees of congestion, with black indicating the most heavily congested areas. Uncoloured roads indicate generally uncongested conditions. Under congested conditions, traffic flows tend to break down and travel times are both longer and more variable. Congested traffic conditions generally result in both poor travel time reliability and poor network resilience.

Traffic volumes under 70% capacity	No colour
Traffic volumes between 70% and 85% of capacity	Orange
Traffic volumes between 85% and 100% of capacity	Red
Traffic volumes over 100% capacity	Black

Figure 30: North West network performance, 2016 (AM)

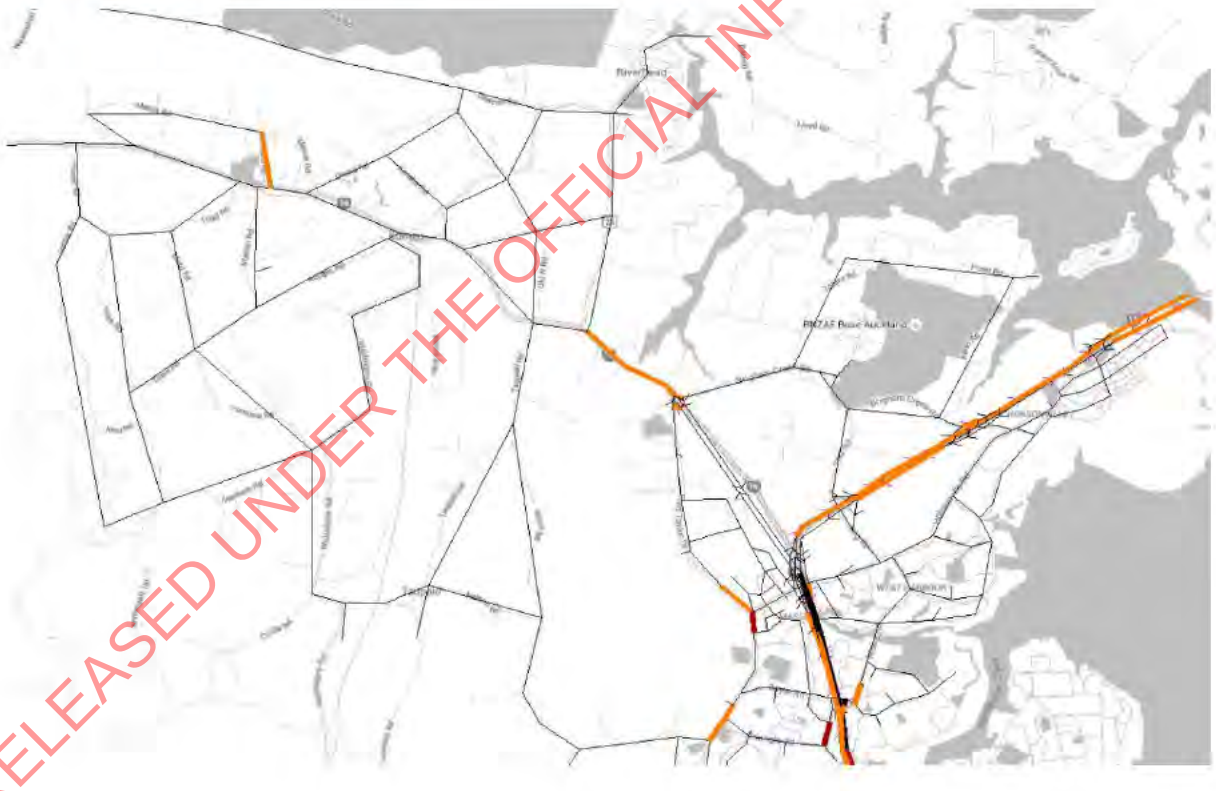

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Figure 31: North West network performance, 2016 (PM)

Figure 32: North West network performance – no intervention, 2046 (AM)

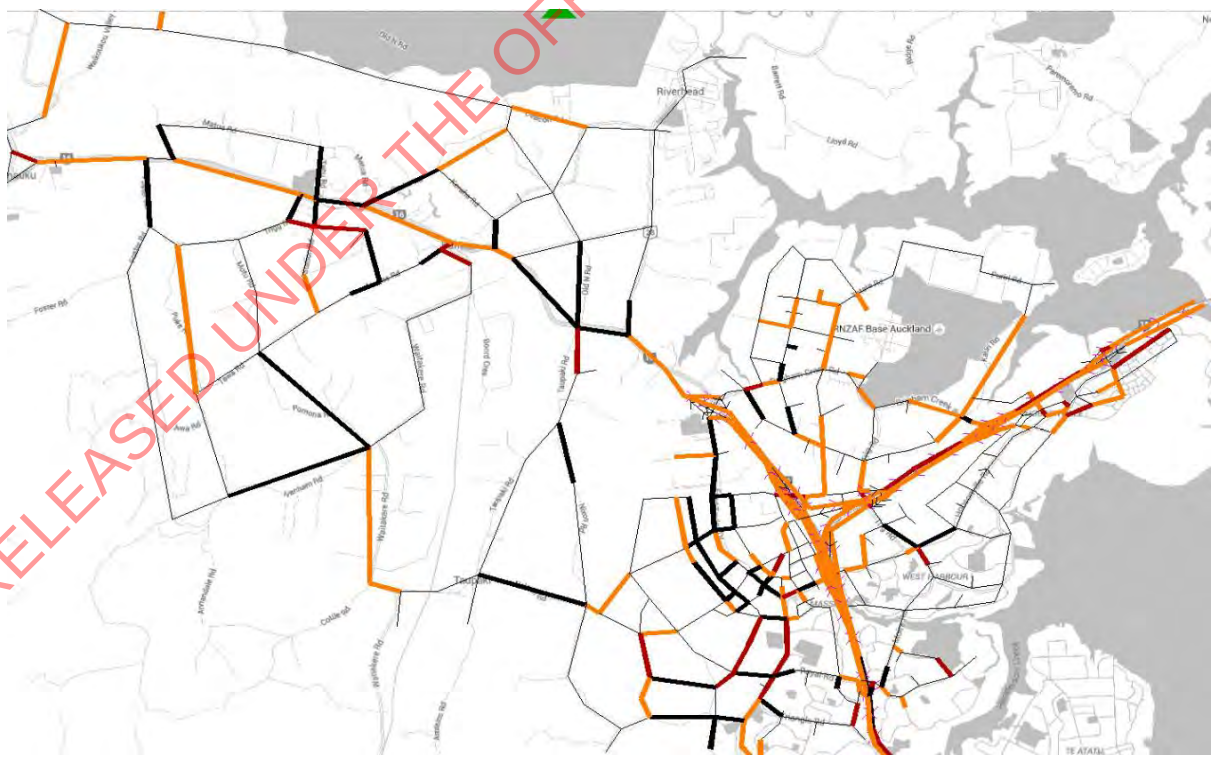

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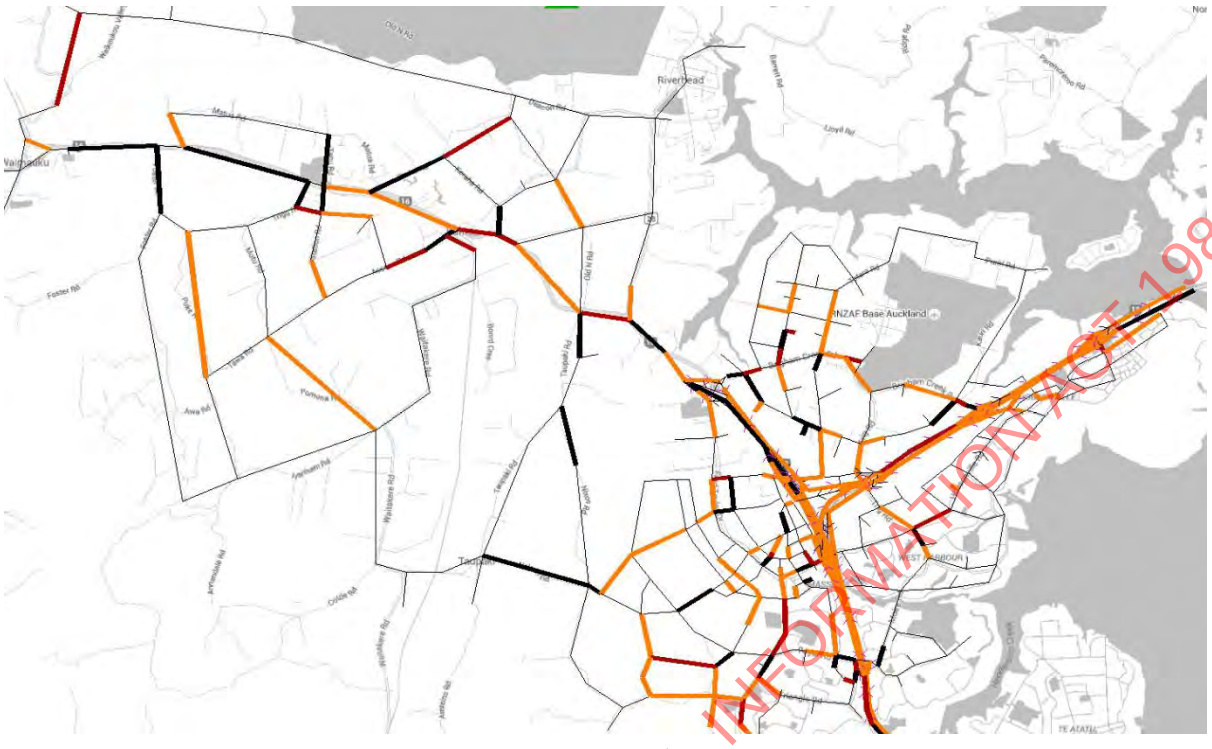
Figure 33: North West network performance – no intervention, 2046 (PM)



The plots above illustrate that while the existing citybound lanes of SH16 operate under congested conditions, by 2046 – without appropriate investment – these congested conditions are predicted to be widespread across the North West transport network. It is noted that the scenario modelled here assumes an RTN service is in place to Westgate, a substantial piece of investment. Should this not occur the network performance can be expected to be significantly worse that shown above.

This evidence demonstrates that the North West's existing transport network will not provide enough capacity to meet forecast demand. This lack of capacity will lead to congested conditions, resulting in poor reliability and poor resilience.

4.9.3. Poor network resilience and reliability outcomes

The GPS 2018 has a clear objective to provide a land transport system that is resilient. It identifies that a resilient transport system manages disruptions in an efficient and effective way and that it is important for economic growth and productivity for a network to be resilient at the most critical points; those with strategic importance where no appropriate alternative routes exist.

Lack of resilience in rural areas such as Kumeū-Huapai is experienced as a result of events such as breakdowns or crashes. While they are often resolved quickly, the impacts can be significant due to the number of users and, as shown in the figures above, the lack of spare capacity on congested networks and the inability of alternative routes to cope with additional traffic. Small incidents on the network can have considerable implications, severely impacting its ability to support the movement of people and goods. An example of this occurred on 27 November 2018, shown in **Figure 34**, where SH16 was closed for over four hours and traffic re-routed on alternative rural routes, causing significant delays.

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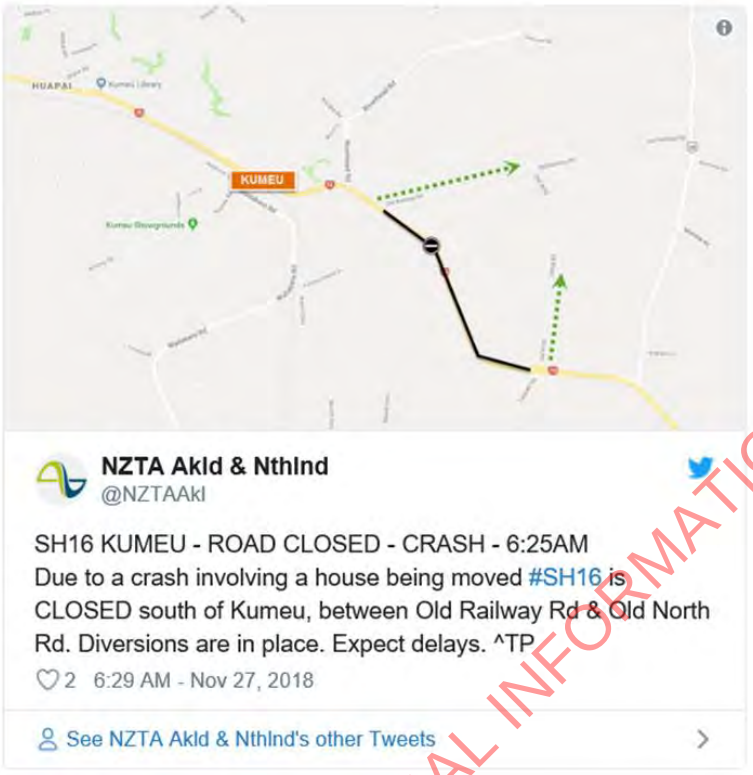
Figure 34: Example of lack of network resilience[11]



SH16 south of Kumeū-Huapai is a critical corridor for the North West. There are two possible alternatives to SH16 – Nixon Road and Waitākere Road, shown in **Figure 35**. These two-lane rural roads do not provide safe, efficient and effective alternative routes in the case of an incident.

The effect of this lack of alternative routes is demonstrated on typical weekdays in the North West where significant delays are experienced on SH16 by commuters that have limited choice both in terms of routes for private vehicles, and transport mode. All transport services are required to use SH16, resulting in a significant over reliance on this corridor.

Figure 35 indicates alternatives to SH16 and current conditions on SH16 on a typical Friday at 9am.

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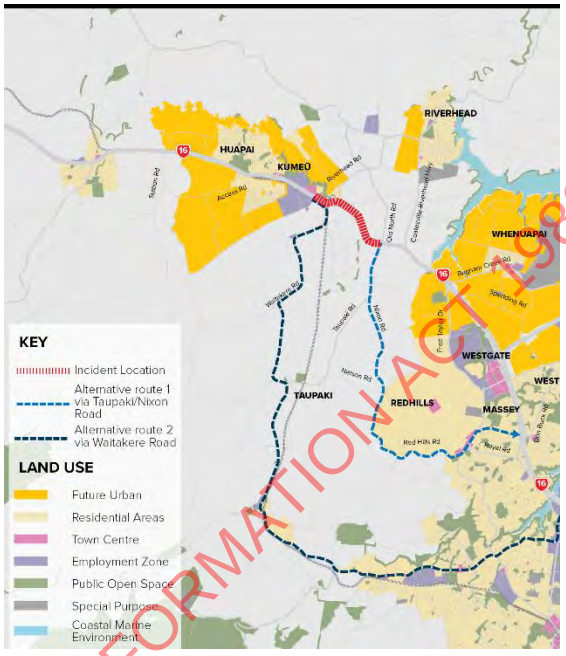
[11] Source: Transport Agency Twitter account, 27 November 2018.

Figure 35: Lack of alternative routes – North West



Problem 2 Summary

The evidence presented confirms that:

- Substantial growth is planned for the North West FUZ
- This growth is predicted to significantly increase the demand for travel both within and to / from the North West area
- The existing transport network is insufficient to cater to these increases in travel demands
- There are very few alternative transport corridors, meaning that SH16 is of critical importance from a resilience perspective
- Without intervention, future congestion will result in poor reliability and resilience of the transport network.

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4.10. Problem 3: Mode choice

A lack of attractive travel choices results in an over reliance on single occupancy vehicle travel leading to inefficiencies in the transport network

The GPS (2018) indicates that it is important for investment to provide safe, resilient travel choices via a range of modes, to incentivise mode shift away from private vehicle travel. The PBC has an objective of achieving 29% public transport trips from the growth area in the AM peak and 16% walking and cycling trips by 2045.

Census (2013)[12] data indicates that the North West area is highly reliant on motor vehicle travel for commuting, with 93% of trips made by private vehicle. Public transport mode share was negligible, at 2%, which reflects the existing poor public transport provision, 3% of commute trips were made on foot and 1% by bicycle[13].It is noted however that significant changes to the public transport network were undertaken in with the rollout of the New Network in June 2017. These changes are expected to realise improvements in public transport patronage are further detailed below.

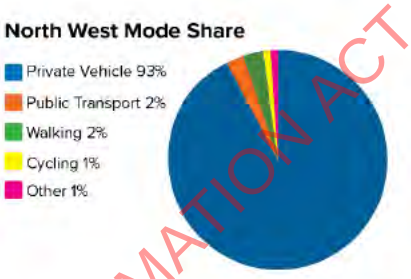

Table 6 summarises currently available public transport, walking and cycling choices.

Table 6: Currently available North West mode choices

Public Transport

The North West is currently served by several bus routes that operate at a range of intervals

Connector Service

- 120 from Constellation Station to Henderson, via Hobsonville and Westgate

Local Services

- Route 114 from Hobsonville Point to Westgate, via Whenuapai
- Route 122 from Huapai to Westgate, via Kumeū-Huapai
- Route 125 from Helensville to Westgate, with an express service continuing to the city centre
- There are no existing bus services to Riverhead.

Onward services are available at Westgate (for trips to Henderson, New Lynn and the city centre) and Constellation Station (for trips to Albany, Takapuna and the city centre via the Northern Busway).

Ferry services are also available at both Hobsonville and West Harbour. Constellation and Swanson stations provide the closest connections to the existing Rapid Transit network.

Existing bus stops that support the above routes are generally simple stops, with no shelters and in some instances, no sign. There is no bus priority infrastructure in the North West.

[12] Census 2018 data is not yet available.

[13] The Whenuapai census area unit showed a higher proportion of walk (6%) and cycle (3%) trips. These are likely associated with locally living RNZAF personnel commuting to the Whenuapai Air Force Base.

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While the NAL rail corridor passes through the centre of Kumeū-Huapai, passenger services ceased to operate in 2009. A passenger rail shuttle was trialled in 2008, using temporary platforms at Huapai, but has since ceased operation.

The Northwest public transport services were enhanced with the roll out of the New Network on 11th June 2017. Significant changes included:

- Improvement of the service levels to Helensville and Kumeū-Huapai (122, 125, 125x);
- Introduction of frequent route between Westgate and Henderson via two branches (14t & 14w);
- Improvement to services to the Whenuapai and Herald Island area from a few per day to a regular hourly service;
- Improvements to the frequency of the crosstown service to / from the North Shore (now a Connector service operating at least every 30 minutes from 7am to 7pm 7 days a week, with hourly beyond those times)
- Introduction of an all-day direct route to the city (110) from Westgate.

Key infrastructure elements to support the network changes that have yet to be delivered include North West bus facilities at Westgate, a bus interchange at Te Atatū and the Northside Drive connection over SH18. When delivered these will further improve network efficiencies and provide opportunities for greater access to public transport services.

Additional anticipated future improvements to the North West's public transport provision include:

- Light rail from the city centre to Kumeū-Huapai, identified as a key investment in ATAP and the GPS
- The draft Regional Public Transport Plan (2018) identifies that services between Westgate and the City Centre, and Westgate and Constellation, will be frequent by 2021.
- Improved frequencies to Kumeū-Huapai are planned to a 'Connector' level of service to 2028
- The Huapai Triangle is listed as gaining a connector service by 2028
- Redhills is also listed as gaining a service at a yet to be determined time
- Service level improvements are also planned from Westgate to the existing Ferry terminals in West Harbour and Hobsonville
- The Regional Land Transport Plan (RLTP) identifies a new bus interchange within Westgate and an expansion of the West Harbour ferry terminal as future projects outside the current ten-year RLTP funding programme.

Active modes

Much of the North West is currently rural and as a result, existing transport infrastructure consists of rural roads with no dedicated pedestrian or cycle infrastructure.

Existing urban environments within Kumeū-Huapai and Riverhead do not generally meet current best practice with:

- Narrow footpaths through town centres
- Footpaths interrupted by wide, commercial vehicle crossings
- Missing footpaths on some streets
- Insufficient safe pedestrian crossing opportunities, particularly across SH16
- Many accessibility issues for impaired pedestrians.

The North West benefits from two significant strategic cycling connections, being:

- The north-western cycleway parallel to SH16 – extending from the city centre to Lincoln Road, and currently being extended by the Transport Agency to Westgate
- The SH18 shared use path – extending from Squadron Drive to Albany Highway, and currently being extended to Constellation Station.

Internally within the North West, cycle infrastructure is lacking, with relatively few dedicated cycle facilities and poor connectivity. The figure below illustrates the existing cycle network in the North West.

The indicative Auckland Transport proposed Auckland Cycle Network (ACN) (shown below) maps out AT's proposed long-term regional cycle network, including cycle infrastructure on the extent of SH16 (an extension of the existing North West Cycleway, SH18, Coatesville-Riverhead Highway, Brigham Creek Road, Hobsonville Road, Trig Road, Fred Taylor Drive, Northside Drive, Access Road and Riverhead Road. Funding

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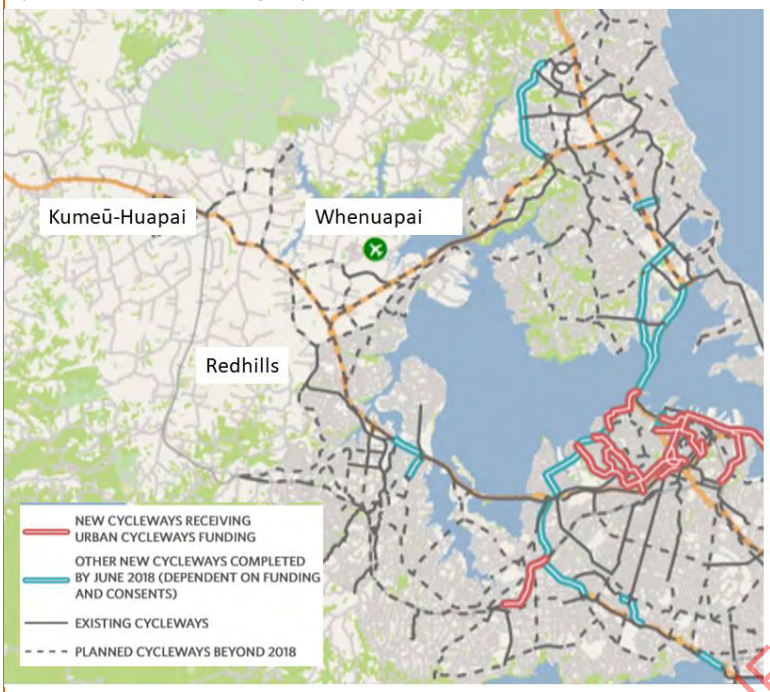
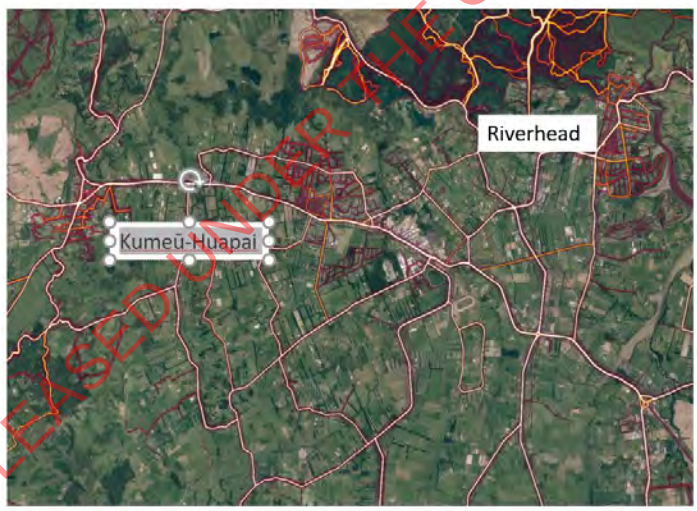
for these projects remains uncommitted however, except for the section of SH16 currently being upgraded (Lincoln Road to Westgate).

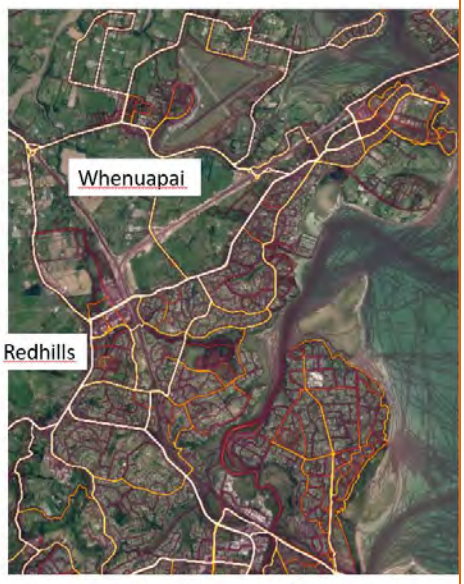


The North West is a popular place for recreational cycling as shown in the Strava cyclist heat maps below. There is a high level of cycling activity in the Riverhead forest with moderate activity around the urban areas of Whenuapai and Redhills. Anedoctally rural North West roads such as Waitākere Road and Taupaki Road are popular with recreational cyclists.

Strava Cyclist Heat Maps



Kumeū-Huapai/Riverhead



Whenuapai/Redhills

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Reliance on private vehicles

The North West has a high existing motor vehicle mode share of 87% - 93%. This dependency on motor vehicles results in several negative consequences, detrimental to the North West's amenity. These include[14]:

- People spend more on transport (buying and maintaining cars, parking etc.) (costly)
- Additional greenhouse gases discharged to the environment
- Requires more roads to carry the same number of people (value for money)
- Social isolation – fewer people walking and cycling
- Less safe as car related deaths and serious injuries are higher than other modes
- Small businesses benefit from more people walking and cycling
- People walking, cycling and using public transport are healthier than people that do not
- Urban land is used for car parking and could otherwise be used more productively
- Congestion on roads results in longer and less reliable travel times and loss of economic efficiency.

It is therefore important that residents have a way to access key destinations by means other than a car.

While the North West covers a wide geographic area, it is broken down into the four smaller geographic areas of Kumeū-Huapai, Riverhead, Redhills and Whenuapai. Each of these areas are of a relatively compact, walkable and cycle-able size, with their own centres, schools and potentially future transit hubs. These factors make them ideal candidates for delivering on transport choice outcomes, however the current transport system falls significantly short in this regard.

As land is released for development, it is critical that the transport system enables a significantly higher proportion of trips to be made by public transport, walking and cycling.

Increasing public transport service catchment areas is an important part of maximising public transport mode share, particularly for long distance travel from the urban periphery. This effective catchment can be significantly expanded through provision for active mode and micro-mobility modes such (e-bike and e-scooter). These modes extend the distance people are able and willing to travel to reach a public transport node (without using a vehicle) and can replace short to medium private vehicle or taxi trips. The micro-mobility modes have a further advantage of minimising external effects such as steep gradients and personal fitness levels.

In addition to a transport network that can physically support walking and cycling and micro-mobility modes, suitable support infrastructure will be required at RTN stations and key public transport interchanges such as bicycle or micro mobility parking, electric charging points and lockers.

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[14] W. Jung, R. Buehler, Sustainable Transport in Germany and the US, 2013

Problem 3 Summary

The evidence presented confirms that:

- The North West has four discrete geographical areas, each with local services, schools and community facilities and of a size that makes them ideal candidates for increasing walking and cycling mode share
- The existing transport network and land use plan does not adequately cater for walking and cycling trips
- The existing public transport network similarly does not provide a quality level of service for public transport users
- As a result of the lack of genuine mode choices available, 93% of work-related trips in the North West are currently by private vehicle
- This high dependence on private car for travel results in significant adverse effects, both on the North West and on the wider region.

4.11. Problem 4: Safety

Recent and continued growth within a largely rural environment has resulted in busier, high speed transport environments and a reduction in personal safety for all modes

4.11.1. Existing safety risks

Figure 36 and **Figure 37** show the collective and personal risks associated with the existing corridors in North West Auckland. They indicate that many key corridors currently experience high or medium-high risk exposure. These corridors include SH16 between Brigham Creek Road and Waimauku, Coatesville-Riverhead Highway both north and south of Riverhead, Old North Road, Don Buck Road, Taupaki Road, Waitākere Road and Red Hills Road.

Figure 36: Collective risk – North West Auckland

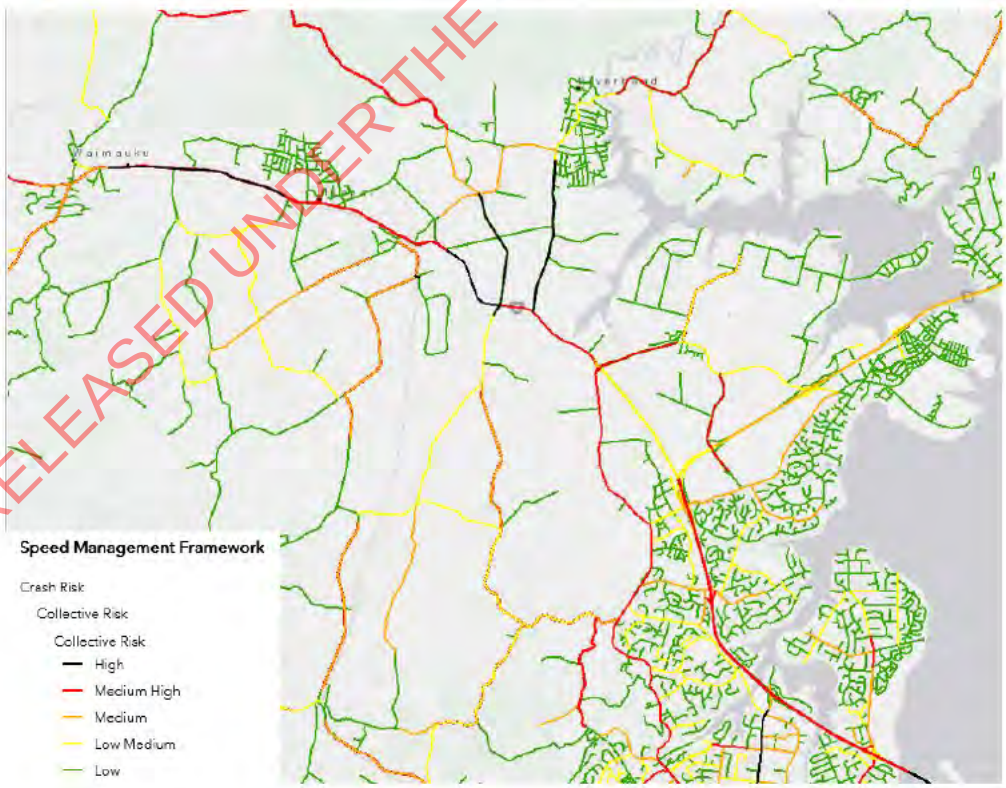

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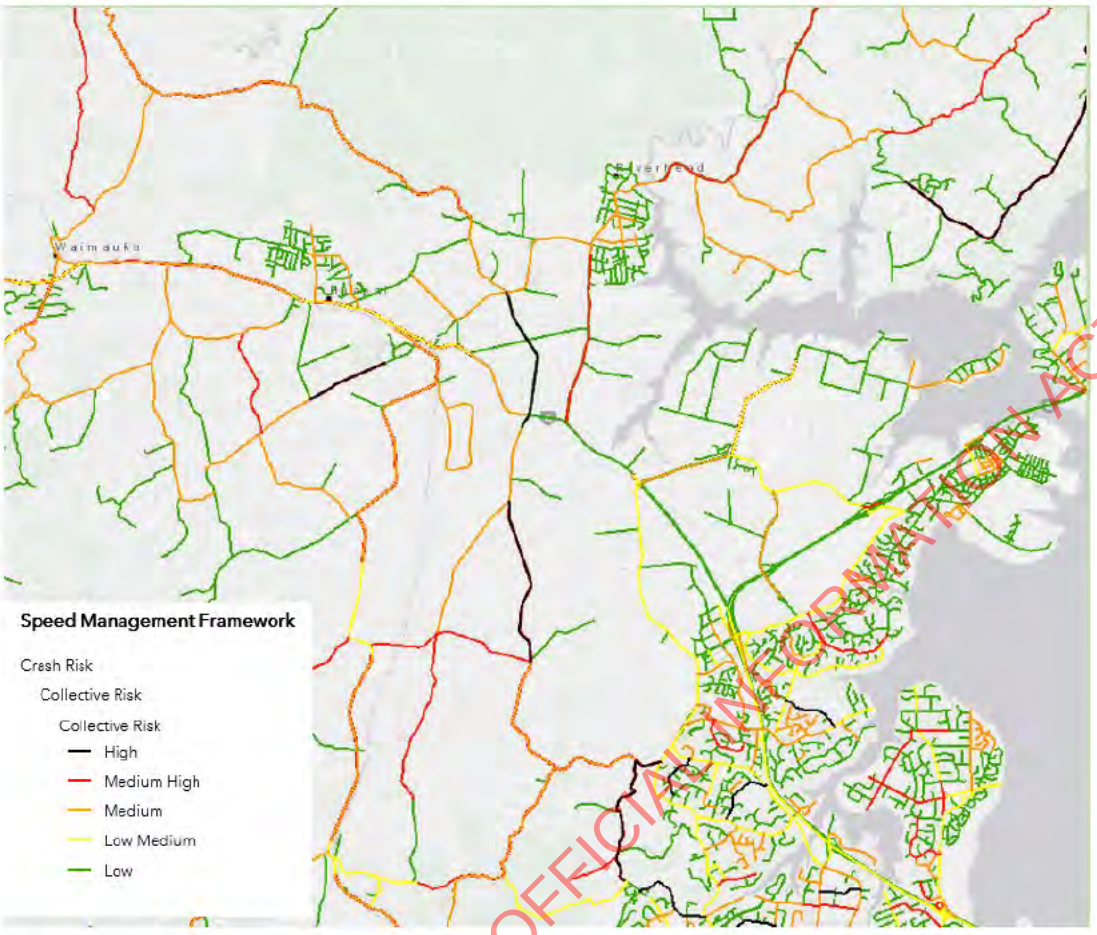
Figure 37: Personal Risk – North West Auckland



Of the death and serious injury crashes recorded on these roads over the five-year period from 2012-2017, the most common crash causes were speed, alcohol, failure to give way and loss of control. Equal numbers of crashes were attributable to each of these factors[15]. More detail of crash causes is provided in Appendix A: Strategic Case.

Traffic volumes on the existing North West arterial road network have generally increased in recent years, in part a response to intensification of the existing North West urban area, and early land use development within Huapai, Riverhead and Whenuapai. These volumes are forecast to further increase in the future. **Table 7** shows the modelled 2016 and 2046 traffic volumes on key routes, if no substantial investment in public transport is made, from the North West SATURN model.

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[15] Some crashes had multiple causes, e.g. speed, alcohol and loss of control

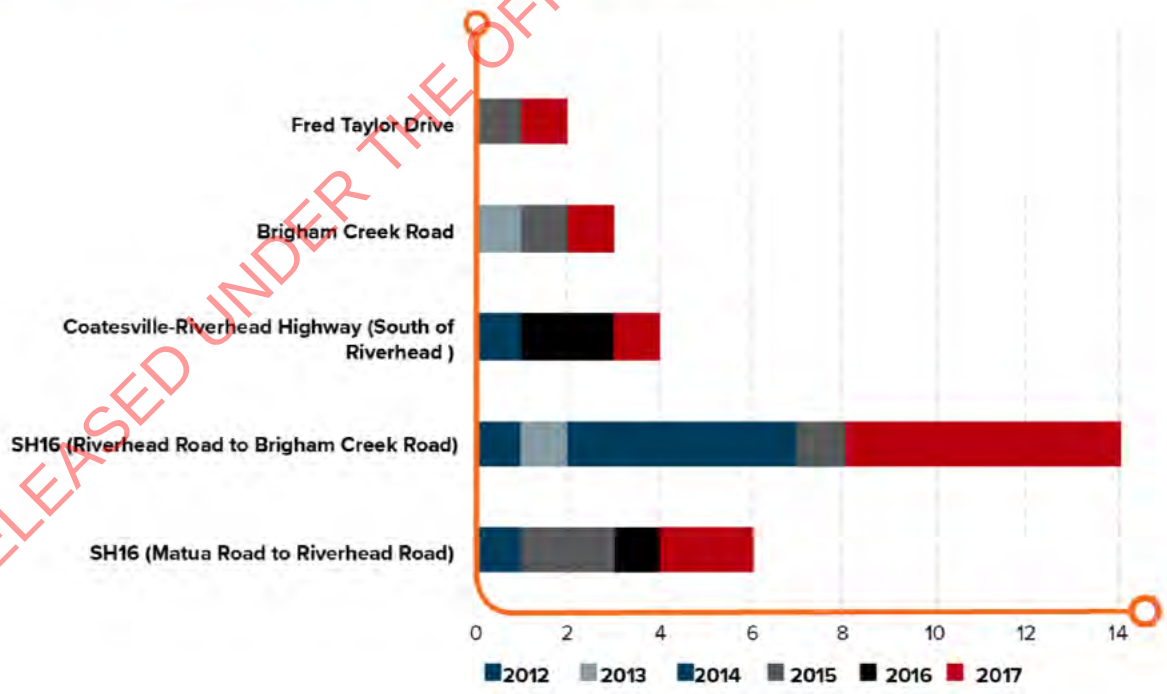
Table 7: Forecast daily traffic volumes on key North West arterial roads

Corridor	2016	2046
Trig Road south of SH18 off ramp	10,000	14,000
Brigham Creek Road east of Airport Road	11,000	19,000
Fred Taylor Drive south of Dunlop Road	6,000	6,000
SH16 north of Access Road	15,000	23,000
SH16 south of Coatesville-Riverhead Highway	38,000	55,000
SH16 south of Royal Road	87,000	156,000
SH18 Upper Harbour bridge	55,000	93,000

4.11.2. Current road safety trends

Figure 38 summarises the number of deaths and serious injuries that have occurred on key arterial roads within the North West area, showing a general trend of increasing occurances. This trend points to a reduction in collective road safety. As traffic volumes continue to increase on the key arterial routes within the North West, without appropriate intervention, these trends are expected to increase.

Figure 38: Deaths and serious injuries on key North West arterials



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Problem 4 Summary

The evidence presented confirms that:

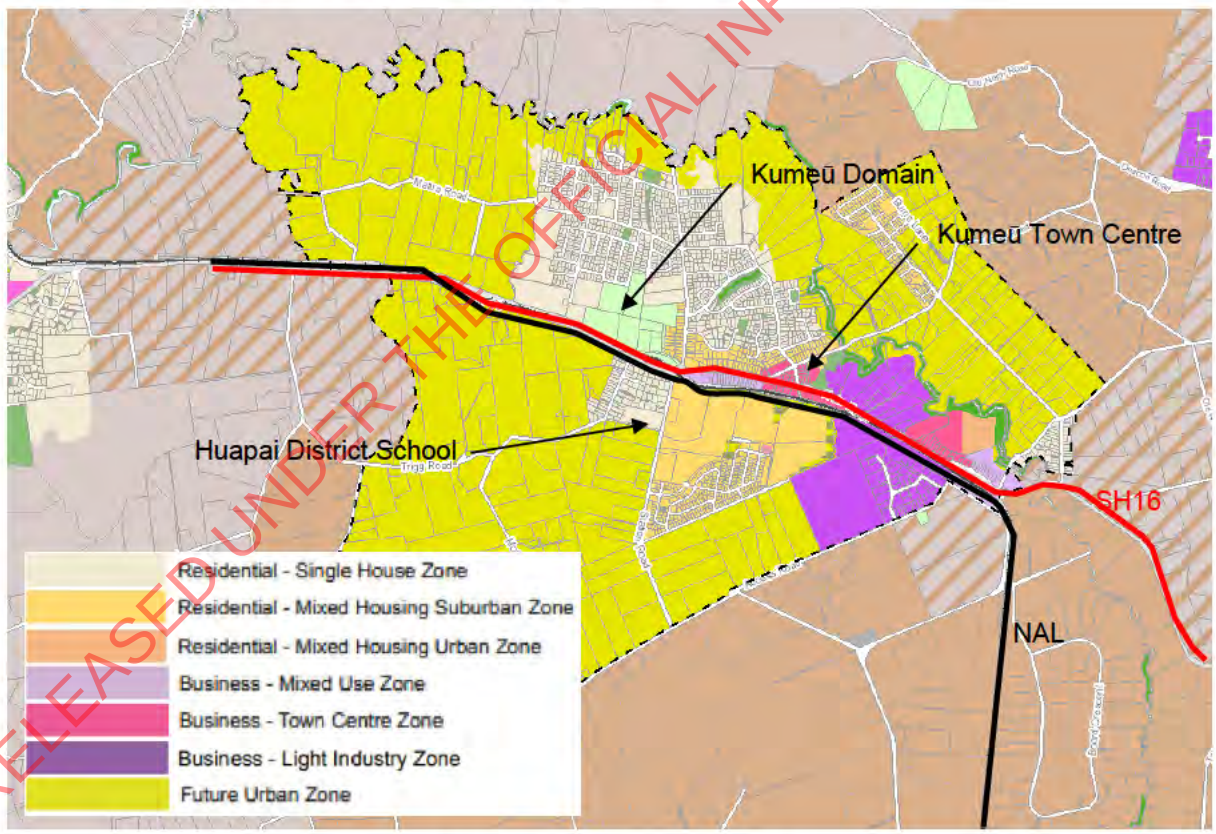
- Personal and collective risk is high or medium-high on many existing key arterial routes in the North West area, indicating a current safety problem
- Traffic volumes have increased over recent years on the key arterial routes within the North West area, and this trend is predicted to continue as the North West develops
- Deaths and serious injuries on key North West arterial routes have increased significantly in recent years
- Without intervention, the two trends above are likely to result in increased deaths and serious injuries on roads in the North West, worsening the existing situation.

4.12. Problem 5: Severance

The strategic transport network bisects Kumeū-Huapai town centre causing severance to the urban built environment

Both SH16 and the NAL rail corridor run through the centre of Kumeū-Huapai, and **Figure 39** illustrates their alignment relative to the AUP: OP zoning.

Figure 39: SH16 and NAL corridors through Kumeū-Huapai



The figure above illustrates how both the SH16 and NAL corridors sever Kumeū-Huapai. Significantly, the SH16 corridor bisects the Business – Town Centre zone, while the NAL corridor runs immediately to the south. This severance has been identified as a key issue within the Kumeū-Huapai Centre Plan which was developed by the community.

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The existing community facilities in Kumeū-Huapai generally lie adjacent the SH16 and NAL corridors, including Huapai District School, Huapai Domain, the public library and Council service centre. These community facilities are severed from half of their existing and future residential catchment by the SH16 and NAL corridors. Existing public transport services, which run on SH16, also require users to cross one or both corridors. **Figure 40** shows the town centre and SH16 corridor.

Figure 40: SH16 corridor through Kumeū-Huapai

Daily traffic volumes on SH16 through Kumeū-Huapai town centre (north of Access Road) have increased from just under 20,000 in 2014 to around 22,000 in 2017; an increase of 10% over a three-year period. Of this State highway traffic passing through the centre of the town, 4% is currently heavy commercial vehicle traffic. Forecasts indicate that without intervention, traffic volumes will increase, but given the limited capacity through the town, traffic will start to spread to adjacent future urban and rural corridors, such that daily volumes on Main Road will be around 23,000 vpd.

Strategic transport corridor function restricts the ability to reduce severance. For example, increased pedestrian crossing provision reduces capacity and causes delay and high traffic volumes make walking and cycling less attractive.

Good urban design principles recommend a more appropriate interface between movement and place, creating people-oriented streets, particularly where place is important, such as town centres. The intention is to improve the sense of belonging, participation and community resilience. Currently movement is prioritised in Kumeū-Huapai, with few attractive spaces for people to congregate and walk between shops, cafes and other amenities.

An Auckland region example is the Orewa town centre, which experienced similar severance challenges before SH1 was re-routed. That centre now has much high amenity value, high pedestrian activity, demonstrating Kumeū-Huapai's potential, if traffic volumes were reduced.

Problem 5 Summary

The evidence presented confirms that:

- SH16 and the NAL pass through the centre of Kumeū-Huapai. Community facilities are severed from half of the existing and future catchment.
- Existing public transport services, which run on SH16, require users to cross one or both corridors.
- Traffic volumes through the town centre have increased over recent years and this trend is predicted to continue as the North West develops, further increasing severance.

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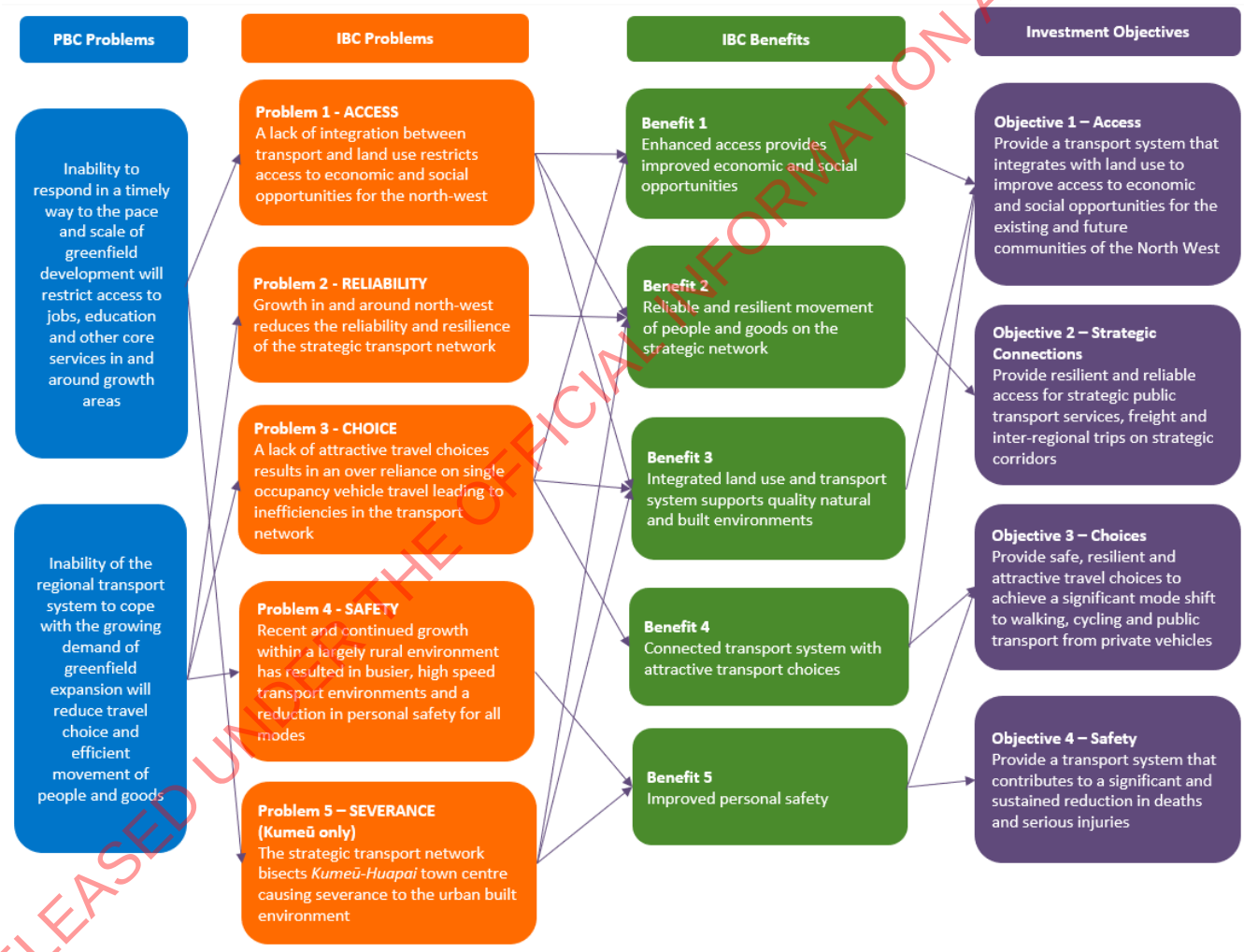
4.13. Problems, benefits, investment objectives

This section summarises the problems, benefits and investment objectives for this programme. They have been derived from the PBC level problems and investment objectives then refined and developed further through the workshop process. Key Performance Indicators (KPIs) and targets have also been set. These will be used to measure the success of the investment proposal in the future.

Table 8 and **Table 9** show the measures for this project. These elements and the way they have been developed is described in further detail in Appendix A: Strategic Case.

Table 8: Problems, benefits and investment objectives



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The five problems are mutually reinforcing e.g. reduced travel choice contributes to poor access or reduced safety affects the reliability of the network. Therefore, the transport system response needs to provide a step change to collectively address these problems and achieve the overall target of improved sustainable urban mobility. This investment is likely to provide a balance between improving existing assets, supporting behaviour changes and providing new modes or infrastructure.

Table 9: Investment objectives, KPIs and measures

Investment Objectives	Investment KPI's	Measures
Objective 1 – Access Provide a transport system that integrates with land use to improve access to economic and social opportunities for the existing and future communities of the North West	1a. Increased access to economic and social opportunities	Number of jobs within a 45 minutes' travel time from the study area in AM peak (model) (Kumeū-Huapai/Riverhead and whole NWBC area)
		Catchment within 400m walk or 3km cycle of a local activity centre (GIS) (Kumeū-Huapai/Riverhead)
		Catchment within 800m walk or 3km cycle of an employment area (GIS) (Whole NWBC area)
	1b. Effectiveness of the transport corridor	People throughput of the transport corridor east of the study area in AM peak (model) (Kumeū-Huapai/Riverhead)
		Traffic congestion on road network in the study area in AM and PM peak (model / qualitative) (Whole NWBC area)
Objective 2 – Strategic Connections Provide resilient and reliable access for strategic public transport services, freight and inter-regional trips on strategic corridors	2a. Performance of inter- and intra-regional connections	General vehicle journey time reliability – Ratio of AM peak: Inter peak: PM peak travel time on SH16 (model) (Waimauku and Kumeū-Huapai to Brigham Creek Road)
		Public transport journey time in AM peak to City Centre (model) (Whole NWBC area)
		Availability of alternative routes (all modes) providing a strategic connection and integration with wider strategic network (qualitative) (Whole NWBC area)
	2b. Access to the strategic network	Cycle catchment within 400m of strategic cycle and 3km of RTN network (GIS) (Whole NWBC area)
		Total patronage of stations on RTN network within the study area (model) (Kumeū-Huapai/Riverhead)
Objective 3 – Choices Provide safe, resilient and attractive travel choices to achieve a significant mode shift to walking, cycling and public transport from private vehicles	3a. Transport options are available	Proportion of households within study area within 400m of a QOS 1 cycle facility (GIS) (Whole NWBC area)
		Proportion of households within study area within 400m bus stop or 800m walk / 3km cycle of an RTN station (GIS) (Whole NWBC area)
		Availability of routes and modes for local trips (qualitative) (Whole NWBC area)
	3b. Attractiveness of PT and active modes	Proportion of AM peak trips made by PT and active modes (model) (Kumeū-Huapai/Riverhead and whole NWBC area)
		Travel time for PT vs Car in AM peak to City Centre (model) (Whole NWBC area)
Objective 4 – Safety Provide a transport system that contributes a significant and sustained reduction in deaths and serious injuries	4a. Provide a safe future transport system	Real and perceived safety for pedestrians and cyclists (qualitative). Assessment of DSIs (model) (Whole NWBC area)
		Daily vehicles per kilometre on rural roads within the study area (model) (Whole NWBC area)

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PART B – ECONOMIC CASE

Part B – Economic Case sets out the:

- Steps involved in the option development and assessment process from the long list to the short list and from the short list to the recommended network (Section 5.1)
- Multi Criteria Assessment process used to evaluate the effects and opportunities associated with each option (Section 5.1)
- Approach to managing demand (Section 5.2)
- Assumptions made and refined through the optioneering process (Section 5.3)
- The recommended network, including summaries of the long list, short list, and a summary of the reasons for selecting each recommended option within the network (Section 7)
- Feedback and response to consultation and engagement stakeholders, including local boards and the public (incorporated throughout the options assessment) and Manawhenua (Section 0).

This process is summarised in **Figure 41**. Further details are provided in Appendix B1: Long List Assessment, Appendix B2: Short List Assessment, and Appendix C: Transport Report.

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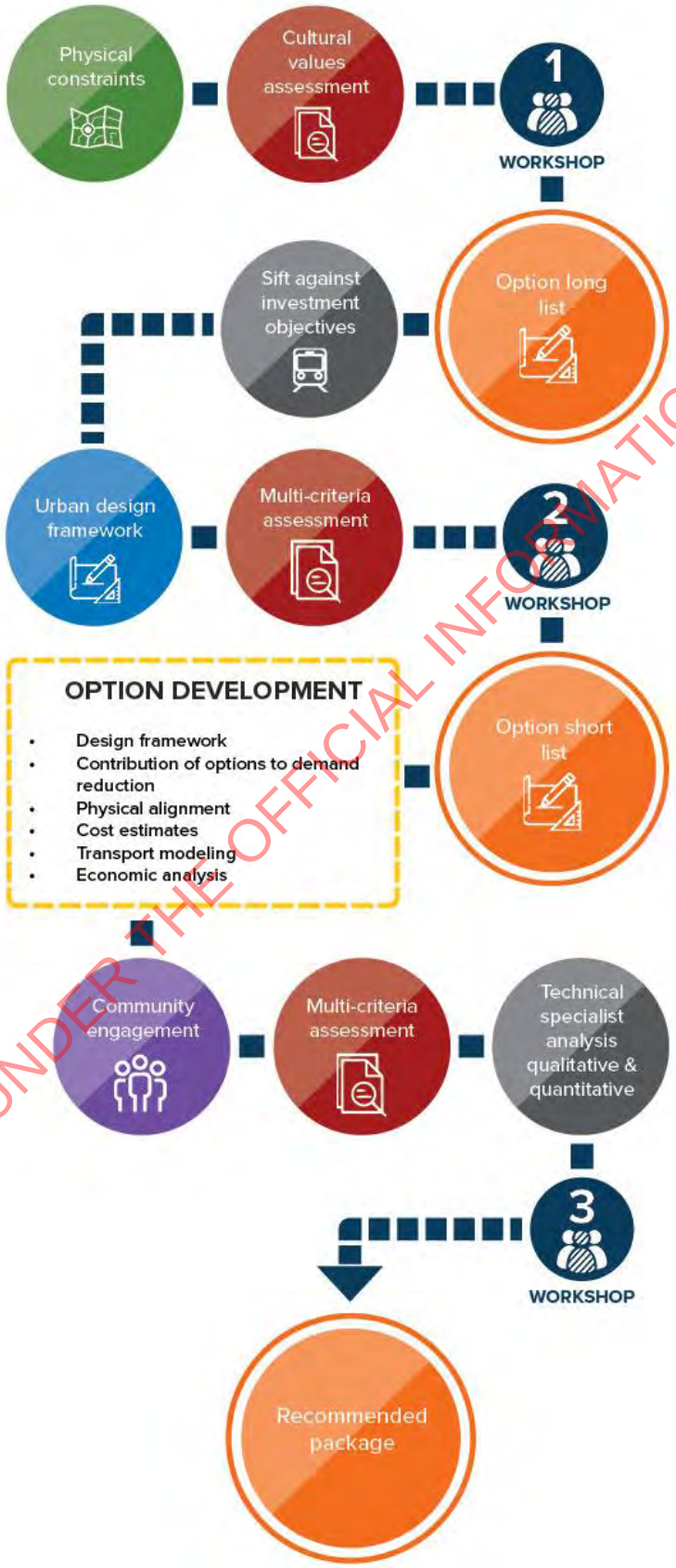
Figure 41 Option development process



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5. Option development and assessment

This IBC further tests and develops the recommendations of the PBC. A wide range of options and alternatives have been tested, including those identified in the PBC, to resolve the problems and address the investment objectives outlined in Section 4.

Engagement with partners, stakeholders and the public was a key part of this process, as described in Section 2.

5.1. Multi Criteria Assessment process

All infrastructure options have been assessed at both the long list and short list phases against the Te Tupu Ngātahi MCA framework. The framework assesses option performance against the investment objectives and four well beings: Cultural, Social, Environmental and Economic (see **Figure 42**). Under each wellbeing grouping, a combination of effects and opportunities are considered. The options were assessed in the context of an environment where future urban land has been rezoned and urbanised.

The MCA well-beings and criteria are explained in more detail in Appendix B1: Long List Assessment. The well-beings are groupings of related criteria and operate alongside the investment objectives e.g. the investment objectives also assess social and economic impacts of options. The purpose of the MCA framework is to identify relevant effects, opportunities and factors for the options. The MCA provides information and informs the recommendations of this IBC regarding which options to discard and which to include in the recommended package.

The investment objectives are:

1. Provide a transport system that integrates with land use to improve access to economic and social opportunities for the existing and future communities of North West Auckland
2. Provide resilient and reliable access for strategic public transport services, freight and sub-regional trips on strategic corridors
3. Provide safe, resilient and attractive travel choices to achieve significant mode shift to walking, cycling and public transport from private vehicles
4. Provide a transport system that contributes to a significant and sustained reduction in deaths and serious injuries.

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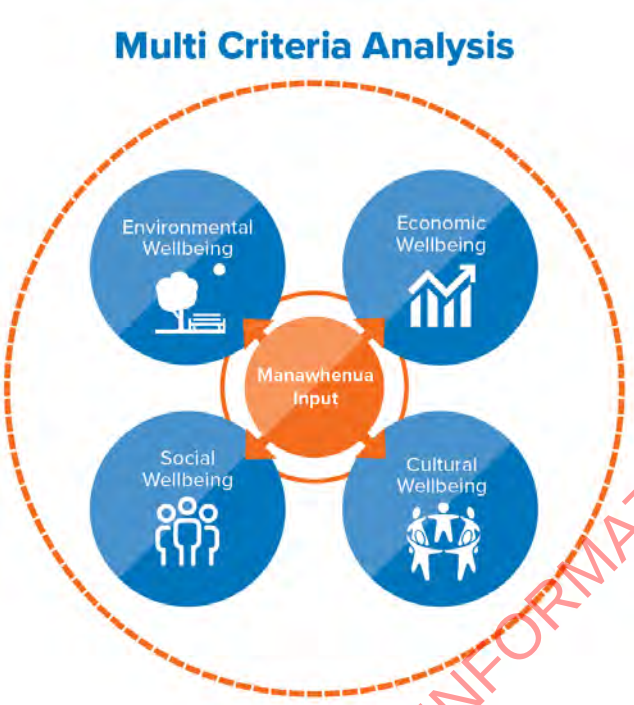
Figure 42: Multi Criteria Assessment process



5.1.1. Cultural – Manawhenua

Under the cultural wellbeing grouping, several criteria relate to Manawhenua. Although not limited to the assessment of these alone, Manawhenua have stated a preference to rank where possible and respond as a group rather than individually. Following a targeted specialist workshop, two wider group workshops, and a follow up hui, Manawhenua representatives have expressed views, provided specialist advice and raised key issues.

5.1.2. Design framework

Te Tupu Ngātahi has developed a design framework (see Appendix G: Urban Design Framework) to assist with the development and assessment of options. The principles in that framework have informed the assessment of options under the urban design criteria in the MCA and, for the recommended network, it has been used to identify opportunities and areas for further consideration in the next phase.

Design principles have been established to provide high level guidance on the attributes of responsive, resilient, sustainable, vibrant and high-quality urban environments. These principles are split into the following values:

- Environment
- Social
- Built form
- Movement
- Land use

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5.1.3. Non-scored criteria

In addition to the scored criteria, several non-scored criteria were considered as shown in **Table 10**. While no score was included for each criterion, the outcomes of the qualitative assessment were considered when evaluating and identifying the short list options.

Table 10: Non-scored criteria

Criteria	Description
Stakeholder feedback	Stakeholder and community feedback for each option identifying scale / validity of objections, key issues and opportunities as well as identified preference / proposed changes to options etc. Public consultation feedback was received at short list stage. Feedback provided by Manawhenua, Council, other key partners and stakeholders was also incorporated into the decision-making process.
Policy Analysis	Options alignment with the strategic policy framework including the AUP: OP and Auckland Plan.
Value for Money	Provide an estimate of likely value for money in conjunction with transport outcomes and construction costs. Long list assessment – provide an early indication of funding efficiency by defining the likely BCR (High/Medium/Low/Very low) for each option. Short list assessment – Indicative BCR.
Resilience	Avoid adverse geology, avoid steep slopes, seismic impacts, other resilience risks (low level infrastructure near coastlines, inundation areas).

The full MCA and outcomes of the option assessment and refinement process can be found in Appendix B: Options Assessment.

5.2. Influencing demand

This section describes the approach to managing demand for this project. The guiding principle being that unconstrained demand should not be provided for, and opportunities sought to influence and reduce demand before infrastructure options are considered. A four-step approach to influencing travel behaviour has therefore been developed.

5.2.1. Defining demand management

The Transport Agency defines demand management as activities that "improve the performance of the transport system by changing transport demand and travel behaviour"[16].

The Transport Agency describes the purpose of demand management as supporting efficient and effective use of the transport system and reducing the negative impacts of travel and freight

[16] New Zealand Transport Agency (2018) *Travel Demand Management* https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/activity-classes-and-work-categories/road-safety-promotion/wc-421-travel-demand-management

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movement. Demand management activities influence how, when and where people and freight travels.

Demand management activities have the following objectives:

- Shaping transport demand to better balance it with supply, and/or
- Shaping travel behaviour to ease pressure on the transport network and the environment, and/or
- Delivering economic benefits to businesses, communities and/or New Zealand from a national perspective

This definition and objectives have been adopted for the North West IBC.

5.2.2. Demand management principles

Making assumptions about travel behaviour and the ability to influence it is critical at each phase of option development and assessment and is an integral part of urban and transport planning and achieving sustainable urban mobility. Fundamentally, it is not feasible or economic to build infrastructure to accommodate unconstrained transport demand. Central and local governments, with constrained available funding, are required to prioritise infrastructure investment to deliver best value for money, usually through projects that deliver the greatest benefit to the most people.

As projects move through progressively more detailed development phases, the ability to influence travel behaviour reduces, as shown in **Figure 43**.

At a strategic level, decisions have broader effect and have the potential to significantly alter transport demand at a regional level (e.g. alignment of a rapid transit corridor through an urban area vs along a motorway corridor) and therefore the outcomes are achieved. Once a project has been designed, opportunities to manage demand are more limited, often to localised, add-on or complementary interventions (e.g. school travel plans cannot fix poor safety perception caused by a new wide road corridor with no footpaths, they can only enable safer crossing).

This hierarchy of intervention for travel demand has been at the forefront of thinking within the North West IBC process.

5.2.2.1. Step 1 – Strategic approach

At a strategic level, a framework of problems, benefits and investment objectives has been developed for the North West (see Section 4.13). A set of KPIs and measures has been developed to quantify the outcomes associated with each investment objective. These KPIs have been used to evaluate options in both a quantitative (where possible) and qualitative manner.

Options must respond to these indicators, amongst other things such as providing access to key destinations and connecting desire lines, and options that respond best will be selected for a recommended network of improvements. **Figure 43** shows this life cycle.

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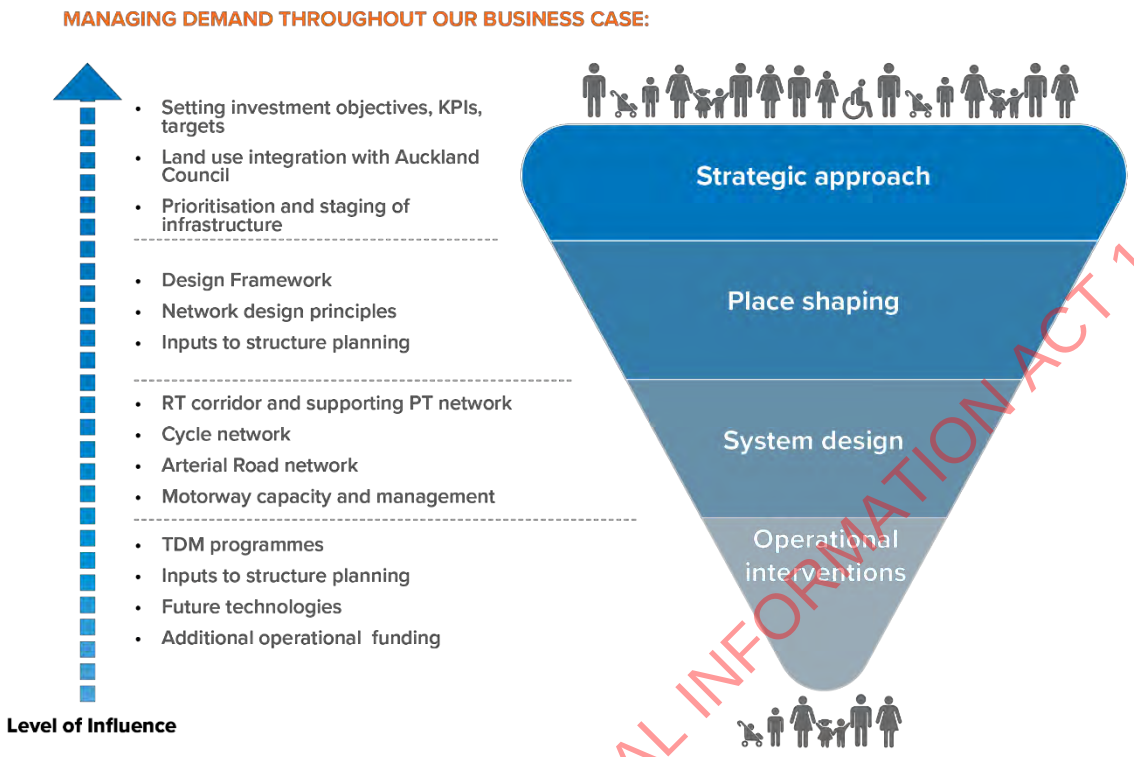
Figure 43: Demand management influence through the project life cycle



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These objectives explicitly guide option development and assessment towards options that reduce single occupant vehicle travel, which is at the heart of managing demand. The objectives require that 'reliable access is maintained' and not that 'sufficient capacity be provided' to meet demand. This guides decision makers towards options that do not over-provide capacity and instead focus on what is required for reliability.

5.2.2.2. Step 2 – Place shaping/ Developing good urban form

The importance of place shaping and developing good urban form is paramount to influence travel behaviour. Designing new neighbourhoods with jobs, local centres, schools and parks within walking or cycling distance of houses and connected with good quality, frequent public transport provides attractive travel choices and significantly reduces the need to travel by private vehicle.

The North West Auckland IBC has reflected this place shaping importance through adoption of an investment objective specifically targeting the integration of land use and transport. This provides an opportunity to lead growth and influence behaviours early. Options are evaluated against their contribution to this objective, and options that deliver poorer integration outcomes are less likely to be adopted. Place shaping is integrated into the North West IBC in several ways to achieve desirable demand management outcomes, as follows:

- Working closely with Auckland Council necessarily requires collaboration at the strategic, policy and regulatory stages of planning so that transport corridors and networks are aligned with land use and maximise access to walking, cycling and public transport

- Applying urban design framework principles to the development of options e.g. considering arterial road alignments to enhance public spaces and balancing place and movement functions with the unique context of each location
- Applying transport and land use integration principles to the design of options to maximise access e.g. co-locating public transport interchanges with centres and/or intensification.

Land use zoning in the North West has a variety of states:

- Live zoned land in Redhills
- Whenuapai land use which is currently the subject of a Plan Change and therefore currently only has proposed zoning
- Kumeū-Huapai and Riverhead land use which is yet to be structure planned; following this process business and local centre locations could change.

Therefore, it is important that the recommended network provides flexibility to respond to future land use changes. The option development process has focused on place shaping opportunities and identified the transport corridors that best connect growth areas with key destinations such as the metropolitan centre at Westgate, local centres, schools and RTN stations. The recommended network provides space for facilities to support walking and cycling, bus priority and amenity improvements for local communities and visitors as well as sufficient width to accommodate forecast future traffic demands.

A specific example of this is the introduction of the Kumeū-Huapai RTN extension and the alternative State highway corridor, which afford the most opportunity for place shaping by enabling Main Road to return to an arterial function, better supporting local access to the existing town centre. The introduction of rapid transit services provides this growth area with maximum access to public transport and will invigorate redevelopment along this corridor (including potential Transit Oriented Developments). The redesign of Main Road will provide opportunities to reduce the effects of severance from the rail line and improve pedestrian permeability across the corridor. The final alignment of the RTN will go through the heart of Kumeū-Huapai, however there is flexibility for the western end to deviate to better connect a planned future secondary local centre once structure planning is completed. Examples of how an urban RTN might look are shown in **Figure 44**.

Figure 44: RTN within an urban environment[17]

[17] Left image shows light rail, but mode will be determined as part of the City Centre to North West RTN study in 2019

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The structure of the arterial network within Whenuapai has been designed to support the range of land use in this area. The east-west corridor along Spedding Road and the north-south Trig Road corridor support access to the light industrial and business zoning adjacent SH18 and enable fast, reliable access to the motorway network for freight traffic. The primary function of the parallel east-west corridor along Brigham Creek Road and north-south arterial on Māmari Road is to support residential access connecting residents to the Whenuapai village and to a frequent bus network to access Westgate and the RTN. The Whenuapai network has been designed with a grid pattern which is easily extended should the future land use of northern Whenuapai change, promoting long term flexibility for the growth area. Connections across SH16 and SH18 are intended to better connect Whenuapai to the metropolitan centre at Westgate and the West Harbour ferry terminal.

The Redhills network has been planned to provide safe and convenient access from residential land uses to local services, schools, parks and other attractions at Westgate, Whenuapai and further afield, enhancing movement choice and overall liveability. The north-south link on Taupaki and Nixon Roads provides a key link between the Kumeū-Huapai and Redhills growth areas and has been selected to provide maximum separation between the rural land use and the FUZ area with the aim to reduce pressure for upzoning in the residual land. It also has the benefit of having the least effect on the Ngongotēpara stream network, thus increasing the opportunity for improvement to the amenity of the natural environment within Redhills.

5.2.2.3. Step 3 – System design

A range of system design options to influence travel demand were considered during the option development and evaluation process (**Figure 45**). The relative effectiveness of different options to manage demand was evaluated in a North West specific context using the agreed investment objectives and KPIs. Options that performed better against these indicators were selected for the recommended network.

Figure 45: System design examples

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5.2.2.4. Step 4 – Operational interventions

A range of operational travel demand management options have been identified (**Figure 46**) that could be applied in parallel to complement the strategic network infrastructure recommended in the IBC.

Figure 46: Operational option examples

5.2.3. Influencing demand in North West Auckland

The guiding principle of this business case is that unconstrained demand should not be provided for, and opportunities should be sought to influence and reduce demand before infrastructure options are considered. The application of these demand management principles and urban interventions in the North West is forecast to result in a shift of **22%** from private vehicle travel to alternative modes, if the recommended network of improvements is provided[18]. An even greater shift of 30% is expected from customers in Kumeū-Huapai and Riverhead. This is summarised in **Table 11**.

Table 11: Estimated changes in mode share

Main means of travel to work	Existing	Expected future	% Shift
Private Vehicle – North West	87%	65%	-22%
Private Vehicle - Kumeū-Huapai and Riverhead	93%	63%	-30%
Public Transport (all trips)	1%	16%	+15%
Active Modes	12%	20%	+8%

Analysis of traffic modelling demands associated with the North West recommended network of improvements showed that the ability to undertake travel in the weekday peak periods was constrained by predicted network congestion in 2046 as a result of future growth.

[18] Recommended network includes significant investment in rapid transit, walking, cycling, ferry and bus infrastructure to provide safe, reliable, attractive alternatives to private vehicle travel

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In addition to providing opportunities to travel by more sustainable modes, the recommended network also enhances movement opportunities during the weekday peak periods, as well as significantly improving reliability and reducing variability across the day, which will particularly benefit the efficiency of the local public transport network. If elements of the programme recommended to support mode shift, such as the extension of the RTN from to Kumeū-Huapai and fully separated walking and cycling facilities on all arterial roads and key collectors, are not provided, these forecast reductions in demand will not be achieved.

The North West is in a regional fringe and it is recognised it is infeasible to use public transport, walk or cycle for a large proportion of trips in the North West in comparison with what may be achieved in urban areas closer to the City Centre with more intensive land use and a greater proportion of high-density communities. Despite this, transport modelling of the recommended network suggests around **20%** of travel will be via active modes which exceeds the PBC objective of 16% walking and cycling trips by 2045. The 16% mode share for public transport is for all public transport trips in the North West and is a substantial shift from the existing mode share of 1%. The public transport trips in the morning peak and how this compares to PBC objectives is detailed in Section 7.3.

It should also be noted that the car mode share in the Waitematā (City Centre and fringe) Census Area Unit was 63% in 2013. The North West area, including Kumeū-Huapai and Riverhead are predicted to achieve similar mode share with the recommended network which is a substantial shift from existing travel patterns in the North West.

5.3. Anchor decisions

The recommended network comprises a range of individual transport elements. Some of these options are inherently linked, resulting in interdependencies between elements. An anchor decisions framework was established to map these interdependencies and understand the effects of decisions. This is shown in **Figure 47**.

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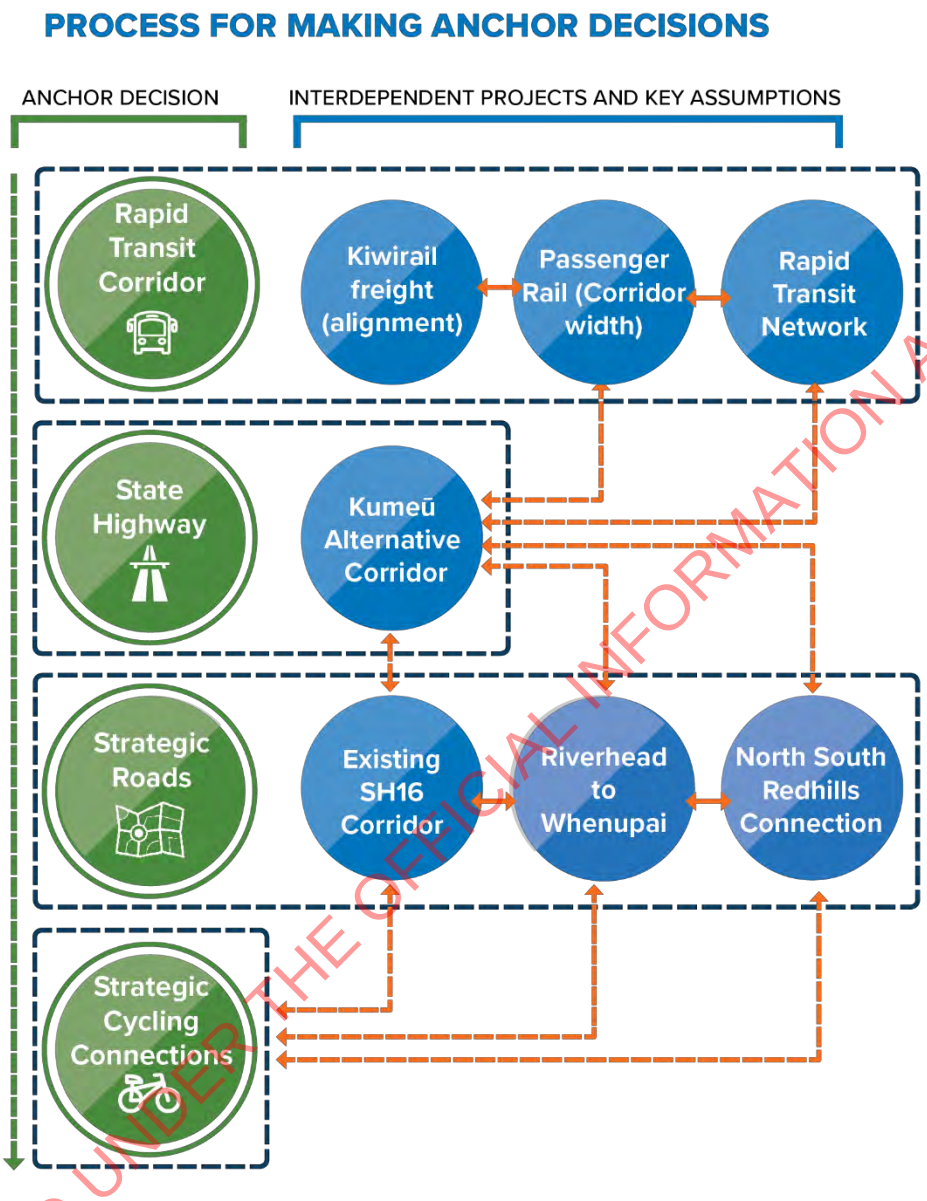
Figure 47: Anchor decisions



The primary decision relates to RTN provision (modes and alignment) as this provides the most significant opportunity to influence mode shift and provides a step change in people movement for the North West. Consideration of an alternative State highway corridor was an inter-related decision with RTN options as the location of this infrastructure depended on the RTN alignments and affected several adjacent connecting strategic and arterial roads. The strategic roads decision was identifying any sub regional desire lines and how these might relate with other infrastructure. The premise of the overall North West option process was that all arterials would provide walking and cycling infrastructure, so the anchor decisions highlighted cycling connections specifically to ensure that the key cycling desire lines were being accommodated by the network options and to identify if there were any stand-alone cycling options to be assessed. The other arterials were then assessed on a case by case basis.

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5.4. Arterial cross section assumptions

In developing the option short list, several assumptions were made regarding road typologies. These assumptions have been challenged throughout the option development processes and tailored where necessary to achieve an appropriately scaled outcome.

All arterial cross sections were initially assumed to be 32m (cross section A) based on design guidance provided by AT's Roads and Streets Framework and have been designed in response to the opportunity to provide multi-modal transport corridors. As options have been developed and assessed, the early assumptions about a standard 32m cross section have been revisited. Corridors used for rapid transit services require specific consideration of space allocation and additional narrower cross sections have been developed to respond to other location specific needs. These cross sections aim to make best use of existing space or provide just enough capacity for the reduced levels of general traffic demand expected following the application of demand management principles.

The following indicative arterial cross sections have been used:

- 32m for four-lane urban arterial corridors (cross section A)
- 30m for corridors within the Redhills AUP: OP precinct[19] (cross section B)
- 25m for rural strategic corridors (cross section C)
- 20m (urban) for corridors which do not require four traffic lanes (cross section D)
- 20m (rural) for corridors that require improvement as a result of growth-related traffic but are in rurally zoned areas (cross section E)
- RTN cross section for corridors used for rapid transit services. (cross section F and G)

These cross sections will be reviewed with respect to their specific location context at the DBC stage.

The 20m cross sections are likely to be able to be achieved within existing road reserves, requiring limited widening and therefore limited disruption to property and residents – although this will need to be confirmed following further investigation at the DBC stage. These cross sections are summarised in **Table 12** and referenced in the sections that follow.

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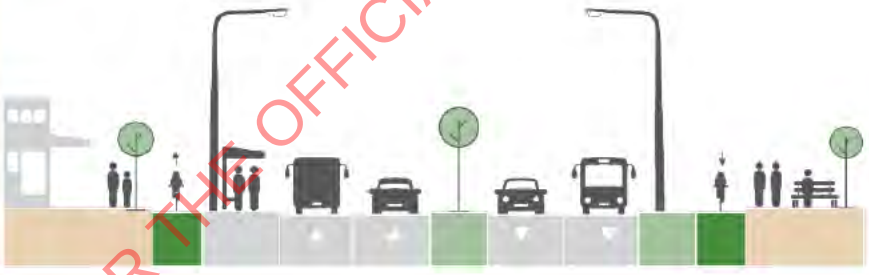
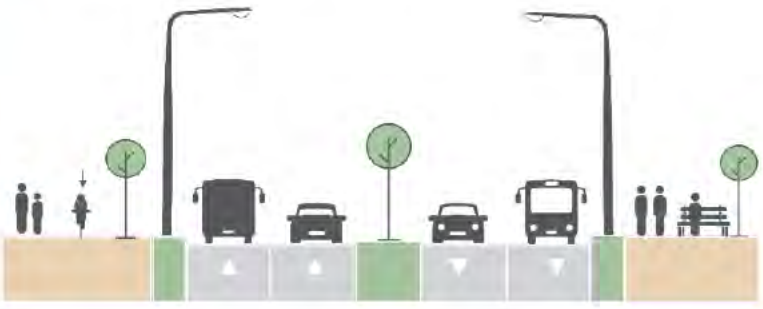
[19] AUP: OP Redhills precinct rules require 30m cross section for arterial corridors

Table 12: Indicative North West arterial cross sections

Cross section	Description
A – 32m	**Form** – 32m arterial route, accommodating separated walking and cycling, and four lanes for public transport, freight, and general traffic. **Application** – Strategic movement corridors to cater for all modes, including freight. Sufficient space in berms for planting to provide good quality urban amenity.
B – 30m	**Form** – 30m, accommodating separated walking and cycling, and four lanes for public transport, freight, and general traffic. **Application** – This cross section is unique to the Redhills AUP: OP precinct area, where 30m wide corridors had already been agreed. 
C – 25m	**Form** – 25m, accommodating shared walking and cycling, and four lanes for public transport and for general traffic, with a solid median. **Application** – Rural corridors where narrower elements can be provided. This cross section has been used for the alternative SH16 corridor. 

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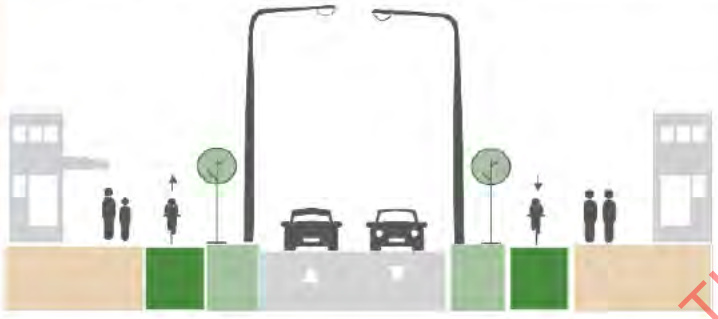
Cross section	Description
D – 20m **urban**	**Form** – 20m, accommodating separated walking and cycling, public transport facilities, and two lanes for public transport and general traffic, with no solid median. **Application** – Urbanisation of existing corridors, which do not require four traffic lanes and may be possible to implement within the existing road reserve (to be confirmed at the DBC stage). 
E – 20m rural	**Form** – 20m, accommodating separated walking and cycling, public transport facilities, and two lanes for public transport and general traffic, with no solid median. **Application** – Rural corridors which require improvement due to growth related traffic increase but remain rural in character. Four traffic lanes are not required.

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Cross section	Description
F - RTN	**Form** – width varies, accommodating separated rapid transit corridor, walking and cycling and a solid median. **Application** – Rapid transit corridor from Brigham Creek Road to Kumeū-Huapai town centre. Within Kumeū-Huapai town centre, rapid transit could be in the centre of the corridor. Outside the centre, rapid transit to be located to one side. **Alternative State highway RTN corridor** **Kumeū -Huapai RTN Corridor**

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5.5. Key considerations

Investment objectives relating to access, reliability, mode choice, safety and severance have been identified for the wider North West growth area. **Table 13** sets out the key considerations for option development to address these investment objectives, specific to each community in the North West.

Table 13: Key considerations

Community	Considerations
Kumeū-Huapai	• Improve travel choice for Kumeū-Huapai to reduce the reliance on private vehicles • Improve access to the key destinations of Westgate, Whenuapai and the city centre • Improve safety on key corridors • Reduce severance effects of SH16 on the existing town centre and reconfigure space to respond to placemaking drivers • Maintain strategic function, reliability and resilience of access for freight and sub-regional traffic • Provide structured access to the FUZ land which allows an effective collector network to be built by developers.
Riverhead	• Provide east-west connections between Riverhead and Kumeū-Huapai to improve access to social and economic infrastructure in Kumeū-Huapai • Improve access to the key destinations of Westgate, Whenuapai and the city centre • Upgrade rural roads to improve safety and access for active modes.
Redhills	• Connect the Redhills growth area to the strategic transport network including the SH16 cycleway, future rapid transit networks and SH16 / SH18 motorways • Improve resilience for SH16 • Provide east-west connections to connect Redhills to Whenuapai business land • Provide north-south intra-regional connection between Redhills and Kumeū-Huapai • Improve access to the Westgate metropolitan centre • Relieve congestion along Fred Taylor Drive and Don Buck Road • Improve bus priority and walking and cycling infrastructure by removing on street parking, driveways and addressing local catchment needs Provide structured access to the live zoned land which allows an effective collector network to be built by developers. • Improve safety on key corridors.
Whenuapai	• Provide additional access to Whenuapai to reduce the severance effects of SH16 and SH18 and improve resilience for the growth area • Provide access between the business zoned land use and the strategic transport network • Improve access to alternative modes such as ferry and future rapid transit network • Provide bus priority for future frequent transit network (FTN) bus services.

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6. Options analysis

This section:

- Describes the recommended transport network for the North West area, including the key outcomes it delivers (Section 6.1)
- Provides a summary of the long list, demonstrating the breadth of options considered (Section 6.2)
- Summarises the short-listed options and rationale for selection of those options that make up the recommended network (Section 6.3).

6.1. Recommended network

The people of the North West are at the forefront of our strategic focus to provide the long term vision of sustainable urban mobility through attractive and viable mode choice, contribution to active and healthy families, a cleaner environment and a more connected, prosperous and liveable community in the North West of Auckland.

The future North West urban area includes growth areas in Kumeū-Huapai, Riverhead, Redhills and Whenuapai. There is an existing metropolitan centre located at Westgate and significant future planned employment in the south east of Whenuapai. Kumeū-Huapai is yet to be structure planned but will likely include some business zoning. The remaining growth area land use has residential zoning with a mix of medium and higher densities.

The North West is primarily accessed via the strategic spines of SH16 and SH18 with a limited existing public transport network. Kumeū-Huapai, Riverhead and to a lesser extent Redhills are bordered by rural land use and are otherwise heavily dependent on a rural transport network. Whenuapai is essentially an island, bordered by SH16, SH18 and the Waitematā Harbour and associated inlets and currently only has three access points.

The guiding principle for the development of the North West's future transport system is to shape travel behaviour through:

- Integrating transport with land use activities, so that there is an appropriate interface between place and movement
- Encouraging travel by active modes and public transport, reducing reliance on private vehicle travel, supporting connected communities and healthy lifestyles
- Reducing pressure on the environment
- Improving safety on existing roads and designing safe new roads
- Creating a community with a sense of identity that has genuine travel choices.

The transport network has been chosen to best deliver the following investment objectives, which are described in Section 4.13 and are summarised in **Figure 48**.

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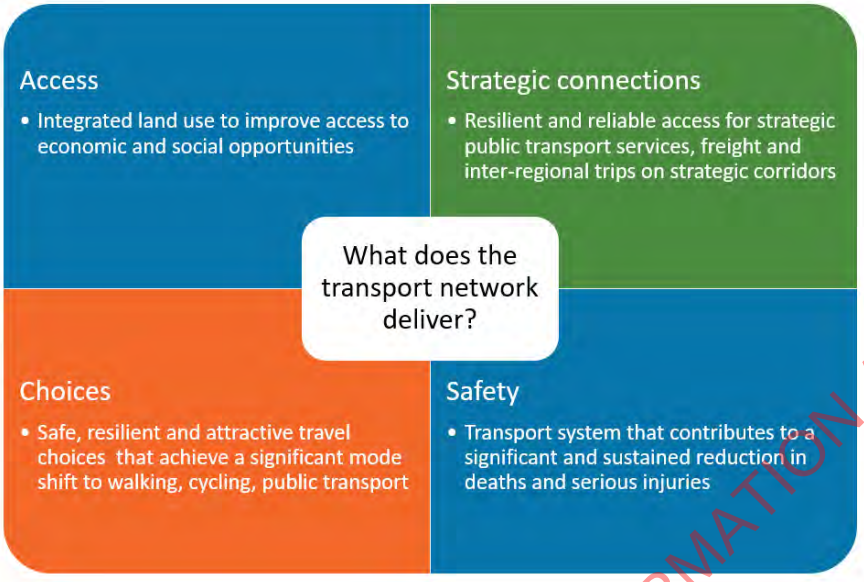
Figure 48 IBC investment objectives



These objectives collectively support a safe, reliable and sustainable transport system which provides for both local and sub-regional trips. Importantly, it is a system which has travel choice and links the key destinations with the public transport network.

The recommended North West transport network is shown in **Figure 49** and provides:

1 Integration between landuse and transport in the North West. The network enhances place shaping opportunities and identifies the transport corridors that best connect growth areas with key destinations such as employment in the Westgate metropolitan centre and Whenuapai, local centres in Kumeū-Huapai and Whenuapai, schools and RTN stations.
2 A rapid transit network to serve the North West to enable a step change in people moving capacity.
3 An alternative State highway corridor to the south of Kumeū-Huapai, to improve longer distance and sub-regional travel and access for freight.
4 An integrated system of arterial roads that have a dual function to connect sub-regions and to link land uses to the new public transport system and existing strategic road network.
5 A regional and primary active mode network that connects key destinations and links to the public transport network and interchanges.
6 Enhancement of the existing ferry system to provide alternative modes to the city centre.
7 Safety improvements on key rural corridors to reduce the effects of DSIs in the North West.
8 Complementary operational demand management measured to support alternative modes and encourage significant mode shift.

Key features of this transport network and an assessment of its performance against investment objectives is included in **Table 14**.

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Figure 49: Recommended North West Network

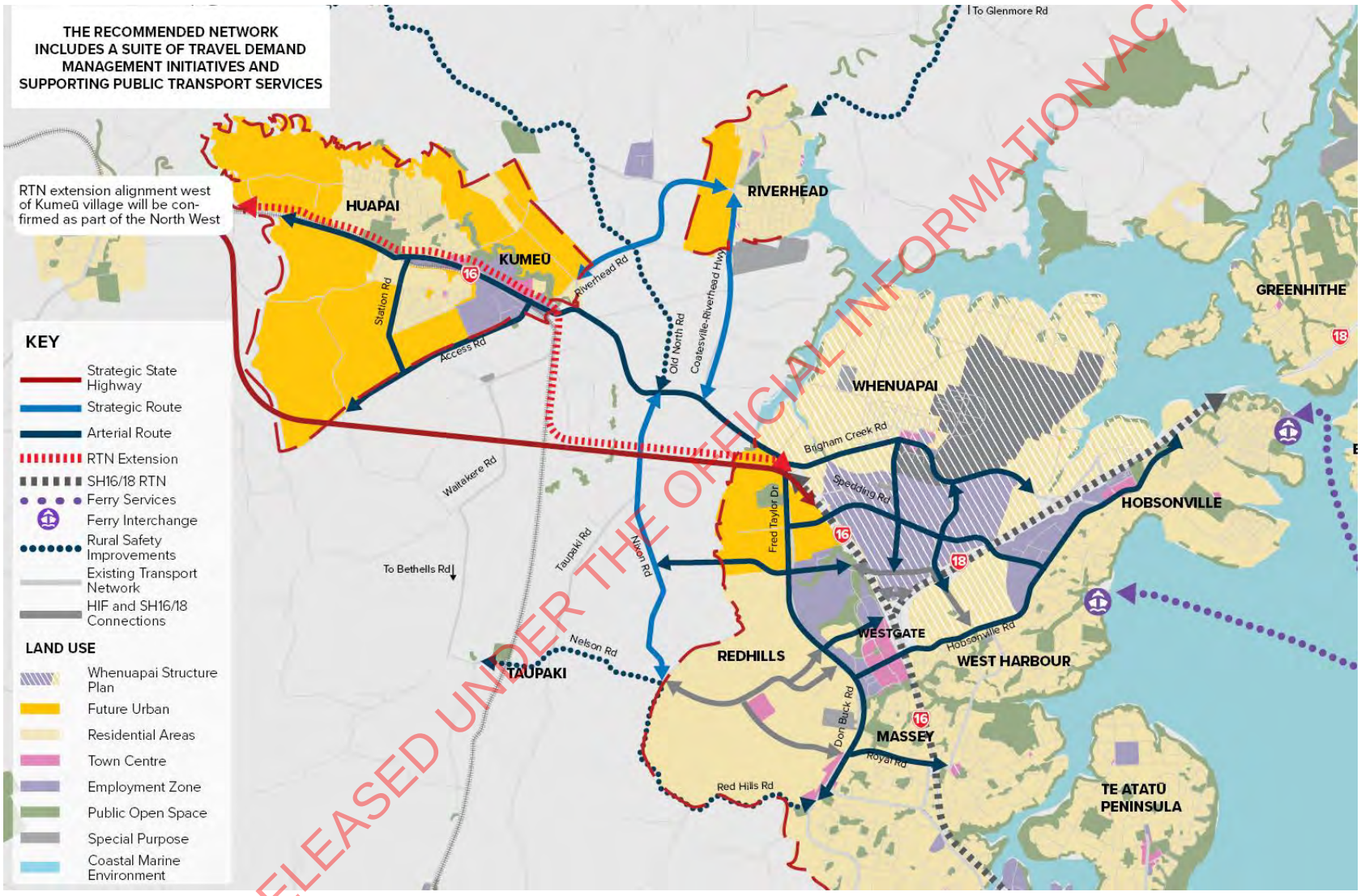

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Table 14: Key features and impact of the recommended transport network

Key Feature	Effect on investment objectives
Integration between landuse and transport in the North West. The network enhances place shaping opportunities and identifies the transport corridors that best connect growth areas with key destinations such as employment in the Westgate metropolitan centre and Whenuapai, local centres in Kumeū-Huapai and Whenuapai, schools and RTN stations. The provision of transport infrastructure to support the landuse maximises access to walking, cycling and public transport and influences the travel behaviour for the North West **supporting TDM principles and a sustainable urban form.** Integrated design allows a safety focus to ensure that the primary desire lines are designed for safe access for active modes.	
Step change in the people-moving capacity of the North West with the extension of a **rapid transit corridor from Brigham Creek Road to Kumeū-Huapai** that enables high-quality, frequent and reliable public transport that will support a significant mode shift for the growth area. The strategic rapid transit alignment balances the transport and urban development potential of the area and supports a key transport interchange at Westgate. The rapid transit network supports all North West growth areas including Redhills and Whenuapai and will also connect to the proposed SH18 RTN, unlocking access to economic and social opportunities across the North West and further afield.	
This rapid transit system is supported by the **proposed arterial network** which connects key trip attractors (business areas, local centres, metropolitan centre, sports fields and residential areas) along main desire lines, providing community connectivity, mobility and choice. The arterial network has been designed to provide equitable access for: • A future bus network which supports high frequency and feeder bus services • A primary cycle network which significantly improves connections within the North West and is expected to have a high cycle demand • Pedestrian movement through the provision of footpaths and safe crossing points on all arterial corridors.	

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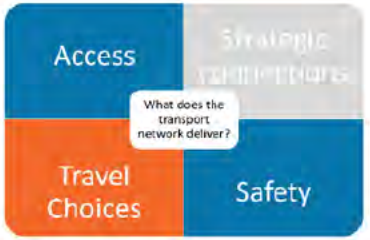
Key Feature	Effect on investment objectives
An alternative State highway corridor to the south of Kumeū-Huapai. This corridor has a dual function to separate longer sub-regional trips from local Kumeū-Huapai trips and provide controlled access into the southern growth area of Kumeū-Huapai. The resulting reduction of traffic along Main Road in Kumeū-Huapai will allow the existing State highway to be reduced to arterial status, which will support place making, community connectivity and the development of a quality urban environment, supporting the introduction of rapid transit.	
No investment in passenger metro rail services is proposed on the existing rail lines (north of Swanson station). This is due to indirect routes to the key North West destinations of Westgate, Whenuapai and the city centre, longer travel time and insufficient ridership for both rail and rapid transit modes.	Not included in recommended option
Investment in existing ferry infrastructure at West Harbour and Hobsonville to enhance the frequency of services and access to the terminals including bus and active modes. Improving existing assets has a lower impact on the sensitive marine environment in comparison with the provision of new infrastructure.	
Improved connections from Riverhead to Kumeū-Huapai (Riverhead Road – separated walking and cycling facilities) and the rapid transit network (Coatesville-Riverhead Highway - bus priority/managed lanes) to promote travel choice, improve safety for all modes and provide opportunity for bus priority measures.	

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Key Feature	Effect on investment objectives
Improved resilience for SH16 through: • Provision of a north-south sub-regional connection on Taupaki Road / Nixon Road to connect Redhills and Kumeū-Huapai. This route also forms part of wider strategic links between Helensville, Dairy Flat and the Westgate metropolitan centre. • Extension of Northside Drive to connect with Taupaki Road / Nixon Road to improve the wider east-west resilience of the transport network.	
Extensions to Spedding Road to provide: • Additional east-west access for Whenuapai, reducing severance from SH16 and SH18 and improving resilience and community connectivity for this growth area • A more resilient network that can distribute traffic • Motorway crossings that do not pass through a motorway interchange improving safety for walking and cycling to and from Whenuapai • Improved access between Whenuapai and West Harbour ferry terminal, enhancing travel choice • Reduced pressure on Brigham Creek Road and its interchange with SH16	
Upgrades of existing urban corridors including Hobsonville Road, Fred Taylor Drive, Don Buck Road, Trig Road and Māmari Road to improve the safety of active modes through the provision of separated walking and cycling facilities and increase the attractiveness of public transport through upgrades such as bus priority.	
Improved safety for rural corridors with 30% reduction in daily vehicles (per km) and 43% reduction in DSIs on rural roads from the urbanisation of roads within the North West growth area and implementing new links such as the alternative State highway corridor. Four rural roads where growth has increased personal or collective risk have been identified for physical safety improvements: Speed management will also be considered. • Old North Road • Coatesville-Riverhead Highway north of Riverhead • Red Hills Road • Nelson Road	

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Key Feature	Effect on investment objectives
Complementary operational demand management measures to support the significant investment in public transport services and infrastructure and comprehensive walking and cycling networks. Annual investment is recommended to provide initiatives such as workplace travel plan support, mobility services, cycle safety and skills programmes. These measures support the investment in strategic connections to achieve significant mode shift, improving access and the safety of the transport system.	

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The recommended network is complementary to four other projects which are being progressed in the North West outside of this project scope:

- Housing Infrastructure Fund – Redhills and Whenuapai arterial corridors
- SH16 / SH18 Connections
- North West Rapid Transit Network - city centre to Brigham Creek
- SH18 Rapid Transit Network – Westgate to Constellation Station.

These additional projects are integral to the holistic transport network and together with the recommended network will form a transport system which supports mode shift, is safe and connects people to key destinations.

The following sections describe the option development and evaluation process that was followed to identify the recommended network.

6.2. Options long list

The options long list for the North West consisted of 81 options, including non-infrastructure options. The groupings were:

- Rapid transit
- Ferry
- Strategic State highway connections
- Strategic sub-regional connections
- Arterial connections
- Non-infrastructure.

These options are summarised below, along with the rationale for discounting those options which did not progress to the short list. The full options long list report can be found at Appendix B1: Long List Assessment.

Except for the rapid transit network (RTN), the options tested were considered as multi-modal links and assessed for walking and cycling and bus and vehicle access. On that basis a separate list of options for cycling and walking was not developed.

6.2.1. Rapid transit options

Rapid transit provides fast, frequent and high-capacity public transport services, separated from general traffic and therefore not affected by road congestion. These corridors are mode-agnostic and can carry light rail or buses, or both. The RTN combines individual rapid transit corridors and stations with the wider public transport network to deliver a range of safe, attractive alternatives to private car travel. It provides opportunities to develop quality, highly accessible urban places centred around stations. An example is shown in **Figure 50**.

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Figure 50: Possible rapid transit concepts

The following rapid transit options were considered for the North West to enable significant mode shift to public transport:

- **RTN extension** from Brigham Creek Road to Kumeū-Huapai (4 alignments)
- **RTN extension** from Riverhead to SH16
- **RTN extension** from Dairy Flat to Riverhead
- **Reinstatement of passenger heavy rail services** to Redhills and Kumeū-Huapai. Potential new station at Taupaki and four alignments to Kumeū-Huapai
- **Improvement of existing rail stations** at Swanson and Rānui including interchange capabilities and park and ride capacity

Table 15 sets out the rationale for discounting options which did not proceed to the short list.

Table 15: Rationale for discarded rapid transit options

Rapid Transit Connections	Sub Option	Rationale
RTN extension	Southern bypass of FUZ	Limited opportunity for land use and transport integration. Smallest catchment.
	Northern alignment	Ecological effects and poor potential for ridership.
RTN extension	Dairy Flat to Riverhead	Low customer demands due to limited catchment along the route, therefore lower strategic importance.
	Riverhead to SH16	Riverhead generated insufficient demand to support a high frequency rapid transit service but an FTN should be considered.
RTN passenger rail service	Northern alignment[20]	Ecological effects and poor potential for ridership.
Rail station improvements	Swanson	Dependent on strategic route via Sunnyvale Road, which was discarded.

[20] Note southern / existing alignment has been retained in short list for further investigation

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6.2.2. Ferry

The following ferry options were considered for the North West to improve travel choice.

- **Improvement to existing ferry terminals** – West Harbour and Hobsonville; increased capacity, improved interchange facilities, improved cycling and walking links
- **New ferry terminals** – Scott's Landing, Whenuapai, Herald Island and Riverhead
- **Increase existing ferry services** – West Harbour and Hobsonville including higher peak frequency and off peak and weekend services
- **Removal of ferry service at direct from** Beach Haven to Auckland city centre.

Table 16 sets out the rationale for discounting options which did not proceed to the short list.

Table 16: Rationale for discarded ferry options

Ferry Connections	Sub Option	Rationale
New ferry terminals	Herald Island	Low strategic significance for the growth area and limited catchment.
	Riverhead	Ecological effects, construction feasibility and non-competitive travel times to other modes.
Removal of ferry service[21]	Beach Haven	Provides important travel choice to Beach Haven catchment and can be linked to Hobsonville ferry service. To be retained.

6.2.3. Strategic State highway connections

The following new alternative strategic State highway connections were considered for the North West to enable sub-regional connections, improve resilience and freight access. These connections are intended to remove sub-regional traffic from Main Road through the Kumeū-Huapai town centre, providing an opportunity to improve accessibility for rapid transit and other public transport services enabling equitable access to social and economic activities in the centre and supporting the creation of spaces where people can connect.

- **Alternative State highway connections** – six potential locations including four within the Kumeū-Huapai growth area, a northern mountain connection and an alternative corridor around Waimauku.

Table 17 sets out the rationale for discounting options which did not proceed to the short list.

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[21] Intention was to reduce sailing times to and from the city centre

Table 17: Rationale for discarded strategic State highway options

Strategic State highway connections	Sub Option	Rationale
Kumeū-Huapai	Existing SH16 alignment	Impact on existing land uses and access, effectiveness as a strategic State highway limited by existing accesses.
	Northern fringe corridor	Environmental impacts.
Helensville	Northern mountain corridor	Environmental impacts.
Waimauku	Alternative corridor to Waimauku	Environmental impacts, limited demand and complex topography.

6.2.4. Strategic sub-regional connections

The following strategic sub-regional connections were considered for the North West to enable sub-regional connections and provide opportunities for safety improvements, resilient and reliable public transport and improved facilities for active modes to connect to the RTN.

- **Kumeū-Huapai to Riverhead connection** – two potential alignments to connect the growth areas
- **Coatesville-Riverhead Highway** – between SH16 and Riverhead
- **Riverhead to Dairy Flat** – two alignments - Coatesville-Riverhead Highway or new northern alignment
- **Existing SH16 alignment** – from Brigham Creek Road to Kumeū-Huapai to operate as strategic sub-regional connection
- **Riverhead to Whenuapai connection** – one alignment to provide for local access between the two growth areas
- **North-south connection between Redhills and Kumeū-Huapai** – one new alignment and one existing alignment along Taupaki and Nixon Road. Note no alignments were considered further west than Taupaki (e.g. Waitākere Road) due to the distance from growth areas, low demand and inability to directly link growth areas or key destinations.
- **Connections to metro rail line** – two alignments to Swanson and Rānui stations.

Table 18 sets out the rationale for discounting options which did not proceed to the short list.

Table 18: Rationale for discarded strategic sub-regional connection options

Strategic sub-regional connections	Sub Option	Rationale
Riverhead to Dairy Flats	New northern alignment	Environmental impacts, no need for additional capacity.
Existing SH16 Alignment	Brigham Creek Road to Kumeū-Huapai	Impact on existing land uses, effectiveness as a strategic sub-regional connection limited. Recommended to have arterial function.
Connections to rail line	Sunnyvale Road to Swanson station	Environmental impacts, inconsistent with countryside living zoning, limited public transport catchment. Alternative Rānui route performed better.

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6.2.5. Arterial connections

The following arterial connections were considered for the North West to support access to the rapid transit and strategic transport networks, improve safety, provide access to key employment areas and social destinations and enable the creation of spaces where people can connect.

- **New arterial connections -** ten connections including bridges between Riverhead / Whenuapai and Herald Island / Greenhithe, improved east-west connections for Whenuapai and Redhills, north-south connection between Redhills and Kumeū-Huapai
- **Upgraded existing urban connections** – connections within Redhills, Whenuapai and Hobsonville and SH16 between Brigham Creek Road and Kumeū-Huapai
- **Upgraded existing rural connections -** seven options within the Kumeū-Huapai growth area, including Taupaki Road and Nelson Road upgrades.

Table 19 sets out the rationale for discounting options which did not proceed to the short list.

Table 19: Rationale for discarded arterial connection options

Arterial connections	Sub Option	Rationale
New arterial connections	Bridge connecting Herald Island to Greenhithe	Low strategic significance and demand.
	Sinton Road	The strategic SH18 bridge connection is confirmed to be included in the North West Rapid Transit project. Remaining route only has a collector function.
	Brigham Creek Road and new north-south connection	Related to Kumeū-Huapai alternative corridor so duplication.
Upgraded existing urban connections	Parallel route to Hobsonville Road, Wiseley Road, Luckens Road	Collector functions only. Might have cycling and walking significance.
Upgraded existing rural connections	Taupaki Road and Nelson Road upgrade (without Taupaki Station activated)	No strategic transport value if no direct connection to heavy rail.
	Fred Taylor Road east upgrade	Reallocation of existing corridor. No route protection required. To be considered as an extension of Hobsonville Road option.

6.2.6. Non-infrastructure

The following non-infrastructure options have been considered for the North West. These options are intended to support mode shift and provide equitable travel choices for all users.

- Local buses and connections to wider rural communities, including increased frequencies
- Behaviour change responses
- Pricing
- Technology.

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Table 20 sets out the rationale for progressing non-infrastructure options.

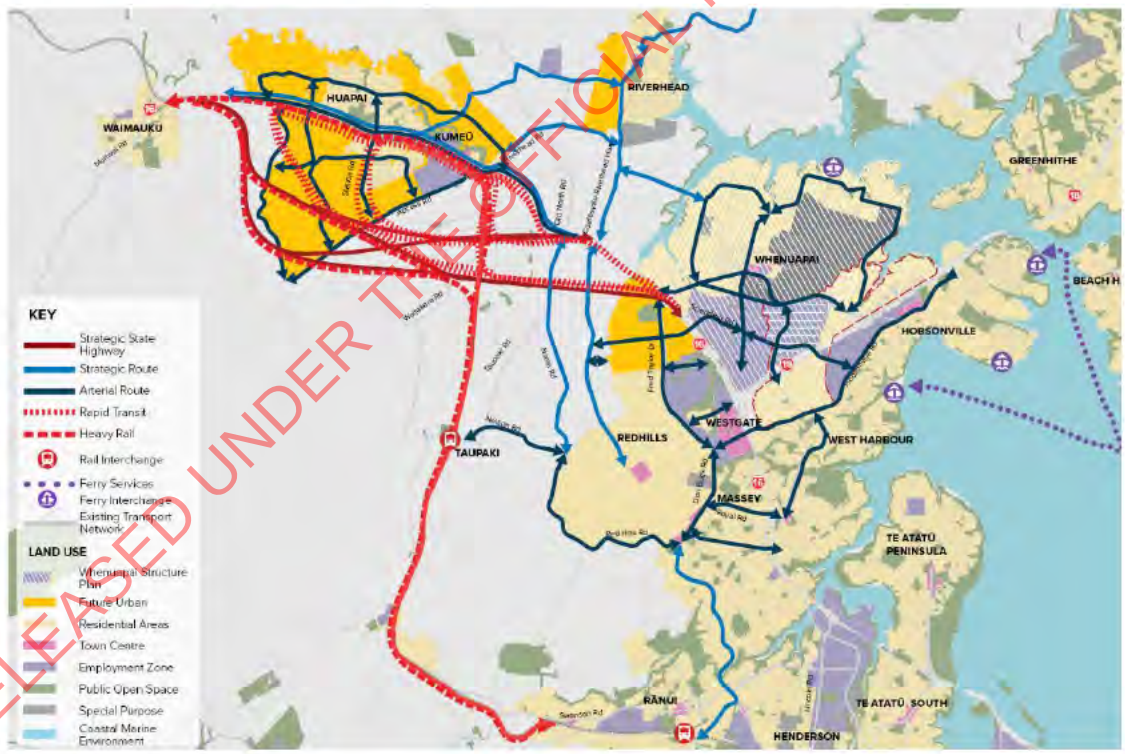
Table 20: Approach to progressing non-infrastructure options

Approach to non-infrastructure options	
Public transport network & services	Collaboration with AT Metro
Behaviour change	Supporting Growth programme-wide approach[22]
Parking strategy	AT study recommended
Pricing & technology	AT/ Transport Agency regional/national policy

6.3. Options short list

This section sets out the short list of options (shown in **Figure 51**), the reasons for selecting the recommended option and the rationale for discarding the remaining options. A summary of the elements is provided in **Table 21** . Each group of options is summarised below and the summary also includes feedback from key stakeholders and the public[23]. Partner feedback was captured in IBC workshops and incorporated into the MCA process.

Figure 51: North West short list options



[22] Appendix I: Travel Demand Strategy provides more detail of this.

[23] Feedback does not relate directly to all option components, as only key decisions were included in the public engagement material.

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Table 21: Options short list

Element	Options
Rapid Transit Network	• RTN alignments to connect Kumeū-Huapai – choice of six alignments • RTN alignments for heavy rail – choice of three alignments
Ferry	• Improvements to facilities and frequencies at West Harbour and Hobsonville • New ferry terminals at Whenuapai and Scott Point
Strategic State highway	• Choice of 4 alternative State highway corridor locations
Strategic sub-regional connections	• Coatesville-Riverhead Highway (two sections) • Kumeū-Huapai to Riverhead connections (choice of three alignments) • SH16 Main Road • Redhills to Kumeū-Huapai North-south connection (choice of two options) • Redhills to Rānui station • Riverhead to Whenuapai connection
Arterial connections	**Kumeū-Huapai** • North-south connections (4 options – Access Road, Station Road, Puke Road, Motu Road) • East-west connections (3 options – Main Road, Matua / Oraha Roads and central east-west alignments) **Whenuapai** • North-south connections (4 options – Trig Road, Tōtara Road, Kauri Road, Bristol extension) • East-west connections (4 options - Spedding east extension, Spedding west extension, Brigham Creek Road (with and without a local centre deviation) and Hobsonville Road. **Redhills** • North-south connections (2 options – Fred Taylor Drive and Don Buck Road) • East-west connections (7 options – Northside Drive extension (east and west extensions), Dunlop Road extension, Royal Road, Triangle Road, Red Hills Road, Nelson Road)

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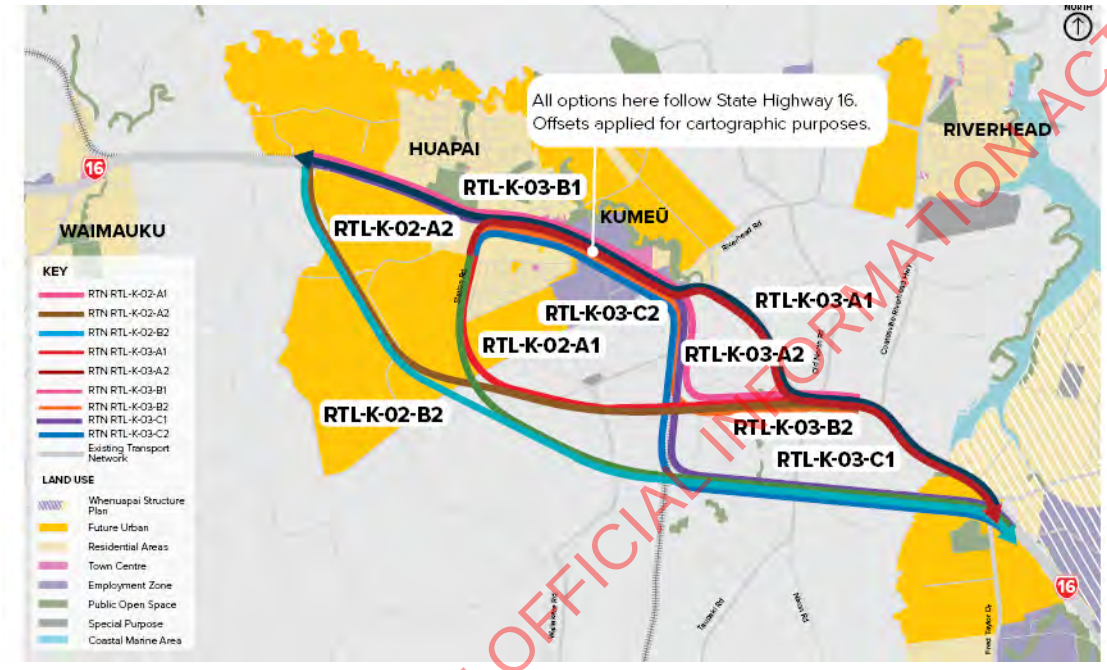
6.3.1. Rapid transit network

6.3.1.1. Rapid transit network – New alignment

Purpose

Step change in people-movement capacity through fast, frequent, high-capacity public transport services, separated from general traffic and free from congestion, to drive significant mode shift to public transport and improve access to economic and social opportunities. Options are mode-agnostic but have been designed to be capable of serving light rail or bus modes.



Need for rapid transit

Like the PBC, a rapid transit connection is recommended to connect Kumeū-Huapai with the wider RTN. This will result in a step change in the people-moving capacity of the North West with a corridor that provides high-quality, frequent and reliable access, supporting a significant mode shift for this growth area. The strategic rapid transit alignment balances the transport and urban development potential of the system and supports a key transport interchange at Westgate as well as unlocking access to economic and social opportunities.

The growth planned for Kumeū-Huapai is expected to increase vehicles on the existing network to around 60,000 vpd (on SH16 immediately west of Brigham Creek Road) and without any new infrastructure this will result in the existing network being significantly beyond capacity, particularly between Taupaki and Kumeū. The introduction of a rapid transit service will facilitate significant mode shift, increase travel choices and improve the resilience of Main Road (existing SH16). Rapid transit is also likely to accelerate and focus development around station locations. The RTN will improve access for the Redhills and Whenuapai communities and will connect with the proposed rapid transit corridor along SH18.

The Rapid Transit system needs to be able to:

- Cater for 60% of the demand in the peak hour (i.e. 2,000 people in the peak hour)

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- Morning peak rapid transit patronage of around 3,300 passengers is expected in 2046 from Kumeū-Huapai stations and 9,500 passengers from Westgate.
- Based on this and the above criteria, this would result in an LRT vehicle approximately every four minutes from Kumeū-Huapai, or a double decker every 1 to 2 mins. \
- Have sufficient capacity to ensure that people shouldn't have to stand more than 20 minutes. This is an AT guideline.
- To spread the load in each vehicle even if more capacity is added downstream, so that there is capacity downstream.
- To support the strategic direction set within the draft RPTP – specifically providing a minimum service level on the FTN and RTN of a service at least every 10 minutes (6am to midnight).

The RTN is predicted to attract significant patronage from the North West and, as an example is expected to move 16% of trips from the Kumeū-Huapai catchment. Bus services and a comprehensive walking and cycling network will connect Redhills and Whenuapai communities to the RTN.

Rapid transit alignment

Potential corridors were identified to carry rapid transit services between Brigham Creek Road and Kumeū-Huapai.

A key assumption underpinning this assessment is that the City Centre to North West RTN project will evaluate this rapid transit corridor in detail. Rapid transit investigations completed on this corridor in 2017 included a study area from the city centre to Brigham Creek Road (NW RTN IBC). An important reason for this was to enable access between Whenuapai and the SH16 RTN. The recommendations of the NW RTN IBC have been used as foundation assumptions for this IBC and as such the rapid transit alignment options in this IBC have been extended from Brigham Creek Road (i.e. Continuing along SH16 or deviating at Brigham Creek Road).

These corridors are mode-agnostic and can carry light rail or buses. Decisions regarding mode will be made as part of the City Centre to North West RTN study in 2019. The image above shows short listed rapid transit alignments.

Two broad alignments were tested, through the existing Kumeū-Huapai centre and through the middle of the southern Kumeū-Huapai FUZ. In addition, two connection points at Taupaki Road and Brigham Creek Road and three north-south connections were also considered to develop the recommended alignment.

Recommended alignment

The recommended rapid transit alignment departs the existing corridor at Brigham Creek Road, follows the existing rail line and then runs along Main Road (map reference RTL-K-03-C1). It is recommended to form part of a multi-modal corridor with the alternative State highway corridor and existing rail line, providing further economies of scale for construction and route protection. This extension to the RTN will be implemented following the completion of North West RTN to Brigham Creek Road, however in the interim additional public transport services in Kumeū and Riverhead will be required.

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Reasons for selection

- The rapid transit alignment is recommended to follow Main Road for the following reasons:
  - Catchment analysis shows that options following Main Road through the existing Kumeū-Huapai centre have the highest ridership potential for Kumeū-Huapai. This is because this alignment provides access to existing developments north of SH16, the existing centre (including employment) and future developments south of SH16 in the FUZ. This alignment is considered to provide the best opportunity for mode shift within Kumeū-Huapai. The route provides direct access to the existing centre and flexibility to serve a future local centre to the west, supporting further access to economic and social opportunities.
  - This alignment (map reference RTL-K-03-B1, B2, A1) is predicated on removing some existing traffic from Main Road (through complementary transport infrastructure), providing an opportunity to improve the amenity of the existing centre and better integrate land use and transport activities along this corridor. This also improves the reliability of sub-regional trips by separating them from local Kumeū-Huapai traffic.
  - The assessment shows that an alignment through the southern FUZ would not serve the existing population of Kumeū-Huapai as well as a Main Road alignment and could introduce further severance to the FUZ area.
- A Brigham Creek Road connection (map reference RTL-K-03-C1, C2) is preferred over Taupaki Road as this increases the resilience of the network through the provision of two movement corridors to Kumeū-Huapai, avoids the need for a very wide corridor between Brigham Creek Road and Taupaki Road to accommodate multiple modes and does not restrict access to existing properties between Brigham Creek Road and Kumeū-Huapai.
- The north-south connection following the alignment of the existing heavy rail line (map reference RTL-K-03-B1, B2) is preferred as it does not introduce further severance to the surrounding rural area or the future FUZ area.
- Bus services and a comprehensive walking and cycling network will connect Redhills and Whenuapai communities to the RTN.

In addition, as rapid transit vehicles typically travel at the speed of the adjacent road corridor, this partially segregated alignment provides the opportunity for the rapid transit service to achieve faster speeds in this offline section and improve the overall efficiency of the system. Modelling suggests that the offline section could achieve a travel time saving of around 1.5 minutes.

Stakeholder / public consultation feedback

Given the necessary integration with the City Centre to North West project, specific rapid transit alignments from Westgate to Kumeū-Huapai were not publicly consulted on. However, wider feedback on public transport was collated and considered (refer to Appendix H for further analysis).

- Responses gathered from the North West feedback form indicated a general view that public transport in the North West is currently poor and there was strong support for increased public transport provision in general.
- There was concern over the current level of service, travel times, and accessibility of public transport. There was also concern over the ability of the RTN to meet their needs for efficiency and frequency, and the timing and cost of implementation.

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- Public feedback indicated a strong desire for an immediate improvement to North West public transport services, particularly for Kumeū-Huapai and Riverhead. Given the lead times for all RTN options to Kumeū-Huapai, further investigation into interim public transport measures is recommended. More detail is provided in Section 6.5.4.
- Rodney Local Board feedback highlighted that more public transport is needed as a priority. Regarding mode, the Rodney Local Board is mode neutral, but considers a "mass transit system of some description (heavy rail, light rail, busway)" a priority. They also consider that the City Centre to North West light rail investigation should be undertaken as soon as practicable to integrate with the concurrent studies being completed by Te Tupu Ngātahi.
- The Henderson Massey Local Board supported the future proofing the north western route for light rail. It supports the delivery of the City Centre to North West light rail line this decade (2018-2028).
- The Stakeholder Reference Groups generally supported an RTN extension to the growth areas, and proposed options for walking, cycling and other public transport connections. Support for objective of mode shift to active/public transport.
- s9(2)(ba)(i) supported the integration of public transport and urban growth in the context of the wider the North West area, including RTN modes (e.g. heavy and light rail and bus services) and the integration of walking and cycling.
- The s9(2)(ba)(i) supported a mode choice of an RTN (i.e. heavy/light rail or bus), with a preference for an efficient mode choice.
- The s9(2)(ba)(i) supported the integration of light and heavy rail at Kumeū and a facility for a 'Park and Ride'.

Response: Rapid transit is to be progressed as part of the City Centre to North West RTN study and is planned for delivery in ATAP in the first decade. Further investigation of interim public transport services is recommended.

Issues for further consideration at DBC

- The recommended rapid transit alignment has been selected to best deliver a segregated, fast, reliable system. The alignment has been designed so that it is suitable for light rail as well as buses. Decisions regarding mode will be made as part of the City Centre to North West RTN study in 2019.
- s9(2)(g)(i)
- The rapid transit alignment is designed to be complementary to the alternative State highway corridor and a reduction of vehicles on Main Road is required to release space for the rapid transit system to minimise the width of the corridor.
- The additional RTN infrastructure will widen the existing SH16 / Main Road corridor, potentially increasing the width of physical severance in some sections of the corridor through the Kumeū-Huapai centre. This however is to be balanced against the step change in access to public transport, the development opportunities associated with the introduction of rapid transit, opportunities to improve pedestrian connectivity and the new function of Main Road as an arterial, which better supports access to the town centre. These collectively offer potential for an improvement in overall amenity for Kumeū-Huapai.
- The existing rail line adjacent to Main Road causes severance for the Kumeū-Huapai centre. Further significant improvements would be made to the amenity and vibrancy of the town centre if this rail line was relocated. This would reduce the width of the corridor, the need

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for property purchase and remove conflicts between local users and inter-regional rail services, including long freight trains. The relocation of the rail has been identified as an opportunity and could further improve safety along this corridor with the removal of level crossings and improve north-south permeability for residents to access core services, RTN and employment. The RTN would be designed to maximise pedestrian connectivity. This opportunity is discussed in Section 6.5.1.

- The existing rail line adjacent to Main Road causes severance for the Kumeū-Huapai centre. Further significant improvements would be made to the amenity and vibrancy of the town centre if this rail line was relocated. This would reduce the width of the corridor, the need for property purchase and remove conflicts between local users and inter-regional rail services, including long freight trains. The relocation of the rail has been identified as an opportunity and could further improve safety along this corridor with the removal of level crossings and improve north-south permeability for residents to access core services, RTN and employment. The RTN would be designed to maximise pedestrian connectivity. This opportunity is discussed in Section 6.5.1.
- Kumeū-Huapai is yet to be structure planned and exact land uses are still to be confirmed. As such the alignment of the rapid transit corridor west of Kumeū village may require refinement and there is an opportunity to closely integrate planned land uses with the RTN. This will be considered as part of the North West RTN SSBC.
- Station locations will also be defined as part of the North West RTN SSBC and will seek to maximise access to key destinations as well as promote good land use integration and adjacent urban development. This may include direct access to a new local centre west of Station Road.
- Park & Ride facilities will be required to complement the RTN. Locations will need to be considered in relation to AT's Park & Ride Strategy during the DBC stage and will depend on the outcomes from the North West RTN SSBC. It is expected that the locations will meet the AT high level principles that:
  - New park-and-ride facilities should be located at the periphery of the public transport network to avoid the congestion effects of additional car travel.
  - New park-and-ride facilities are most effective in areas that are car-dependent with minimal alternatives to access quality public transport services. These areas tend to be on the urban periphery where a bigger positive investment impact is possible as land is cheaper.
  - Demand to be managed via pricing to enable the allocation of bays to those with a need to drive to public transport and enabling some cost recovery.
  - As surrounding land is developed and land value increases over time, the opportunity to redevelop park-and-ride land becomes possible.
- There is an opportunity to align a strategic walking and cycle facility with the RTN alignment.
- Additional consideration of the urban environment will be required with respect to the interaction with local intersections such as Access Road and Station Road to improve access and safety for north-south connections for active modes. This will build on works currently being undertaken by AT at these locations. Integration with the adjacent heavy rail line will also need to be addressed.
- The RTN will also connect to the proposed rapid transit corridor on SH18, also improving access for Whenuapai and Redhills. Bus services and a comprehensive walking and cycling network will connect Redhills and Whenuapai communities to the RTN.

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- Prior to the extension of the RTN to Kumeū, implementation of a new interim bus service will be required. This may include higher frequencies, express services, bus shoulder running and bus priority measures.

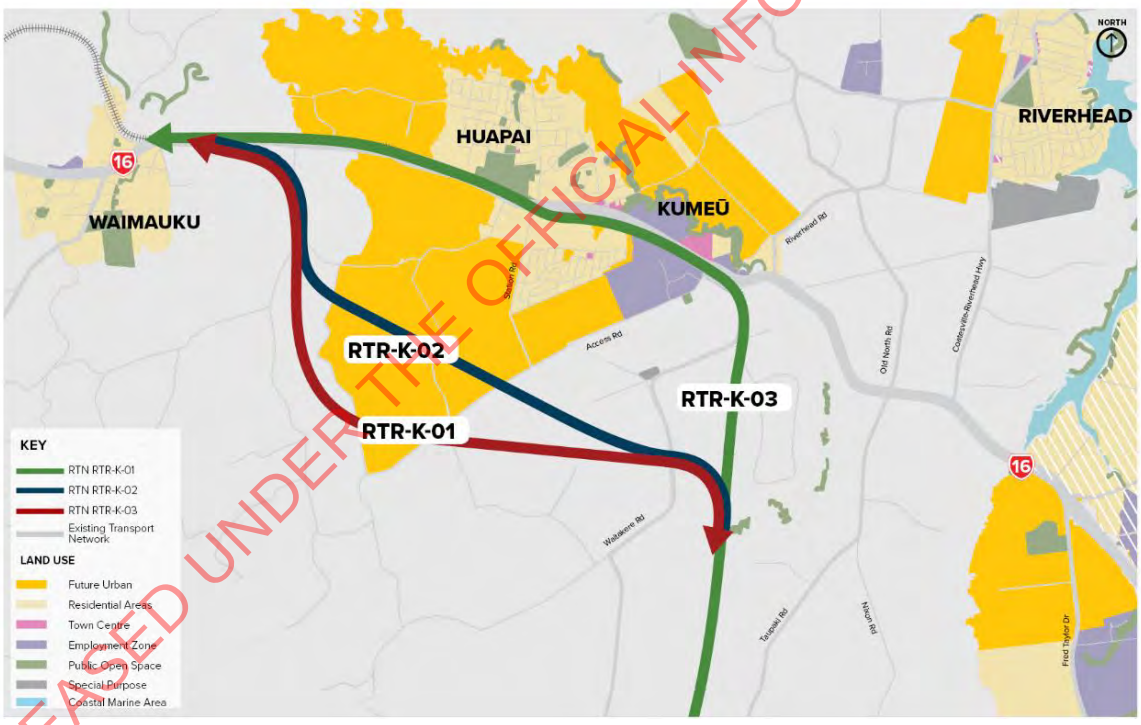
Summary

This option is integral to the significant mode shift required to support the planned growth in the North West, and is therefore part of the recommended network. It makes a significant contribution to travel choice and access investment objectives and is itself a strategic connection for public transport.

The location of the RTN has been selected so that it is suitable for light rail as well as buses and provides an opportunity to integrate with land uses, unlocking urban development potential and improving access to economic and social opportunities.

6.3.1.2. Rapid transit network – Existing rail infrastructure

Purpose: Provide travel choice for the North West. Use of existing RTN assets



Option assessment

The re-introduction of passenger rail services to Kumeū-Huapai has been assessed for both short-term and long-term applications in the recommended network. Currently no passenger rail services operate north of Swanson and the rail line is not electrified. The image above shows short listed rapid transit rail alignments.

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Short term implementation

In the short term, passenger rail services could improve interim travel choices for Kumeū-Huapai using existing infrastructure. However, investigations have concluded that a diesel passenger rail shuttle service from Swanson is not preferred due to slower travel times and required transfers at Swanson. The single track would also limit frequencies given the inability to pass on the single track. Double tracking (or passing loops), an upgrade to the Waitākere rail tunnel and potentially electrification would be required for an interim service that operates at an attractive frequency and accommodates both passenger and freight services. s9(2)(i) and s9(2)(g)(i)

Long term implementation

In the long term, projected public transport (PT) ridership does not support both rail and another rapid transit mode. Modelling shows demand of approximately 2,000 passengers in the morning peak period for passenger rail services. This is substantially lower than the alternative rapid transit mode, with approximately 3,300 passengers. A combination of both modes results in approximately 3,600 passengers, which is only slightly more than rapid transit alone for significant additional investment. Therefore, the combination of rapid transit modes splits demands rather than significantly increasing mode share and the inclusion of rail does not achieve the best outcome for mode shift.

In addition, the heavy rail alignment does not directly serve key North West destinations at Westgate and Whenuapai, which make up a large proportion of the trips from Kumeū-Huapai. Heavy rail is around 35% slower than the planned rapid transit connection to the city centre via SH16 (just over one hour, compared with 45 minutes) even after the City Rail Link project is operational. The destinations of Henderson and New Lynn can be accessed from the SH16 rapid transit line via the FTN at Westgate and Lincoln Road.

As identified in the problem statements, the existing rail alignment (map reference RTR-K-03) bisects the Kumeū-Huapai growth area and it severs the land uses to the north and south with very limited opportunities available to cross the rail line. This is an unfavourable outcome as it significantly constrains local connectivity, impacts the vibrancy of the town centre and has safety implications with existing level crossings. Infrastructure that crosses the rail line is required to be future proofed for triple tracking which adds complexity and costs to all intersection upgrades along this section of SH16 and further exacerbates access issues. It is expected that the frequency and length of trains on this section of the line will increase, increasing delays experienced at level crossings and potentially also increasing safety risks.

On balance, with lower predicted patronage than the RTN (due to longer travel times and origin and destination demand patterns), limited ability to service the wider growth area including Whenuapai and the metropolitan centre at Westgate, and implications on local town centre amenity from double tracking, passenger rail services are not included as part of the recommended network.

Stakeholder / public consultation feedback

Around 37% of respondents mentioned passenger heavy rail specifically. The key themes from this feedback included:

- Support to utilise and upgrade existing rail infrastructure (double tracking, tunnel widening and electrification) as soon as possible, to service the North West growth areas. This was considered an opportunity for quick and cost-effective improvements.

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- Accessibility to rail was needed from a range of destinations via feeder buses to train stations; and
- Park and ride facilities are required at stations to also facilitate accessibility.
- Those that did not support passenger rail services said that it was infrequent, much slower compared to driving, and too expensive to implement, as there are not enough people using the service.
- The s9(2)(ba)(i) supported provision of a short-term public transport option, such as heavy rail passenger services from Swanson. They also requested that options were designed for a range of physical abilities.
- The s9(2)(ba)(i) declared support for the integration of light and heavy rail at Kumeū, and a desire for a Park & Ride facility.
- The PTUA supported the provision of passenger heavy rail services to Kumeū-Huapai.
- The Rodney, Upper Harbour and Henderson-Massey Local Boards were generally supportive of the proposed public transport network and its integration with land use. Heavy rail passenger service was not specifically raised in any of the written feedback received from Local Boards.

Refer to Appendix H for further analysis.

Response: Passenger rail will not be progressed as part of this recommended network. Opportunity identified to explore interim express bus services.

Issues for further consideration

- The Ministry of Transport is due to release the Northern Freight Study in early 2019 and this IBC will need to align with the outcomes. We understand this report is likely to recommend a single freight line with increased off peak services using longer trains.
- The potential increase in freight movements on the existing rail line may exacerbate the existing severance and safety effects on Main Road. As such there is an opportunity to consider the relocation of the freight rail line to align with the alternative State highway corridor to create a multi-modal corridor. The opportunity in relocating this infrastructure to alignment RTR-K-01 or 02 is that some land within the existing rail corridor (RTR-K-03) could be reallocated for a rapid transit solution that is more permeable in form and function. Alternatively, it could also allow for greater urban development adjacent to Main Road to support the activation of the Kumeū-Huapai corridor as a main arterial.
- An alternative bus based interim public transport option could be investigated to provide travel choice prior to the implementation of the RTN.

Summary

Due to the current rail alignment not serving the wider catchment area of Whenuapai and lower predicted demands due greater travel times and misalignment with key destinations, reactivation of passenger rail services is not included as part of the recommended network.

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6.3.2. Ferry

Purpose

Additional travel choice for the North West, provides resilience for public transport users.

Option assessment

Four ferry terminal locations were assessed:

- West Harbour (FI-01)
- Hobsonville Point (FI-02)
- Scott Point (FT-01)
- Whenuapai (FT-03)

The existing catchment and future density of adjacent development supported the ferry services at Hobsonville Point and West Harbour. These locations offer an attractive travel time to the city centre, are complementary to other public transport services and have potential for strong bus and active mode connections. Improvements to these services would further enhance the IBC objectives of access to employment opportunities and support mode shift and travel choice.

A new ferry location at Whenuapai was not progressed due to insufficient forecast demand, high travel times and significant environmental impacts in a sensitive marine environment. A new terminal at Scott Point was also discarded due to competing demand with adjacent ferry terminals and significant potential environmental impacts.

Therefore, the recommended network includes provision for increased services at West Harbour and Hobsonville and infrastructure improvements at the terminals to enhance PT and active mode access, such as secure cycle parking facilities and bus stopping facilities.

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Stakeholder / public consultation feedback

- In general, the overall direction given to us by the public, was that there was preference for upgrading existing terminals and increased frequencies and off peak / weekend services, rather than creating new ferry terminals.
- Importance of integrating the ferry timetable with other modes of transport (e.g. park and rides, walking/cycleways, bus/train timetables).
- The Upper Harbour Local Board support the proposed public transport network, including the increased investment in ferry services.

Refer to Appendix H for further analysis.

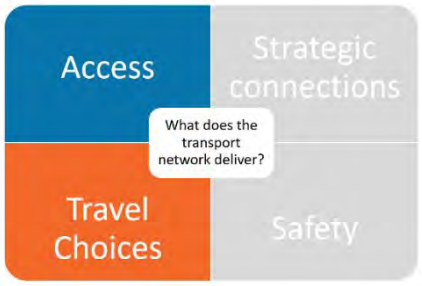
Response: Increased ferry services are part of the recommended network.

Issues for further consideration at DBC

- The support from the existing catchment creates an opportunity for an initial increase in ferry services to encourage change in travel behaviour prior to the growth in Whenuapai.
- Review of potential capacity constraints at city centre ferry terminals, as part of wider AT Ferry Strategy. Includes any associated CAPEX cost with providing for the recommended increased frequency in services from Hobsonville and West Harbour.
- Increased OPEX costs within the current funding envelope

Summary

West Harbour and Hobsonville ferry terminal and service upgrades are part of the recommended transport network. The options contribute to the investment objectives to improve travel choice and access to economic and social opportunities.



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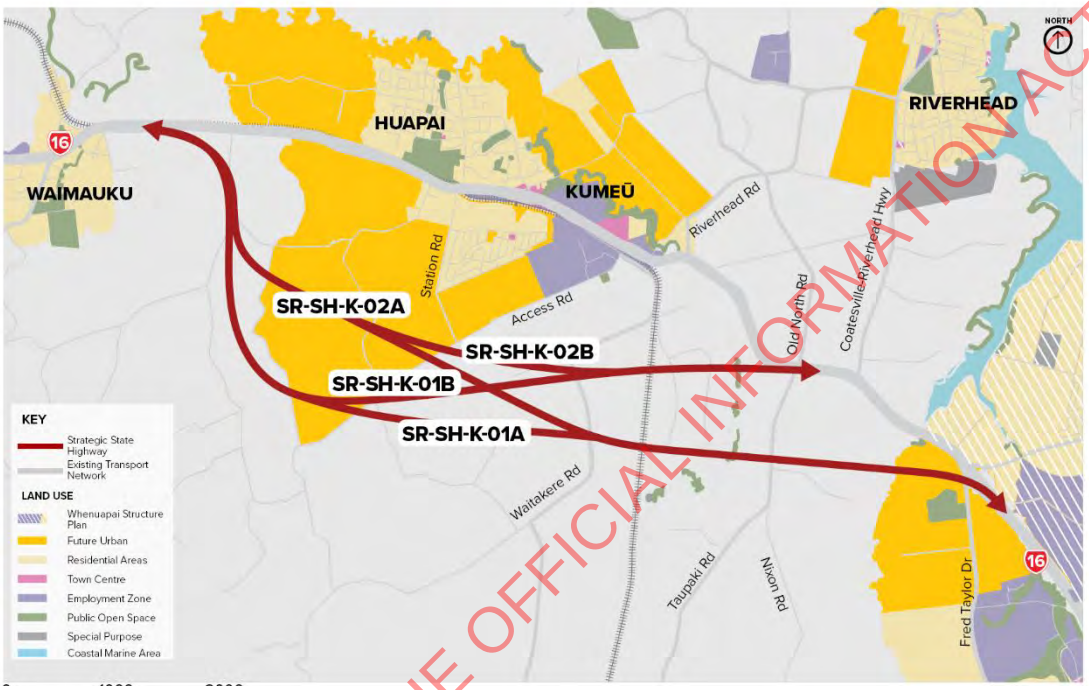
6.3.3. Strategic State highway

6.3.3.1. Alternative State highway - Kumeū-Huapai

Purpose

To improve land use integration in the Kumeū-Huapai town centre by providing an alternative strategic route for longer distance regional and sub-regional connections. This will reduce traffic, providing an opportunity to activate the town centre, enable rapid transit and improve the resilience of the network.



As previously discussed, the option to retain the State highway on its current alignment on SH16 was not progressed at the long list stage due to:

- Significant congestion (modelled forecast up to 60,000 vpd west of Brigham Creek Road by 2046)
- Lack of resilience with only one road serving Kumeū-Huapai
- Poor urban design outcomes for the town centre including reduced amenity, further reduced access and increased severance from a wider road corridor and higher traffic volumes
- Reduced ability for the State highway to integrate with RTN.

This section therefore focuses on the development of an alternative location for the State highway. Four options were assessed, two with a Brigham Creek Road connection and two with a Taupaki Road connection:

- Brigham connection - southern location (SR-SH-K01A)
- Brigham connection- central southern location (SR-SH-K02A)
- Taupaki connection - southern location (SR-SH-K01B)
- Taupaki connection – central southern location (SR-SH-K02B).

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Option assessment

Options were considered and assessed on their ability to remove sub-regional trips from the existing SH16 / Main Road corridor to better enable rapid transit and reduce potential corridor width on SH16.

Removing traffic from SH16/Main Road (approximately 35,000 vpd) enables this corridor to function as an arterial road (estimated volume of 9,000 – 14,000vpd) enhancing local access to employment and core services. It also reduces conflict between freight and local traffic and improves resilience and travel time for all sub-regional traffic by providing less friction from property access and intersections. Both options provide controlled access to the current Kumeū-Huapai business area, southern FUZ area and connect with the proposed north-south connection to Redhills.

General location

Two broad locations (southern and central southern) were assessed, both of which deliver a resilient outcome. The most southern position (SR-SH-K01A & B) for this connection is recommended as it creates the least severance within the southern FUZ zone, retains access to employment opportunities via the arterial network and supports the urban form and integration of land use and rapid transit along Main Road in Kumeū-Huapai.

Connection point

Both Brigham Creek Road and Taupaki Road were considered as connection points with the existing SH16 corridor. Brigham Creek Road (SR-SH-K01A & 2A) is the recommended connection as it allows integration with a full motorway interchange at Brigham Creek Road, reduces the requirement for property access onto the State highway and creates additional space between Taupaki and Brigham Creek Roads for public transport priority if required. It is considered more resilient than a Taupaki Road connection as it connects via an interchange rather than a potential five-leg intersection with Taupaki Road, existing SH16 and Old North Road.

Recommended option

The recommended option is the southern position with a Brigham Creek connection (SR-SH-K01A). Overall the southern route increases the resilience of the transport network and ultimately improves safety for active modes by reducing traffic volumes along the existing SH16 / Main Road. The option also complements the proposed rapid transit route allowing for a multi-modal section at the eastern end of the alternative corridor to improve efficiency and value for money.

Stakeholder / public consultation feedback

- In general, information provided on feedback forms indicated strong support for the alternative corridor to be implemented as soon as possible, with a clear desire for some connections into Kumeū-Huapai to be retained. Key themes included:
  - Strong preference to connect from the Brigham Creek Road interchange, with a mixed view on whether the alternative corridor should pass through the centre or further south of the FUZ
  - Congestion was the main issue raised, in terms of the existing problem and the potential to reduce congestion with the right combination of options. Other concerns included: population growth (i.e. that infrastructure is in place before further land use development), and implications for owners of property located along the alternative corridor route.

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- Some respondents were concerned that the new corridor would create further severance. The s9(2)(ba)(i) indicated great interest in the timing and staging of Kumeū-Huapai projects such as the alternative corridor. Concerns were raised over the impact of traffic reductions on local businesses before population growth occurs. In general, s9(2)(ba)(i) were in favour of an alternative state highway corridor with upgrades to Access Road and Station Road to reduce congestion pressure and enable a more vibrant town centre. Some concerns were expressed regarding accessibility for staff and customers and the implications of this for businesses.
- The Upper Harbour Local Board were supportive of strong connections to the wider North West transport network.
- The Rodney Local Board considered that the Kumeū-Huapai alternative corridor should be prioritised.
- The s9(2)(ba)(i) provided written feedback which focussed on the alternative corridor. They sought a fast decision on the option, with a preference for a four-lane connection from Brigham Creek Road to just west of Foster Road in Waimauku.

s9(2)(ba)(i) were generally supportive of the proposed transport options and sought that land is designated for future infrastructure as soon as possible.

Refer to Appendix H for further analysis.

Response: The recommended network includes the alternative State highway connection with connection to the town centre via Access Road. Timing will be considered in more detail during DBC phase, but consideration will be given to measures designed to retain town centre vibrancy.

Issues for further consideration at DBC

- The timing of the new alternative State highway corridor is likely to be after the introduction of the RTN. Therefore, interim measures to support mode shift to reduce vehicle traffic on SH16 / Main Road and at the Brigham Creek Road interchange should be explored.
- The design of the alternative State highway corridor will be undertaken in later stages, however, to maintain its dual function, it is critical that intersections with this option are restricted to locations that support key strategic transport links and provide primary access to the Kumeū-Huapai FUZ. It is not intended that every local road will have access onto this strategic link.
- Development of this option requires ongoing discussion with the community of Kumeū-Huapai so that disruption to business is minimised.

Summary

This option is necessary to provide for strategic traffic movement, support the implementation of rapid transit in Kumeū-Huapai and to allow regeneration of the urban form in Kumeū-Huapai. The southern option reduces severance of the FUZ and a connection at Brigham Creek Road best provides for a resilient network.

It is therefore a key component of the recommended network and contributes to all four objectives.

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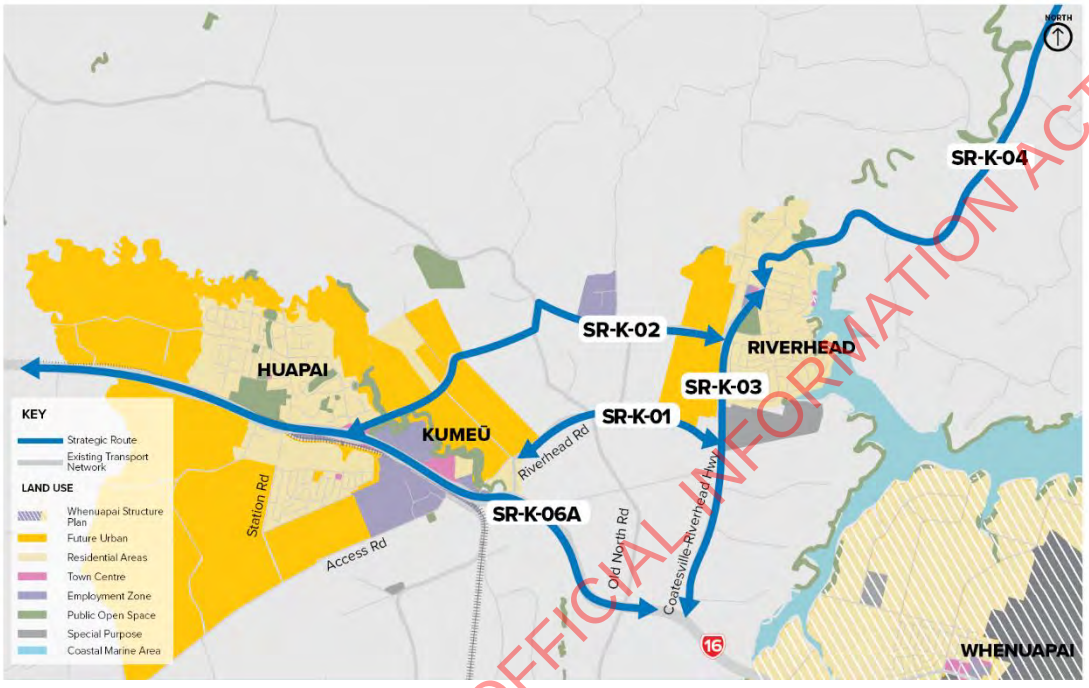
6.3.4. Strategic sub-regional connections

6.3.4.1. Strategic sub-regional connection – Kumeū-Huapai and Riverhead

Purpose

To better enable sub-regional connections, improve resilience and improve access to social and economic activities.



Option assessment

Coatesville-Riverhead Highway – South of Riverhead to SH16 (SR-K-03)

This option is considered a strategic connection for the Riverhead community to access the future RTN and SH16. The link does not have the catchment to support rapid transit, so it is critical that this road provides a high-quality connection to enable bus and active modes to reach the rapid transit network and support mode shift. The improvements would support resilient access for the interregional trips from Dairy Flat to reach the SH16 network. The road is currently rural, and this upgrade would include some urbanisation of its current form which would improve safety for cyclists.

Given this existing corridor can be upgraded to meet future requirements, no alternative alignments were considered for this section of Coatesville-Riverhead Highway.

Coatesville-Riverhead Highway – North of Riverhead to Dairy Flat (SR-K-04)

A northern alternative to SR-K-04 was discarded at long list due to potential environmental impacts and no requirement for further capacity. Therefore, one option was considered for this section of Coatesville-Riverhead Highway.

This section of the road does not require upgrade for capacity purposes with approximately 9,000 vpd forecast to use it. Due to the limited growth adjacent to the corridor, a bus priority scheme was not considered necessary along the corridor. Equally, the proportion of active mode users was expected to be low given the large distance between destinations.

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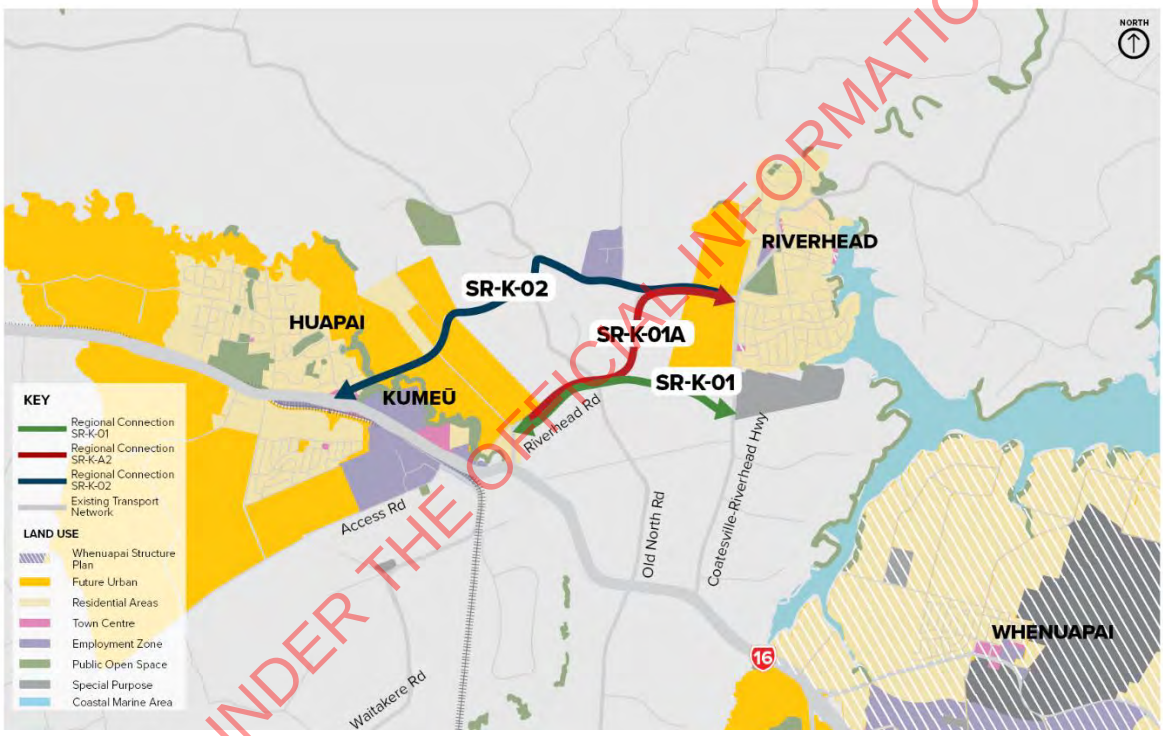
However, this section has a medium-high collective risk rating. Traffic volumes and therefore exposure risk is expected to increase as a result of growth in both Riverhead and Dairy Flat. Safety improvements are therefore recommended.

Kumeū-Huapai to Riverhead connection (SR-K-01 & SR-K-02)

This link is a critical walking and cycling connection between growth areas, particularly as the Riverhead community will rely on many key town centre facilities in Kumeū-Huapai. Two alignments were initially considered, both with similar access advantages with varying degrees of topographical challenge. Following public engagement, a third hybrid alignment (SR-K-01A) was developed which combined the flattest topography of the two routes. This was assessed as the optimum route as it best used existing infrastructure, provided an environment to support active mode travel (and thus mode shift) and connected to the local centre thus improving access to economic and social opportunities. This hybrid alignment supports the Rodney Greenways plan which identifies this route as a future dedicated cycleway.



Main Road (SH16) - (SR-K-06A)

This option considered the reduction of hierarchy of Main Road from its current sub-regional State highway function to a strategic sub-regional arterial corridor. A separate option in Section 6.3.5.1 assessed Main Road for an arterial function (AR-K-07).

Traffic modelling shows that with the future RTN and the alternative State highway corridor in place, traffic volumes of 9,000-14,000 vpd might be expected on Main Road. This is a reduction of between 9,000-21,000 vpd[24] if these improvements were not provided. Only limited bus priority will be provided on this route as this would otherwise duplicate the function of the RTN and this therefore

[24] Traffic volumes vary along the corridor between Brigham Creek Road and Station Road

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reduces the strategic requirement for Main Road. Existing property accesses along the corridor need to be retained which conflicts with the proposed strategic function. Therefore, maintaining strategic function was not included in the recommended network.

Stakeholder / public consultation feedback

- In general, information provided on feedback forms indicated strong support for connections between Riverhead and Kumeū-Huapai, however there was preference for using the existing network where possible.
- Support for Coatesville Riverhead Highway south of Riverhead to improve connections to SH16 and the proposed rapid transit network.
- Support for investigation into safety improvements along Coatesville Riverhead Highway north of Riverhead.
- Public feedback showed a desire for an improved bus service for Riverhead and showed interest in park and rides to support public transport.
- The Rodney Local Board considered that more public transport is needed as a priority.

Refer to Appendix H for further analysis.

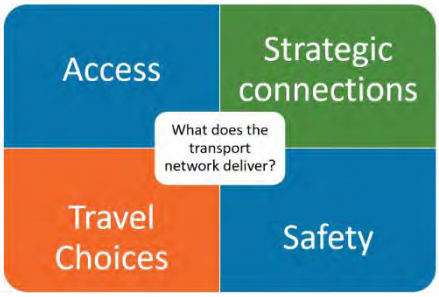
Response: The recommended network includes upgrades to Coatesville-Riverhead Highway south of Riverhead. Safety improvements on Coatesville-Riverhead Highway north of Riverhead are also included. The Kumeū-Huapai Riverhead link was revised to provide a hybrid option along Riverhead Road.

Issues for further consideration at DBC

- Prior to the implementation of rapid transit services, there is an opportunity to improve local Riverhead bus services that could include express services to the city centre and increased peak hour frequencies.
- Services that travel through Riverhead are currently being investigated as part of the Rodney Local Targetted Rate programme. These would unlikely be express but would provide access to services from Westgate.

Summary

Two strategic arterial corridors are recommended for Kumeū-Huapai and Riverhead growth areas:



- Coatesville-Riverhead Highway south of Riverhead to provide access for the growth area to the future rapid transit network.
- Riverhead Road to form the strategic connection between Riverhead and Kumeū-Huapai to provide a strong local connection between growth areas, linking Riverhead with Kumeū-Huapai social and business infrastructure. This includes the provision of walking and cycling facilities.
- Safety upgrades to Coatesville-Riverhead Highway are also included.
- Main Road is not recommended as a strategic connection. With the introduction of the recommended network, it will become an arterial corridor.
- The Kumeū-Huapai strategic connections collectively address all four objectives

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6.3.4.2. Strategic sub regional connections – Whenuapai and Redhills

Purpose

To better enable sub-regional connections, improve resilience and improve access to social and economic activities.

Option Assessment

Four types of connections are assessed:

- North-south connection (SR-R-01 and 02)
- Connection between Riverhead and Whenuapai (SR-R-03)
- Connection between Redhills and Rānui train station (SR-R-04)
- North-south connection (SR-R-01 & SR-R-02)

A north-south connection is considered important to provide access between the Redhills, Kumeū-Huapai and Riverhead growth areas, and for the onward strategic connections with Helensville and Dairy Flat. The connection would also reduce pressure and provide further resilience to SH16 and provide an opportunity for bus services to connect Redhills, Kumeū-Huapai and Riverhead.

Two alignments were tested for this strategic connection:

- Existing Taupaki Road / Nixon Road with a connection at Taupaki Road (SR-R-01)
- New alignment connecting at Coatesville-Riverhead Highway (SR-R-02)

Traffic modelling for the options showed that Taupaki Road could expect up to 18,000 vpd (south of the alternative State highway corridor). The new north-south alignment was forecast to carry around 12,000 vpd with the existing Taupaki Road also carrying 12,000 vpd, which totalled 24,000 vpd for both the North-south corridors. Overall, a new alignment potentially attracted more combined demand so Option SR-R-02 would still necessitate a rural road upgrade for Taupaki Road and Nixon

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Road. Therefore, Option SR-R-02 would require upgrades on two routes for the same connection outcome.

The new alignment would also cross many streams and some challenging topography, having potentially adverse environmental impacts. s9(2)(ba)(i)

The form of the intersection of the new north-south alignment with the proposed alternative State highway corridor will be confirmed through detailed design but given the complexity of the multi-modal State highway corridor, may require grade separation. The Taupaki Road connection provides the greatest flexibility for design due to its location further west, away from the complex Brigham Creek Road interchange.

A connection point at Taupaki Road is recommended over Coatesville-Riverhead Highway as it separates Helensville traffic via Old North Road and Dairy Flat traffic via Coatesville-Riverhead Highway. This reduces the amount of traffic going through the centre of Riverhead, better supporting the development of the local community and providing resilience to the network.

Taupaki Road has been identified in the Rodney Greenways plan as a dedicated cycleway and the upgrade to Taupaki Road will support this aspiration with improved cycleway infrastructure.

Utilising the existing road corridors of Nixon and Taupaki Roads minimises impacts on surrounding land parcels and enables the continuation of the existing rural land use. Establishing a new north-south corridor through the rural landscape bisects many rural properties creating residual parcels east of the new corridor due to the general east-west orientation of the existing land parcels. The majority of the new land parcels generated by this option would be less than the minimum parcel size for the Rural - Countryside Living Zone and the rural viability of the land could therefore be challenged resulting in increased pressure to move the RUB.

The north-south alignment on Taupaki Road / Nixon Road (SR-R-01) is the recommended option due to the efficient use of existing infrastructure, more resilient strategic connections and better integration with the future Brigham Creek Road interchange.

The wider effects of upgrading the North-south connection to connect Kumeū-Huapai with Redhills has been considered. Although Old North Road remains outside the FUZ, its traffic volumes increase as a result of increased demand from the upgraded north-south connection on Taupaki Road. Old North Road has an existing high collective and personal risk rating, and this is likely to worsen with additional traffic associated with growth. As a result, complementary safety improvements are recommended on this corridor.

Riverhead to Whenuapai connection (SR-R-03)

This connection provides access for Riverhead to the employment opportunities in Whenuapai. The connection would cross a sensitive marine area with potentially significant environmental and construction impacts. The traffic modelling showed potential flows of around 10,000 vpd, coming from Riverhead and locations further north such as Helensville. However, with the introduction of the RTN and alternative State highway alignment, the traffic between Coatesville-Riverhead Highway and Brigham Creek Road would be greatly reduced and this new link would essentially be a duplicated movement. The alignment was also considered for cycling and walking only but was a significant cost for a low to moderate active mode demand and was therefore not considered viable. This option was

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not included in the recommended network. No alternatives were considered for this connection as the existing SH16 corridor already provides the same function.

Connection from Redhills to Rānui Station (SR-R-04)

An alternative option for connection to Swanson Station was discarded at long list. This connection from Redhills to Rānui station considered the upgrade of Don Buck Road to provide a high-quality bus service to the metro rail station. Due to its surrounding catchment, including key social infrastructure such as Massey High School and high density THAB residential zoning, it scored well for its transport connection. However, significant impacts on the landscape and visual aspects of the corridor, constructability and property requirements were identified. This option was therefore not included in the recommended network.

Stakeholder / public consultation feedback

- There is a close division in public opinion for the two North-South connection options.
- Mixed public opinion in relation to the upgrade of Don Buck Road to Rānui Station. There was some public support to upgrade this route, including providing walking and cycling facilities. Although some respondents noted that accessing Henderson (Sturges) Train Station was preferential to Rānui.
- Strong support for the Riverhead to Whenuapai connection, although mixed opinion in relation to mode use. There were concerns over the ecological sensitivities of the area and questions over whether this link could be established while protecting these values.

Refer to Appendix H for further analysis.

Response: The recommended network includes the north-south arterial using Taupaki / Nixon Roads.

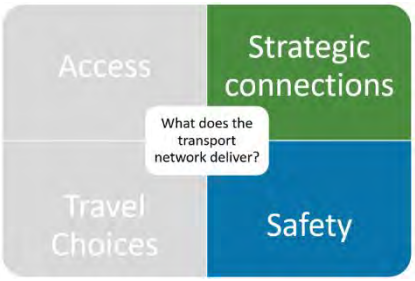
Issues for further consideration at DBC

- Form of north-south arterial / alternative State highway corridor intersection. Consideration of a Riverhead rapid transit station adjacent this location.
- Consideration to increase the cross section of Taupaki Road to four lanes between the alternative State highway corridor and Main Road to support operational and capacity requirements.

Summary

The north-south arterial via the existing Taupaki Road and Nixon Road route is recommended to address strategic connections and safety objectives

Safety improvements to Old North Road are recommended as existing safety problems are likely to worsen as a result of growth, if no intervention is provided.



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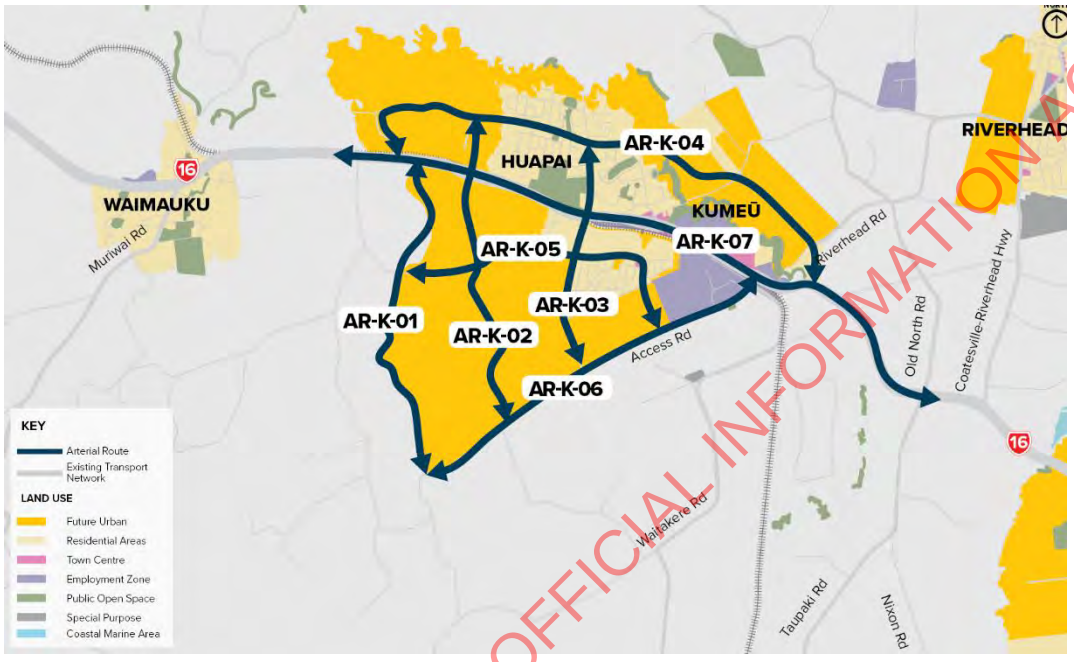
6.3.5. Arterial connections

6.3.5.1. Arterial connections Kumeū-Huapai

Purpose

To better enable access to the RTN and new alternative State highway corridors, support bus and active modes and improve access to social and economic opportunities

Option Assessment



North-south arterials

Four north-south arterials were assessed as part of the future arterial network. These were:

- Access Road (AR-K-06)
- Station Road (AR-K-03)
- Puke Road (AR-K-01)
- Motu Road (AR-K-02)

Access Road (AR-K-06) plays a key role in connecting the existing and likely future business zones to both the RTN and the alternative corridor which is particularly important for freight vehicles. It is forecast to carry approximately 20,000 vpd. It is aligned along the south eastern boundary of the southern FUZ, providing an opportunity for an enhanced collector network to connect to it, whilst reducing additional severance effects within Kumeū-Huapai.

Station Road performs a similar function and would provide a central integrated multi-modal corridor for the growth area and enable connectivity between southern and northern residential catchments.

The other two arterial corridors on Puke and Motu Roads are located to the west of the growth area. As Kumeū-Huapai has not been structure planned, there is some uncertainty relating to future land use, future rapid transit station locations and location of a new local centre. At this stage there is no clear justification for a third arterial spine and these roads have not been included in the

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recommended network. It is recommended that the function of these roads be considered in the structure planning process.

East-west arterials

Three east-west arterials were assessed as part of the future arterial network:

- Main Road (AR-K-07)
- Matua/Oraha Road (AR-K-04)
- Central east-west (AR-K-05)

The arterial function of Main Road (existing SH16 from Brigham Creek Road to Kumeū-Huapai) plays an integral role in supporting the development of the RTN through a reduced road hierarchy, potential for enhanced walking, cycling and crossing facilities and maintaining the dual function of moving people and providing property access. It enables better integration with the town centre reducing severance. It is therefore included in the recommended network. Only minimal physical improvements are recommended for SH16 / Main Road between Kumeū and Brigham Creek Road (excluding the Brigham Creek interchange) as the Safe Roads Alliance project is recommending provision of a shared path, central median and additional traffic lanes between Brigham Creek Road and Taupaki Road.

Matua / Oraha Roads (AR-K-04) and central east-west alignments (AR-K-05) were not progressed as they did not have a direct function to connect to the RTN or alternative State highway corridor. Instead they both perform a collector function to distribute local trips within Kumeū-Huapai. Matua Road is also adjacent to recently developed land with significant property access requirements.

Stakeholder / public consultation feedback

- General support for selected north-south and east-west arterials to be undertaken as soon as possible.
- Through public feedback, there was seen to be a desire for safety improvements (including safe providing walking and cycling facilities with connections to stations) and on the wider rural network including Old North Road.
- The Rodney Local Board reiterated that the community had provided feedback that the current traffic in Kumeū-Huapai is congested and plans should be made for an alternate corridor as a priority and that current roads require safety improvements and better pedestrian and cycling facilities and more public transport is needed as a priority.
- In general, the s9(2)(ba)(i) were in favour of upgrades to Access Road and Station Road to reduce congestion pressure and enable a more vibrant town centre.

Refer to Appendix H for further analysis.

Response: safety improvements to be provided on Old North Road. Consideration will be given to a range of interventions including speed management and alignment improvements.

Issues for further consideration at DBC

- s9(2)(g)(i)

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Summary

Main Road is recommended to be reduced from a State highway to an east-west arterial to improve severance, support the implementation of the RTN and improve the urban form of the existing town centre. This addresses all four objectives

Access Road and Station Road are included in the recommended network to provide north-south multi-modal access to either the RTN or the alternative State highway alignment and primarily contribute to access and travel choices. Improvements will build on works currently planned by AT at these locations.

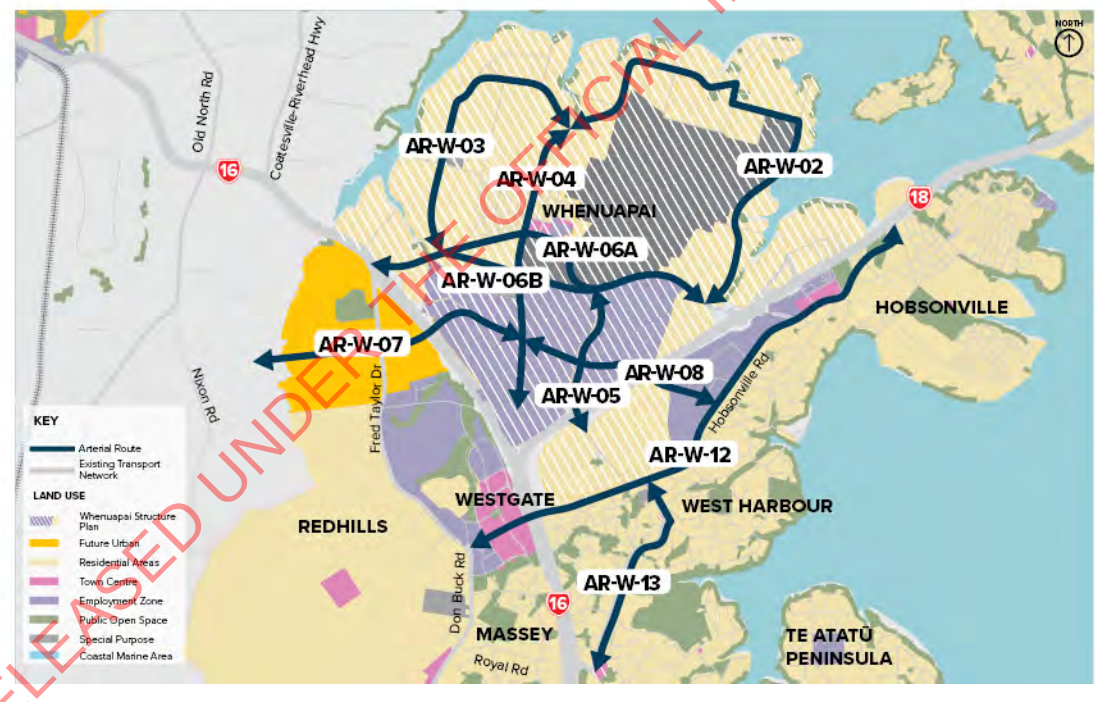
Safety improvements are recommended on Old North Road.

6.3.5.2. Arterial connections – Whenuapai

Purpose

To better enable access to the RTN and State highway corridors, support bus and active modes and improve access to social and economic opportunities

Option Assessment



North-south arterials

Four alignments for north-south arterials were assessed in the short list:

- Kauri Road (AR-W-02)
- Tōtara Road and Māmari Road (AR-W-04)
- Bristol Road extension (AR-W-03)

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- Trig Road (AR-W-05)

As the strategic Riverhead to Whenuapai link and Whenuapai ferry terminal did not proceed as part of the recommended network, the northern section of Whenuapai remains focused on people-movement towards the RTN and strategic SH16/SH18 network.

The roads north of Whenuapai village (Kauri Road (AR-W-02), Tōtara Road (AR-W-04) and Bristol Road extension (AR-W-03)) perform a local distributor function and are better suited as collector roads. Estimated traffic volumes for these collector roads are 7,000-15,000 vpd. There is a high frequency bus network planned for Tōtara Road to serve the northern residential catchment and connect with Westgate via Māmari Road. The traffic flows on Māmari Road south of the village are estimated to be 27,000 vpd, supporting the need for potential bus priority and enhanced active mode infrastructure along this corridor. Therefore, Māmari Road (southern section of AR-W-04) is recommended as an arterial road, including extensions to the existing road to provide this connection. It contributes to the objectives of access and travel choice.

Trig Road improvements (AR-W-05) include the SH18 motorway bridge widening. Trig Road is estimated to carry around 16,000 vpd north of SH18 by 2046. Trig Road plays an important role connecting the future zoned business area with both the Trig Road and Brigham Creek Road interchanges for additional strategic network resilience, addressing both access and strategic connection objectives. The provision of cycling and walking facilities over SH18 enhances travel choice and non-vehicle access to Westgate, Whenuapai business area and ferry services. It may also provide public transport / HOV priority across SH18, enhancing the wider connectivity of the public transport network. Trig road is therefore included in the recommended network. Given that this existing corridor can be upgraded to meet future requirements, no alternative alignments have been considered for this connection.

East-west arterials

Two east-west arterials, each with two variants, have been assessed:

- Spedding Road – Eastern extension (AR-W-08) and western extension (AR-W-07)
- Brigham Creek Road - Upgrade (AR-W-06) and deviation (AR-W-06B)
- Hobsonville Road (AR-W-12)

Spedding Road

Spedding Road connects residential land use in Redhills with the Whenuapai employment area as well as connecting to future RTN stations on SH16 and SH18. It is expected to carry between 9,000 – 12,000 vpd. Extensions to both ends of Spedding Road provide resilience for Whenuapai through additional State highway crossings that avoid interchanges and improve access for connector bus services to access the RTN. These crossings improve safety and connectivity for local walking and cycling journeys and contribute to the travel choice and safety objectives. This is particularly relevant for the western extension (AR-W-07) as it provides a non-interchange crossing of SH16 thus removing active modes from the conflicting movements and higher traffic volumes associated with an interchange.

These additional Spedding Road State highway crossings improve the efficiency of adjacent interchanges and support the wider network strategic connections. For example, SH16 Brigham Creek Road interchange has a reduction of 7,000 vpd (from 32,000 vpd to 25,000 vpd) if the western Spedding Road extension is provided. These interchange reductions also delay costly interchange upgrades, thus improving the affordability of the programme. The Spedding Road eastern extension

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(AR-W-07) across SH18 potentially affects the Rāwiri Stream s9(2)(ba)(i) [redacted]

Both extensions of Spedding Road are recommended to be included in the programme. No alternatives to this have been assessed as Brigham Creek Road already performs an east-west function for Whenuapai and Spedding Road is partially existing, so this option best uses existing assets.

Brigham Creek Road

With Spedding Road primarily providing access for the future business land use, Brigham Creek Road (AR-W-06) is refocused on distributing the northern residential catchment to the SH16 and SH18 strategic connections. The flows on Brigham Creek Road are forecast to be 25,000 vpd approaching the interchanges by 2046, noting that with the introduction of the direct SH16 to SH18 motorway link the east-west traffic movement via Brigham Creek Road is reduced.

To provide for the desired urban design and amenity outcomes for the Whenuapai village (Local Centre), this section of Brigham Creek Road needs to provide a low speed environment with reduced general traffic capacity. The SH16/18 Connections project will significantly reduce east-west through traffic along Brigham Creek Road. Near the local centre, flows are expected to be around 16,000 vpd. This redistribution of traffic and the provision of the surrounding recommended network, supported by the Collector Road network, will satisfactorily provide for north-south movement between the Whenuapai residential and employment areas without adversely impacting on the outcomes for the Whenuapai Local Centre. The Brigham Creek Road deviation (AR-W-06B) would better support urban design outcomes by physically removing the arterial road from within the Local Centre. However, on balance, given the reduced forecast flows on Brigham Creek Road, the Brigham Creek Road deviation provides comparatively little additional improvement (and therefore value for money) and is not included in the recommended option. The general upgrade to Brigham Creek Road (AR-W-06) is therefore retained in the recommended option.

Hobsonville Road

Two alternatives were considered to Hobsonville Road but were discarded at long list as their primary function was as a collector road. Therefore, only Hobsonville Road (AR-W-12) was assessed for the short list. Hobsonville Road is the key east-west road for access between Westgate and Hobsonville Point and is estimated to carry around 22,000 vpd by 2046. It is a resilience route to SH18 and is also an important link between the ferry terminals and Westgate. Its function is a multi-modal corridor that supports bus priority for local services, walking and cycling as well as provide access for freight to the future business zones. It is therefore included as a critical link in the recommended network.

Stakeholder / public consultation feedback

- Strong support for Spedding Road connections and improving walking and cycling facilities on Hobsonville Road.
- Mixed support for the Brigham Creek Road deviation. Desire to reduce traffic volumes past the town centre but some respondents also felt provision of an extra road corridor was not needed.
- The Upper Harbour Local Board supports the strong connections proposed to the wider north-western roading network. It also supports the proposed walking and cycling network,

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but recommends that it prioritises key destinations, such as schools, town centres and key arterial routes, to encourage mode switch for shorter journeys.

Refer to Appendix H for further analysis.

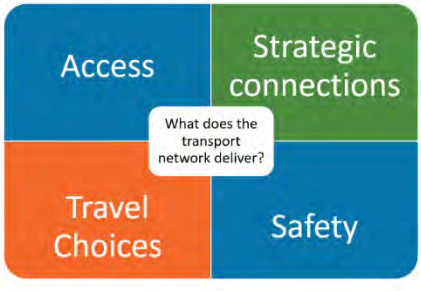
Response: Spedding Road connections are included in the recommended network. These also help to reduce traffic volumes past the Whenuapai centre. Brigham Creek Road deviation not provided.

Issues for further consideration at DBC

- Design of the eastern extension of Spedding Road needs to minimise impacts on the Rāwiri Stream. s9(2)(ba)(i)
- Māmari Road infrastructure should be designed to provide bus priority for the high frequency Westgate bus service.
- Tōtara Road and the north western corridor, north of Brigham Creek Road, have been identified as collector roads and are not proposed as part of the recommended network. As discussed in Appendix C: Transport Report, 2046+ population and employment in the area north of Brigham Creek Road is higher than that identified through the Whenuapai Structure Plan. However, the Structure Plan identifies a focus for employment and higher density residential south of Brigham Creek and therefore the recommended network has been designed to support this intensified land use with an arterial network south of Brigham Creek Road. The corridors north of Brigham Creek Road remain as collectors to distribute the residential trips onto the arterials and State highway network.
- Consideration of final cross section requirements for Hobsonville Road. The detailed design of the Hobsonville Road upgrade needs to be cognisant of heritage constraints and effects on adjacent properties and access. 2046 traffic volumes on Hobsonville Road are predicted to vary along the recommended corridor between the SH16 Interchange and Squadron Drive, such that four-laning would not necessarily be required from a general traffic capacity perspective. However, to provide for the strategic function of this east-west arterial corridor, which is the only east-west arterial south of SH18, it is considered that four-laning as shown in the recommended network should be carried forward for more detailed investigation, as part of the DBC. Final cross section requirements for Hobsonville Road to be developed in more detail as part of the DBC.
- Consideration as part of the Hobsonville Road DBC for pedestrian access to North West Shopping centre, specifically if a separate pedestrian bridge is required.
- Consideration of the final cross section requirements for Trig Road with potential for reduction to two lanes between Spedding Road and Brigham Creek Road. To be investigated as part of the DBC.

Summary

The recommended Whenuapai arterial network (Spedding Road, Brigham Creek Road, Māmari Road, Trig Road) provides a grid network designed to access both business and residential land use, improve resilience and support mode shift through improved access to RTN and new cycling and walking links. The options collectively contribute to achieving all four IBC objectives.



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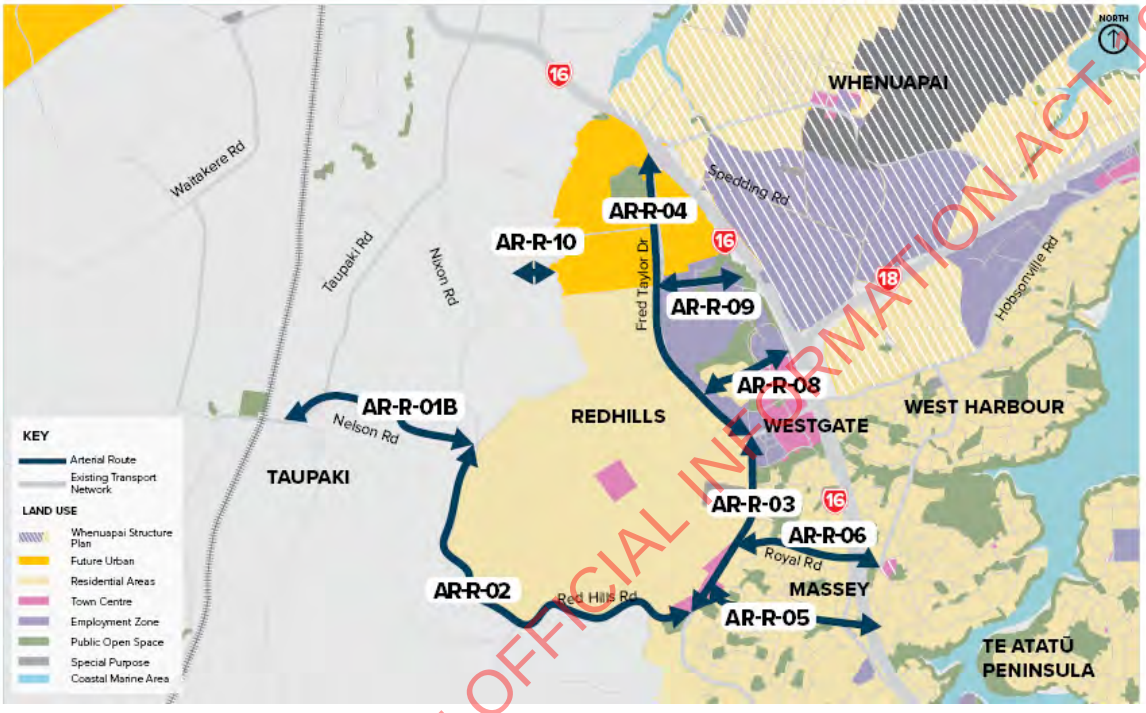
6.3.5.3. Arterial connections – Redhills

Purpose

To better enable access to the RTN and alternative State highway corridor, support bus and active modes and improve access to social and economic opportunities.

Option Assessment



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North-south arterials

Two options were considered at short list:

- Fred Taylor Drive (AR-R-04)
- Don Buck Road (AR-R-03).

As the existing corridors can be upgraded to meet future requirements no alternative alignments were considered for these connections.

Fred Taylor Drive and Don Buck Road form a north-south spine running parallel to SH16. These roads have an important function to distribute future Redhills growth and connect people to rapid transit stations, the strategic cycle network and SH16 motorway interchanges. The vehicle flows on these roads are expected to be 18,000 – 29,000 vpd by 2046 and require upgrading to four lanes to accommodate infrastructure to support high occupancy vehicles (HOV) and local bus priority in the peak periods. Both roads are likely to have intersections with Redhills collector roads, so this proposed upgrade to improve their arterial function provides flexibility for intersection treatments and turning lanes if required. The arterials will provide dedicated walking and cycling facilities thus improving safety for active modes. Therefore, upgrades to Fred Taylor Drive and Don Buck Road to

improve their arterial function are included in the recommended network. These arterials directly contribute towards safety, travel choice and access objectives.

East-west arterials

The east-west arterials provide access to the SH16 RTN or SH16 strategic network, including the SH16 cycleway. A number of connections were considered at short list:

- Northside Drive extensions (AR-R-09 and AR-R-10)
- Dunlop Road extension (AR-R-08)
- Redhills to State highway connection (AR-R-06 and AR-R-05)
- Red Hills Road (AR-R-02)
- Nelson Road (AR-R-01B)

Northside Drive extension

The extension of Northside Drive plays an important role as an alternative east-west connection between Whenuapai and the proposed Redhills north-south arterial (Taupaki / Nixon Road) thus increasing resilience for SH16 within the network. It is sufficiently south of the proposed alternative State highway to be an alternative route, rather than a duplication. A northerly east-west link was discarded at the long list stage and no further alternatives were considered. Northside Drive is a partially existing road, so this option would best use existing assets.

Dunlop Road

The extension of Dunlop Road completes the PT priority link into Westgate providing for future local bus services. The link will support mode shift and improve access to the Westgate metropolitan centre and social and economic opportunities. It is recommended to be included in the programme network. No alternative connections were considered as this is the primary access to the Westgate bus interchange.

Redhills to State highway connection

Both Royal Road (AR-R-06) and Triangle Road (AR-R-05) were considered for a link from Redhills to the SH16 strategic network. Royal Road is preferred due to the likely location of a future rapid transit station, provision of frequent bus services, access to the SH16 cycleway and direct connection into the Redhills north-south arterial. Royal Road also has a lower impact on ecology and land requirements. It is expected to carry approximately 23,000 vpd.

Red Hills Road

Red Hills Road (AR-R-02) is currently a rural road and, in the future, will maintain rural land use on the western side, with controlled access from the Redhills growth area to the east. It has estimated flows of around 15,000 vpd by 2046 and the eastern end is likely to support a local bus service between Westgate and Lincoln Road. Fundamentally Red Hills Road retains a collector function and distributes people to the arterial network along Don Buck Road. The majority of Redhills trips are anticipated to use the internal Redhills arterial network to reach the eastern connections and destinations, rather than Red Hills Road. There are opportunities to improve the walking and cycling infrastructure on Red Hills Road.

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However, it has an existing high / medium-high personal risk rating, indicating there is an existing problem. Additional traffic from the Redhills growth area will increase exposure and therefore safety risk. Safety improvements are therefore recommended to address this issue.

Nelson Road

The final east-west connection from Nelson Road to the Taupaki train station has been discarded as an arterial road as the reinstatement of passenger heavy rail services is not included in the recommended network. The function of this road therefore remains a local rural road rather than a PT focused arterial. It does however have an existing medium/high personal risk rating and safety improvements are therefore recommended on Nelson Road.

Stakeholder / public consultation feedback

- Most respondents of the North West Feedback Form prioritised the upgrade of Fred Taylor Drive, Don Buck Road (Redhills) and Don Buck Road and Metcalfe Road. There was a desire for safety improvements on the wider rural network especially regarding safety, walking and cycling networks and congestion.
- Public feedback indicated a preference for the E-W connection (using Dunlop Road and Baker Lane) to be a collector road and the N-S connection (from Royal Road to the proposed Redhills Local Centre) to be an arterial road. The majority indicated that Northside Drive should be an arterial road, while Dunlop Road (extension) should be a collector road.
- The Henderson-Massey Local Board supports the approach of integrating transport with land use planning and the "mode neutral" principle to provide transport choice through public transport, walking and cycling.

Refer to Appendix H for further analysis.

Response: The recommended network includes upgrades to Don Buck Road, Fred Taylor Drive, Royal Road and Dunlop Road. Safety improvements on Red Hills Road are also included. Waitākere Road has a lower safety risk and has been identified as an opportunity to potentially form part of a rural road safety programme if its safety risk increases in the future.

Issues for further consideration at DBC

- Upgrade of Taupaki Road to include improvement to the Taupaki Road / Nixon Road intersection
- Design of Royal Road to minimise disruption to the adjacent properties
- Consideration of final cross section requirements for Fred Taylor Road, particularly a reduction between Northside Drive and Dunlop Road. 2046 traffic volumes on Fred Taylor Drive Road are predicted to vary along the recommended corridor between the SH16 Interchange and Don Buck Road, such that four-laning would not necessarily be required from a general traffic capacity perspective. However, to provide for the strategic function of this north-south arterial corridor, which provides resilience to public transport access between Westgate and Kumeū-Huapai, Riverhead and Whenuapai, it is considered that four-laning as shown in the recommended network should be carried forward for more detailed investigation, as part of the DBC.

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Summary:

The Redhills arterial network provides key north-south and east-west connections **that** are designed to access the RTN and strategic State highway network as well as both business and residential land use, improve resilience and support mode shift through improved access to RTN and new cycling and walking links. Safety improvements are recommended in Redhill Road and Nelson Road. As such the Redhills arterials contribute to all four investment objectives.

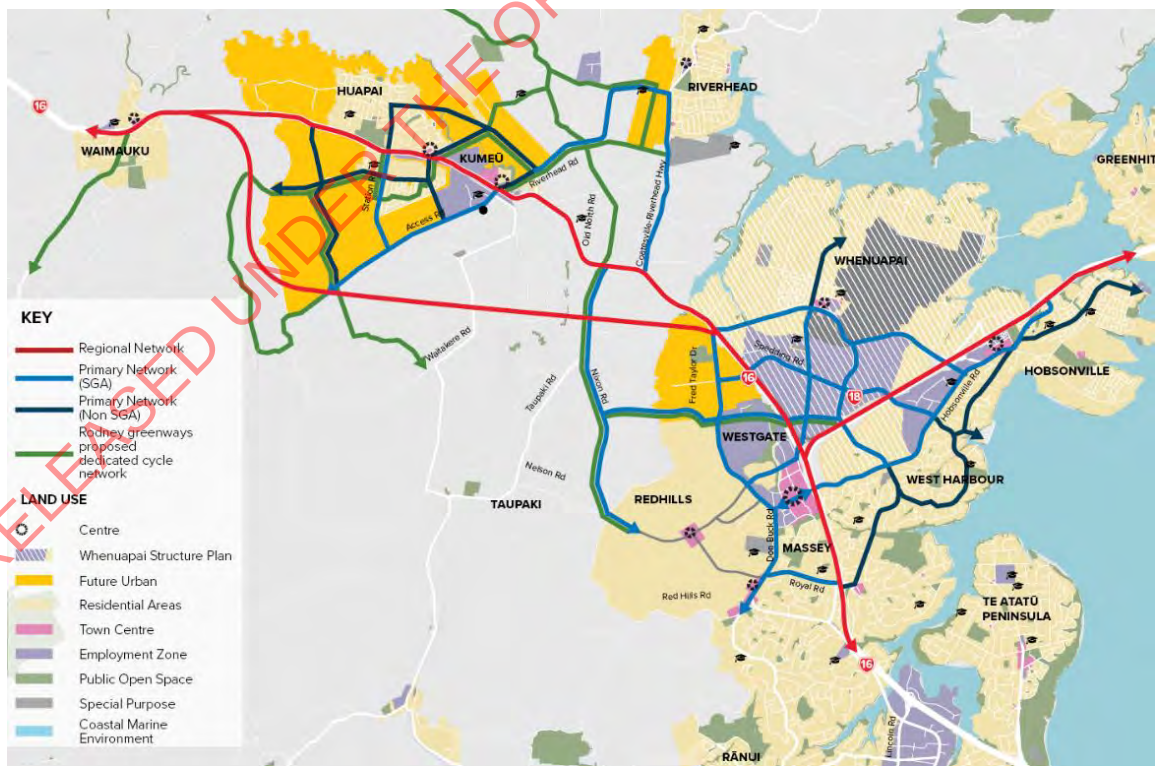
6.3.6. Walking and cycling

Purpose

The recommended network was developed recognising the importance of connecting key destinations via a range of modes. Cycling and walking connectivity has been developed to complement the recommended network and has been designed to link to key attractors (hubs) such as the town centre, jobs, and schools with connectors (spokes) flowing out into future suburbs.

Option assessment

The walking and cycling networks in the North West are proposed to consist of separated walking and cycling facilities on all new and existing arterial corridors, as shown on the map (red lines and dark blue lines). This is a significant increase in infrastructure in the North West. This network forms the top level of the network and other layers of detail will be required to further complement the network and enhance connectivity on collector and local roads.



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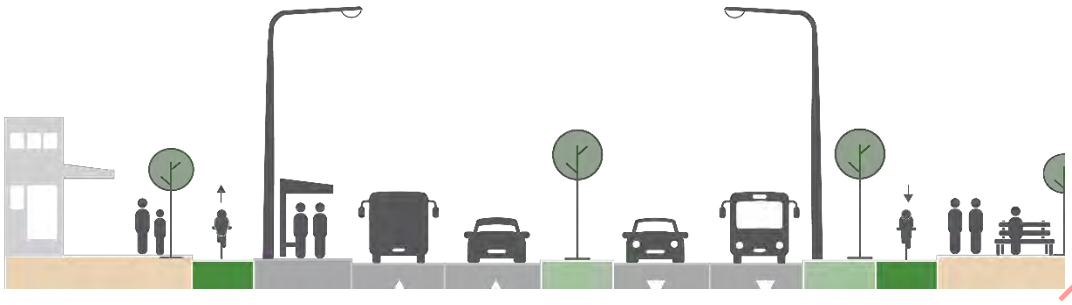
Walking and cycling infrastructure on a 32m cross section is shown below. Walking and cycling infrastructure is proposed to be in a similar form on smaller cross sections, i.e. 25m and 20m.



Further information on walking and cycling catchments for local activity centres, employment areas, access to bus stops and strategic cycling and PT network is included in Appendix C.

The network has been designed to provide links between the different growth areas that make up the broader North West i.e. the links between Kumeū-Huapai/Riverhead with the urban areas of Redhills and Whenuapai. This provides safe and attractive walking and cycling routes for medium distance trips and could be attractive for modes such as e-bikes and scooters.

Consideration was given to non-road corridors for cycle network provision, but no strategic desire lines were identified that did not follow road corridors. Therefore, all recommended cycle facilities are located on arterial corridors.

In addition, and to achieve mode shift, there is an opportunity to consider walking and cycling infrastructure on some key collectors within Redhills, Whenuapai, Kumeū-Huapai and Riverhead. These links have not been included in the recommended transport network as they are not key arterial corridors, but they are considered to have merit as part of an efficient cycle network. Delivery mechanisms for these corridors are discussed in more detail in Section 6.5.3.

Stakeholder / public consultation feedback:

- Support for walking and cycling improvements, particularly on rural roads.
- Safety and segregation noted as the most important consideration for people.
- The Upper Harbour, Rodney and Henderson-Massey Local Boards support the proposed walking and cycling networks and associated safety improvements for these modes of travel.
- The SRGs support the proposed options for walking, cycling and for objective of mode shift to active/public transport. They also note that the new transport connections should reflect current community aspirations – e.g. Council/Local Board greenways plans.

Refer to Appendix H for further analysis.

Response: Safe, separated walking and cycling facilities will be provided on all arterial corridors. Rural road safety improvements are included in the recommended network.

Issues for further consideration:

The walking and cycling facilities on non-Supporting Growth arterials will need to be integrated with wider network improvements and may require inclusion in the appropriate walking / cycling programmes, Structure Plans or precinct plans. Alignment of planning and application of catchment metrics should be pursued at every opportunity so that walking and cycling outcomes are achieved.

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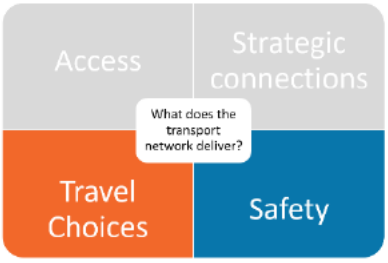
Summary

Walking and cycling facilities on all links shown is included in the recommended network. These facilities specifically support travel choice and safety objectives.



6.4. Manawhenua feedback

As a group, Manawhenua provided feedback regarding the development of the North West recommended network throughout the MCA process. During the Manawhenua Shortlist Assessment Hui held on 19 October 2018, Manawhenua provided feedback on the short list of options and the emerging recommended network. s9(2)(ba)(i)

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6.5. Opportunities

The recommended transport network identifies rapid transit infrastructure and key arterial corridors to create a transport system that improves access, supports mode shift and is safe and reliable. As part of this assessment process several additional interventions have also been identified as potential opportunities to further enhance this network and should be considered as part of parallel projects or structure planning in the North West.

6.5.1. Heavy rail line relocation

The short list analysis identified a significant opportunity for Kumeū-Huapai through the relocation of the heavy rail line to align with the proposed alternative State highway corridor to create a multi-modal corridor to the south of the FUZ. Benefits include:

- Improve safety by removing level crossings with SH16 / Main Road
- Improve severance as level crossings could be replaced with coordinated signalised intersections for the RTN, improving north-south movements through Kumeū
- Less property purchase required for the RTN as the existing rail corridor could be reallocated to the new RTN
- Additional space available within Kumeū-Huapai town centre for amenity improvement and urban regeneration projects
- New rail corridor that could focus on efficiently moving freight. There would be an opportunity to link to business land uses in the south eastern section of the Kumeū FUZ
- Space to provide electrification and double tracking facilities. This section could be built and then the existing line switched over to the new alignment to minimise down time on the rail network
- Flexibility to design a road network that complements the rail alignment and provides grade separated access if required.

The Ministry of Transport is due to release the Northern Freight Study in early 2019 and this IBC will need to align with the outcomes.

6.5.2. Rural safety upgrades

Several roads have been identified for rural safety upgrades as part of the recommended option. During community engagement, concerns were expressed about the safety of Waitākere Road, particularly for cyclists. A safety review was undertaken for this route which showed that in the last five years, the corridor had a medium-low safety risk overall and a medium risk closer to the centres of Kumeū-Huapai and Waitākere / Swanson. Traffic volumes on Waitākere Road are expected to increase from around 5,000 vpd to 10,000 vpd by 2046. It is currently a route for the wider rural catchment to access Swanson Station and even with the introduction of the RTN, some of this demand is likely to remain. It is also a popular route for recreational cyclists.

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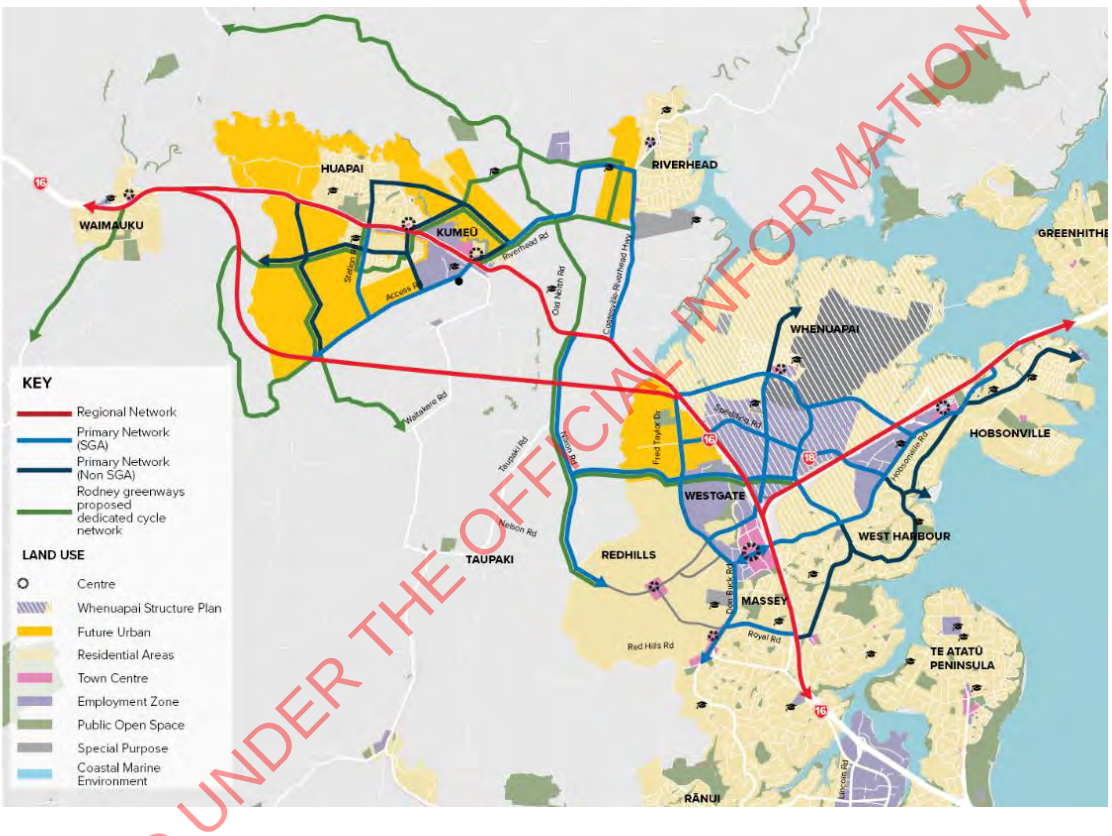
Waitākere Road was not considered at the long list for an arterial upgrade, as it does not provide a significant strategic function between growth areas. The current safety risk rating shows a lower level of safety concern than some other roads within the North West. Therefore, it is recommended that crash trends are monitored for Waitākere Road and if the risk increases it should be included in a rural safety upgrades programme.

6.5.3. Cycling

The recommended transport network has been mapped with the regional, primary and secondary cycle network as shown in **Figure 52**. The proposed arterial network (primary network SGA) will provide a significant increase in formal cycling facilities throughout the North West.

Figure 52: Cycle network



The following links are desirable as part of a primary cycle network to improve access to key destinations but are not being progressed as arterial corridors through the Supporting Growth programme (blue lines in **Figure 52**):

- Moire Road, to access the strategic cycle network
- Potential collector road network within Kumeū-Huapai to provide links to the arterial corridors or town centre
- Tōtara Road north of the Whenuapai town centre
- Luckens Road, Wiseley Road, Marina View Drive and Launch Road to access the West Harbour and Hobsonville Point ferries.

These links have not been included in the recommended transport network as they are not key arterial corridors, however they do have merit as part of an efficient cycle network and the facilities could be provided within the function of a collector road. It is recommended that these links be

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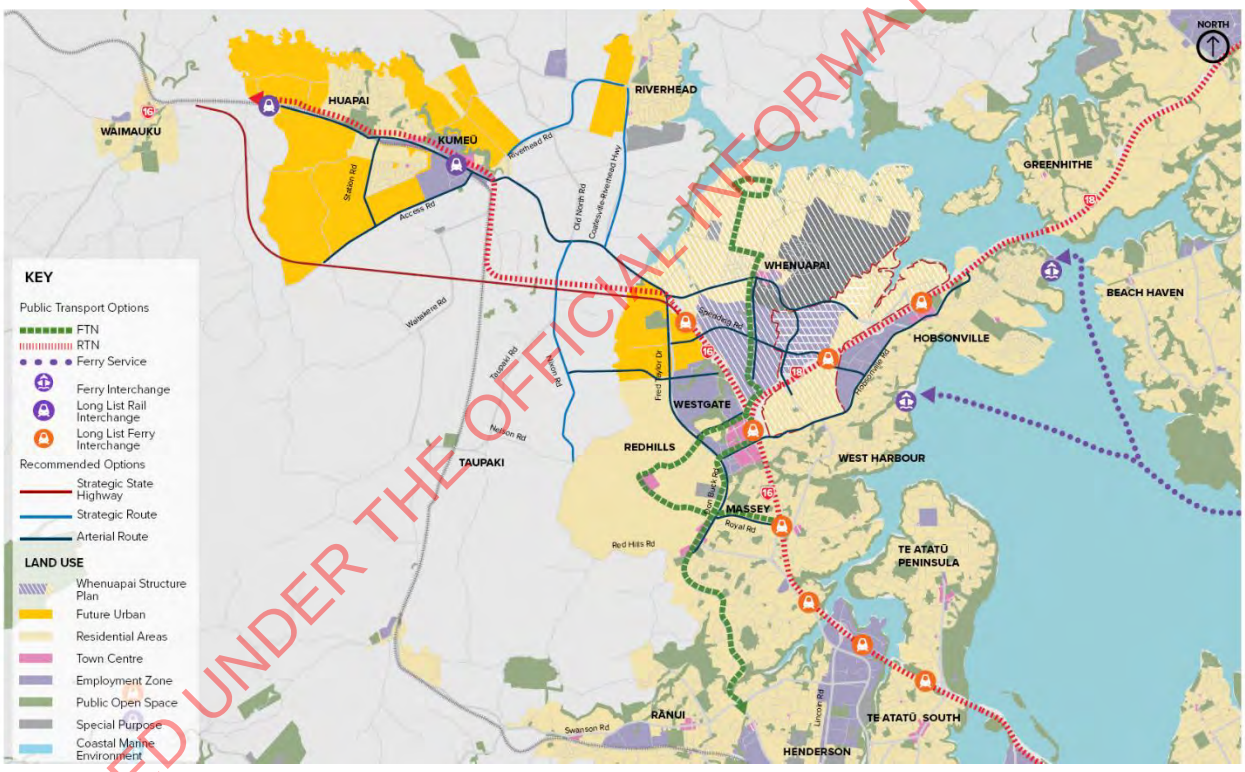
considered as part of a wider North West cycle programme and incorporated into structure planning or collector road development processes.

6.5.4. Local Bus Network

The North West currently has a limited local bus network and residents predominantly rely on travel via private vehicle. In responding to the North West Feedback Form, people felt public transport within the North West is currently poor, with over 37 percent of all people generally mentioning concern over the current level of service, travel times, and accessibility of public transport. Respondents had a strong desire for an immediate improvement to the North West public transport services. The future implementation of the RTN will provide a step change in travel choice which will be supported by a planned future bus system including high frequency and feeder services. **Figure 53** shows this frequent bus network. Note there is a comprehensive system of connector and local bus services proposed on other key arterials of the North West network.

Figure 53: Future frequent bus network



Prior to the extension of the RTN to Kumeū, there is a need for an interim bus network to be established to provide people-moving capacity and the foundation for change in travel behaviour.

Feedback from the public engagement process strongly supported interim bus options that provide a frequent, fast and reliable peak hour service. The work undertaken in this IBC has highlighted the following opportunities:

- Increased bus services from Kumeū-Huapai and Riverhead that serve the local area then connect to the city centre from Westgate.
- Improved frequency during the peak hour periods to support the commuter population.
- Consideration of bus priority measures between Kumeū-Huapai and Westgate to provide a travel time advantage for bus passengers. Considerations might include intersection priority

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or shoulder running. Removing some of the vehicle traffic from this section of SH16 could delay the requirement for upgrades of key infrastructure such as the Brigham Creek interchange or a new alternative corridor. Depending on the solution this might require land acquisition outside of the Supporting Growth programme.

It is recommended that an interim bus service is investigated for the North West as part of the wider AT Metro bus network planning. Early implementation will achieve more benefits for behavior change and help unlock travel choice for the North West prior to the opening of RTN.

6.5.5. Land Use Opportunities

Long list options considering landuse and operational travel demand management options have been identified during the process of this IBC. These are discussed in detail in **Appendix I: Travel Demand Strategy**.

An opportunity has been identified as the land release for the Kumeū-Huapai/Riverhead area is identified in FULSS to occur between 2028 and 2032. The Council's current view is that structure planning must occur prior to the release of land, and accordingly this is programmed for Kumeū-Huapai/Riverhead in 2025.

The business case team have worked closely with Auckland Council to integrate new and existing land uses with the planned future transport system, noting that there remains a significant opportunity for further integration during the structure planning process in Kumeū-Huapai/Riverhead.

The following long listed land use options were identified as opportunities for further assessment in the structure plan process:

- Develop new local centre in Huapai FUZ.
- High density residential next to PT corridor(s).
- Enhance the existing Kumeū Town Centre for higher density.

Landuse and complementary urban interventions will be key opportunities in the DBC to assist the development of an urban form that promotes the principles of a sustainable urban mobility system.

6.5.6. Project Implementation Integration

The North West area has a relatively constrained geographic area, with significant physical constraints such as the SH16 and SH18 transport network. There is a wider opportunity to integrate the implementation and delivery of elements of the recommended network with parallel projects within the wider scope of the North West. This includes consideration of the timing and staging of these projects. This could result in reduced disruption to residents, commuters and enable efficiency gains in terms of construction.

Identified projects include:

- Trig Road and the crossing of SH18 and the interrelationship and proximity to Northside Drive and SH16/SH18 Connections Project
- Recommended Spedding Road crossing of SH16 in the north and the relationship to the Brigham Creek interchange as part of the SH16/SH18 Connections Project

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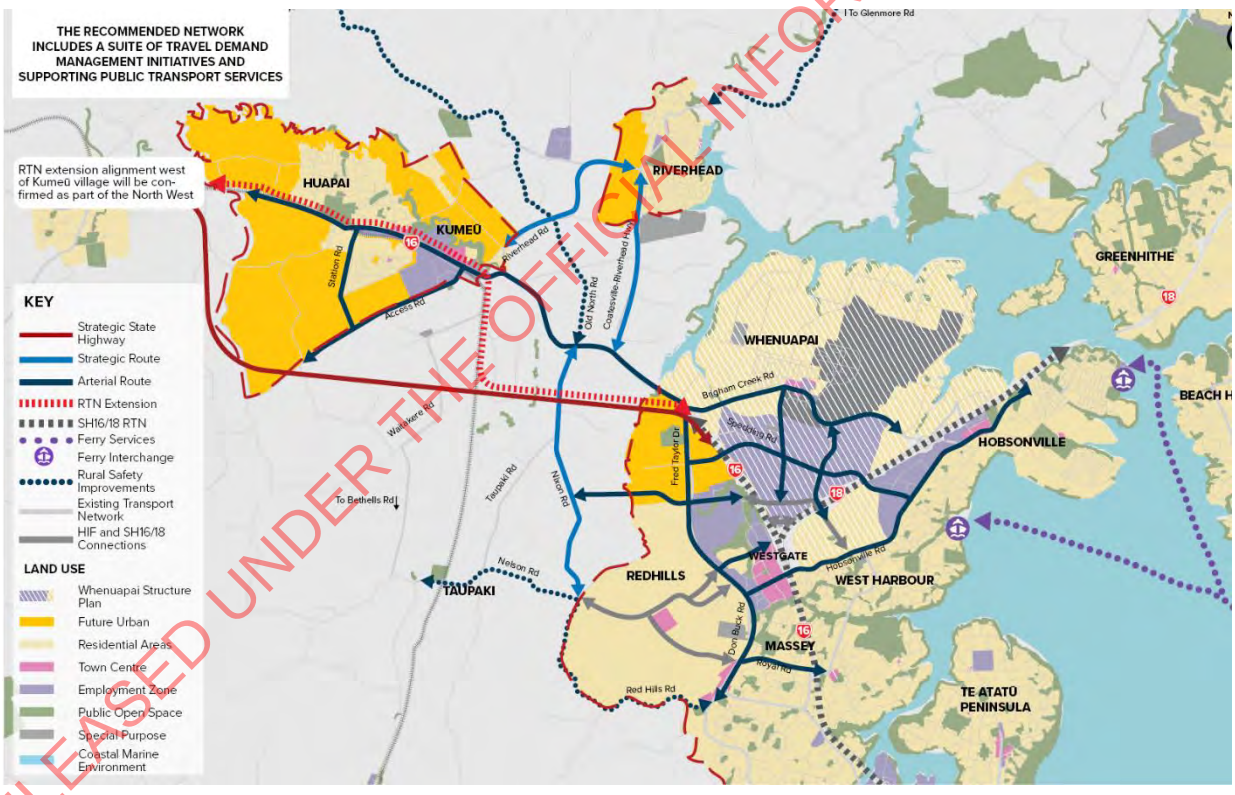
- Recommended Spedding Road SH18 crossing in the south and the relationship with the SH18 RTN project and SH16/SH18 Connections project
- Westgate and Massey arterials that support the City Centre to North West RTN and provide connectivity to RTN stations (locations to be confirmed).

7. Recommended network

The North West Auckland recommended network is presented in this section, together with the outcomes it delivers. **Figure 54** shows the recommended network. It is noted that this network is complementary to four other key projects which are being progressed in the North West outside of this project scope. These projects are assumed in place.

- Housing Infrastructure Fund – Redhills and Whenuapai arterials
- SH16/18 connections including Northside Drive
- North West Rapid Transport Network –city centre to Brigham Creek
- SH18 Rapid Transit Network – Westgate to Constellation Station

Figure 54: Recommended network



summarises the key outcomes of the recommended network against the IBC objectives and GPS. **Table 23** summarises the urban form of these connections.

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Table 22: Assessment of recommended network against objectives

Key features	Outcomes	Option	Investment Objectives				GPS Objectives			
			Access	Strategic	Travel choice	Safety	Safety	Access	Environment	Value for $
Integrated landuse and transport	The network enhances place shaping opportunities and identifies the transport corridors that best connect growth areas with key destinations. The provision of transport infrastructure to support the landuse maximises access to walking, cycling and public transport and influences the travel behaviour for the North West **supporting TDM principles and a sustainable urban mobility system.** Further opportunities for urban interventions will be realised in the DBC phase.	Complementary suite of TDM measures that could include travel behaviour change schemes, carpooling schemes, car sharing, and bicycle hire schemes and, promotional / educational campaigns	H	H	H	M	M	H	H	H
Rapid transit network (Westgate area to Kumeū-Huapai)	**Step change in people-movement** to drive mode shift for the North West. Route located to maximise efficiency and provide access to the largest ridership catchment. Route provides direct access to Kumeū-Huapai. Riverhead and Whenuapai residents served by potential stations at Brigham Creek Road, and Coatesville-Riverhead Highway. Redhills and Whenuapai residents also served by potential station at Westgate metropolitan centre.	RTN corridor: SH16 Access Road to Huapai, new corridor from Brigham Creek Road to Access Road	H	H	H	L	L	H	H	M
Public transport services	Improved interchange facilities and services at existing terminals to **support mode shift and access to employment**. Arterial road network is designed to support the future bus network.	Hobsonville Ferry	M	M	H	L	L	M	M	L
		West Harbour Ferry	M	M	H	L	L	M	M	L
Alternative State highway corridor	New corridor to remove sub-regional trips from SH16 / Main Road and **support the implementation of the RTN and urban redevelopment**. Provides improved access in the southern Kumeū-Huapai FUZ.	Alternative State highway – southern location	H	H	M	M	M	H	L	L
Strategic sub-regional connections	Rural corridors are improved for safety and attractiveness for walking and cycling. Taupaki Road provides resilience for SH16. Road capacity	North-south connection: Taupaki Road and Nixon Road	L	M	L	H	H	L	L	M

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Key features	Outcomes	Option	Investment Objectives				GPS Objectives			
			Access	Strategic	Travel choice	Safety	Safety	Access	Environment	Value for $
	upgrades on some sections of Taupaki Road and Coatesville-Riverhead Highway (south of Riverhead).	Kumeū to Riverhead connection: Riverhead Road	H	L	M	H	H	M	L	L
		Coatesville-Riverhead highway upgrade: SH16 to Riverhead	H	L	H	M	M	H	M	L
Kumeū-Huapai arterials	North-south arterials provide access to either the RTN or alternative State highway.	Access Road upgrade: SH16 to Alternative State highway	M	L	M	L	L	M	L	L
		Station Road upgrade: SH16 to Access Road	M	L	M	L	L	M	L	L
		SH16 Brigham Creek Road to Taupaki Road	M	M	L	M	M	M	L	M
		SH16 Taupaki Road to Kumeū	M	M	L	M	M	M	L	M
Whenuapai arterials	East-west connections on Spedding Road and Brigham Creek Road with north-south arterials to connect residential and business land use and improve resilience. Reduced volumes on Brigham Creek Road through the Whenuapai centre provide an opportunity to reconfigure road space to enable a more connected community. Separated cycle facilities to connect people to RTN, ferry and strategic cycle network to encourage mode shift.	Māmari Road extension: Northside Drive to Brigham Creek Road	H	M	M	L	L	H	M	M
		Trig Road upgrade: SH18 crossing to Brigham Creek Road	H	M	M	M	M	H	M	L
		Brigham Creek Road upgrade	H	L	L	M	M	H	L	M
		Spedding Road extension west: Trig Road to Fred Taylor Drive	H	M	M	M	M	H	L	L
		Spedding Road extension east: Trig Road to Hobsonville Road	H	M	M	M	M	H	L	L
		Hobsonville Road upgrade	H	L	L	M	M	H	L	M

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Key features	Outcomes	Option	Investment Objectives				GPS Objectives			
			Access	Strategic	Travel choice	Safety	Safety	Access	Environment	Value for $
Redhills arterials	Additional east-west and north-south arterials to provide access to RTN and strategic transport network, support bus priority to Westgate and provide a resilient route to SH16, promoting community connectivity, mobility and choice.	Northside Drive Extension: Fred Taylor to Nixon Road	L	H	L	M	M	M	L	L
		Northside Drive upgrade: Fred Taylor to Maki street	H	M	L	L	L	H	L	M
		Dunlop Road extension: Fred Taylor Drive to Maki Street	H	H	H	L	L	H	L	L
		Royal Road upgrade: Don Buck Road to SH16	H	H	H	M	M	H	M	M
		Fred Taylor Drive Upgrade: SH16 to Don Buck Road	M	H	M	M	M	M	L	M
		Don Buck Road upgrade: Triangle Road to Fred Taylor Drive	M	H	M	M	M	M	L	M
Walking and cycling	All arterials in the recommended network provide separated walking and cycle facilities that connect key destinations, encourage mode shift and improve safety for all users.	All recommended network arterials	H	M	H	H	H	H	H	H
Safety	Safety upgrades to key surrounding rural roads in response to existing issues or increased flows due to the recommended network.	Old North Road, Coatesville-Riverhead Highway, Red Hills Road and Nelson Road	L	L	M	H	H	L	L	H

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Table 23 Summary of Recommended Network form

Key features	Option	2046 Demand	Lanes	Commentary
Integrated landuse and transport	Complementary suite of TDM measures	N/A	N/A	Supports North West mode shift from 1% to 16% of overall trips using public transport.
Rapid transit network (Westgate area to Kumeū-Huapai)	RTN corridor: SH16 Access Road to Huapai, new corridor from Brigham Creek Road to Access Road	3,300 pax/hr AM peak period at Kumeū	N/A	Reduced traffic on Main Road would improve effectiveness and attractiveness of the RTN and enable better integration between land use and the RTN. It would provide an opportunity to reconfigure space to enable a more connected community.
Public transport services	Hobsonville Ferry	N/A	N/A	N/A
	West Harbour Ferry	N/A	N/A	N/A
Alternative State highway corridor	Alternative State highway – southern location	35,000 vpd	4	Lower volumes west of FUZ but protect for 4 lanes. Potential for corridor to be used as multi-modal corridor if rail was relocated.
Strategic sub-regional connections	North-south connection: Taupaki Road and Nixon Road	13,000 vpd	2	Urbanisation of a rural road. Improvement to safety. Implementation of cycling and walking facilities.
	Kumeū to Riverhead connection: Riverhead Road	5,000 vpd	2	Improvement to cycle and walking facilities. Improving safety for rural road due to increased demands.
	Coatesville-Riverhead highway upgrade: SH16 to Riverhead	15,000 vpd	4	As no direct RTN connection for Riverhead, connection will require high-quality PT and bus priority/HOV infrastructure.
Kumeū-Huapai arterials	Access Road upgrade: SH16 to Alternative State highway	20,000 vpd	4	Likely to have high use by freight vehicles accessing business land use. Opportunity for 2 laning to the north of Access Road. To be investigated as part of DBC
	Station Road upgrade: SH16 to Access Road	6,000 vpd	2	Links to RTN but no plans to have a high frequency bus network on this route.
	SH16 Brigham Creek Road to Taupaki Road	14,000 vpd	4	4 lanes being delivered by SafeRoads Alliance
	Taupaki Road to Kumeū	18,000 vpd	2	To be integrated with RTN through Kumeū -Huapai
Whenuapai arterials	Māmari Road extension: Northside Drive to Brigham Creek Road	27,000 vpd	4	High volumes serving residential and business land use. FTN operating on this link to connect Whenuapai to Westgate.

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Key features	Option	2046 Demand	Lanes	Commentary
	Trig Road upgrade: SH18 crossing to Brigham Creek Road	16,000 vpd	4	Four laning for strategic access and bus/ HOV priority
	Brigham Creek Road upgrade	25,000 vpd	4	Possible two laning adjacent town centre. To be investigated as part of DBC.
	Spedding Road extension west: Trig Road to Fred Taylor Drive	12,000 vpd	2	Important strategic connection for resilience and improved walking and cycling connections.
	Spedding Road extension east: Trig Road to Hobsonville Road	9,000 vpd	2	Important strategic connection for Whenuapai resilience. Access to SH18 bus station.
	Hobsonville Road upgrade	22,000 vpd	4	Key connection for Hobsonville to Westgate, RTN and strategic road network. Opportunity for two laning on some sections to be investigated at DBC
Redhills arterials	Northside Drive Extension: Fred Taylor to Nixon Road	9,000 vpd	2	Completes east-west link for resilience to SH16.
	Northside Drive upgrade: Fred Taylor to Maki street	17,000 vpd	4	Four laning for strategic access resilience
	Dunlop Road extension: Fred Taylor Drive to Maki Street	8,000 vpd	4	Key strategic link to Westgate bus station. Four lanes to provide bus priority. Opportunity for 2 lanes to be investigated at DBC.
	Royal Road upgrade: Don Buck Road to SH16	23,000 vpd	4	Important strategic link to RTN and strategic transport network. Potential peak hour bus priority measures.
	Fred Taylor Drive Upgrade: SH16 to Don Buck Road	18,000 vpd	4	Four laning for strategic access and bus/ HOV priority and improved cycling and walking facilities. Key spine to support to Redhills collector network.
	Don Buck Road upgrade: Triangle Road to Fred Taylor Drive	29,000 vpd	4	Four laning for strategic access and bus/ HOV priority and improved cycling and walking facilities. Key spine to support to Redhills collector network.
Walking and cycling	N/A			No cycle and walking only links recommended for the network.
Safety	Old North Road, Coatesville-Riverhead Highway, Red Hills Road and Nelson Road	N/A	2	Rural safety improvements including considerable of elements such as safer speeds and alignment improvements.
Demand management	N/A			Programme-wide approach to encourage uptake of alternative mode facilities and services, enabling community connectivity, mobility and choice.

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7.1. What's changed since TFUG?

The TFUG programme identified a comprehensive transport network for the North West which enhanced the liveability of the North West through better access to jobs and improvements to the environment, travel choice and economic growth. **Table 24** summarises the impacts of the TFUG North West network on the TFUG programme investment objectives.

Table 24: TFUG programme effects[25]

TFUG Objective	Summary of TFUG network effects
Access to jobs and core services	• Extension of the RTN network from Westgate to Huapai (SH16) and Westgate to Hobsonville (SH18) which will significantly increase the population with walking and cycling distance of the RTN. • High proportion of population with jobs accessible by car (within 30 minutes) and PT (45 minutes). 20% of all regional jobs will be accessible by PT under the RTN
Improved environmental, cultural and community outcomes	• Preferred ecological network for creation of inter-coastal connections. Connected cycleway will reduce vehicle trips and reduce pollution • Opportunity for rehabilitation of ecological connection along transport corridors • Remove through movements from Kumeū town centre and provide public transport options for the community. RTN stations provide opportunity for diverse houses and commercial development • Better connection between Whenuapai and the ferry terminals
29% public transport trips from the growth area in the AM peak	• Public transport services should provide faster travel times than private travel, creating opportunities for more trips to be made by public transport • Under the RTN programme, over 30% of AM peak hour trips originating in the west are made using public transport
Economic growth through travel time reliability	• High investment in transport will improve reliability across all modes supporting economic growth through mode choice, access to Westgate metropolitan centre and Whenuapai employment • Improved capacity for SH16 and SH18 corridors. RTN reduces traffic volumes, improving access for freight vehicles
Land development in line with FULSS	• Assist Kumeū business area to develop with good accessibility to the east and west. • Accessibility of Whenuapai will assist development of residential and employment • Facilitate higher density housing areas, centres and high-order employment around public transport nodes

This network was reassessed as part of the Supporting Growth programme and this section compares the differences between the infrastructure proposed in TfUG (Section 1.3.1) and the infrastructure proposed by this IBC (Section 7).

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[25] Refer to Table 47 of Transport for Future Urban Growth Programme Business Case, 9 September 2016

The difference between the two networks is shown in **Figure 55** and **Table 25 and Table 26** provides additional rationale for the changes.

Figure 55: Changes between the TFUG and Supporting Growth recommended networks

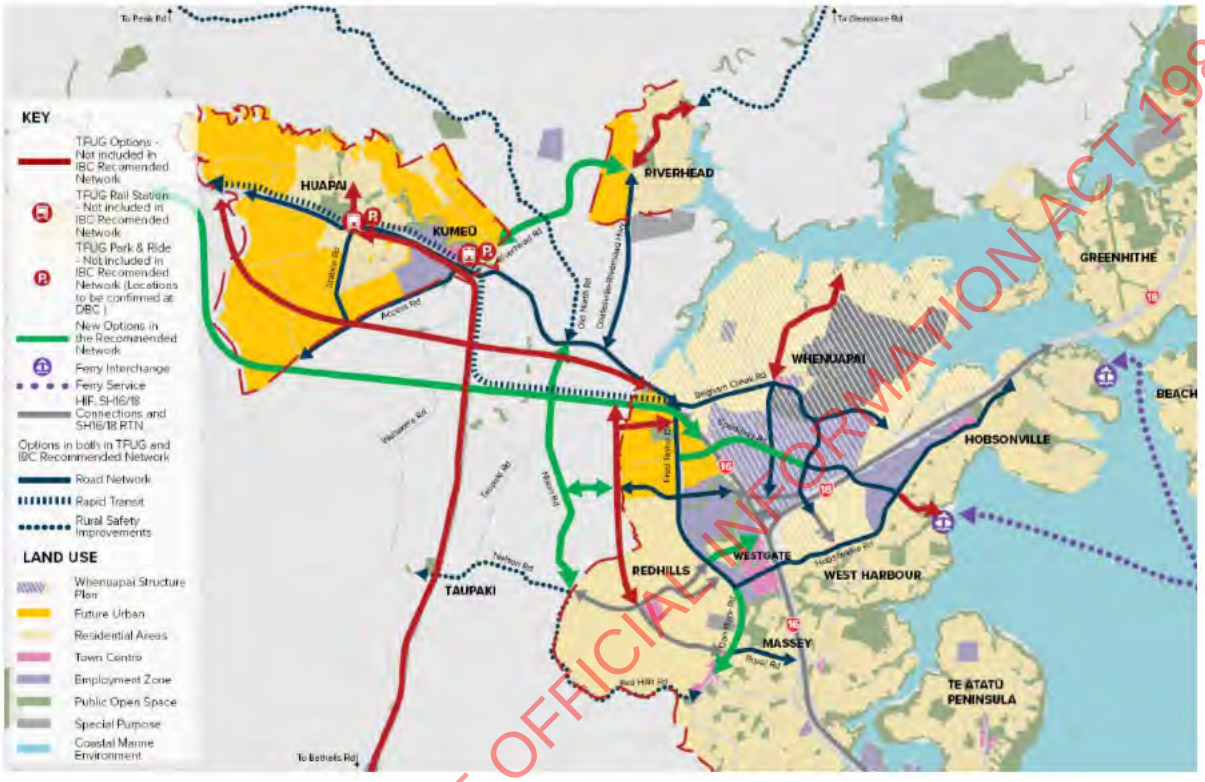

Table 25: Elements added to the TFUG network

Infrastructure	Description	Rationale
New location for the alternative SH16 corridor	Route located further south, at the edge of the Kumeū-Huapai Future Urban Zone	More southern location further reduces severance of FUZ area. Connections can be provided to serve the residential and employment land uses in the FUZ. Alternative corridor removes the through State highway traffic function from expected residential land use. Provides significant future opportunity to be a multimodal corridor should the heavy rail lines be relocated from Kumeū town centre.
Redhills north-south arterial	Alignment uses existing Taupaki Road/Nixon Road instead of the new proposed TFUG alignment	Best use of existing assets, reduced effects on environment and reduced pressure on adjacent rural land and RUB. Provides best flexibility for connection to the alternative State highway corridor with separation from the Brigham Creek Interchange. A connection point at Taupaki Road is recommended over Coatesville-Riverhead Highway as it separates Helensville traffic via Old North Road and Dairy Flat traffic via Coatesville-Riverhead Highway. This reduces the amount of traffic going through the centre of Riverhead, better supporting the development of the local community and providing resilience to the network.

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Infrastructure	Description	Rationale
Kumeū-Huapai to Riverhead connection	Safety, cycling and walking upgrade	Further strengthens the east-west connections between Kumeū-Huapai and Riverhead. Best use of existing desire lines and infrastructure. Supports mode shift through improved Riverhead access to RTN network. Supports better Riverhead access to social infrastructure such shops and medical facilities in Kumeū-Huapai.
Northside Drive extension to new north-south arterial	Further extension to TFUG alignment	Completes the east-west connection on Northside drive between Whenuapai and Redhills. Further improves resilience by providing direct access to the Redhills north-south arterial.
Western extension to Spedding Road	Includes a SH16 crossing and extension of Spedding Road to Trig Road	Further improves resilience for Whenuapai with another access into Whenuapai. Non-interchange SH16 motorway crossing provides safer access for active modes and removes local trips from the motorway access. Important function to relieve pressure on Brigham Creek road and provide access to employment and residential land use.
Dunlop Road extension	Bus priority	Provides bus priority for several bus services to access the key Westgate Bus interchange supporting mode shift, travel choice and improved access to the Westgate metropolitan centre. Completes the east-west Redhills Dunlop Road link which is focused on providing PT priority.
Don Buck Road from Fred Taylor Drive to Triangle Road	Arterial upgrade	Provides a strong north-south alternative route to SH16. Infrastructure supports mode shift and travel choice through improved access to RTN and strategic transport network (including cycle network) and provision of bus priority. Option further enhances connection with the Redhills collector network.

Table 26 Elements changed from the TFUG network

Infrastructure	Option	Rationale
Alternative SH16 corridor	TFUG corridor	Replaced by a new location for the alternative State highway corridor. As discussed in table above
Passenger rail	Reactivating rail west of Swanson	Passenger rail is not part of the long term RTN due to: • Ridership does not support dual modes • Rail does not directly serve key destinations of Westgate, Whenuapai and city centre, • Rail 35% slower than LRT to the city centre Given this, implementation and investment in passenger rail in the short term is less attractive due to value for money implications from investing in infrastructure that may be underutilised in the future. As such the two rail stations located at Kumeū-Huapai are also not included in the recommended network. Note that these have been replaced by a new RTN system from Brigham's Creek to Kumeū-Huapai which is expected to contain multiple stations in the Kumeū-Huapai catchment.
Park and Ride	Park and Ride facilities at Brigham Creek and Kumeū	Park and Ride will be a component of the future planned network. However, due to the uncertainty of land use in Kumeū-Huapai and therefore the interrelationship with the North West

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Infrastructure	Option	Rationale
		RTN line a decision was made to delay the assessment of the exact location of stations and park and rides until further certainty was gained and a robust optioneering process for station location could be undertaken. Therefore, specific Park and Ride locations are not shown graphically on the IBC. Modelling to date has included a Park and Ride at Brigham Creek and another location at the end of the RTN service. These locations will be confirmed during the DBC process.
Arterials	Coatesville-Riverhead highway – north of Riverhead village	Insufficient adjacent land use to support RTN or bus priority on this corridor. Traffic demand does not show capacity constraints north of Riverhead village. No upgrade has been recommended through the village as the volumes are predicted to significantly decrease by this point as people disperse through the local road network. This section of highway has a place-shaping function and will remain at two lanes providing a transition between the high-speed arterial south of the village and rural arterial north of the village. North of the village to Glenmore Road has been identified as having safety risk and this section has been included as a rural safety improvement.
	Tapu Road	Station Road is an arterial to connect people to the RTN or to the alternative State highway. Tapu Road is a similar north-south connection but serves a much smaller catchment, with lower flows and functions as a collector to access the RTN.
	East-west Redhills arterial -Nelson Road to Taupaki	IBC indicated extension to Taupaki was not required as passenger rail services are not included in recommended option. The link has an existing safety risk, so it has been recommended to be included as a rural safety improvement
	Redhills north-south arterial	Replaced by the Taupaki Road/ Nixon Road alignment. As discussed in table above
	Northernmost Redhills east-west link	Duplication of other east-west corridors, in particular the alternative State highway connection from Brigham Creek Road.
	Tōtara Road	The network of collectors north of Brigham Road are predicted to collectively provide sufficient capacity to access Brigham Creek Road. Tōtara Road remains a collector road that provide a local distributor function and access to local land uses. Should the land use change at the RNZAF Airport base, the function of Tōtara Road could require upgrading to an arterial.
	Connection from Hobsonville Road to West Harbour Ferry	Transport demand analysis did not highlight capacity as an issue for this route and function remains as a collector road to access the West Harbour ferry. This route has been identified as part of an opportunity for a wider walking and cycling network

As described above, the TFUG Programme identified a comprehensive transport network to support growth in the North West. This network was estimated to cost between $2,100 - $2,700 million and included several key infrastructure elements that have been allocated for delivery outside of the Supporting Growth programme specifically:

- Rapid transit from Westgate to Squadron Drive - $371 million

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- Rapid transit from Westgate to Brigham Creek Road - $129 million
- SH16 / 18 direct motorway connections - $271 million.

The total cost of these elements is $771 million. When these costs are removed from the TFUG programme, this gives an equivalent estimated cost of approximately $1,330 million (P50).

The recommended network within this IBC, not inclusive of the elements above, has a cost estimate range of $2,920 million - $3,660 million.

In the North West, the following elements have resulted in increased costs:

- Changed costing scope and methodology due to further design analysis. This includes greater costs associated with earthworks and bridge crossings.
- Increased property valuations, including the increase in value for live zoned land in Redhills and structure planned land in Whenuapai.
- Increased number and length of arterials including an additional bridge crossing of SH16, Spedding Road, Hobsonville Road, additional arterial connection between Riverhead and Kumeū-Huapai, and Don Buck Road from Royal Road to Triangle Road. Total cost of these elements is $673 million.
- Increased estimated cost for the alternative state highway and RTN corridors due to greater design certainty – including realignment of the existing SH16 to join Brigham Creek Road, to enable a diamond interchange at Brigham Creek Road and increased length of corridor due to recommended southern position of the alternative State highway corridor. Combined cost is $1,250 million.

s9(2)(i) and s9(2)(g)(i)

7.2. Staging of implementation

This section describes the proposed approach to the implementation of the recommended network. The staging responds to the desired FULSS land release timings and is summarised in **Table 27**.

It is noted that the staging of implementation of this network will need to be supported by interim infrastructure and PT services contained within the complementary projects to support the North West. This will include key stations to support the wider network such as Te Atatū Station and Westgate Station. The staging approach will be further developed and refined during the DBC phase including the effects of harnessing land use opportunities or other interventions such as improved network performance to delay the need for implementation of transport infrastructure.

The recommended network is highly flexible and could be implemented in different ways to respond to any changes in growth patterns and / or funding availability.

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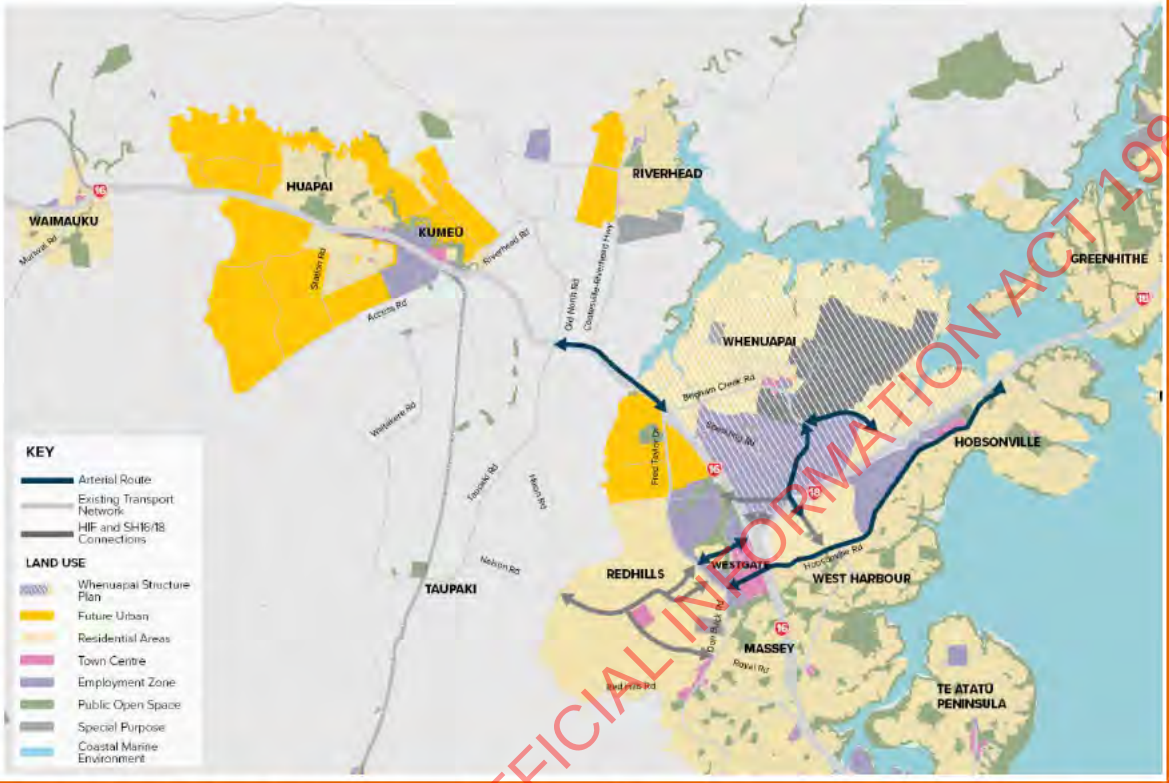
Table 27: North West implementation staging

STAGE 1A – 2018-2022



Supports 1st half of decade 1 land release for Redhills, Whenuapai South, Scott Point and Huapai. Provides access for growth areas to the strategic network and actively encourages mode shift.

- Arterial network within Redhills to allow developers to connect a comprehensive collector network.
- Dunlop Road and its extension to Westgate provide bus priority to the Westgate bus interchange supporting initial mode shift.
- Upgrade of Hobsonville Road supports the growth at Hobsonville Point and Scott Point and improves travel choice to Westgate and activate the business zoning south of SH18.
- Upgrades to Trig Road and eastern end of Brigham Creek Road activates the Whenuapai business area and improve connections to SH18.
- Operational demand management measures provided to complement Stage 1 projects as they are implemented.
- Safe Roads project (progressing separately outside of Supporting Growth programme) to increase safety and capacity between Brigham Creek Road and Taupaki Road.
- Improved bus services and ferry services as per the draft RPTP. This includes weekend ferry services from Hobsonville, and increased frequency and services at West Harbour and additional bus frequencies and services.
- Increased operational funding above RLTP funding would assist in supporting early behaviour change

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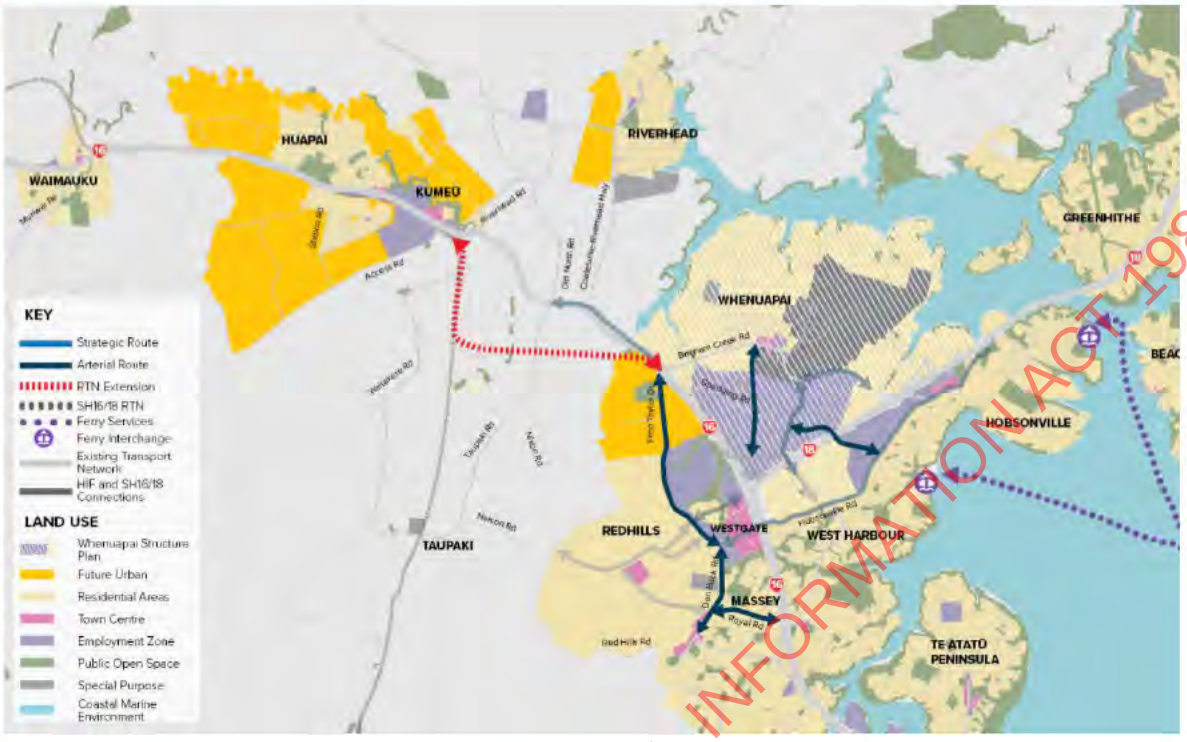
STAGE 1B – 2023-2027



Supports 2nd half of decade 1 land release. Step change in people-moving capacity for North West

- As per ATAP, the implementation of RTN from Westgate area to Kumeū-Huapai. This stage is for RTN to Kumeū-Huapai local centre as this growth area is due to be structure planned in 2025. This will enable the first step of mode shift for the existing catchment whilst allowing the development of the rapid transit extension to best match the Kumeū-Huapai land use. Note it is assumed that the RTN from the city centre to Westgate is delivered in the first decade. The City Centre to North West RTN study will confirm this timing in 2019.
- Improved ferry services to Hobsonville Point and West Harbour to provide mode choice and support the wider public transport system.
- Improve Fred Taylor Drive and Don Buck Road to support the additional growth within Redhills, maintain bus priority and improve active mode facilities.
- Upgrade Royal Road to support local bus services and access for walking and cycling to the strategic SH16 cycleway.
- Extend Spedding Road east to provide new SH18 crossing for Whenuapai to support the growth in the Whenuapai business area. Connection supports access to the future SH18 RTN.
- Upgrade Māmari Road to support residential growth in Whenuapai and to allow Whenuapai Stage 2 growth collector network to connect.
- Operational demand management measures provided to complement Stage 1B projects as they are implemented.
- Increased operational funding above RLTP funding would assist in supporting early behaviour change

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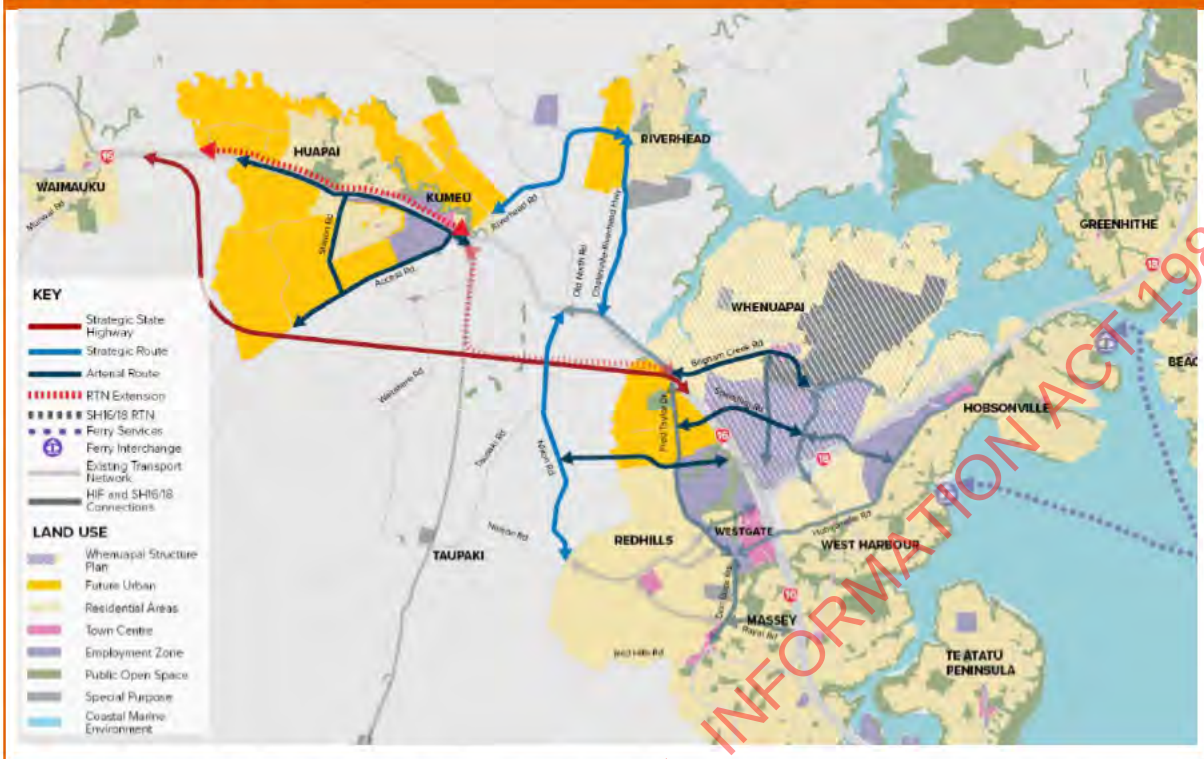
STAGE 2 – 2028-2032



Supports 1st half of 2rd decade land release for Kumeū-Huapai, Riverhead, Redhills north and Whenuapai Stage 2.

This assumes the SH18 RTN and SH16/18 Connections project are implemented in this decade. Supports access to the RTN and strategic road network.

- Alternative State highway corridor to remove vehicles from the existing SH16 / Main Road in Kumeū-Huapai to support urban redevelopment and provide access to the southern FUZ which is released for development. It is noted that further assessment will be needed on the interrelationship between the alternative corridor and the RTN. Displacement of traffic from SH1 is likely to be necessary to enable construction and eventual operation of the RTN.
- Upgrade Station Road and Access Road to provide safe access to the RTN for active modes. Connects people to the RTN and alternative corridor and supports bus network.
- Upgrade Coatesville-Riverhead Highway to encourage active modes to access the RTN, improve safety and support local feeder bus.
- Rural road improvements for Riverhead Road to improve connection between Riverhead and Kumeū-Huapai, improve safety and encourage active mode trips.
- Upgrade Taupaki Road / Nixon Road to connect Redhills with the newly developed Kumeū-Huapai and Riverhead growth areas.
- Extend Northside Drive to complete the new east-west link from Northside Drive ramps to Taupaki Road forming a resilience link. Improves access between Redhills and Whenuapai.
- Western extension of Spedding Road to support the east-west connections between Redhills north and Whenuapai land uses. Improves resilience for western Whenuapai and likely to ease some pressure on Brigham Creek Road interchange.
- Upgrade Brigham Creek Road to support residential growth in north Whenuapai.
- Operational demand management measures provided to complement Stage 2 projects as they are implemented.

No investment is required in Decade 3, this is because unlike Auckland's other growth areas, all land in the North West is planned for release by Decade 2. As such, investment in infrastructure should be timed to enable this to occur.

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7.3. Outcomes delivered

The North West's recommended future transport system has been selected to shape travel behaviour and deliver the following investment objectives:

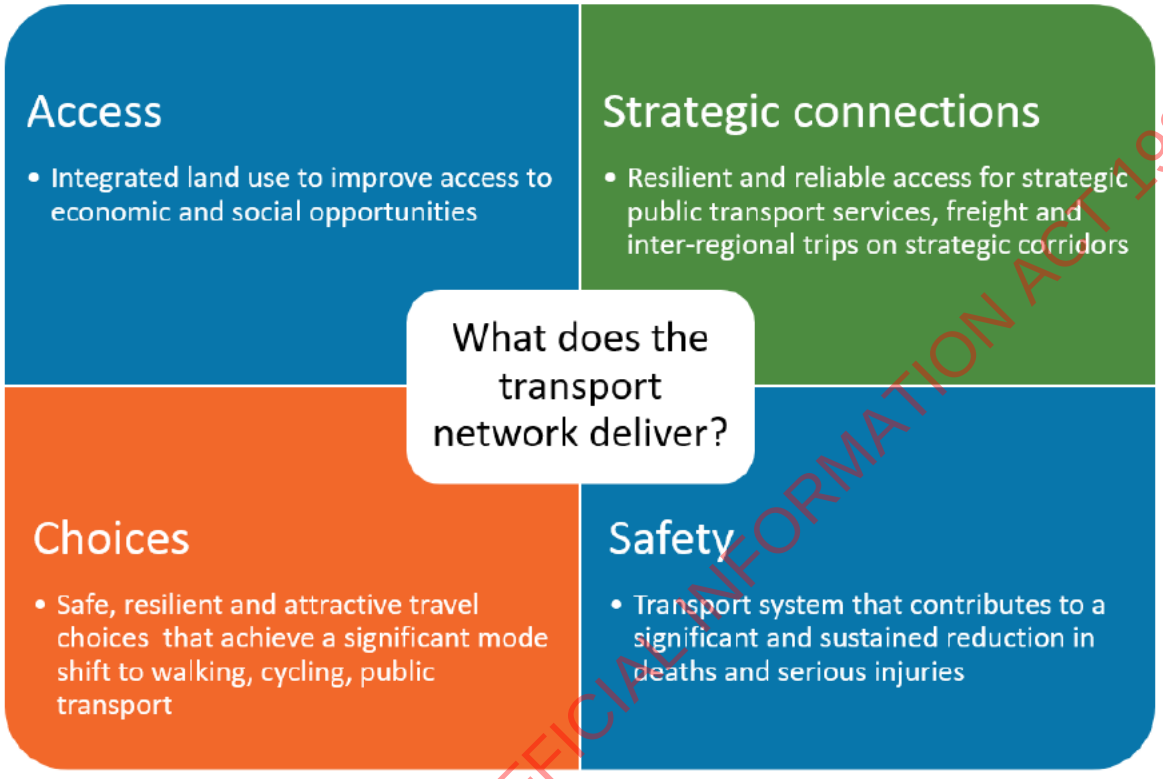

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Table 28 summarises the outcomes achieved by the recommended network, with reference to these investment objectives and their related investment KPIs, which are described in Section 4.13. Detailed analysis regarding the performance of the network against specific measures is provided in Appendix C: Transport Report.

Table 28: Recommended network outcomes

Areas	IBC Outcome
Safe, attractive walking and cycling **KPI 1A, 2B, 3A, 3B, 4A**	Comprehensive walking and cycling network, linking with the regional cycle network and supported by a secondary local cycle network enables a mode shift from 12% to 20%, exceeding the PBC target of 16%. Kumeū-Huapai predicted to experience the greatest increase in cycle mode share, given the more limited nature of existing facilities. Around 50%, 85% and 70% of households in Kumeū -Huapai and Riverhead are within 3km of employment, local activities and good quality public transport respectively. Across the whole of the North West, including Redhills and Whenuapai, access to employment and local activities further improves to around 75% to 100%. In addition, across the North West around 20% and 60% of households are within 400m of high-quality cycle facilities or 3km of the regional network respectively.

Areas	IBC Outcome
 Frequent, reliable, accessible public transport **KPI 1B,2A, 2B, 3A, 3B**	Enables a substantial increase in access to social and economic opportunities, connecting communities along dedicated corridors and enables transit-oriented development – programme includes rapid transit extension to Kumeū-Huapai. This will substantially increase access for all North West Auckland growth areas. Total forecast mode shift is from 1% to 16% using public transport for all trips. The PBC included an aspirational target of a mode share of 29% of people using public transport for external trips outside the North West. Overall, the North West is expected to reduce private vehicle use, by increasing the public transport mode share for external trips to around 41%, equating to an increase of 11% or around 36% more public transport trips compared with the PBC target. The recommended network will also achieve high mode shift for key destinations such as 83% of weekday AM peak trips to the city centre are expected by public transport. 40% to 50% of people in Kumeū-Huapai, Riverhead and Redhills are within 400m walk of frequent public transport services or 3km cycle of a rapid transit station, supporting mode shift for both local and strategic journeys. Whilst in Whenuapai, around 70% of people are within 400m walk of frequent or rapid public transport services.
 Resilient **KPI 1B, 2A, 3A, 3B, 4A**	Safe, attractive, convenient, high-quality alternative mode choice provided. Good quality alternative strategic corridor and grid network of arterial corridors to provide choice. This provides flexibility to respond to changes in behaviour, growth, and technology.
 Reliable **KPI 2A, 3B**	Travel time variability (between the AM peak, PM peak and interpeak) across the network is reduced for public transport and general traffic. This means access to employment, social opportunities, and core services will be more reliable than currently. The reliability of public transport will be enhanced by the extension of rapid transit services to Kumeū and Huapai, in a dedicated corridor. This improves travel time reliability for Kumeū and Huapai residents by having a dedicated public transport corridor, operating with rapid transit services on a consistent timetable. In addition, other components of the recommended network, particularly the alternative State highway corridor, reduce the variability of intra-regional and freight route journey times around Kumeū. Instead of weekday peak period journey times being two to three times off-peak journey times, the recommended network is predicted to result in weekday peak journey times being one to one and half times off-peak times. Access to the strategic network will be reliable (due to reduced travel time variability) and resilient (due to an additional access to the motorway). Reliable travel is a key enabler of local employment, as it will attract businesses and therefore jobs.
 Safe **KPI 4A**	A safe, connected network of routes accessible to people of all ages and abilities is provided. Improved safety for rural corridors with 30% reduction in daily vehicles (per km) and 43% reduction in DSIs on rural roads. Four rural roads where growth has increased personal or collective risk have been identified for physical safety improvements. Speed management will also be considered. Real and perceived safety for pedestrians and cyclists is improved with dedicated space for these users, where activation by other modes of transport provides natural surveillance.

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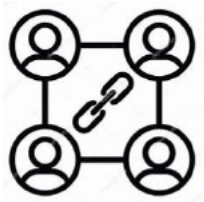
Areas	IBC Outcome
Development ready **KPI 1A**	The North West may be 'development ready' in the FULSS timeframes depending on regional prioritisation of greenfield growth. Enables route protection of arterial corridors. Provides appropriate capacity to meet the demands of growth. Provides flexibility to respond to changes in development timing. Provides opportunities to lead with behaviour-change initiatives.
 **Cohesive community** **KPI 1A**	Existing corridors are enhanced with active mode facilities creating people-oriented streets where more people walk and cycle Public transport services hub into town centres, helping to support local businesses with high foot traffic. New corridors alleviate potential traffic demand and severance through town centres, such as Kumeū-Huapai and Whenuapai. Amenity-rich residential areas are a short, safe walk or cycle from parks, schools, shops and cafes, strengthening local communities Pressure on the environment is reduced through lower vehicle emissions Less physical space is required for car travel and can be re-purposed for people and community places.

7.4. Results alignment

The recommended network of improvements has been assessed using the Investment Assessment Framework (IAF). The IAF requires cost benefit appraisal and results alignment evaluation[26] against GPS priorities. The cost benefit appraisal has been assessed as **LOW**. s9(2)(i) and s9(2)(g)(i)

Assessment profiles are developed according to activity class groupings. The recommended network of improvements for North West Auckland is predominantly within the following activity classes:

- Walking and cycling improvement activities
- Public transport improvement activities
- Promotion of demand management programmes
- Road improvement activities.

To determines a proposal's priority, the two assessment factors of results alignment and cost-benefit appraisal are brought together to form an investment assessment priority profile.

Auckland is identified as a high-growth urban area. The programme has been specifically developed to respond to the access requirements of an additional 320,000 new dwellings in the Auckland region and the significant gap identified between the current transport system and the identified need.

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[26] New Zealand Transport Agency (2018) *Results Alignment* https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/2018-21-nltp-investment-assessment-framework-iaf/developing-an-assessment-profile-2018-21/#results-alignment

The recommended North West network responds to the access requirements of 43,000 new dwellings and 17,000 new employment opportunities. The network is integrated with Auckland Council's land use aspirations and includes new public transport, walking and cycling facilities intended to improve intermodal connectivity and support significant mode shift.

It has been assessed as having **VERY HIGH** results alignment against the public transport improvements activity class. In addition, it has **HIGH** results alignment against the three remaining activity classes, as indicated by the elements in **Table 29**. **Table 29** also indicates the proposal's investment priority

In addition to the Access Liveable Cities category, the recommended programme also delivers **HIGH** results alignment from a safety and environment perspective as follows:

- Addresses a high perceived safety risk to use of cycling
- Targets promotion of significant lower emissions from the transport system to reduce environmental and public health harms
- Targets the use of active modes for health and environmental benefits
- Enables a significant modal shift from private motor vehicles to active modes.

Table 29: Results alignment – access liveable cities

Activity Class	VERY HIGH	PRIORITY
Public transport improvements	• Enables a substantial increase in access to social and economic opportunities for large numbers of people along dedicated key corridors and enables transit-oriented development – programme includes rapid transit connection to Kumeū-Huapai. This is likely to be a continuation of the city centre to Brigham Creek Road light rail line. This will substantially increase access for all the North West Auckland growth areas.	1
Public transport improvements	• Addresses significant gap in access to new housing in high growth urban areas – 40% to 50% of people in Kumeū-Huapai, Riverhead and Redhills and 70% of people in Whenuapai will live within 400m of reliable, frequent public transport services. Currently only limited public transport services are provided, particularly to Riverhead and Kumeū-Huapai. • Supports agreed integrated land use, multi-modal plans and mode shift in major metros – RTN stations to be provided adjacent to metropolitan centre, Kumeū-Huapai town centre and planned employment opportunities. • Improves intermodal connectivity where this enhances the appropriate use of public transport – ferry terminal and service frequency improvements recommended, correlated with improved bus service connections and improved cycle connectivity to encourage walk/ferry, cycle/ferry and bus/ferry connectivity. • Makes best use of the public transport service operations and connection to other services – public transport service is designed to connect centres (Kumeū-Huapai, Whenuapai, Redhills) with the Westgate metropolitan centre and the city centre. All services to travel via town centres, enabling good quality connection to other services and maximising walk-up demand and foot traffic to local retail.	5

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Walking and cycling improvements	• Targets the completion and promotion of networks in major metros to enable access to social and economic opportunities – proposed facilities significantly improve active mode connection to the North West metropolitan centre as well as planned business land in Whenuapai. • Supports increased uptake of children using walking and cycling especially to and from school – by including walking and cycling facilities along desire lines to schools, particularly Massey High School which is located on Don Buck Road. • Supports agreed integrated land use and multi-modal plans in major metros – with transport interventions that support land use, i.e. public transport interchanges next to metropolitan centres and key urban centres, connected with safe, attractive walking and cycling facilities. • Addresses a significant gap in access to new housing in high growth urban areas – 60% of future North West residents will be within 3km of employment opportunities using safe, attractive, separated cycle facilities.	
Promotion of demand management programmes	• Targets opportunity to establish and promote active modes or public transport access to new housing in high growth urban areas – Programme identifies opportunities to work with community groups to promote active modes and public transport use once services and facilities are in place. Facilities designed to directly connect schools, town centres and employment areas mean that potential users can be more specifically targeted. • Targets mode shift and ride sharing to improve access to economic and social opportunities and improve amenity in major metros. Programme identifies opportunities to work with community groups to promote active modes and public transport use once services and facilities are in place. Facilities designed to directly connect schools, town centres and employment areas mean that potential users can be more specifically targeted.	
Road improvements	• Addresses significant gap in access to new housing in high-growth urban areas – resilient, reliable transport system that connects new housing areas to jobs and social opportunities and includes viable alternatives to private vehicle travel, including RTN, improved ferry services, walking and cycling networks.	

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8. Economics

This section sets out the costs, benefits, and BCR for the recommended network. s9(2)(i) and s9(2)(g)(i)

8.1. Benefits

The economic benefits of the recommended network over a 40-year period are summarised in **Table 30.**

Table 30: Economic benefits (discounted million NZ$)

Item	Recommended network ($M)
Travel time costs	900
Congestion costs	180
Trip reliability	50
Vehicle operating costs	130
Crash savings	150
Active modes	270
Public transport user benefits	510
CO_2	10
Wider economic benefits	440
PV total net benefits	**2,640**

These benefits show a typical pattern of benefit to many transport projects with travel time savings the predominant area of benefit. Car travel time savings also include public transport de-congestion benefits, as travellers shift to more efficient travel modes. Safety (crash) benefits are $150m, as a result of the existing safety issues in the area.

8.2. Costs

The capital and operating costs of individual elements were developed and considered through the option selection process. Individual elements comprising the recommended network were priced to an IBC Estimate (IBE) level. s9(2)(i) and s9(2)(g)(i) **Table 31** summarises the CAPEX costs (P50) of the recommended network.

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Table 31: CAPEX costs – recommended network

Project	Property ($M)	P_{50} ($M)	P_{95} ($M)
New Network Connections			
Rapid Transit Corridor – Brigham Creek Road to Kumeū -Huapai	71	541	677
Alternative State highway – Outside FUZ Brigham Creek Road to west of Huapai	41	713	892
Dunlop Road Extension Fred Taylor Drive to Maki Street	17	46	58
Northside Drive Extension (West) Fred Taylor Drive to Nixon Road	7	66	83
Māmari Road Extension Northside Drive to Don Buck Road	40	119	149
Spedding Road Extension (West) Trig Road to Fred Taylor Drive	12	75	94
Spedding Road Extension (East) Trig Road to Hobsonville Road	20	97	122
Upgrades to Existing Arterials			
Taupaki Road / Nixon Road	9	97	122
Coatesville-Riverhead Highway SH16 to Riverhead Road	13	86	108
Don Buck Road Triangle Road to Fred Taylor Drive	9	53	67
Fred Taylor Drive SH16 to Don Buck Road	61	144	180
Royal Road Don Buck Road to SH16	21	51	64
Northside Drive Fred Taylor Drive to Maki Street	15	37	47
Trig Road SH18 to Brigham Creek Road	28	80	100
Brigham Creek Road SH16 to SH18	74	179	224
Hobsonville Road Fred Taylor Drive to Squadron Drive	99	238	298
Access Road Upgrade SH16 to Alternative State highway	55	159	199
Improvements to Existing Collector Roads			
Riverhead Road	0	60	75

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Project	Property ($M)	P_{50} ($M)	P_{95} ($M)
Station Road SH16 to Access Road	11	42	53
Ferry terminal improvements			
West Harbour	0	15	20
Hobsonville Point	0	8	10
Rural road safety improvements			
Coatesville-Riverhead Highway, Old North Road, Nelson Road, Red Hills Road	0	13	18
TOTAL	**603**	**2,920**	**3,660**

Beside the capital costs, other annual costs items were estimated and discounted. These are extra costs over do minimum costs. Fare revenues were not included in the total cost calculation. This assumption applies to the national BCR analysis, where such fares are considered economic transfers. The fare revenue has been included in the government BCR which only considers net costs to government. All NPV figures have been calculated over a 40-year period. **Table 32** summarises these costs for the recommended network.

Table 32: Operating and maintenance costs -recommended network

Item	Cost ($M)
Bus operating costs	21.0
Rapid transit operating costs	35.0
Ferry operating costs	0.2
Station operation and maintenance costs	2.2
Ongoing operational demand management measures	1.7
General infrastructure (annual) and bridges (after 10 years) maintenance	3.0
Resurfacing (every 10 years)	15.5

Table 33 provides the present value of these costs.

Table 33: Net present value costs (discounted million NZ$)

Item	NPV costs ($million)
Capital	2,100
Maintenance and periodic	40
Public transport operating costs	470
Total costs	**2,610**

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8.3. Benefit Cost Ratio (BCR)

The BCR was calculated using the net present value benefits and costs described above. This is shown in **Table 34**.

Table 34: Benefit cost ratio – recommended network

Item	Cost ($M)
PV total net benefits, $M PV	2,640
PV total net costs, $M PV	2,610
Benefit Cost Ratio	1.0

The BCR for the recommended network of projects is over 1.0, and the present value of benefits is slightly higher than costs. It is considered that this analysis is conservative and more detailed analysis of benefits, including more detailed analysis of wider economic benefits (WEBs) may result in a higher BCR.

8.4. Sensitivities

A range of sensitivity tests were undertaken, and the results are provided in **Table 35**.

Table 35: Summary of sensitivity tests

Sensitivity	Test 1	Test 2	Test 3
Discount rate	Base Case 6%	Discount Rate 4%	Discount Rate 8%
	1.0	1.3	0.8
Benefits progression	Base Case (2026 @ 14% and 2036 @ 88% of 2046)	Pessimistic (2026 @ 0% and 2036 @ 50% of 2046)	Using population growth profile
	1.0	1.2	0.9
Cost estimate	Expected C=case (P50)	P95 cost	Base case
	1.0	1.2	0.8
Postponed time zero	Base Case (2024)	Time Zero 2028	Time Zero 2034
	1.0	1.4	1.2
Wider economic benefits	Base Case (20%)	Optimistic (30%)	Pessimistic (10%)
	1.0	1.1	0.9
PT fare revenue	Base Case	BCR(G)	
	1.0	1.1	

Sensitivity testing suggests the BCR could range between 0.8 – 1.4 with changes to key assumptions. The sensitivity testing highlights a sensitivity to when the infrastructure is provided relative to

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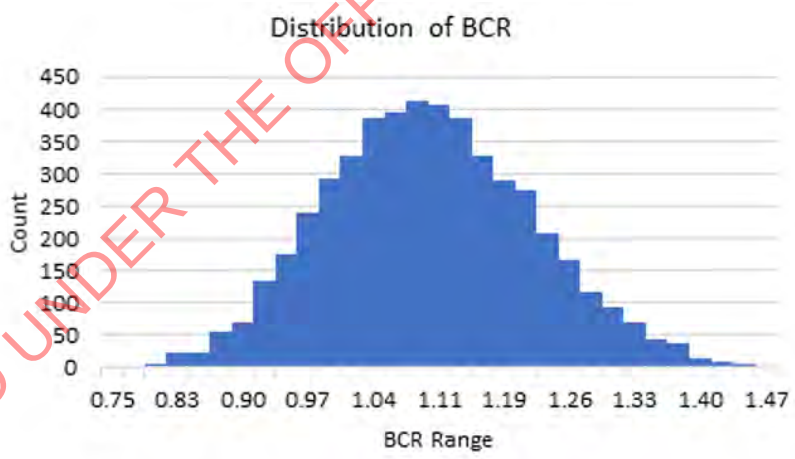
development of the area. Optimum implementation timing will be further refined for each element in the DBC stage.

A risk analysis has been undertaken to assess the BCR range of the recommended network. This risk analysis was undertaken based on a high-level risk-based Monte Carlo analysis approach. This analysis for the cost and benefit risks was undertaken for the following inputs:

- Cost risks. A base cost estimate (no contingency), P50 (expected estimate) and P95 costs were used as the low, base and high values respectively based on a triangular probability distribution.
- Benefit progression over a 40-year period based on a single modelled year output. The analysis assumed that the benefits in 2026 and 2036 will be 0% and 50% of the 2046 benefits respectively. A low of 0% (year 2026) and 30% (year 2036), and a high of 15% (year 2026) and 75% (year 2036) have been included in the analysis based on a triangular probability distribution.
- Wider economic benefits have been assumed to provide an additional 20% of total benefits. A low of 10% and high of 30% have been assumed as inputs to the Monte Carlo analysis using a triangular probability distribution.
- Public transport reliability benefits have been assumed to be 30% of the travel time benefits. A low of 10% and high of 60% have been assumed as inputs to the Monte Carlo analysis using a triangular probability distribution.

Based on the Monte Carlo analysis with 5,000 iterations, a BCR distribution range was developed.

Figure 56 - Recommended network BCR distribution



Based on the risk analysis in Figure 56, the recommended network has a BCR range between 0.9 and 1.3 (based on 5th and 95th percentile Monte Carlo analysis output distribution profile).

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8.5. Incremental economic analysis

Incremental benefit-cost analysis is undertaken on mutually exclusive options to identify optimal economic solutions. Mutually exclusive options occur when acceptance of one alternative or option precludes the acceptance of others. For example, when a new road is proposed and there is a choice between two different alignments, and the choice of one alignment precludes the choice of the other, the two options are mutually exclusive.

The options investigated for the North West growth area are generally individual sections that collectively form a transport network and hence incremental BCR calculations have not been undertaken as these options are not mutually exclusive. There were some short list options with different mutually exclusive alignments, however the differences operationally were too minor to be distinguishable and hence option selection was made based on other considerations, such as construction complexity and extent of land acquisition required.

8.5.1. Scenario testing – Affordability

The recommended network responds to the investment objectives, current policy context (particularly the GPS), and desired urban form outcomes, in a balanced and appropriate manner. Achieving these outcomes will require a significant level of investment from AT and the Transport Agency. As noted in Section 4.13, a step-change in transport infrastructure is needed to appropriately address the magnitude of the problems. If this infrastructure is implemented incrementally, the impact of this collective step change is lost, resulting in partial realisation of benefits.

The affordability of the recommended network is acknowledged as a potential barrier to approval and implementation. To that end, a series of alternative scenarios have been put forward which would require lower levels of investment and reduce the overall network cost. Although pure incremental benefit-cost analysis has not been undertaken, economic benefits and costs have been calculated for each scenario and compared with the recommended network.

The estimated cost range for the North West recommended network is **$2,920 - $3,660 million**. The recommended network delivers **VERY HIGH** results alignment and a BCR of **0.9 and 1.3.**

Four scenarios have been tested to explore alternative investment scenarios as follows, s9(2)(i) and s9(2)

Table 36 summarises the approximate changes in network cost and anticipated effect on the network BCR for each of these alterative investment scenarios, together with the potential changes in how the alternative investments respond to the investment objectives, when compare with the recommended network investment.

In summary, although the scenarios provide substantial reductions in cost in comparison with the recommended network, they also deliver fewer benefits, and therefore are less economically viable than the recommended package. They also deliver poorer outcomes in terms of access to walking and cycling facilities, urban form, network resilience and certainty to enable land to be released for development.

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Table 36: Scenario evaluation summary

Scenario	Change in funding required ($M CAPEX)	Change in benefits realised ($M NPV)	BCR*	Incremental BCR	Comparison of investment objectives			
					Access	Strategic	Travel Choice	Safety
Recommended Network	**N/A**	**N/A**	**1.0**	**N/A**	**H**	**H**	**H**	**H**
Scenario A: No alternative State highway	- $680M	- $620M	1.0	0.9	–	–	=	–
Scenario B: Reduced arterials	- $170M	- $210M	1.0	1.2	–	–	=	–
Scenario C: No four-lane arterials	- $620M	- $170M	1.2	0.3	–	–	–	–
Scenario D: Reduced rural safety	- $10M	- $10M	1.0	1.6	=	=	=	–

* *BCR based on PV costs and include operating costs*

While substantial changes to the recommended network are likely to negatively affect the investment objectives and do not provide strong economic justification, there may be some instances where reduced cross-sections or consolidated corridors could reduce costs without negatively affecting the outcomes sought.

These opportunities will be explored in more detail during the DBC phase for each project. Specific roads which have been identified include:

- Alternative State highway corridor having a multimodal function and sharing construction costs with the RTN or a future opportunity to relocate heavy rail
- Potential reduction to 2 lanes for sections of:
  - Brigham Creek Road near the town centre
  - Access Road
  - Hobsonville Road
  - Dunlop Road

Therefore, it is considered that the recommended network should remain the preferred option for the North West, as it provides the best balance of economic performance, affordability and delivery against the investment objectives and key outcomes sought for this investment.

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PART C – IMPLEMENTATION

9. Implementation

This section sets out the benefits of route protection, and the preliminary route protection and property strategies required to implement the recommended network.

9.1. Benefits of route protection

The next stage of implementation for the recommended network depends in part on the nature of the intervention identified and the organisation (be it infrastructure provider, land developer or Council) best placed to deliver it. A large (but not exclusive) element in the next stage of implementation will be to establish 'route protection' for the recommended options, as recommended in the PBC. 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. There are a number of potential mechanisms for route protection, s9(2)(i) and s9(2)(g)(i) The route protection process itself is proposed to take place over the next four years.

While the IBC has focused on the 'benefits and impacts' of the intervention itself, there are a number of benefits of this initial step of 'route protection'. In summary, the key benefits of route protection are that it:

- **Provides a mechanism for AT and the Transport Agency 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. This means that projects can be delivered to meet project objectives, as part of the wider transport system and give certainty that the transport system can be operated.
- **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. This is in part associated with the increasing land values that occur as 'live zones' are implemented, and cost savings associated with the control or management that route protection can place on development on the land.

Figure 57 illustrates the component costs of land as farmland, FUZ, and land once developed. In comparison with the other growth areas in Auckland, the North West has the second highest land cost once developed, hence a high level of risk.

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Figure 57: Mid-point land values in relation to the RUB[27] (Sources: Auckland Council; CBRE)

- **Provides certainty to landowners**, the existing community and future customers. This can minimise the risk of social disruption that can occur when infrastructure is retrospectively delivered within developing and established urban areas. It can enable new and establishing communities to plan with more certainty (e.g. they can move to an area knowing there will be public transport travel options for them in the future).
- **Enables developers to commit investment to progress infrastructure**. Where a transport network affects multiple parcels of land, the certainty of route protection enables developers to commit to provision of early 'contributing' infrastructure, with the expectation that subsequent stages of development will complete other elements of the network. For example, protecting an arterial road corridor gives certainty to existing adjacent developers.
- **Supports Council's subsequent stages of land use planning and development and improves the quality of the urban environment with more certainty**, for example enabling Council to identify areas of higher density residential development in areas that will be serviced by rapid transport networks or other higher quality public transport options. For example, location of public transport interchanges adjacent to a proposed local centre and high-density residential activity.

Balanced against the above benefits, there are costs. These include increased expenditure on land (in circumstances where early purchase is required) and the risk of potential planning 'blight' (adverse social and economic impacts associated with the lack of development on a protected corridor over a long period of time).

Further discussion on specific route protection options is provided below in Section 9.2 s9(2)(i) and s9(2)(g)(i) The Route Protection Strategy provides an overview of the overall route protection options (e.g. designation, plan change / zoning, structure planning or precinct plan provisions and landowner agreements). The Financial Case (Section 10) provides further cost evaluation of the above benefits (and costs).

[27] RUB was correct at the time of this report. It is now referred to as Metropolitan Urban Limit (MUL)

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9.2. Priority for route protection

The benefits of route protection of transport corridors are not equal across the range of projects identified in the recommended network. The benefit of route protection for each corridor is dependent on a number of criteria including:

- **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 erode 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.

Based on the suite of projects identified within the North West recommended network, **Table 37** sets out a high-level assessment of relative route protection priority across the network.

Table 37: Route protection priority

Decade	Project type	Urgency	Financial saving	Place shaping	Value capture	Overall priority
Short term delivery	Upgraded existing roads	✓✓✓	✓	✓✓		High
Medium term delivery	Rapid transit corridor	✓✓✓	✓✓✓	✓✓✓	✓✓✓	High
	Upgraded existing roads	✓✓✓	✓	✓✓		High
	New arterial roads	✓✓	✓✓✓	✓✓		Medium
Long term delivery	Alternative State highway connection	✓✓	✓✓			Medium / High
	Sub-regional connections	✓	✓✓	✓		Low
	Upgraded existing roads	✓	✓	✓✓		Medium
	New arterial roads	✓	✓✓✓	✓✓		Medium

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9.3. Route protection strategy

This IBC contains a preliminary route protection strategy s9(2)(i) and s9(2)(g)(i) for the recommended area-based network, s9(2)(i) and s9(2)(g)(i) that sets out a methodology for identifying potential route protection packages based on a range of "drivers" or factors. These include (for example): opportunities for place making/achieving liveability outcomes; timing of Council's structure planning processes; developer readiness; whether growth pressure is imminent; presence of Central Government interest; number of affected landowners; availability of funding; presence of scheduled environmental features; potential for adverse environmental or cultural effects.

For each notional package of components, preliminary route protection mechanisms have been selected from a range of options, including NoRs for designation, developer agreements, and structure plan/plan change opportunities. These mechanisms reflect three distinct layers of route protection, namely identification, communication and formal protection. s9(2)(i) and s9(2)(g)(i)

Formal protection via Notices of Requirement for designation provides the most robust and permanent method of route protection for transport corridors, signalling the intention of the requiring authority to implement the infrastructure at some future time (usually within a statutory lapse period) and ensuring that land subject to the designation is not used or developed in a manner that is incompatible with the transport purpose. The designation enables the relevant requiring authority to retain control and provides long term certainty to the community, landowners and developers. Acquisition of land or entry into developer agreements provide similar levels of permanent route protection.

Lower levels of route protection include identification and communication of the recommended transport network, including utilising opportunities presented by structure planning and plan change processes. While use of these planning processes does not provide the highest and best level of route protection, they do offer a mechanism that will "buy time" by signalling future network intentions to the community and property owners until such time as formal route protection becomes necessary or urgent due to growth pressure and the application of live zoning.

All three levels of route protection will be used at various times for the Supporting Growth network, depending on the urgency and priority of individual network components and any funding constraints. Ultimately, however, much of the recommended network is likely require NoRs for formal route protection.

s9(2)(i) and s9(2)(g)(i) this IBC identifies NoRs as the ultimate form of route protection for most recommended network components, along with some plan change processes and developer agreements. The reasons for this relate principally to the uncertainty of timing in respect of developer readiness/alignment and the Council's structure planning timetable. While all available opportunities for these lower level route protection mechanisms will be explored, those opportunities will arise sooner in some areas than others and may only enable individual pieces of network components to be protected.

The route protection strategy s9(2)(i) and s9(2)(g)(i) is reasonably high level and assumes completion of formal route protection for most network components within the next 4 years. It also anticipates that further refinement of the strategy for the whole programme will be undertaken at a programme wide

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level having regard to competing priorities between each IBC area, in addition to feedback from the IQA process in relation to programme affordability.

Further work done in the DBC phase will result in more detailed prioritisation of network components and further refinement of the programme wide route protection strategy to include a more layered approach. This is likely to involve NoRs for specific first decade projects and lesser levels of protection in the interim for projects that do not require the highest level of protection immediately. s9(2)(i) and s9(2)(g)(i) it represents a starting point for the development of the programme wide route protection strategy rather than an end point for route protecting the network recommended in this IBC.

9.3.1. Summary of preliminary approach to route protection

The components of the recommended network have been grouped into eight packages for the purpose of route protection s9(2)(i) and s9(2)(g)(i) The packages are summarised in **In general**, the ultimate route protection mechanism recommended in this strategy is by way of Notice of Requirement (NoR) as this provides the most robust protection over the medium to longer term. For some packages, lower levels of route protection mechanisms may be appropriate and adequate in the short to medium term. As discussed above, these opportunities will be investigated during the DBC phase having regard to programme-wide prioritisation and affordability considerations.

In addition, the DBC investigations will ultimately confirm the final required width for each arterial upgrade. Should this upgrade not require additional width beyond the existing road corridor then the DBC will confirm that the NoR for that element is not required.

Table 38 below, having regard to factors such as:

- How urgent the project or projects are, including whether:
  - Projects are more desirable in the short term
  - Live zoned land is required for infrastructure
  - Risk of build out of subject land
  - High degree of local or central government interest.
- How complex the project or projects might be (i.e. significant potential adverse effects, numerous landowners affected and difficulty of acquiring land, the nature of landholdings, or a sensitive or difficult receiving environment).
- Whether opportunities are enhanced through packaging or strategically timing the route protection (e.g. working with the Council's structure planning process or with developers on their private plan changes that might affect some level of interim route protection).

In general, the ultimate route protection mechanism recommended in this strategy is by way of Notice of Requirement (NoR) as this provides the most robust protection over the medium to longer term. For some packages, lower levels of route protection mechanisms may be appropriate and adequate in the short to medium term. As discussed above, these opportunities will be investigated during the DBC phase having regard to programme-wide prioritisation and affordability considerations.

In addition, the DBC investigations will ultimately confirm the final required width for each arterial upgrade. Should this upgrade not require additional width beyond the existing road corridor then the DBC will confirm that the NoR for that element is not required.

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Table 38: Preliminary North West route protection strategy summary table

Package	Components	Urgency of implementation	Mechanism	Route protection priority	Requiring Authority
NW1 – Alternative SH16 Corridor and RTN	**SR-SH-K01a**: Alternative SH16 Corridor from SH16 Brigham Creek Roundabout south of Kumeū-Huapai FUZ	Dependent on RTN extension and should be evaluated at DBC phase as a package with RTN. Rapid transit provides the greatest ability to achieve significant mode shift in the North West growth area. Desired RTN alignment follows SH16 / Main Road through Kumeū town centre. Alternative corridor is required to remove traffic from corridor, enabling it to be re-purposed for RTN.	New NoR / Variation to existing SH16 designation	High	NZTA / AT
	RLT-K-03-C1: Rapid transit – New corridor from SH16 Brigham Creek Roundabout to Kumeū -Huapai Town Centre via existing Heavy Rail corridor	While the alignment of the rapid transit corridor is subject to further refinement during the next phase, the corridor itself is a fundamental part of the recommended network. It provides significant additional people-moving capacity to serve the North West growth area. DBC should include alternative State highway and Main Road urban form.			
	AR-K-07: Repurposing of the existing SH16 corridor to an arterial (urban and rural) form and function.	Dependent on alternative SH16 corridor to remove traffic through Kumeū-Huapai town centre. Should be evaluated as a package with RTN. Corridor can then be repurposed as an arterial with rapid transit adjacent.			
NW2 – Kumeū-Huapai Urban Arterials	**AR-K-03A**: Urban Arterial upgrade of Station Road	The Kumeū-Riverhead area is anticipated to be development ready after 2028 and is scheduled as a longer-term FUZ area for development. Upgrades within the area are interdependent with the land use patterns.	NoR	Medium	AT
	AR-K-06A: Urban Arterial upgrade of Access Road and Tawa Road				
NW3 – Kumeū-Riverhead	**SR-K-01A**: Rural arterial upgrade Kumeū-Riverhead	The Kumeū-Riverhead area is anticipated to be	NoR	Low	AT

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Package	Components	Urgency of implementation	Mechanism	Route protection priority	Requiring Authority
Rural Arterials	**SR-K-03A**: Rural arterial upgrade of Coatesville-Riverhead Highway (SH16 to Riverhead)	development ready after 2038 and is scheduled as a longer-term FUZ area for development. Upgrades within the area are interdependent with the land use patterns.			
NW 4 – Hobsonville Road Urban Arterial	**AR-W-12**: Urban arterial upgrade of Hobsonville Road	Upgrade of an existing corridor. Linked to growth in Whenuapai, in particular. Has existing issues that need to be addressed. Significant development pressure.	NoR	High	AT
NW 5 – Westgate and Whenuapai Urban Arterials	Urban arterial upgrade of Fred Taylor Drive **(AR-R-04)**	Growth in Whenuapai south is forecast to begin within 5 years. The Council is currently undertaking a Plan Change process for Whenuapai south. Growth in the Redhills area is forecast to begin as soon as transport infrastructure is in place. The area was live zoned through the AUP: OP. Projects within the area primarily involve upgrade to existing road corridors.	NoR or Developer Agreement	High	AT
	AR-R-08: Urban arterial upgrade of Dunlop Road (Fred Taylor Drive to future Westgate Transport Hub)				
	AR-R-09: Urban arterial upgrade of Northside Drive (Fred Taylor Drive to SH16 overbridge)				
	AR-W-05: Urban arterial upgrade of Trig Road (SH18 to Brigham Creek Road)				
	AR-W-06a: Urban arterial upgrade of Brigham Creek Road (Trig Road to SH18).				
	AR-W-08: Urban arterial upgrade and extension of Spedding Road (Fred Taylor Drive to Hobsonville Road)				
NW 6 – Whenuapai	**AR-W-04A**: Urban arterial upgrade and	Growth in northern Whenuapai area is forecast	NoR	Medium	AT

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Package	Components	Urgency of implementation	Mechanism	Route protection priority	Requiring Authority
Urban Arterials	extension of Māmari Road **AR-W-06A**: Urban arterial upgrade of Brigham Creek Road **AR-W-07A:** Urban arterial upgrade and extension of Spedding Road (Fred Taylor Drive to Hobsonville Road)	to begin within 10-15 years. The Council is planning to undertake a Plan Change process for Whenuapai north within the next decade. Projects within the area primarily involve upgrade to existing road corridors, except Spedding Road, which also requires new bridges across SH16 and SH18.			
NW 7 – Redhills Urban Arterials	**AR-R-03**: Urban arterial upgrade of Don Buck Road (Fred Taylor Drive to Red Hills Road) **AR-R-06**: Urban arterial upgrade of Royal Road (Don Buck Road to SH16)	Growth in the Redhills area is forecast to begin as soon as transport infrastructure is in place. The area was live zoned through the AUP: OP. Projects within the area primarily involve upgrade to existing road corridors.	NoR	Medium	AT
NW 8 – Redhills Rural Arterials	**SR-R-01A**: Rural arterial upgrade of Nixon Road and Taupaki Road Rural arterial extension of Northside Drive (Redhills to Nixon Road) **(AR-R-10A).**	Growth in the Redhills area is forecast to begin as soon as transport infrastructure is in place. However, urban arterials have greater need because the adjacent land use is denser.	NoR	Low	AT

9.4. Property approach

A preliminary property analysis has been developed for the North West network. s9(2)(i) and s9(2)(g)(i) Approximately 1,850 properties are estimated to be within the area of investigation for the recommended package of improvements for the North West. s9(2)(i) and s9(2)(g)(i)

The proposed strategy has considered the long-term nature of the proposed route protection of the recommended network and concluded that:

- Route protection of the identified infrastructure will provide certainty for landowners and a better financial outcome for the New Zealand Government/ Auckland ratepayers.
- Route protection will carry a financial liability with respect to the protected property for AT and the Transport Agency. However, based on previous projects most property transactions occur in the three years prior to project implementation and therefore a reasonable assumption is that on average (across multiple projects) only 10-20% of properties with a

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designation over them will require purchase prior to this three-year period. The assumed financial liability of route protection of the recommended option(s) is therefore in the order of 20% of the total property cost, not the full cost.

- The earlier a property is purchased the lesser the cost of acquisition is likely to be. Purchasing prior to live zoning would make strong fiscal sense. Early funding of property in this regard will save total project costs.

10. Financial Case

This section outlines the financial case to route protect the recommended network and for the ultimate implementation of the network.

10.1. Cost of route protection

This IBC seeks approval and funding to progress the recommended network to the DBC and route protection phases. Some elements of the network will likely be progressed through alternative processes (and associated funding streams) such as existing safety programmes. However, most elements of the recommended network will require further development via a route protection mechanism.

The funding required for the DBC and route protection phases can be described as follows:

- **DBC and statutory approval costs** – Route protection using Notices of Requirement (NOR) is the recommended mechanism for most projects identified in the recommended network. For the North West, the DBC and NOR phase is expected to cost $41 million[1].
- **Expected property costs from NORs** – Once a designation is in place, it is anticipated a proportion of the total property required will need to be purchased by the requiring authority s9(2)(i) and s9(2)(g)(i) Like capital cost savings, there is potential for some property cost savings through delivery of projects via developers and this has been considered. It is assumed that most property transactions would take place in the three years prior to implementation, with approximately 20% of transactions taking place prior to this period. Applying this assumption to the timing of each element of the recommended network results in an estimated property liability as summarised in **Figure 56**. Given the nature of property prices, there is a high degree of uncertainty as to property cost in the future. As such, property liability has been reported using low (0% escalation) and high (10% per annum) property price escalation. For the North West, the estimated property liability as a result of confirmed NORs is between **$122 - 206 million**[2] distributed over two decades.

Implementation costs (physical works) are not included in the cost of route protection and are discussed further in Section 10.3.

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[1] Based on 3% of physical construction costs, excluding property, traffic management and contingency.

[2] Upper range includes 10% per annum escalation of property costs, based on historic escalation.

Figure 56: Property liability from NORs

10.2. Financial case for route protection

An approach has been developed to quantify the return on investment associated with early route protection. This methodology assumes that there are property and construction cost savings arising from route protection now, rather than in the future, given the long-term nature of some of the interventions in the recommended network.

Construction cost savings are expected due to the potential for lower mitigation requirements (and therefore costs) for projects consented in an undeveloped environment rather than in an existing developed area. Similarly, property costs are expected to be lower if a designation is in place to control subsequent land development (e.g. while some land value increases may be experienced, a factor has been applied for the 'avoidance' of development cost risk).

The following assumptions have been made:

- Early route protection would be in place by 2020
- Late route protection would be in place by 2027
- 10% saving in construction cost
- 7% saving in property cost
- Escalation in property price has been tested at 0% (low) and 10% (high) per annum
- Early route protection requires early acquisition of some property (20% within 2020-2028).

This methodology has been applied to projects recommended for implementation after 2028 (decades 2 and 3) only. It has been assumed that route protection is required immediately for projects to be implemented before 2028 and limited savings are therefore likely.

Early route protection for medium to long term projects will require more upfront investment. With discounting (6% discount rate) the increase in cost of early route protection compared with late route protection is estimated at approximately $14 million (2018$) across the North West programme.

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When future cost savings (reduction in property cost, development cost and construction cost) are considered and discounted, these equate to around **$49 million** (2018$).

The analysis shows a return on investment for early route protection of the recommended programme of approximately 3.5 times.

10.3. Recommended network cashflow

10.3.1. Financial case uncertainty

The financial case and specifically, the cost and critical property liability aspect (given the route protection focus) is based on a range of assumptions. This is because long term route protection has not previously been undertaken widely. The main uncertainty relates to the potential cost required for property purchase. This uncertainty includes:

- The level of third party (developer) funding, as this requires negotiation and agreement and must be undertaken on a case by case basis
- More or fewer properties required to be purchased
- Cost of property is higher or lower than assumed
- Growth is quicker or slower than assumed.

This uncertainty should be considered by funders when allocating property funding.

10.3.2. Capital costs – recommended network

A cost estimate for the recommended network has been developed s9(2)(i) and s9(2)(g)(i) Costs have been developed for each network element, as described in Section 8.2.

For the recommended North West Auckland network, costs are as follows:

- Total estimated capital costs of **$2,920 - $3,660 million**
- Property and land costs of approximately **$603 million**.

It is noted that the costs are still subject to peer review and may change. As individual projects develop through DBC and pre-implementation phases, designs and costs will also be developed in more detail and focused on cost-effective ways to deliver the project outcomes.

Based on current estimates, the anticipated cash flows for the investment proposal over its intended life span are summarised in **Figure 57**. Costs will be spread over multiple decades, based on the staging outlined in Section 7.1 and will be shared between the Transport Agency, AT and other parties according to the assumptions summarised in Section 10.5.

Figure 57 separates costs into those associated with rapid transit, State highway investment, new and existing arterial corridors. A substantive portion of the costs relate to upgrading existing arterial

[28] s9(2)(i) and s9(2)(g)(i)

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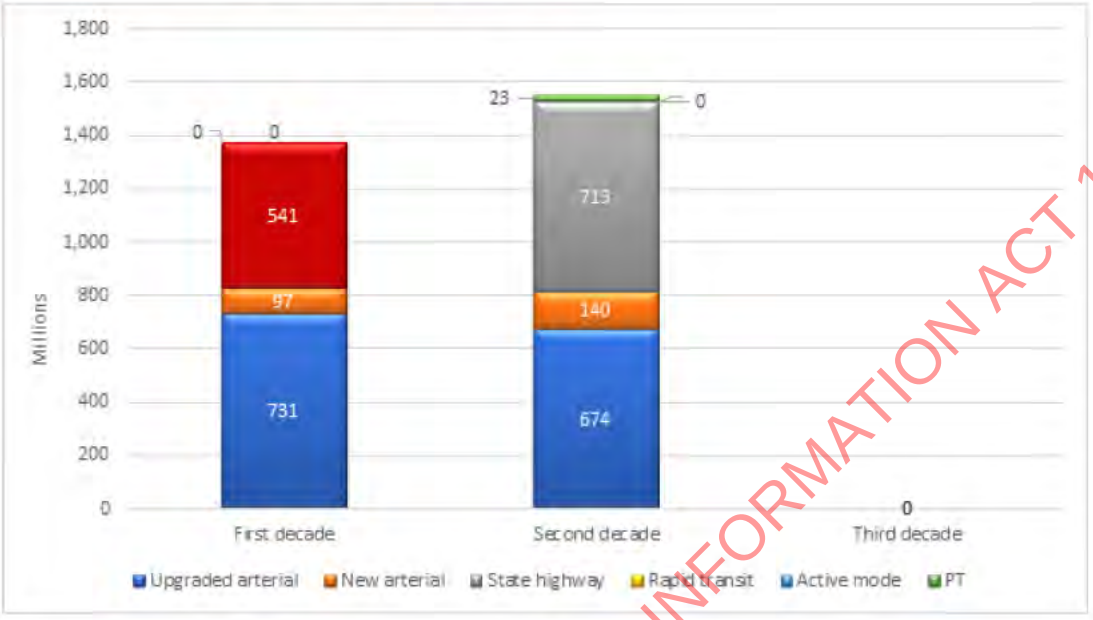
corridors, of which most of the investment is required to provide walking and cycling facilities that are safe and effective and commensurate with the mode shift and access outcomes sought.

Figure 57: Recommended network cashflow (P50)



10.3.3. Operational costs – recommended network

Operating and maintenance costs for the recommended option[1] have been outlined as annual ongoing costs in **Table 39**. These costs are additional over existing operational costs and are attributable directly to the recommended option. Section 10.5 describes cost allocation and cost sharing arrangements between the Transport Agency and AT. Potential funding arrangements will be investigated in more detail as part of the DBC phase.

Table 39: Ongoing annual operating costs (million NZ$)

Item	Cost ($M)
Bus operating costs	21.0
Rapid transit operating costs	35.0
Ferry operating costs	0.2
Station operation and maintenance costs	2.2
Ongoing operational demand management measures	1.7
General infrastructure (annual) and bridges (after 10 years) maintenance	3.0
Resurfacing (every 10 years)	15.5

[1] Over and above the costs associated with the do minimum network

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10.3.4. Comparison of spend by area

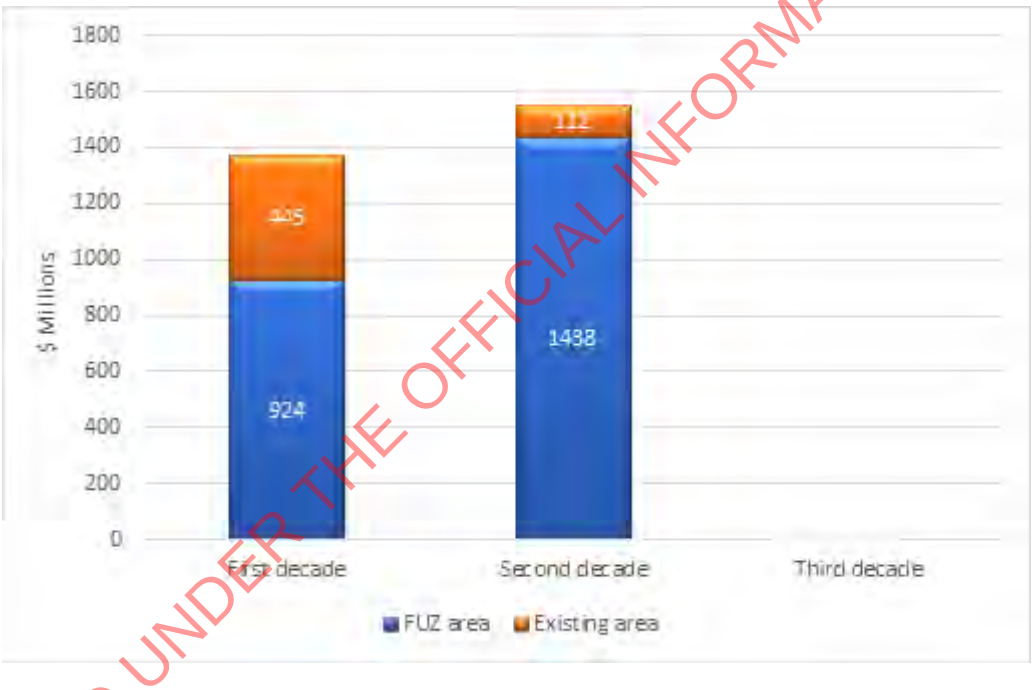
Elements of the recommended network serve existing North West communities as well as future urban areas. The recommended network cost has been split based on whether a project primarily serves the existing area (Kumeū-Huapai, Riverhead, Westgate, Hobsonville) or the FUZ area.

The following assumptions have been made:

- All infrastructure geographically within the FUZ has been assigned to the FUZ area
- All infrastructure geographically within the existing area has been assigned to the existing area
- Costs for projects that respond to an existing problem but are made worse by growth have been split evenly between the existing and FUZ areas.

Costs by decade for the existing area and FUZ area are shown in **Figure 58** below.

Figure 58: CAPEX (P50) split by area



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10.3.5. Programme Wide Staging

The staging is based on the recommended network and achieves key drivers such as aligning transport improvements with growth timings and targeting investment that supports early mode shift outcomes. As outlined in this IBC, different affordability scenarios have also been developed to understand the implications of reduced investment. This IBC is part of a wider programme of supporting growth throughout the Auckland region and the affordability challenges and prioritisation of investment are best addressed across the entire programme, with the scenario testing undertaken in this IBC informing that programme wide discussion. This programme wide affordability and prioritisation issue has been considered s9(2)(i) and s9(2)(g)(i) sets out the work done in this area and the approach to this critical issue in the next stage of the programme development (DBC).

10.4. Opportunity savings from developers

There is potential for new arterial roads to be partially funded by property developers as part of a package of development contributions. AT usually requires new developments to construct identified roads to a collector road standard, based on an agreed cross-section, which is then vested to public ownership. In some locations, it may be feasible for AT to require contributions (of project delivery costs and property) equivalent to a collector road standard AT would and then be responsible only for the additional cost associated with property and construction to an arterial standard cross section.

This approach would reduce the implementation cost to AT and the Transport Agency. When determining the opportunity for a reduction in capital cost over the North West recommended network, the following assumptions have been made:

- Capital costs of new arterial roads could be reduced significantly [3] from developer contributions
- Existing arterials have limited potential for development contributions and have been excluded
- Capital costs for rapid transit could receive developer contributions towards stations. This is estimated to account for approximately 1% of the overall cost of the project
- RTN, active mode and strategic road corridors are fully paid by the Transport Agency and AT.

Analysing the recommended network indicates an opportunity to reduce the scale of funding required in each decade.

The required funding (**$2,920 million**) is outlined in **Figure 59** taking account of proposed implementation timeframes and including opportunities for reductions in cost from developer related savings.

Figure 59: Capital cost by decade with savings

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10.5. Cost sharing

The Transport Agency is typically responsible for costs associated with:

- State highway improvements
- Motorway interchanges and ramps
- Rapid transit facilities
- Strategic cycle facilities.

AT is typically responsible for costs associated with:

- Arterial road construction
- Improvements to existing arterial roads
- Improvements to existing collector roads
- Public transport interchanges (park and ride; kiss and ride)
- Public transport services.

Total funding requirements for the recommended network are outlined in **Figure 60**. These funding requirements recognise estimated developer contributions (5%), potential for cost optimisation during the DBC phase (13%) and projects that serve existing areas (rather than FUZ) (12%). The remaining funding is allocated to AT (13%) and the National Land Transport Fund (NLTF) (57%).

The cost optimisation assessment evaluates the following opportunities:

- Reduced earthworks volumes
- Reduced corridor cross section
- Potential cost saving on existing corridors if project can fit within existing designations.

A significant proportion (53%) of this funding is required outside the current RLTP period, which is focused on a ten-year horizon. There is therefore time to further consider the funding requirements and how this could be addressed. The funding requirement for the North West area is substantial and consideration of alternative funding sources is recommended.

Figure 60: Funding breakdown – North West recommended network

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10.6. Funding s9(2)(g)(i)

10.6.1. RLTP allocation for the first decade

ATAP includes the following commentary with respect to the Supporting Growth programme of works.

- $1,300 million to be allocated to greenfield transport infrastructure over the next 10 years. Over this period, around 32,000 new homes housing up to 100,000 people are expected to be built in Auckland's major greenfield growth areas. Significant investment in transport infrastructure will be needed to enable this growth, encourage the use of public transport and active modes, and to provide a reasonable level of service to future residents.
- $1,800 million to be allocated to light rail for the city centre to Māngere and North West corridors. This will be used to leverage funding and financing to progress both corridors over the next 10 years. Delivering light rail on the North West corridor will require significant investment, but also provides an opportunity to support substantial growth.
- s9(2)(g)(i)

The 2018-2028 Auckland Regional Land Transport Plan (RLTP) has $275 million allocation for greenfield transport infrastructure projects. This funding is expected to be prioritised to the North West and South areas to cater for short term growth.

s9(2)(g)(i)

For certain projects, such as new arterial roads through FUZ areas, the benefits of investing to enable and support growth are largely enjoyed by landowners in the form of higher value land, as it can be urbanised. Further analysis, on a case-by-case basis, will be required to agree the funding arrangements for these investments between landowners and AT.

As the RLTP allocates funding for a 10-year period, costs for the recommended programme within the first decade are shown in **Table 40** with commentary on likely funding sources provided.

Table 40: Funding required in first decade

Project	Capex (P50)	Likely Funding Source	Developer cost	RLTP / NLTP cost	NZTA (NLTP)	AT
Project development (DBC and route protection)	$41M	RLTP		$41M	$21M	$20M
s9(2)(i) and s9(2)(g)(i)						

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s9(2)(i) and s9(2)(g)(i)

s9(2)(g)(i)

The following programme components (totalling $630 million) are included in the RLTP, but are currently unfunded:

- Hobsonville Road -$16 million
- Crossing over SH18 to connect with Hobsonville Road - $21 million
- Northside Drive east - $48 million
- Fred Taylor Drive north - $135 million
- Redhills – north-south arterial and three east-west arterials - $314 million
- Māmari / Trig Road - $43 million
- RTN stations at Trig Road and Squadron Drive - $53 million.

s9(2)(g)(i)

10.6.2. Programme Wide Affordability

Investment within the currently 10-year period has also been considered across the Programme

s9(2)(i) and s9(2)(g)(i)

s9(2)(g)(i)

10.6.3. Alternative funding sources

There are several different investigations currently underway by Treasury, Ministry of Transport (MOT) and others to consider the mechanisms for the future funding of infrastructure. This includes consideration of:

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- Crown Infrastructure Partnership funding
- Value capture
- Targeted rates
- Pricing
- Public private partnerships (PPPs).

This IBC has not considered these options in detail as they are significant interventions that require a region-based approach and alignment across several projects.

s9(2)(g)(i) [redacted]

The IBC has considered these options at a high level, as potential funding options. As many of these measures require regional alignment and policy but also are very project specific in their application, s9(2)(i) and s9(2)(g)(i) [redacted] the DBC phase will consider these alternative funding sources in more detail, firstly at the programme wide level and then at the project specific level. This will provide greater clarity on the potential scale and use of alternative funding mechanisms.

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11. Recommended network response to potential uncertainty

The recommended network responds to the investment objectives, current policy context – particularly the GPS, and desired urban form outcomes, in a balanced and appropriate manner. These outcomes are dependent on a range of assumptions, which underpin this IBC, such as complementary transport infrastructure, including KiwiRail infrastructure and likely future land uses. **Table 39** describes the potential effects on the recommended option if these assumptions were to change.

Table 39: Recommended network response to potential uncertainty

Scenario	Commentary
RTN mode choice – light rail versus busway	Irrespective of the mode choice, a rapid transit corridor has the same function to provide fast, frequent and high-capacity services, separated from general traffic and therefore not affected by road congestion. The recommended rapid transit alignment from Brigham Creek Road to Kumeū-Huapai has been designed so that the rapid transit corridor is offline and utilises a new multi-modal corridor as well as the existing rail corridor to maximise route efficiency. The rapid transit corridor is therefore not affected by existing property access on SH16, traffic congestion and constructability issues. The same alignment would be retained for either light rail or bus.
RTN not implemented from city centre to Brigham Creek Road	The IBC recommends extension of the RTN to Kumeū-Huapai from Brigham Creek Road. It is considered that a rapid transit corridor is warranted to drive a significant step change in mode shift for Kumeū-Huapai and will provide development and urban redevelopment opportunity for Kumeū-Huapai town centre. If the first stage of the North West RTN from the city centre to Brigham Creek Road is not provided at all, a rapid transit corridor for the stand-alone section from Kumeū-Huapai to Brigham Creek Road would not be progressed. However, mode shift is still required to accommodate the future growth within the network, so an alternative method of moving people would be required and would need to be implemented. It is considered that the mode shift potential of the recommended programme would be significantly impacted should an RTN not be implemented. It would also significantly reduce accessibility for the North West.
Delay of the implementation of RTN from city centre to Brigham Creek Road.	The recommended network staging currently assumes the North West RTN would be established prior to the release of development in Kumeū-Huapai. If the rapid transit corridor from the city centre to Brigham Creek Road is delayed and development still commences in Kumeū-Huapai, then an interim Frequent Transit Network (FTN) would be required to facilitate mode shift and accommodate the increased trips. If an interim solution was to operate on the existing road network, then localised widening may be required on SH16 between Taupaki Road and Kumeū-Huapai, which could require a change to the current designation. A delay to the RTN might also increase the priority of the alternative State highway corridor in Kumeū-Huapai to relieve pressure on SH16 / Main Road. An alternative could be to restrict growth in Kumeū-Huapai until the RTN is established.

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Scenario	Commentary
RTN terminates at Brigham Creek Road (interim scenario or long-term scenario)	If the RTN terminates at Brigham Creek Road and an RTN extension to Kumeū-Huapai is not considered viable or is yet to be built, then an FTN would need to be established to connect Kumeū-Huapai and Riverhead to the rapid transit network. The recommended network includes an offline section between Brigham Creek Road and Kumeū-Huapai so if this infrastructure is not built, then the FTN would need to operate on the existing SH16. At a minimum bus priority would be required and as mentioned above localised widening of SH16 and changes to the SH16 / Main Road designation would likely be required.
SH18 RTN mode choice	The current investigations for the SH18 RTN indicate a bus-based solution. If light rail is progressed on the SH16 RTN corridor there is a potential future opportunity for SH18 RTN to operate with the same mode. A key benefit for light rail is the ability to support urban development and Transit Oriented Development (TOD). Therefore, the SH18 RTN alignment might have an urban component to the alignment to access development opportunities. This IBC has not specifically considered this opportunity and it is expected it would be assessed as part of a specific SH18 RTN business case. However, the recommended network has some flexibility as Hobsonville Road, Brigham Creek Road and Trig road are all being upgraded to arterials and are included in the route protection strategy.
SH16/SH18 Connections Project	The NZTA SH16/SH18 Connections Project is an integral part of the connectivity solution for Redhills and Whenuapai and includes links that will improve access to and from the strategic network and the future growth areas. If these links are not implemented then additional pressure would be likely at Brigham Creek and Trig Road interchanges as well as parallel local roads such as Brigham Creek. This would result in strategic trips using the local road network which would be under additional pressure from future growth. In addition, the planned future bus network for Whenuapai would be affected as the link through Māmari Road to Westgate would not exist and this route would need to use the already busy Hobsonville Road route.
North Auckland rail line is realigned to the south of Kumeū-Huapai	The assumption in this IBC is that KiwiRail will not realign the North Auckland rail line to the south of the Kumeū-Huapai FUZ. If this assumption changes, for example if freight demand increased to a level where double tracking was required and the line was realigned, this would present an opportunity to reduce severance and improve the connectivity of the Kumeū-Huapai town centre. There would also be an opportunity to utilise the alternative State highway corridor as a multi-modal rail/road corridor.
Passenger rail to Whangārei	The assumption in this IBC is that KiwiRail will not reinstate passenger rail services north to Whangārei. If this assumption changes then it is anticipated that KiwiRail would need to investigate electrification and double tracking. This would then provide an opportunity to consider moving the existing line south of Kumeū-Huapai, potentially to follow the proposed alternative State highway corridor and reduce severance and safety issues within Kumeū-Huapai.
Conversion of Whenuapai Air Force Base into residential activity	The IBC assumes that Whenuapai Air Force Base remains as its current land use. If this area were to be developed with residential activity, it would not affect the location of the recommended arterial network south of Brigham Creek Road. The increased demand associated with this land use would likely trigger the upgrade of collector roads in north Whenuapai (including Kauri Road and Tōtara Road north of Brigham Creek Road) and potentially another east-west connection with SH18 at Squadron Drive. These could be designed to complement this IBC recommended network. Depending on

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Scenario	Commentary
	flows the deviation of Brigham Creek Road might be warranted to reduce the traffic through the local centre.
Walking and Cycling	The recommended network includes a primary cycling network on the arterial network and identifies other cycling routes along collector routes that would be beneficial to progress through other walking and cycling programmes. The effectiveness of this cycling network is dependent on the completion of not only the strategic (arterial) cycle links in this programme but also improvement of cycling infrastructure at a local level e.g. on new collector roads as part of FUZ developments. Therefore, if the supporting local cycle network improvements are not realised, then the overall attractiveness of cycling will diminish, and the cycling benefits of the programme could be reduced.

12. Management case

The management case assesses whether a proposal is deliverable and demonstrates that an appropriate project management regime is in place for the next phases of the project. It tests the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance. s9(2)(i) and s9(2)(g)(i)

12.1. Programme governance

Te Tupu Ngātahi has been formed to deliver route protection for the recommended network in Auckland's greenfield growth areas. AT and the Transport Agency identified that an Alliance model would deliver these outcomes in an agile, efficient manner within a five-year programme.

Governance in the context of the Alliance is defined as the processes 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 58**.

The Governance Management Plan describes the key roles and responsibilities of each of these groups.

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Figure 58: Te Tupu Ngātahi governance structure

12.2. Assurance and acceptance

As part of standard practice, the Transport Agency and AT have established project assurance and approval processes to support quality investment decision making. These processes will be used, in conjunction with the Te Tupu Ngātahi team, where appropriate.

Prior to the completion of the DBC phase, the following assurance procedures will be undertaken:

- Independent road safety audit (RSA)
- Safety in design workshop and register maintained
- Independent peer review of the economic evaluation
- Peer review/parallel capital cost estimate.

12.3. Change control

Documented policies and procedures regarding scope change with financial delegations are set out in the Transport Agency's Instruments of Delegation and AT's Delegations Policy and Financial Delegations Limits by Level. The change controls and Te Tupu Ngātahi policies and procedures, will be adhered to during the delivery of this project.

Escalation to the appropriate scope committees, as detailed above, will be undertaken as required so that any initiated scope change is given full value for money consideration, as any significant change in scope post-financial close is likely to have considerable and long-term portfolio implications.

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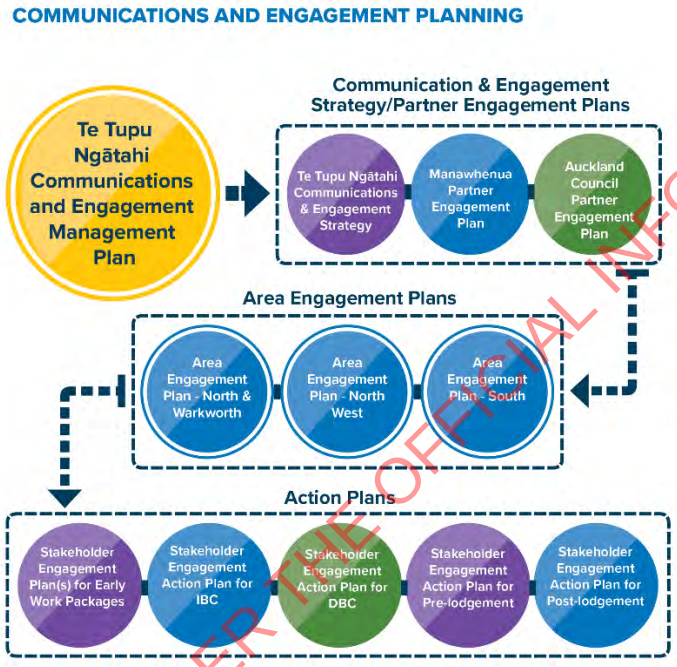
12.4. Partner relationships and stakeholder engagement

12.4.1. Communications and engagement management plan

Te Tupu Ngātahi has an extensive and ongoing engagement and consultation programme.

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 59**.

Figure 59: Communications and engagement



12.4.2. Next steps

Engagement and communication in the next stage (following AT and NZ Transport Agency Board endorsement of the recommended network), will build on engagement undertaken during the IBC phase. The focus of the next stage of engagement in the North West is to:

- Continue to build understanding of Te Tupu Ngātahi progress and the process of route protection
- Critical ongoing discussion with Auckland 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.

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- **Provide information on staging and timing** for the recommended network, including specific opportunities for sequencing of urban development (e.g. integration of utilities within the future transport corridor)
- **Understand specific issues/ environmental effects and opportunities** in the recommended network to identify potential design responses and environmental management / mitigation (for route protection documentation)
- **Undertake one-on-one engagement with landowners / developers** regarding potential effects and opportunities for shared alignment in outcomes (e.g. through developer agreements) – particularly in Redhills and Whenuapai where land is live zoned or is about to be
- Inform stakeholders about the processes for **route protection** and provide an opportunity for participation (i.e. submission on the NOR or similar as appropriate)
- Identify opportunities for AT and NZ Transport Agency **property acquisition processes** (e.g. willing buyer/willing seller arrangements, albeit leading these processes is outside the specific scope of work for Te Tupu Ngātahi)
- Enable Te Tupu Ngātahi to inform decision makers on the **risks and opportunities** of potential route protection mechanisms for the recommended network
- Continue regular sessions with KiwiRail regarding the rail line in the North West including the outcomes of the **Ministry of Transport Northern Freight Study.**

12.5. Risk and opportunity management

The Supporting Growth programme is a large programme comprised of multiple projects, inherent with areas of uncertainty that transpire into risks and opportunities. These must be managed to enable successful delivery.

Risk and opportunity will be managed at three levels:

- Organisational business risk and opportunity
- Programme-wide risk and opportunity
- Project and area-specific risk and opportunity.

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 Transport Agency.

A specific risk assessment has been completed for the North West area s9(2)(i) and s9(2)(g)(i) The critical and high risks are set out in **Table 40**.

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Table 40: Critical and high risks – North West Auckland

s9(2)(g)(i)

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s9(2)(g)(i)

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s9(2)(g)(i)

12.5.1. Funding commitments and obligations

If approval is obtained and the project proceeds to route protection, the project partners have an obligation to secure the funding for the elements of the project for which they are responsible.

Funding will be as agreed by the project partners and includes, but is not limited to:

- Further design
- Route protection
- Potential land acquisition (if route protection is confirmed).

12.6. Benefit realisation and management

Benefits management is the identification, analysis, planning, realisation and reporting of benefits. These phases align with the Treasury Investment Lifecycle phases of thinking, planning, doing, reviewing. Benefits management is vital so that each element identified in the recommended network achieves what it sets out to do. It involves articulating the expected benefits from each element, how it will be known that the benefits are achieved, and assessment of what has eventuated against what was planned.

Detailed benefit management plans will be produced for each of the recommended network elements during the DBC phase. **Table 9** (in Section 4.13) maps the problem statements, benefits, investment objective to a range of KPI's and measures on which projects can be measured.

12.6.1. How will this information be used?

Benefit realisation is intended to fulfil two key functions:

- Assessment against anticipated benefits of a project which help validate how well the purpose for investment has been achieved
- At a programme-wide level, providing confirmation of proposed staging approach.

Given the 20-30-year time period for the implementation of the recommended North West network, staging of infrastructure is critical to the success of the network in delivering against the investment objectives.

While measurement and monitoring across all elements of the recommended network is important, this should be prioritised in areas where change and benefits are expected first and therefore focused on those projects expected to be delivered in the first decade. For the North West, this is focused on

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the communities of Redhills and the southern part of Whenuapai and the extension of rapid transit to Kumeū-Huapai. Tracking of network performance in the following areas should be prioritised. Strategic network reliability and safety benefit measurement are not proposed in the first decade because early recommended network elements do not focus on these areas. **Table 41** provides an example that will be further developed in the DBC phase.

Table 41: Priority measures for North West benefit realisation

Benefit	Relevant KPIs	Measurement Focus	Monitoring Plan Options
Mode shift in existing areas	KPI 1b, KPI 2b, KPI 3b	• Total PT and vehicle travel on SH16 west of Brigham Creek Road and south of Westgate • PT patronage at rapid transit stations • Mode share data from Stats NZ	• Transport Agency TMS database • Monthly and annual PT patronage trends • Census journey to work data
Public transport service reliability	KPI 2a	• PT journey times between Kumeū and Westgate and the city centre	• AT HOP data
Walking and cycling mode share and experience	KPI 3b, KPI 4a	• Mode share data from Stats NZ • Perception of walking and cycle facilities • Crash statistics • Walking and cycling usage at key locations	• Census journey to work data • AT customer insight biannual survey results • Transport Agency CAS database • AT cycle count data • Monitoring of new facilities

12.7. Issues management

Issues will be managed such that they are resolved, to avoid potential negative impacts on the project. Issues will be identified, logged, periodically reviewed and evaluated, escalated where necessary and reported. Issues will be discussed at various levels of project governance as required.

12.8. Next steps

There are three key next steps for the progression of each of the elements of the recommended network, being:

- Detailed Business Case
- Pre-Implementation
- Implementation.

Each of these steps have very different characteristics and capability needs and are therefore considered separately with regards to the procurement strategy

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12.8.1. Detailed Business Case

An integrated transport network that supports sustainable urban mobility and enables growth and good urban form in and around future urban areas is a critical success factor for the SGA programme. The transport network has an important role in supporting and enabling land uses and built form responses, such as Transit Oriented Development (TOD) and higher density housing or town centres closer to public transport nodes. Therefore, recommending transport networks that support and enable good urban form will underpin our DBC process.

During the IBC development, Programme-wide urban design principles were developed and documented in Part A of the Te Tupu Ngātahi Urban Design Framework (refer Appendix G). Urban design criteria were also considered as part of the option development and assessment, and opportunities to apply the urban design principles were identified for each of the recommended networks. During the DBC phase, Part B of the SGA Urban Design Framework will be developed at a Programme-wide level and applied at a project level in the option development, assessment, design and AEE development. This will include further development and refinement of urban design opportunities and their application at a project and DBC level. As part of this, the Urban Design Framework and DBCs will include more commentary on 'what good urban form is' in the context of these future urban environments, as well as definition of what urban form is enabled by the transport networks (i.e. the 'people oriented streets' – scale, character and function, and the permeability of the networks that will enable land uses and built form response).

It is expected that the DBC process will include further refinement on issues affecting the success of a sustainable urban mobility system including land use zoning, land use form and opportunities for enhanced land use.

The DBCs will focus on:

- Refinement and confirmation of recommended option alignment, including exact land requirements (if any).
- Identification of urban intervention opportunities e.g. land integration opportunities such as higher densities near transport nodes or the location of the local centre in Kumeū-Huapai to better support sustainable urban mobility.
- Further development of project costs based on design refinement.
- Identification of funding mechanisms and cost to different parties for route protection and implementation, including AT, Transport Agency and third parties.
- Confirm route protection mechanism.
- Identify priority order for route protection and implementation.

The components of the recommended network have been grouped into eight packages for the purpose of route protection. Individual DBCs will be produced for each of these packages.

Preliminary priority for route protection (within the North West growth area) has been predicted based on urgency and complexity and whether there are opportunities to enhance outcomes. The delivery of individual DBCs within the North West growth area will consider these preliminary priorities and will inform the next stage of route protection strategy having regard to programme-wide considerations including affordability.

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The packages are summarised in **Table 44** below. **Table 44** also summarises the key issues that would need to be addressed within each package and general issues to be addressed within each DBC.

Table 44: North West DBC summary table

DBC package	Components	Key issues to be addressed	Priority
NW1 –Alternative SH16 Corridor and RTN	**SR-SH-K01a**: Alternative SH16 corridor from SH16 Brigham Creek Road south of Kumeū-Huapai FUZ	Co-ordination with City Centre to North West RTN business case team regarding extension to Kumeū-Huapai. Alternative state highway corridor form. Urban design considerations in Kumeū - Huapai town centre to maximise community connectivity Land requirement and property impacts.	High
	RLT-K-01-C2: Rapid transit – New corridor from SH16 Brigham Creek Road to Kumeū - Huapai town centre via existing heavy rail corridor		
	AR-K-07: Repurpose the existing SH16 corridor to an arterial (urban and rural) form and function.		
NW2 – Kumeū-Huapai Urban Arterials	**AR-K-03**: Urban Arterial upgrade of Station Road	Alignment with structure plan process and land release strategy. Land requirement and property impacts.	Medium
	AR-K-06: Urban Arterial upgrade of Access Road and Tawa Road		
NW3 – Kumeū-Riverhead Rural Arterials	**SR-K-01/SR-K-02**: Rural arterial upgrade Kumeū-Riverhead	Recommended design development Land requirement and property impacts. Engagement with affected landowners	Low
	SR-K-03: Rural arterial upgrade of Coatesville-Riverhead Highway (SH16 to Riverhead)		
NW 4 – Hobsonville Road Urban Arterial	**AR-W-12**: Urban arterial upgrade of Hobsonville Road		High
NW 5 – Westgate and Whenuapai Urban Arterials	**AR-R-08**: Urban arterial upgrade of Dunlop Road (Fred Taylor Drive to future Westgate Transport Hub)		High
	AR-R-09: Urban arterial upgrade of Northside Drive (Fred Taylor Drive to SH16 overbridge)		
	AR-W-05: Urban arterial upgrade of Trig Road (SH18 to Brigham Creek Road)		
	AR-W-06a: Urban arterial upgrade of Brigham Creek Road (Trig Road to SH18).		
NW 6 – Whenuapai Urban Arterials	**AR-W-04**: Urban arterial upgrade and extension of Māmari Road		Medium
	AR-W-06a: Urban arterial upgrade of Brigham Creek Road		

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DBC package	Components	Key issues to be addressed	Priority
	AR-W-07/ AR-W-08: Urban arterial upgrade and extension of Spedding Road (Fred Taylor Drive to Hobsonville Road)		
NW 7 – Redhills Urban Arterials	**AR-R-03**: Urban arterial upgrade of Don Buck Road (Fred Taylor Drive to Red Hills Road)		Medium
	AR-R-06: Urban arterial upgrade of Royal Road (Don Buck Road to SH16)		
NW 8 – Redhills Rural Arterials	**SR-R-01**: Rural arterial upgrade of Nixon Road and Taupaki Road		Low

In addition to the specific issues discussed above, the DBCs will also include the following general considerations:

- Integrated approach to stormwater management - catchment management (flooding) and stormwater treatment to capture potential activities (transport and land use) that are likely over the next 30 years.
- Identification of additional transit operation opportunities - how existing infrastructure in the SGA network could be used more efficiently.
- Identification of additional land use integration opportunities.
- Integrated approach to provision of utilities - integrating the transport response with the needs and opportunities of utility providers to provide a better whole of system outcome.
- Benefits of pricing and road use - further evaluate the impact of pricing policy, e.g. distance-based pricing or access pricing, in line with "The Congestion Question" (MoT).
- Active modes - design development in collaboration with AT design specialists.
- Financial and management cases –
  - Identify and explore different funding and revenue streams to improve the affordability of the recommended network, e.g. partial and full developer funding. Undertake sensitivity testing of potential funding sources.
  - Identify opportunities for value engineering, including projects that can be delivered within existing corridors and lower cost interventions.
  - Include a wider range of cost sensitivities and escalation on the capital and property costs.

All other elements of the IBC recommended network will also require completion of a DBC. This will need to be procured separately by the appropriate owner (AT or the Transport Agency).

For the North West, these other elements are:

- Cycle facilities on non-arterial roads to support recommended network:
  - Moire Road
  - Luckens Road
  - Wiseley Road
  - Marina View Drive

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  - Launch Road
  - Tōtara Road
  - Future collector network in Kumeū-Huapai.
- Interim FTN service between Kumeū-Huapai and Westgate and/or the city centre, including case for operational funding
- Demand management operational interventions.

12.8.2. Pre-implementation

Pre-implementation is the further progression of individual projects that require the highest level of formal route protection (NoR) from DBC stage through the statutory approvals stage, including design development, the preparation of an Assessment of Environmental Effects, confirmation of property requirements and securing the appropriate statutory approvals to allow the project to be constructed or implemented. The result of pre-implementation will be a network of corridors that are permanently route protected by designation shown in the Unitary Plan.

The intent of route protection is to identify and appropriately protect the land corridors necessary to enable the future construction, operation and maintenance of the recommended network options. In its broadest sense, route protection involves three layers: identification, communication and formal protection (as discussed in greater detail in the Programme Wide Management Case). Formal route protection via NoR will not be required for all network components but is likely to be the ultimate mechanism used for most network components even if lower levels of protection are utilised in the short to medium terms for second or third decade projects.

12.8.3. Implementation

Once a project has been through the pre-implementation phase it will be ready for implementation. This will include detailed design and physical works. There are several different contract models available for both services (including combining them). The contract type will need to consider factors, including:

- Scale
- Complexity
- Programme.

Given that this implementation phase is many years away for most Supporting Growth projects and the factors that would influence the method of implementation procurement will almost certainly change over time, a more detailed implementation strategy should be developed for each project as part of the DBC phase.

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